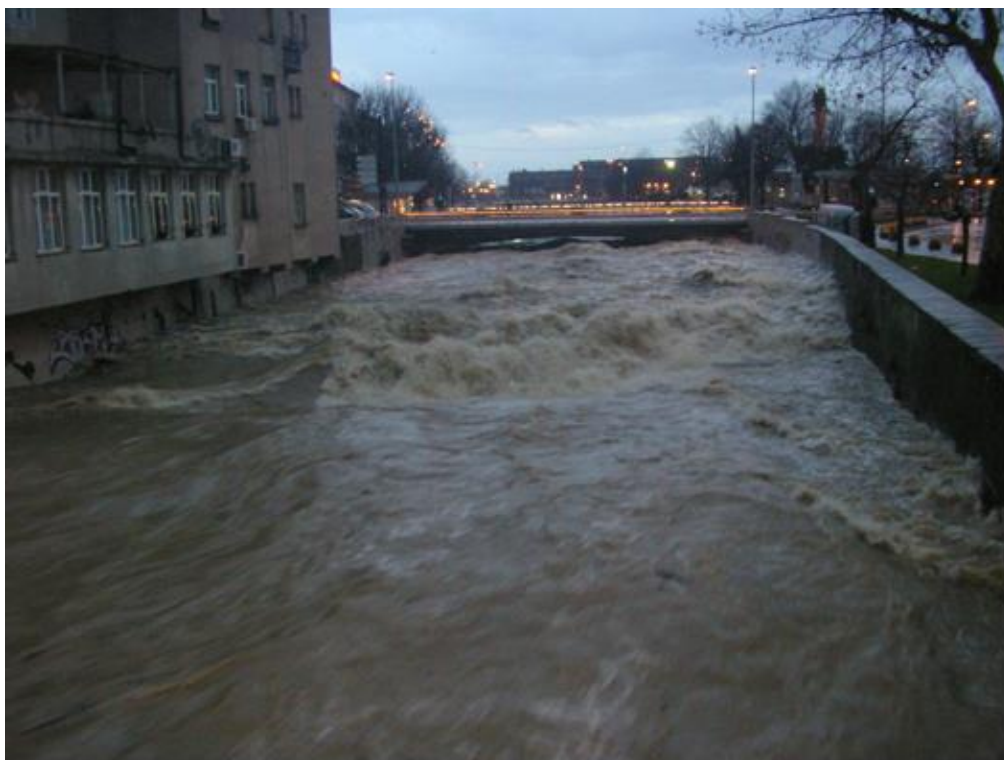




**DRAFT MULTIANNUAL PROGRAMME FOR THE
CONSTRUCTION OF REGULATION, PROTECTION
AND LAND RECLAMATION WATER FACILITIES FOR
THE PERIOD UNTIL 2030**

Zagreb, October 2022

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1 Introduction

1.1 Legal basis and purpose of the document

The Multiannual Programme for the Construction of Regulation, Protection and Land Reclamation Water Facilities for the Period until 2030 (hereinafter: Multiannual Programme) is a water management programme for activities of protection against adverse effects of water and irrigation as stipulated under Article 43 of the Water Act (Official Gazette 66/19 and 84/21).

The Multiannual Programme is adopted by the Government of the Republic of Croatia and developed by Hrvatske vode in accordance with the Water Management Strategy¹ and River Basin Management Plan. Prior to adoption of the Multiannual Programme, it is mandatory to conduct a Strategic Environmental Assessment defined by the provisions of the Environmental Protection Act (Official Gazette 80/13, 153/13, 78/15, 12/18 and 118/18), Regulation on the Strategic Environmental Assessment of a Strategy, Plan or Programme (Official Gazette 3/17) and Nature Protection Act (Official Gazette 80/13, 15/18, 14/19 and 127/19).

The Multiannual Programme determines:

- Individual projects for the construction of regulation, protection and land reclamation water facilities,
- Method and period of implementation,
- Parties involved in implementation,
- Investment amounts and sources of funding for each project,
- The order of priority in implementation (where applicable).

The previous Multiannual Programme was developed and adopted in 2015 (Official Gazette 117/15), when the River Basin Management Plan 2013 – 2015 was in force, and is available on the Hrvatske vode web page ([VIŠEGODIŠNJI PROGRAM GRADNJE REGULACIJSKIH I ZAŠTITNIH VODNIH GRAĐEVINA I GRAĐEVINA ZA MELIORACIJE 2011 – 2015 \(voda.hr\)](http://voda.hr)). It is a framework investment programme into: (i) water regulation for the protection from adverse effects of water through the construction of regulation, protection and basic land reclamation water facilities, which can serve for receiving and evacuation of floods; and (ii) irrigation through the construction of water facilities for irrigation. The presented investments are dealt with in two separate units for the reason that they have different starting points, objectives, beneficiaries, sources of financing, technical and financial aspects. The implementation of the Multiannual Programme is anticipated through a longer period, with possibilities of adaptation, in order to achieve clearly described goals and priorities as well as the control of activities and monitoring of achieved effects.

Although the previous Multiannual Programme covered a longer time period (2013 - 2022), the implementation of the projects was primarily aimed at the 1st programming period ending in 2017, after which an update of the proposed list of projects was planned for better adaptation to the new needs and harmonisation with the River Basin Management Plan in effect².

1.2 Methodology of development

1.2.1 Protection against adverse effects of water / flood risk management

Protection against adverse effects of water includes activities and measures of flood defence, ice control on watercourses and protection against erosion and torrents. The tasks contained in the protection against adverse effects of water and water regulation are part of Hrvatske vode activities and relate to investment

¹ Water Management Strategy 2008 - 2038 (status: developed by Hrvatske vode in collaboration with the ministry competent for water management, adopted by the Parliament of the Republic of Croatia on 15.07. 2008 (Official Gazette 91/08).

² River Basin Management Plan 2016 - 2021 (Official Gazette 66/16).

activities in the construction and maintenance of regulation and protection water facilities and basic land reclamation facilities, management of projects for the construction of regulation and protection water facilities and basic land reclamation facilities, supervision of construction and maintenance of regulation and protection water facilities and basic land reclamation facilities, flood risk management as well as management, supervision and implementation of flood defence³. In addition, Hrvatske vode also develop flood risk management plans as part of integrated flood risk management plans. They also operationalise all plans of intended works and measures according to available funds.

The previous Multiannual Programme contains a total of 373 projects for protection against adverse effects of water relating to the construction of regulation and protection water facilities. To date:

- 57 projects have been completed (constructed and operational),
- 42 projects are under construction (works ongoing or executed),
- 64 projects have been rejected (implementation not possible due to various reasons),
- 210 projects remain to be implemented.

The update of the Multiannual Programme covers all areas where there exist or are probable to occur potential significant flood risks according to the flood hazard maps and flood risk maps contained in the Flood Risk Management Plan, which is an integral part of the River Basin Management Plan 2016 - 2021 ([Plan upravljanja vodnim područjima 2016. – 2021. \(voda.hr\)](#)). Along with additional, i.e. new projects, the list of identified projects for protection against adverse effects of water also contains the remaining 210 unimplemented projects from the previous Multiannual Programme, some of which have been updated if there occurred changes in the status on site or conditions to apply different technical solutions.

This updated Multiannual Programme contains a total of **504** projects for protection against adverse effects of water, of which **325** projects relate to the Danube river basin district and **179** projects to the Adriatic basin district

Tab. 1.1 Total number of projects for protection against adverse effects of water

	Previous Multiannual Programme					Updated Multiannual Programme	
	Planned	Rejected	Completed	Under construction	Remain for implementation	New projects	Total no. to be implemented
North Adriatic basins	33	5	3	1	24	9	33
South Adriatic basins	84	19	16	6	43	103	146
Adriatic basin district - Total:	117	24	19	7	67	112	179
Drava and Danube Rivers sub-basin	124	25	20	10	69	76	145
Sava River sub-basin	132	15	18	25	74	106	180
Danube River Basin District - Total:	256	40	38	35	143	182	325
Grand total:	373	64	57	42	210	294	504

The implementation of the projects from the list of the updated Multiannual Programme is expected to proceed with the following dynamics:

- Starting with the construction or completing a total of 251 projects until 2023, when the new update of the Multiannual Programme is planned in order to harmonise it with the River Basin Management Plan 2022 - 2027
- Leaving the implementation of the remaining 253 projects for the period after 2023

1.2.2 Irrigation

Public irrigation is the activity of abstracting groundwater and surface waters and their delivery for irrigation of agricultural land using irrigation facilities owned by units of regional self-government or combined land reclamation facilities owned by the Republic of Croatia. The right to use water for irrigation is realised in

³ Pursuant to Article 199 of the Water Act (Official Gazette 66/19 and 84/21).

accordance with the Water Act for the purpose of achieving the objectives of the National Project of Irrigation and Agricultural Soil and Water Management in the Republic of Croatia and irrigation plans and programmes of regional self-government units, and for meeting the needs for irrigation of various users for various purposes⁴.

A part of Hrvatske vode activities consists of irrigation activities relating to: managing construction projects of irrigation facilities owned by regional self-government units according to national programmes and projects, as well as cofinancing of construction projects of irrigation facilities owned by district (regional) self-government units.

The basis for the development of the updated Multiannual Programme is the National Project of Irrigation and Agricultural Soil and Water Management in the Republic of Croatia (July 2005), whose update has started in 2019 but is not completed yet, and county irrigation plans (developed in the period from 2003 to 2019).

The Multiannual Programme analyses (i) strategic determinants, (ii) areas available for irrigation, (iii) projects proposed within county irrigation plans, and (iv) activities on the preparation of projects within the implementation of the National Project of Irrigation. By using additional indicators, which quantify the importance and effects of irrigation, the proposal of projects to be implemented was developed.

The project proposal took into account the spatial limitations (protected areas, sanitary protection zones, etc.), which were noted during the development of county irrigation plans. As part of the updated Multiannual Programme, the projects were additionally checked with regard to vulnerable areas⁵.

The project proposal contains basic data on projects, including cost estimates.

1.2.3 The Programme approach

The starting point for the development of this updated Multiannual Programme is the Flood Risk Management Plan contained in the River Basin Management Plan 2016 – 2021, which was adopted by the Government of the Republic of Croatia on July 6, 2016 (Official Gazette 66/16). A part of implementation measures to reduce flood risks was already included in the previous Multiannual Programme, and a part of them was realised through annual water management plans. In order to enable the inclusion of better (more appropriate) technical solutions in the project list of the Multiannual Programme, individual relevant projects, which were planned for the second programming period (2018 – 2022), were evaluated and elaborated with respect to some variant flood risk reduction solutions.

Under the updated Multiannual Programme, the construction of a series of projects for protection against adverse effects of water is planned. They are systemised into project groups formed according to corresponding flood defence systems, spatial position and impact area (area of a small basin, municipality or town, etc.). The grouping was performed in order to gain a better insight into the impacts of the planned projects on increased levels of flood protection and to form corresponding project groups, so that their application for financing from EU funds could be more efficient).

The updated Multiannual Programme contains a list of all planned projects, with the mark of the corresponding project group, priority assessment, cost amount and main evaluation indicators for each individual project. These project groups include project from both priority groups. The selection of the corresponding project groups, i.e. spatial grouping of the proposed projects, enables avoiding a partial consideration of impacts of each individual project as well as a more efficient assessment and monitoring of achieved set objectives and benefits in a greater area, i.e. the area of the project group. This approach also makes the consideration of environmental impacts of the planned projects significantly easier, since

⁴ Pursuant to Article 109 of the Water Act (Official Gazette 66/19 and 84/21).

⁵ Vulnerable areas are areas where it is necessary to implement intense measures of water protection from pollution by nitrates from agricultural sources. The Decision on determining vulnerable areas in the Republic of Croatia was adopted in 2012 (Official Gazette 130/12).

the assessment of cumulative effects of the programme's environmental impacts is performed at the level of project groups, not individual projects. Additionally, when selecting project groups, attention was paid to potential transboundary impacts in order to determine the projects which might require the performance of suitable assessments according to a special procedure.

Due to the complexity and comprehensiveness of the updated Multiannual Programme, only the framework activities necessary for achieving the set objectives for the listed projects have been defined, without prior analyses of possible alternative solutions, investment and maintenance costs, social and economic benefits, and other relevant criteria. All mutually dependant or functionally related projects to be realised in a certain area have been divided into project groups that cover greater parts of areas in which the proposed interventions should improve the existing deteriorated status and would not endanger the existing status (biological and hydromorphological quality elements). For each individual planned project from the list of updated Multiannual Programme, it is possible to find a higher quality solution in the course of detailed development of project documents or feasibility studies.

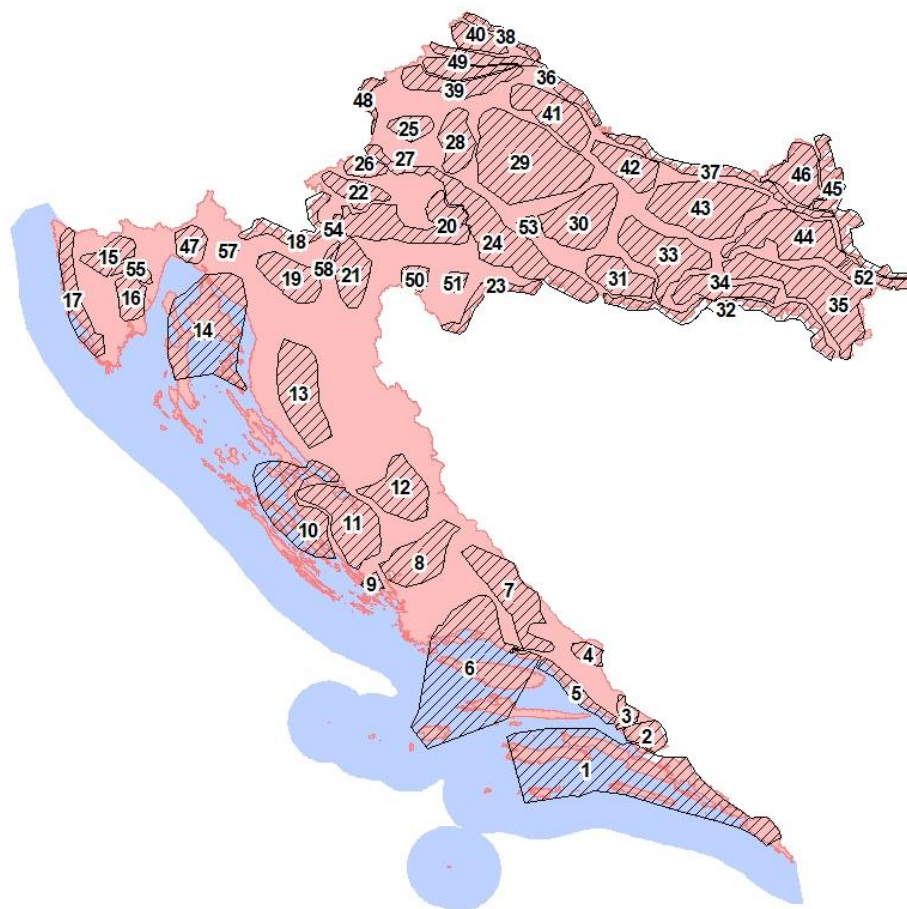


Fig. 1.1 Project groups for protection against adverse effects of water

In order to establish a more efficient and faster way to implement individual projects, during the updating of the Multiannual Programme we considered all possibilities of using funds from revenues from dedicated water fees (original funds of Hrvatske vode) and other available sources, such as the national budget of the Republic of Croatia or various domestic loans, as well as the use of additional funds from international sources, including EU funds and international loans and donations.

Sustavno praćenje pokazatelja rezultata provedbe ažuriranog Višegodišnjeg programa i postizanja ciljeva i koristi pruža stalnu informaciju o stanju realizacije, te omogućava prijenos iskustava na sljedeće faze Višegodišnjeg programa i/ili druge projekte.

1.3 Harmonising the Multiannual Programme with Relevant Strategic Documents

1.3.1 2030 National Development Strategy

The objectives and activities foreseen by the National Development Strategy of the Republic of Croatia until 2030 (hereinafter: NDS) contribute to the achievement of the vision of Croatia in the year 2030: “In 2030, Croatia is a competitive, innovative and safe country with a recognizable identity and culture, a country with preserved resources, good living conditions and equal opportunities for all”. The NDS, among other things, takes into account the goals of the European Green Deal and the Territorial Agenda 2030. The Strategy defines the vision of future development taking account of the global trends and the effort to be invested to mitigate the consequences of the pandemics, as well as of the consequences of recovering from the earthquakes that hit Croatia in 2020. Furthermore, climate change and the challenges posed by climate change for the protection of natural resources and protection of the environment as a whole call for an ambitious joint response, including Croatia’s, in accordance with the European Green Deal. Growing urbanisation lays emphasis on, among other things, the problems associated with environmental pollution and increased vulnerability of the population in relation to the negative consequences of climate change. Technological transformation, together with numerous advantages, leads to a bigger exposure of public systems and stresses the need for preventive resolution of safety challenges. Additional safety challenges also come from increased disaster risks, either from natural events or events caused by human activities.

According to the NDS, the Multiannual Programme isn’t included in the strategic planning documents.

In principle, the Multiannual Programme supports 3 directions of Croatia’s development until 2030:

1. Increasing resilience to crises – Investing in the activities aimed at reducing flood risks, by establishing higher safety standards and thus also of population’s resilience to crises (e.g., priority investment in the rehabilitation and reconstruction of flood protection structures in the earthquake-hit areas); investing in the development of land reclamation structures (irrigation and drainage of agricultural land) significantly increases the resilience of agriculture to crises.
2. Green and digital transition – Investing in the activities aimed at reducing flood risks, in particular in the part referring to the promotion of “green infrastructure” solutions for flood risk reduction projects and implementing restoration projects significantly contribute to the protection and conservation of natural resources as the basic step in green transition.
3. Balanced regional development – Investing in the activities aimed at reducing flood risks contributes to the development and establishment of a unique higher standard of protection of the population and industry from floods in an environmentally friendly way throughout Croatia, thus creating an appropriate basis for balanced regional development.

More specifically, with the foreseen activities (projects) the Multiannual Programme mostly contributes to the achievement of Strategic Objective 8 (SO8):

Ecological and energy transition for climate neutrality in priority area “Protecting natural resources and combating climate change”, with priorities in implementing the sustainable environment policy including:

- Quality and sustainable water management, and
- Risk prevention and promotion of climate change resilience and adjustment, and additionally
- Development of green infrastructure in urban areas and creation of green cities.

	NDS Strategic Objective	Multiannual Programme
SO8	Protecting natural resources and combating climate change ...The development of flood risk reduction infrastructure will be ensured using nature-based solutions... ...Measures to reduce the risk of soil salinization and landslides will be taken through sustainable management of water resources and	Directly contributes to the achievement of the objective through the implementation of the projects within the Multiannual Programme of Construction Directly contributes to the achievement of the objective through the preparation of

	development and implementation of measures to prevent flood risks and flash flood action....	technical documents for the projects within the Multiannual Programme of Construction
SO10	Sustainable mobility: Development of maritime and inland waterway transport – Development and improvement of ports and waterways	Indirectly: The implementation of projects foreseen by the Multiannual Programme indirectly contributes to the achievement of the objective of establishing sustainable mobility in the part referring to the improvement of ports and waterways, particularly in the inland waterways sector.

1.3.2 Climate Change Adaptation Strategy for the Period up to 2040 with a View to 2070

As specified in the Climate Change Adaptation Strategy for the Period up to 2040 with a View to 2070 (Official Gazette 46/20, hereinafter: “CCAS”): “... In view of its nature, the CCAS belongs to the group of the so called horizontal strategies, i.e. strategies that have an inter-sectoral character, with the Climate Change and Ozone Layer Protection Act requiring the harmonisation of all development strategies with the CCAS”. Although this is a programme which in terms of its substance is a document elaborating in detail just one relatively narrow segment of water management – investment in structural measures for flood risk reduction and investment in irrigation, the Multiannual Programme is a programming document adopted by the Croatian Government, which is why its harmonisation with the CCAS is checked and established. Namely, based on the conducted assessment of climate change impacts and sector vulnerability to climate change, the water resources sector has been selected among eight key sectors, thus specifically elaborating water (resources) management as a horizontal management area/sector (together with the following sectors: agriculture, forestry, fishing and aquaculture, biodiversity, energy, tourism, and health).

Starting from the CCAS objectives (Chapter 2. CCAS General Objectives):

- (a) Reducing the vulnerability of natural systems and society to negative climate change impacts;
- (b) Increasing the capacity to recover from climate change impacts; and
- (c) Using potential positive impacts, which can also be the consequence of climate change;

and additionally:

- (d) The purpose of the CCAS is to make people aware of the importance of the impact of climate change on society, indicate threats and the need to integrate the concept of climate change adaptation into the existing and new policies, strategic and planning documents, programmes and other activities implemented at every level of management. In that sense, it should help make the adaptation principle one of the decisive criteria in the planning and adoption of development decisions in the future at every level of management. It will contribute to the reduction of vulnerability of the environment, economy and society to climate change, and will eliminate possible conflicts among sectors in the process of adaptation.
- (e) Despite significant progress of scientific knowledge about climate change and its impacts, there are still many question marks related to climate change impacts and the degree of vulnerability of particular sectors. For that reason, the purpose of the CCAS is to encourage and guide scientific research to better comprehend the complexity of climate change impacts and reduce the degree of uncertainty related to climate change impacts. Investing in research and development is necessary to find innovative solutions in climate change adaptation, which will benefit the entire society in strengthening climate change resilience.

The CCAS defines priority measures and coordinated action through short-term action plans and monitoring of the implementation of measures. The purpose of the CCAS is to bring together all the relevant institutional, political, economic, and social stakeholders to create sufficiently strong support to the implementation of joint adaptation measures and activities, for which a proactive approach is essential. It means that it is essential to start taking action or implementing measures immediately, since any postponement will reduce their efficiency and will make them more expensive.

The CCAS identifies that the main negative climate change impacts which lead to the vulnerability of water resources, relevant for the Multiannual Programme, have to do with the following:

- Reduction of water quantities in watercourses and springs; reduction of water reserves in the underground and lowering of groundwater levels; reduction of water levels in lakes and other lake-like natural or artificial systems; rising sea levels, salinization of coastal aquifers and aquatic systems; rising water temperatures accompanied by a reduced receiving capacity of aquatic receiving bodies; reduced efficiency of coastal infrastructure; and more intensive salinization of river estuaries and coastal aquifers – all of which have a significant effect on the availability of water for irrigation; and
- Increased frequency and intensity of floods in areas at risk; increased frequency and intensity of flash floods; increased frequency and intensity of storm water floods in urban areas; rising sea level, including increasing probability of floods at watercourse mouths with a direct impact on increasing flood danger and risk;

Namely:

- “It is expected that deteriorating hydrological conditions due to climate change impacts will on the one hand lead to increasing frequency and duration of dry periods, and on the other hand to increasing frequency and intensity of flood events”;
- “... Synergy effects of adverse impacts due to increasing human pressures, expressed first of all through increasing water demand”;
- “... The coastal karst aquifers and other water bodies in the coastal region (lakes, watercourses, springs) will be at particular risk due to the cumulative effect of possible change with reduced groundwater flows and levels and more intensive intrusion of seawater into coastal karst aquifers and lakes, and the spread of saline seawater along watercourse channels deeper into the hinterland soil”;
“... The intensity of heavy short-lasting rainfall will increase in the future, both of low and high probability of occurrence, creating preconditions for more frequent flood events on torrential watercourses, in urban areas and river basins....”;
- “... Particularly negative consequences of climate change are expected on watercourses in the coastal region due to the cumulative effect of coincidence of rising sea level and extreme discharges. With reducing average annual and minimum annual discharges and increasing maximum annual discharges, highly marked changes in water temperatures are also expected, which will adversely affect not only aquatic ecosystems, their diversity and receiving capacity, but also the possibility to use them for other purposes. Under such circumstances it is necessary to achieve the objective – preserve the good water status in changed climate circumstances due to climate change, as well as ensure the reduction of flood and drought risks.”;
- “... The expected sea level rise, but also the actions of tides, waves and storm surges in the future will affect the coastal infrastructure as well. Urban areas with low-lying coast will be at the highest risk...”.

According to the CCAS: “Croatia is relatively rich in water, but not in water reserves due to its geological composition with a high share of areas with karst structures and heavily heterogeneous discharge in space and time (low capacities of karst regions for prolonged accumulation of water reserves during critical dry periods). The status of water and sea reserves in Croatia largely depends on cross-border impacts, both due to the global impact of climate change on the rate of change in the ocean and sea levels, and due to a high share of cross-border and border watercourses in relation to Croatia’s total water resources.” Based on that, an overview of impacts and challenges of climate change adaptation (CCAS, Table 4-2.) in the sector of water resources and possible responses to the reduction of high sensitivity has been systematized, from which the following impacts were selected as relevant for the Multiannual Programme:

Impacts and challenges causing high vulnerability	Possible responses for reducing high vulnerability
✓ Sea level rise and changes in sea thermohaline properties (flood risks)	- Strengthening expert, research and management capacities for assessing the occurrence and risks of negative climate change impacts and adaptation of freshwater and maritime ecosystems - Construction, reconstruction and upgrade of existing flood protection systems by applying the approach of giving rivers space and using natural retention areas, systems for water
✓ Increased frequency and intensity of storm water floods in urban areas (flood risks)	
✓ Reduced water quantities in watercourses and water sources (irrigation)	

Impacts and challenges causing high vulnerability	Possible responses for reducing high vulnerability
✓ Reduced water reserves in the underground and lowered groundwater levels (irrigation) ✓ Lowered water levels in lakes and other lake-like natural or constructed systems (irrigation)	- use and water protection and other multi-purpose hydraulic systems in the new (future) climate conditions - Applying an integral approach in managing water resource and systems and intensifying intersectoral analyses and activities, - Strengthening the protection of natural aquatic and maritime systems, in particular protected areas and ecological network areas from negative impacts of climate change as well as for their adaptation.

Certain impacts and possible responses to climate change adaptation are also directly or indirectly relevant for the Multiannual Programme in almost all sectors/areas, just to name a few of them below:

Impacts and challenges causing high vulnerability	Possible responses for reducing high vulnerability
Agriculture	
✓ Higher need for water for irrigation due to more frequent droughts ✓ More frequent floods and surface water stagnation – that will reduce or completely ruin crop yield	- Strengthening capacities for understanding and applying measures to adapt to climate change - Increasing soil water holding capacity in agricultural land - Irrigating agricultural land - Constructing water reservoirs - Applying bioengineering anti-erosion measures - Rehabilitation and/or construction of drainage systems - Development of drought warning system
Forestry	
✓ Damage on forest ecosystems due to increased intensity and frequency of extreme weather events (natural disasters)	- Strengthening expert and management capacities for assessing the occurrence of negative impacts connected with climate change and adaptation of forest ecosystems to climate change - Establishing intersectoral monitoring and reporting on the status of forest ecosystems as a prerequisite for informed planning and implementation of adaptation measures
Spatial planning	
✓ Sea flooding due to increased sea levels ✓ Flooding of settlements due to extremely high volumes of precipitation	- Improving the informational basis as a basis for making rational decisions related to planning climate change adaptation measures - Developing capacities within the spatial planning system in order to integrate adaptation measures into spatial planning - Including the climate change adaptation aspect in the instrument for integrated coastal area management - Integrating adaptation measures into spatial planning system - Applying spatial planning measures through programs and projects for the rehabilitation of the most endangered areas/sites - Raising public and policy-makers' awareness related to the planning of climate change adaptation measures
Disaster risk management	
✓ increasing the extent of the health and socioeconomic load on the community due to food contamination and environmental pollution after events such as floods or landslides	- strengthening the competencies of key stakeholders in risk management related to climate change - strengthening capacity for management and recovery after major accidents and disasters related to climate change - determination of multidisciplinary priority guidelines for action related to climate change - expansion of risk monitoring and assessment system using tools for monitoring risk indicators related to climate change - more efficient damage recovery as a result of major accidents and disasters related to climate change

Impacts and challenges causing high vulnerability	Possible responses for reducing high vulnerability
	- modification of load on community after exposure to climate change-related threats.

According to what is stated in the Adaptation Strategy: "The largest number of proposed measures belong to the so-called non-structural measures (administrative, political, legislative, technical and planning measures, measures to increase awareness of the need to adapt to climate change and measures related to data collection, monitoring and scientific research work). A relatively small number of so-called "structural" measures (measures that include a constructed facility or natural structure whose existence is aimed at reducing or avoiding the possible impacts of climate change), includes certain technical interventions, such as the construction of protective dams and walls, the construction of hydraulic facilities, but also afforestation, construction of green infrastructure, strengthening of soil absorption capacity to receive excess water etc." When it comes to measures and activities that are dealt with in more detail in the Multiannual Programme, the so-called structural measures and measures encouraging the use of green technologies are relevant in providing the following:

- reducing the risk of flooding with structural measures as a response for reducing high vulnerability: "construction, reconstruction and upgrade of existing flood protection systems by applying the approach of giving rivers space and using natural retention areas, systems for water use and water protection and other multi-purpose hydraulic systems in the new (future) climate conditions" and
- Irrigation with structural measures as a response for reducing high vulnerability: "irrigation of agricultural land and construction of water reservoirs".

	Measure / activity from the Adaptation Strategy	Multiannual Programme
HM-02	HM-02-04 Construction, reconstruction and extension of protective embankments, dikes and similar multifunctional facilities related to the protection against adverse effects of water with priority application of the concept of giving rivers space and using natural retentions	Direct implementation of measure by implementing projects from the Multiannual Construction Programme
	HM-02-03 Preparation of design and planning documents for the construction, reconstruction and upgrade of protective embankments, dikes and similar facilities and multipurpose systems for protection from adverse effects of water with priority application of the concept of giving rivers space and using natural retentions	Direct implementation of the measure by preparing technical documents of projects from the Multiannual Construction Programme
	HM-02-05 Development of "green and blue infrastructure" – by restoring watercourse sections with natural flow characteristics or according to eco-remediation principles of river restoration and provision of natural lowland areas for controlled flooding and retention / reduction of large water - measures of "flood adaptation"	Direct implementation of the measure by preparing technical documents of projects from the Multiannual Construction Programme (encouraging the use of solutions based on the concept of green and blue infrastructure i.e. by implementing projects or restoring/rehabilitating structures).
P-05	P-05-02. Analysis of possibility to construct innovative irrigation systems	Direct implementation of the measure by preparing technical documents of projects from the Multiannual Construction Programme
	P-05-03. To continue and expand the implementation of the National Project of Irrigation and Land and Water Management in the Republic of Croatia: by developing conceptual solutions, preparing pre-investment studies and design documents and rehabilitating and reconstructing existing systems and constructing new irrigation systems	Direct implementation of the measure by preparing technical documents of projects from the Multiannual Construction Programme i.e. by implementing irrigation projects
	P-07-01. Define the needs for restoring existing and constructing new drainage systems	This measure is not implemented in the Multiannual Programme

1.3.3 Low-Carbon Development Strategy of the Republic of Croatia until 2030 with a view to 2050

On the basis of the general objectives of the Low-Carbon Development Strategy of the Republic of Croatia until 2030 with a view to 2050 (Official Gazette no. 63/21, hereinafter: Low-Carbon development Strategy), two objectives are particularly relevant for the Multiannual Programme, related to the efficient use of resources and reducing energy dependence, i.e. increasing energy efficiency. Among other, „... the aim is to reduce the consumption of natural resources, reduce the generation of hazardous and toxic substances, reduce emissions to air, water and soil, and reduce or prevent the generation of waste at the place of origin...“. It is envisaged “to achieve a 7% reduction in emissions in non-ETS sectors, compared to 2005 emissions. This is the minimum that must be achieved, and it is also a binding target under the European Union and the Paris Agreement, within the common EU target until 2030.” The Low-Carbon Development Strategy recognized climate change as the biggest challenge facing the world with which causes huge damage to the economy, society and ecosystems: “It is therefore important to simultaneously work on the strengthening of resilience to climate change, and to implement adaptation measures in order to minimise damage and take advantage of opportunities. In selecting appropriate low-carbon development measures, the risks of climate change should be taken into account, as well as the fact that the selected measures contribute to adaptation to climate change, and vice versa”. Furthermore, the Low-Carbon Development Strategy also states: “Since the Republic of Croatia has great development strength in preserved natural (water, soil) resources, preserved landscape values and the fact that it is a strong tourist recipient (with great potential for rural and ecological tourism), education and encouraging local connection of the entire food chain “from the field to the table” - i.e. connecting the local tourist offer, processors and local producers, one can certainly expect a reduction in greenhouse gas emissions - both directly by using organic agriculture or farming technology with lower nitrogen losses, and indirectly by reducing emissions from transport, storage and processing far from places of production of agricultural products.”. Accordingly, the guidelines for low-carbon development that are of relevance for the Multiannual Programme are:

- The development of projects of integrated systems and multi-purpose solutions for electricity generation, water-regulation projects, agricultural and ecological measures, tourist and other purposes, should be evaluated through general social benefits (cost-benefit analysis) and in this sense, the forms of enticement should be decided. The beginning of the use of financial resources from the Modernization Fund is in accordance with the Act on Climate Change and Protection of the Ozone Layer. This is an opportunity for public-private partnership and financing from different funds with synergy of action.
- Hydro land reclamation projects will be constructed as well as protection systems against natural disasters on as many agricultural areas as possible.
- Systematic work on the improvement of inland waterways is needed when it comes to organization, modernization of the fleet, education, construction of infrastructure (waterways and ports), maintenance and safety of navigation, as well as improvement of cooperation with neighbouring countries. It is necessary to examine the possibilities for the expansion of inland waterways.

Measure MAG-12 related to agriculture is relevant for the Multiannual Programme: “Hydro land reclamation projects and disaster protection systems: In addition to the controlled application of mineral fertilizers, controlled drainage, reuse of drained water and the use of water of appropriate quality are important for reducing nitrate emissions. Drainage has the function of draining excess water. Also, the change in soil-air ratios affects the activity of beneficial microorganisms.”

Strategic Environmental Impact Assessment was conducted for the Low-Carbon Development Strategy and this Strategic Assessment analysed the possible impact of the Low-Carbon Development Strategy on the environment and ecological network and environmental protection measures were determined as well as measures to mitigate impact on the objectives of preservation and integrity of ecological network areas, to name a few:

- Environmental protection measure: When planning hydro land reclamation projects and disaster protection systems (flood defence) and hydropower plants, when preparing a feasibility study, the evaluation of

ecosystem services shall be taken into account, especially in the sense of analysing the value of preserved floodplains which mitigate climate change (natural retentions for receiving flood waves) and bind greenhouse gases (wetlands and forest ecosystems). This measure will be implemented after the project of mapping and assessing the value of the ecosystem and the creation of a manual for the evaluation of ecosystem services, which will be implemented by the Ministry in charge of nature (until 2023).

- Measures to mitigate negative impact on the objectives of preservation and integrity of the ecological network area: When planning hydro land reclamation projects and disaster protection systems (flood defence) and hydropower plants, when preparing a feasibility study, the evaluation of ecosystem services shall be taken into account, especially in the sense of analysing the value of preserved floodplains which mitigate climate change (natural retentions for receiving flood waves) and bind greenhouse gases (wetlands and forest ecosystems). This measure will be implemented after the project of mapping and assessing the value of the ecosystem and the creation of a manual for the evaluation of ecosystem services, which will be implemented by the Ministry in charge of nature (until 2023).

In both cases it is envisaged that the measure is implemented by the investor. It is of note that the Low-carbon Development Strategy elaborates on the disaster protection systems (flood defence) in the programme of measures exclusively in the context of agriculture.

	Measure / activity from the Low-Carbon Development Strategy	Multiannual Programme
MAG-12	Hydro land reclamation projects and disaster protection systems: In addition to the controlled application of mineral fertilizers, controlled drainage, reuse of drained water and the use of water of appropriate quality are important for reducing nitrate emissions. Drainage has the function of draining excess water. Also, the change in soil-air ratios affects the activity of beneficial microorganisms	Direct implementation of the measure by preparing technical documents of projects from the Multiannual Construction Programme

1.3.4 The Spatial Development Strategy of the Republic of Croatia

The Spatial Development Strategy of the Republic of Croatia is a fundamental national document for guiding the spatial development (Official Gazette 106/17, hereinafter: The Spatial Development Strategy). It is adopted pursuant to the Physical Planning Act (Official Gazette 153/13, 65/17, 114/18, 39/19 and 98/19), which, in addition to the Strategy, also determines the adoption of the Physical Planning Programme of the Republic of Croatia (Official Gazette 50/99 and 84/13). The core values of future development of the planning system are based on the constitutional provision that the sea, seashore, islands, waters, air space, mineral resources, and other natural assets, as well as land, forests, flora and fauna, other components of the natural environment, real estate and items of particular cultural, historical, economic or ecological significance which are specified by law to be of interest to the Republic of Croatia shall enjoy its special protection, which should be interpreted through 4 core values: spatial basis, identity, spatial development and international context.

In line with the general goal of spatial development: A balanced and sustainable spatial development based on the principles of territorial cohesion in order to raise the quality of life and mitigate negative demographic trends, while preserving the identity of the territory, the following concept settings have been elaborated:

1. Affirmation of polycentricity,
2. Mitigating of the depopulation rate of the most vulnerable areas,
3. Preservation of the identity of the Croatian territory,
4. Taking advantage of the favourable traffic position within main international traffic routes,
5. Sustainable development of the economy and infrastructure systems,
6. Connecting with the European space,
7. Integrated approach to physical planning, and
8. Active adaptation to the dynamics of change.

The achievement of this general goal and concept settings is planned by guiding activities on the basis of 5 determined development priorities with strategic spatial development directions projected until 2030:

1. Sustainability of spatial organisation,
2. Preservation of territorial identity,
3. Traffic connectivity,
4. Development of energy system,
5. Resilience to change.

Flood risk reduction, i.e. flood defence is elaborated under the development priority Resilience to change (5), i.e. as part of the Adaptation to climate change (5.1), which was assessed as having a direct impact on the achievement of the following concept settings:

6. Connecting with the European space,
7. Integrated approach to physical planning, and
8. Active adaptation to the dynamics of change,

And indirect impact on the achievement of the following concept settings:

- 2. Mitigating of the depopulation rate,
- 3. Preservation of territorial identity, and
- 5. Sustainable development of the economy and infrastructure systems.

The analysis of states and processes in space, of which water management is of particular relevance in the context of the Multiannual Programme, gives an overview of the states of infrastructure systems related to the protection of people and property from adverse effects of water, while also listing strategic and planning documents of water management, e.g. the River Basin Management Plan, which includes both water status management and flood risk management, as well as multiannual construction programmes and the framework of flood risk management:

- Protection from adverse effects of water refers to flood defence, defence from ice on watercourses and protection from erosion and flash floods.
- Efficient flood defence is, in fact, based on preventive action and efficiency of action in regular and emergency conditions of direct danger or flooding.
- The development of the Flood Risk Management Plan as a constituent part of the River Basin Management Plan included the development of flood hazard maps, which contain an overview of potential development of certain flood scenarios, and flood risk maps, which contain an overview of potential harmful consequences of scenarios presented in flood hazard maps. These maps are especially important from the aspect of use of available spatial resources in planning new construction areas or extension of existing ones, for settlement enlargement, protection of existing settlements that are under unacceptable flood risks and/or guiding of economic activities in space. In spatial terms, there are also sensitive areas exposed to erosion and flash floods, thus the efficiency of their protection systems is of special importance.
- Water regulation refers to construction of water management facilities (regulation, protection and land reclamation) and water maintenance in order to achieve harmless water flow.

From the viewpoint of the Spatial Development Strategy, activities related to flood risk reduction elaborated in the context of climate change, stating:

- Extreme weather events that occur due to global warming (such as heavy rains, floods, melting glaciers and raising sea levels) that significantly reshape the space and have destructive impacts on some ecosystems, landscape and constructed structures, and cause great economic and material damage,
- Problem of microclimate change in urban areas (increased intensity and frequency of precipitation without sufficient infrastructure capacity and/or existence of larger absorption surfaces) lead to local floods in urban areas and frequently result in rock fall and landslide appearance).

According to the Spatial Development Strategy:

The general response to climate change adaptation is also the stipulation of special construction conditions in areas with increased risk, from the selection of least risky areas for construction to determination of distances and elevations of inlet parts of facilities in areas with increased flood exposure, the planning of green roofs and walls, etc.

- For purposes of long-term reduction of climate change impact, the stipulation of requirements regarding increased energy efficiency of buildings is also important. Efficient and sustainable protection aimed at reducing flood risks is of particular importance.
- Responses to climate change in urban areas are related to the construction of green infrastructure, planning ratios of constructed structures and natural or greened areas, greening landslides, adequate infrastructure capacity, establishment of reservoir areas with dual regime of use (e.g. planning recreation areas that are activated as retentions in case of floods), etc. In this regard, the construction of a flood defence system plays a large role (higher number of reservoirs and retentions), in addition to systemic improvements of risk management and implementation of flood defence measures on the entire territory of the Republic of Croatia.
- From the spatial aspect, it is important that all these systems and measures are in line with the strategic directions of spatial development, i.e. spatial plans at the implementation level.
- In cooperation with the body competent for water management, it is necessary to review the planned uses of space in natural river floodplains at the national and regional level. With respect to this, it is of key importance to clearly determine the competences, authorities and obligations and to establish an efficient model of cooperation and coordination at the sectoral level – from the development and enactment of strategic and operative documents to the instruments of their implementation.
- In addition, possible implementation of modern, ecologically acceptable approach to flood protection (“room for rivers”) and accordingly plan the use of space. Wherever possible, unsettled flood areas should be used as natural retentions and new construction should be directed beyond flood plains.

On the other hand, the achievement of sustainable development of the economy and infrastructure systems, of which flood protection infrastructure is a part (flood risk protection), is based on implementation of its priorities and directions. Infrastructure availability is necessary for optimal development of settlement systems and functionality at the settlement level. Thus, when planning infrastructure systems, priority should be given to settlements with the most pronounced negative demographic trends, and also to the use and modernisation of existing infrastructure capacities before planning the new ones, with application of the principle of sustainable urban development, which means a rational use of space and available resources. In the analysis in chapter Priorities and strategic directions of spatial development, in the part relating to 4.1.7. Improving the accessibility of infrastructure systems, 4.1.8. Rational use of space 4.3.1. Transport system development 4.5.4. Sustainable waste management 4.5.6: Adapting to business environment, certain conditions are also mentioned that relate to flood risk reduction, although not directly to the implementation of the Multiannual Programme.

Based on the above, it can be concluded that the implementation of the Multiannual Programme, whose goal is the development of infrastructure for reducing flood risks, is of exceptional importance for the achievement of goals of the Spatial Development Strategy of the Republic of Croatia.

Ordinance on the content and required spatial indicators of spatial status reports

	Project / activity from the Spatial Development Strategy	Multiannual Programme
4.5.1	Preparation of planning and technical documentation for a more efficient management of the flood defence system and mitigation of drought consequences, with an emphasis on the defence of the most endangered urban areas, with considerations of multipurpose hydrotechnical systems	Direct implementation of the measure through the preparation of technical documentation for the projects in the Multiannual Programme of Construction
	Evaluation of spatial, historical, natural and infrastructural characteristics of space along rivers and integrated considerations of systems development: flood protection, inland navigation, water supply, energy use, settlement development, protection of natural and cultural heritage, traffic and tourism, with a focus on the protection of the most sensitive	Direct implementation of the measure through the preparation of technical documentation for the projects in the Multiannual Programme of Construction

	areas along rivers (water protection zones, protected nature areas and important habitats), with international expert coordination of all countries in the river basins	
	Programme of protection, regulation and use of the Sava River and its hinterland from the border with the Republic of Slovenia to Sisak	Direct implementation of project through individual interventions_____
4.7.1.	Requirement that the location of waste water treatment plants be planned outside inundation areas / flood plains	
4.7.2.	Activity: analysis of consequences of retaining legalised structures in space in relation to the use planned in spatial plans, infrastructure capacities, limitations and risks (flood plains, landslides, etc.)	
4.3.1.	Requirement that the planning and construction of traffic infrastructure corridors be carefully executed, with a high level of environmental protection, careful use of space and natural resources, having in mind the landscape value of the space – in the case when an individual infrastructure occupies an natural flood plain, it is necessary to retention/inundation areas at the basin level	
4.5.4.	Requirement that the locations of waste management facilities be planned outside flood plains and sanitary protection zones	
4.5.6.	Requirement that larger economic activities be planned exclusively based on detailed investment programme, in accordance with the limitations and possibilities of the space (mostly in spaces that are marked as “other land” outside valuable nature parts, landslides, water-bearing areas, flood plains, etc.)	

1.4 Strategic environmental assessment of the Programme's impact and transboundary impact

Strategic assessment is a procedure assessing probably significant impacts on the environment that may occur during the implementation of a strategy, plan or programme. It is performed during the development of the draft proposal of the plan or programme, prior to the establishment of the final proposal and its submission into the adoption procedure, in the manner prescribed by the Environmental Protection Act and Regulation on strategic environmental assessment of strategies, plans and programmes.

Simultaneously with the development of the updated Multiannual Programme, the SEA procedure is carried out based on the results of the Strategic impact study as the expert basis, for which the competent ministry commissioned the company OIKON d.o.o. from Zagreb. The purpose of the Strategic impact study was to determine the conditions and define the measures to be complied with during the development of more detailed documents for projects addressing adverse effects of water and irrigation from the lists of the updated Multiannual Programme. The definition of the project units enabled us to gain insight into the cumulative effects of the updated Multiannual Programme impacts on the environment of a greater area instead of individual impacts of each planned project on the environment of a smaller area. The Strategic impact study does not deal with the details of the technical solutions, but the environmental characteristics and measures of prevention, reduction and mitigation of the unfavourable environmental impacts of the updated Multiannual Programme.

After conducting an appropriate assessment of the impact on the ecological network (AA) screening procedure, the competent ministry issued a Decision stipulating that a main appropriate assessment of the impact on the ecological network has to be conducted for the planned update of the Multiannual Programme. Therefore, the Strategic impact study also contains the chapter The main assessment of the impact on the ecological network⁶ presented in a separate volume.

The strategic assessment procedure is finalized with the report that the competent ministry is obliged to develop within 30 days from the day of making the decision on the adoption of the updated Multiannual

⁶ Sukladno PRILOGU I. Uredbe o strateškoj procjeni utjecaja strategije, plana i programa na okoliš (Narodne novine, broj 3/17)

Programme. The report contains (i) information summarising how considerations of the protection of the environment and ecological network have been integrated into the programme, (ii) description of the manner in which the results of the strategic impact study, opinions of the bodies and/or persons determined under special regulations, objections, proposals and opinions of the public as well as the results of transboundary consultation have been considered in the course of making a decision on the adoption of the programme, (iii) explanation of the reasons for accepting the programme, (iv) the environmental protection measures and measures for mitigation of the negative impacts on the ecological network, (v) method of monitoring the implementation of the measures which have become part of the programme, and (vi) method of monitoring significant environmental. The competent ministry is obliged to inform the public, the bodies and/or persons designated by special regulations and the countries which participated in transboundary consultations of the report about the conducted strategic assessment and adoption of the updated Multiannual Programme.

In the case of a potential transboundary impact of the updated Multiannual Programme, the competent ministry is obliged to proceed in accordance with the provisions of the Environmental Protection Act and the Law confirming the Protocol on strategic environmental assessment to the Convention on environmental impact assessment in a transboundary context (Official Gazette – International agreements 7/09, 3/10, 6/14 and 11/17).

The conclusions of the strategic assessment of the impact of the updated Multiannual Programme are a constituent part of this document.

For all construction projects, an appropriate assessment of the impact on the ecological network (AA) procedure must be conducted.

The first step is to submit to the competent (ministry / county) a request for screening with a description / conceptual solution of the project. If the competent body assesses that it is possible to exclude a significant impact of the project on the conservation objectives and on the integrity of the ecological network, the project proceeds into the regular procedure for obtaining permits. In the opposite case, the project proceeds into the Main Assessment procedure, in which potential negative impacts are considered in more detail, alternative solutions for achieving the project objective are attempted to be found, as well as measure which can mitigate the impacts. If the project remains unacceptable, it is possible to conduct determining of overriding public interest, with public participation, and if there is one, the project is approved with and compensatory measures. This means the compensation of the „sacrificed“ area with a replacement area, natural or artificially created, which will take its role in the ecological network.

2 Status of the systems included in the Multiannual Programme

2.1 Regulation and protection water systems⁷

2.1.1 General information on river basin districts

The territory of the Republic of Croatia hydrographically belongs to the Adriatic Sea Basin and Black Sea Basin, and, pursuant to the Water Act, is divided into two river basin districts:

- The Danube River Basin District (Danube RBD), and
- The Adriatic River Basin District (Adriatic RBD).



Fig. 2.1 River basin districts, sub-basins with important watercourses

The boundary between the river basin districts in Croatia follows the natural hydrographic and hydrogeological boundary between the Adriatic Sea Basin and Black Sea Basin, while the demarcation

⁷ Data used are from the RBMP 2016-2021

line between the coastal waters and the open sea and the national border on the land define the other boundaries.

Tab. 2.1 Structure of river basin districts

Area	Danube RBD km ²	Adriatic RBD km ²	Open sea km ²	Republic of Croatia km ²
Land	35.117	18.183		53.300
Islands		3.262	4	3.266
Sea		13.858	17.718	31.576
TOTAL	35.117	35.303	17.722	88.142

Note: Data from the RBMP 2016-2021 (Tab. A1 on p. 5)

The spatial distribution of surface waters (rivers, lakes, transitional and coastal waters) and groundwater and their mutual connections are primarily determined by morphological and hydrogeological characteristics of individual areas. Nearly all major rivers in the Republic of Croatia are border or cross-border watercourses and have international significance.

The Danube River Basin District contains an abundance of groundwater and a very thick, wide-spread network of surface watercourses, particularly in the Danube RBD. The largest rivers with a basin area of over 10,000 km² are the Danube, Sava, Drava, Mura and Kupa Rivers, while the rivers with a basin area of 1,000 – 10,000 km² are the Dobra, Korana and Glina Rivers (the Kupa tributaries), the Krapina, Ilova - Pakra, Česma, Orjava, Bosut and Una Rivers (the Sava tributaries), the Karašica - Vučica (the Drava tributary) and the Baranjska Karašica and Vuka Rivers (the Danube tributaries). In the eastern part of Pannonian Croatia, the Sava River, together with its northern tributaries, flows along the southern state border and is joined by its significant right tributaries (the Una, Vrbas, Ukrina and Bosna Rivers) from the neighbouring country, the Drava River, together with its southern tributaries, flows along the northern state border, while the Danube River, together with its western tributaries, flows along the eastern state border. Additionally, about 50 rivers in the Sava sub-basin and about 15 rivers in the Drava and Danube sub-basin have medium-sized to large basins of 100 – 1,000 km².

In the Danube River Basin District, there is a very small number of natural lakes, of which Plitvice Lakes are the best known. They are located at the source of the Korana River, consisting of a series of 16 cascading lakes with a height difference of 133 m. A large number of artificial lakes were created for exploiting the hydropower of rivers and for fishing (ponds), or by digging gravel and sand.

The Adriatic River Basin District is characterised by short and quite frequently discontinuous surface flows, as well as significant underground runoff through karst channels and fissures within rock masses. The majority watercourses are torrential in character, and without water in the dry period. The largest transboundary river is the Neretva, with over 96 % of its basin in Bosnia-Herzegovina (BiH), and the only boundary river is the Dragonja (Slovenia). The large rivers are the Cetina (length 104 km), Krka (length 72 km), Zrmanja (length 69 km) and Lika (length 77 km), with basin areas from 1,000 to 10,000 km². About moderately large 40 rivers with basin areas from 100 to 1,000 km², are along their entire length in the Republic of Croatia. The Cetina river basin's major part is located in BiH. A special phenomenon are sinking rivers (Pazinčica, Lika, Gacka, Krbava, Vrljika) whose flows sink into karstic underground. There are no significant surface watercourses islands on the islands, with the exception of occasional torrential watercourses or rare springs with mostly low capacity.

The largest natural lake in the Adriatic RBD is the Lake Vrana near Biograd (surface 30.7 km²). Other significant natural lakes are the Lake Vrana on Cres Island (surface 6 km²), Lake Prokljan, Lake Visovac, Veliko and Malo Lakes on Mljet Island, Bačina Lakes near Ploče, as well as Crveno Lake and Modro Lake near Imotski. The largest artificial lake is the reservoir Peruća (about 13 km²) on the Cetina River. The other significant artificial lakes are the reservoirs Butoniga in Istria, Lokvar and Bajer in Gorski kotar, Kruščica in Lika and Lešće in the Kupa basin.

Tab. 2.2 Lengths of watercourses

	Watercourse length (km)		
	Danube RBD	Adriatic RBD	Republic of Croatia
Watercourses total	58.128	9.465	67.593
Watercourses with basin area over 10 km ²	10.586	2.258	12.844
Note: Data from the RBMP 2016 - 2021 (Tab. A.8 on p. 24)			

Transitional waters appear in the vicinity of river mouths into the coastal sea, where the dynamic of seawater movement significantly affects chemical and ecological characteristics of fresh water. The significant rivers with river mouths affected by the sea are the Dragonja, Raša and Mirna in Istria, Rječina in Kvarner, as well as Zrmanja, Krka, Jadro, Cetina, Neretva and Ombla in Dalmatia. The category of transitional waters may also include the Lake Vrana near Biograd, Rogoznica Lake and Bačina Lakes.

The territory of the Republic of Croatia is also characterised by significant wetlands areas, particularly in floodplains in parts of the Drava, Danube, Sava and Neretva river basins. There are four particularly important sites that are listed as the Ramsar wetlands sites - Kopački rit in the Drava and Danube river basins, Lonjsko polje, Crna Mlaka fish ponds in the Sava river basin and the Lower Neretva (whose part is located in BiH) in the Adriatic river basin district.

2.1.2 Level of development and maintenance of regulation and protection water systems

Flood protection systems consist of numerous regulation and protection water facilities (dikes, bank revetments, artificial watercourse channels, relief canals, lateral canals, drainage tunnels, dams with reservoirs, sluices, retentions, pumping stations, multiple purpose reservoirs, stilling pools, erosion and torrent control facilities), as well as water facilities for land reclamation (canals with accompanying pumping stations, underdrains, concrete culverts, plugs, siphons, channel falls, chutes, anti-erosion lining, sluices and other accompanying facilities, plant and equipment). The drainage of ameliorated surfaces is an integral part of overall flood defence and is performed with flood defence as a whole.

The flood protection systems of large rivers – the Danube, Sava, Drava, Mura, Kupa, Una, Neretva and Cetina, including major torrential floods, are of the highest importance. The defence mostly includes larger cities, towns and settlements, then smaller settlements, infrastructure facilities and agricultural land. Defensive dikes constructed along large rivers are regularly maintained and gradually reconstructed or extended in critical sections. Existing reservoirs and retentions contribute to significant mitigation of flood wave peaks, although flooding occurrences usually cannot be fully prevented. The largest natural retentions used for riverbed flood relief function within the flood protection system Srednje posavlje in the Sava basin (the Kupčina, Odransko polje, Lonjsko polje and Mokro polje) and the flood protection system of the Drava confluence into the Danube (Kopački Rit).

Retentions in mountain areas, which regulate the water regime and reduce maximal discharges, are used for reducing torrential flood hazards. Protection against erosion processes caused by torrential waters is facilitated by the construction of facilities preventing the removal and disposal of torrential sediment in downstream sections (dams, sills, settling ponds). Torrents with very intense erosion processes are mostly present in the Adriatic River Basin District, although there are some in continental Croatia as well. In the Kvarner area, due to existing danger from landslides activation in the Rječina canyon and Vinodol valley, this could lead to the occurrence of large-scale floods.

Existing flood protection system in the Sava river basin consists of numerous regulation and protection water facilities, such as:

- Dikes along the watercourses of the 1st order with different protection levels and a total length of about 1.610 km,
- Dikes along the watercourses of the 2nd order with different protection levels and a total length of about 200 km,
- Multipurpose reservoirs (Lokve on the Lokvarka, Pakra on the Pakra, Vonarje on the Sutla) with a total volume of about 73 hm³,
- Mountain retentions with a total volume of 2.5 hm³,
- 5 large lowland retentions (Lonjsko polje, Mokro polje, Kupčina, Zelenik and Jantak) with a total volume of about 1.590 hm³,
- 2 sluices (Prevlaka and Trebež) and 2 weirs (Jankomir and Košutarica) for the distribution of floods into lowland retentions,
- 3 large relief canals (Odra, Lonja - Strug and Kupa-Kupa) with a total length of about 65 km,
- Connecting canals Zelina - Lonja - Glogovnica - Česma and Ilova – Pakra,
- Lateral canals for collecting mountain waters along the defended areas with a total length of about 530 km,
- Dikes along the Kupa and Korana in the area of Gornje Mekušje near Karlovac with a total length of 4.3 that protect the waste water treatment plant,
- Southern dike of the retention Lonjsko polje with a length of 8 km,
- Palanjek weir on the Sava dike,
- Sava revetment in the area of the settlement Palanjek near Sisak,
- Regulated riverbed of the Pakra River on the section 2.8 km long,
- Sava revetment in Štitar and Mlaka,
- Sill in the Glina riverbed in Glina.

Existing flood protection system in the Drava and Danube river basin was formed by the construction of:

- Dikes along the watercourses of the 1st and 2nd orders with different protection levels,
- Multipurpose reservoirs on the Drava (Čakovec, Varaždin, Dubrava) with a total volume of 152 hm³,
- Mountain retentions in Podunavlje (Borovik, Koritnjak, Čopinac, Čitluk), Slavenska podravina (Lapovac II. and Javorica), in the basins of Županijski kanal (Slanac) and Gliboki potok (Rasinja),
- Lowland retentions (Petar i Šandor along Našice fish ponds),
- Mountain retentions in the basin of Županijski kanal (13 retentions with a total volume of 8.6 hm³), on the Bednja (Trakošćansko jezero) and in the area between the Mura and Drava (6 retentions with a total volume of 3.3 hm³),
- Lateral canals for collecting mountain waters,
- Relief canals (Prof. Bella, Crni Flok, Karašica - Drava, Trnava - Zelena, Dolni potok - Gornji potok, Zapadni kanal),
- Diversion channels on the hydropower plants Dubrava, Čakovec and Varaždin.

Existing flood protection system in the Adriatic River Basin District – North Adriatic basins includes:

- Regulated (improved) riverbeds of the watercourses of the 1st order with a total length of about 187 km,
- Dikes along the watercourses of the 1st and 2nd orders with different protection levels,
- Multipurpose reservoirs (Kruščica and Gusić polje in the Lika and Gacka basins, Butoniga in the Mirna basin, Letaj on the Boljuničica, Valići on the Rječina, Lepenica on the Lepenica) with a total volume of 180 hm³,
- Mountain retentions with a total volume of 0.4 hm³,
- Lateral canals for collecting mountain waters with a length of about 271 km,
- 2 drainage tunnels with a length of 6.2 km.

Existing flood protection system in the Adriatic River Basin District – South Adriatic basins includes:

- Regulated (improved) riverbeds of watercourses and torrential streams of the 1st and 2nd orders,
- Dikes along the watercourses of the 1st order with different protection levels with a total length of 177 km,

- Revetments on the watercourses of the 1st order,
- Multipurpose reservoirs (Peruća with a volume of 565 hm³ and Ričica with a volume of 31 hm³),
- Retentions (Prološko Blato with a volume of 11.4 hm³),
- Lateral canals for collecting mountain waters with a total length of about 81 km,
- 10 pumping stations with a capacity of about 59 m³/s,
- 7 drainage tunnels with a total length of 11 km,
- 2 dams with navigation locks on the Mala Neretva,
- Sluices with a width over 2 m (Nokat, Kula Norinska, 4 sluices in Komin, Crepina, Jarčilog),
- Sluices with a width under 2 m (Pržinovac, 28 sluices in Komin),
- Sea dike Diga that protects the area between the Neretva and Mala Neretva from the sea with a length of 2.6 km.

The joint defence system of the transboundary area in the right backshore of the Neretva River includes: dikes with a total length of 8.2 km (6.3 km in the Republic of Croatia are already constructed, while the construction of the remaining part on the territory of Bosnia and Hercegovina is starting), as well as one pumping station, regulation sluice and overflow facility each on the territory of the Republic of Croatia and on the territory of Bosnia-Herzegovina.

2.1.3 Assessment of the area's protection from adverse effects of water

The floods that happened in recent years showed that individual parts of the territory of the Republic of Croatia are very vulnerable due to incomplete protection systems, unconstructed or insufficiently maintained regulation and protection water facilities. It has been estimated that floods potentially endanger about 15 % of the national territory, while the majority is protected and enables different levels of protection.

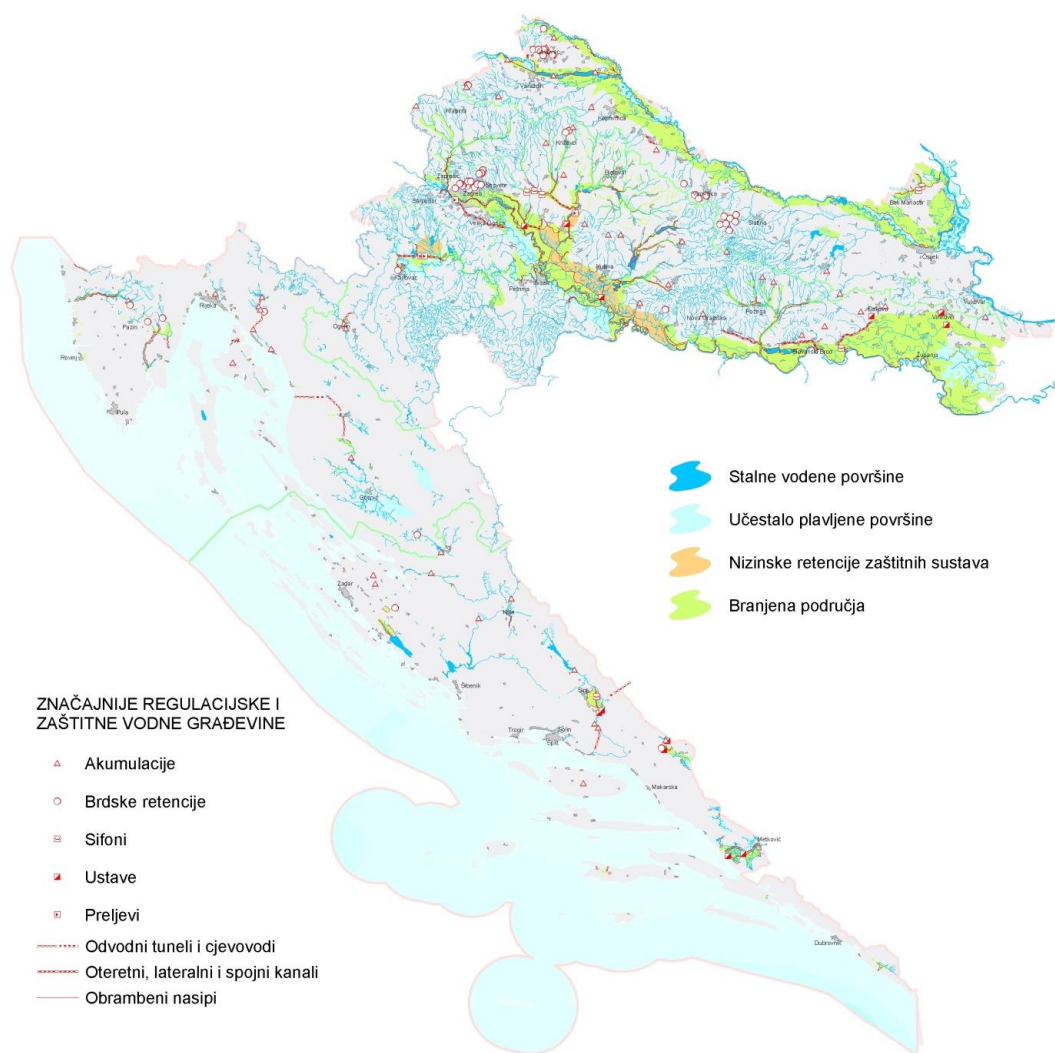


Fig. 2.2 River basin districts, sub-basins with important watercourses

In the Danube River Basin District, only larger towns have an adequate level of flood protection. The defence against the flooding of tributaries is mostly not solved in an adequate manner, while the protection level against mountain waters flooding does not exceed floods of 5 to 25-year return period.

Flood protection systems in the Adriatic River Basin District provide different protection levels, depending on their development level.

The Danube River Basin District – Sava sub-basin The area best protected from the Sava floods is the City of Zagreb area, whose dikes provide a 1,000-year level of safety. The area along the Sava upstream of Zagreb towards the state border with Slovenia (5,700 ha), where dikes are only partially constructed, remains unprotected. Many areas along the Sava downstream of Zagreb all the way to the border with Serbia have a safety level lower than necessary because the protection system Srednje posavlje has not been completed. The system Srednje posavlje directly protects the area along the Sava between Podsused and Stara Gradiška, as well as along the Kupa downstream of the Dobra confluence, where the presently least protected Sisak and Karlovac lowest town areas are located. Due to reducing peak discharges of flood waves in lowland retentions, the system Srednje posavlje is of key importance for the protection of the Slavonian section of the Sava downstream of Stara Gradiška, as well as for flood protection of the neighbouring countries Bosnia and Herzegovini (BiH) and Serbia. Flood protection based on lowland retentions and spacious floodplains benefitted the ecosystem in the areas of Lonjsko polje and Mokro polje. The constructed parts of the relief canal Lonja - Strug (initial and final sections) are used, along with the surrounding natural watercourses, for transport of water entering and filling up the retention

area in Lonjsko polje and Mokro polje. The designation of this area the Nature Park Lonjsko polje facilitated the conservation of biodiversity of the area without negative consequences for the living conditions of the local population.



Fig. 2.3 Flood defence system Srednje posavlje

The construction and reconstruction of the Sava dikes are carried out with the purpose of protection from 100-year return floods. About 70 % of the length of all dikes along the Sava and its tributaries in the sections under backwater effect of the Sava water levels has the necessary superelevation of 1.20 m above the 100-year flood. Some shorter sections of the Sava dikes in the Lower and Middle Sava area remain to be reconstructed, primarily the sections along its left bank from Trebež to Dubrovčak and the sections along its right bank upstream of Sisak, which are not sufficiently high because they were executed according to different protection criteria.

Protection systems in the basins of the Sava's larger tributaries are either incomplete or do not exist. The towns and settlements are mostly protected, while the agricultural land is often flooded. Only 36 % of the area is protected from floods, while protection facilities in other parts are either not constructed or have a low protection level, mostly 5 to 25-year safety level. A part of Zagreb is still threatened by torrential floods from Mt. Medvednica despite the construction of 19 mountain retentions that provide protection against 20 to 50-year floods.

The Danube River Basin District – Drava and Danube sub-basin: The protection from flood waters of the Danube, Drava and Mura is facilitated by the construction of hydropower plants with three multipurpose reservoirs on the Drava River (Varaždin, Čakovec, Dubrava) and defensive dikes in all areas where it is necessary, as well as by retaining wide inundation areas along the watercourses and controlled drainage of backshore waters. The dikes are completed in almost all areas, with the exception of some sections along the old riverbeds at the hydropower plants Čakovec, Varaždin and Dubrava, as well as along the Vučica River and in a smaller part of Baranja. During the last flood occurrence, it was evident that some sections of the existing dikes have to be reconstructed because they do not have a satisfactory height and dimensions.

The construction and subsequent reconstructions of the defensive dikes Drava - Dunav and Zmajevac – Kopačevo facilitated not only an efficient protection of Baranja from 100-year return floods of the Drava and Danube, but also the preservation of wide floodplains along the Drava river mouth into the Danube. In addition to a favourable influence on the natural water regime in the Nature Park Kopački rit, the flood protection in the downstream area along the Danube was also improved. The drainage of ameliorated areas in the Podunavlje area was achieved by the establishment of a dense canal network with numerous sluices and pumping stations.

The protection of settlements and agricultural land from torrential floods is only partially solved by the construction of mountain reservoirs and retentions because the protection systems against mountain waters are not completed and cannot provide adequate protection for the lowland areas. In Međumurje and the basin of Županijski kanal, the existing protection systems against mountain waters mostly have 5 to 25-year level of safety.

A particular problem in flood protection on the Danube and Lower Drava is posed by the occurrence of ice. For the removal of ice plugs that disturb unhindered water flow and may cause ice floods, icebreaker ships are used. Based on the tripartite Croatian, Hungarian and Serbian water management agreement, assistance is also requested for icebreaker ships from the Republic of Hungary, which break the ice in the sector of common interest. In addition, the use of mines and explosives for breaking of ice barriers in critical locations was enabled through the state administration body competent for civil protection.

The Adriatic River Basin District – North Adriatic basins The existing flood protection systems comprise of a number of regulation and protection water facilities constructed for the purpose of increasing the flow of watercourses or faster drainage of excess water from closed-off karst fields, reduction of large water waves, reduction of flow velocity and riverbed stabilisation, reduction of intense erosion processes and halting of sediment production and transfer. The level of flood defence systems development is the highest in the Mirna and Raša river basins. The lowest-lying towns (Buzet and Pazin), settlements and arable agricultural land in the valleys of the Mirna, Dragonja, Raša and Pazinski potok are still not sufficiently protected from floods.

The multipurpose reservoir Butoniga plays an important role in flood protection of the Mirna basin. It has a volume of 19.7 hm³, which can receive and reduce a 1,000-year water wave. Along the Mirna River, whose total length, including boundary canals, is about 100 km, about 120 km of dikes is constructed for protection from 25 to 50-year floods, while along the Raša River, whose total length, including boundary canals, is about 68 km, and about 44 km of dikes is constructed for protection from 25 to 50-year return floods.

In the Lika area, the flood defence system includes only regulated parts of watercourses in settlement areas, and it depends on the needs and requirements of the HPP Senj, which uses waters from the hydropower system of the Lika and Gacka Rivers. Floods threaten numerous agricultural surfaces and infrastructure facilities in the greater Otočac area, which is insufficiently defended from floods of the Gacka River and its tributaries, as well as the greater Gospić area and Kosinjsko polje, which is unprotected from floods of the Lika River and its tributaries.

Numerous torrents endanger towns, settlements, roads and agricultural land on the west coast of Istria, Kvarner and Kvarner islands. In the Kvarner area, there is also the danger from landslides filling up watercourses (the Rječina canyon and Vinodolski valley), which may cause large-scale floods. The settlements along the Adriatic highway along the entire area from Senj towards Starigrad Paklenica are endangered by torrential waters from the slopes of Mt. Velebit.

The Adriatic River Basin District – South Adriatic basins The existing flood protection systems comprise of numerous regulation and protection water facilities constructed in the basins of the Zrmanja, Krka, Cetina and Neretva Rivers, larger torrential areas and closed-off karst fields. Along the Krka River, a short section of the right dike was constructed to protect the town Knin from 100-year floods. Adequate protection of the backshore upstream of Knin has still not been achieved. The Butišnica valley continues to be exposed to frequent torrential flooding due to a limited capacity of the reservoir Golubić. On the Zrmanja River, a revetment was built on the right bank in Obrovac for protection against 100-year floods, while on its left bank in Žegarsko polje there is an existing dike (2.7 km) for flood protection of ameliorated land.

Sinjsko polje is protected from 50-year floods of the Cetina and its left tributary Ruda Velika by defensive dikes with a total length of 28.4 km, lateral canals with accompanying dikes with a total length of 20.2 km

protect the field from mountain torrents. A significant contribution to the flood defence of Sinjsko polje is provided by the reservoir Peruća, which receives and regulates waters from the Cetina narrower basin for demands of the downstream hydropower plants (Đale, Zakučac, Kraljevac). The drainage of ameliorated land in Sinjsko polje is carried out through a network of open canals, 2 sluices and 2 pumping stations (Trilj and Vedrine).

The Neretva River floods coming from the upstream part of the basin are under a direct influence of the operation of existing hydropower plants and reservoirs in the neighbouring Bosnia and Herzegovina. Existing dikes along the Neretva and Mala Neretva defend the Neretva Delta from 100-year floods. The protection from mountain and spring waters is carried out by boundary dikes and lateral canals. At the start of the Mala Neretva in Opuzen and its river mouth into the sea, dams with sluices are constructed for regulation of floodwater discharges in order to relieve the Velika Neretva riverbed and prevent seawater intrusion into the Mala Neretva waters. During floods, all culverts downstream of Metković in the left-bank and right-bank dikes of the Neretva River are closed by sluices, with the exception of the Norin and Crna Rijeka river mouths on the right bank, which area always open.

In order to reduce the physical scope and duration of floods in larger karst fields in Dalmatia, the regulation of watercourses and construction of tunnels (Imotsko-Bekijsko polje, Rastok, Vrgorsko polje, Konavosko polje, Nadinsko blato, Bokanjačko blato), canals, dikes and pumping stations was carried out; however, the flood protection systems are not fully completed.

The Dalmatian coast from the Zrmanja to Prevlaka as well as the Dalmatian islands are endangered by numerous torrential watercourses as well, whose riverbeds are often narrowed down or usurped by inappropriate construction of residential and commercial buildings.

2.1.4 Other water uses impacting water regulation and flood defence

Inland waterways The Agency for Inland Waterways was responsible for the management of inland waterways until coming into force the Act on Amendments to the Act on Inland Navigation and Inland Ports (Official Gazette 118/18), when the Agency for Inland Waterways became a part of the Ministry of the Sea, Transport and Infrastructure, Directorate for Inland Navigation, Regional Unit Vukovar, Sector for Waterways. The total length of all classified inland waterways in the Republic of Croatia is 1,016.8 km, of which 611.6 km waterways of international importance, 128.6 km waterways of regional importance and 276.6 km waterways of national importance. The remaining unclassified national waterways are located within the National Park Plitvice Lakes, National Park Krka and Nature Park Kopački Rit, as well as on individual waters within limits of navigation possibility.

Waterways in the Danube River Basin District are a part of the European Inland Waterway System, and, as such, they must be built and regulated according to the standards proscribed for individual waterway categories. To date, there are no built waterways. The future multipurpose canal Danube - Sava (Vukovar - Slavonski Šamac), about 62 km long, is contained in the plans, but it is still not known when its construction will start. The Danube River is a class VIc inland waterway of international importance in its entire course through the Republic of Croatia (137.5 km). The Drava River is an inland waterway of international importance from its confluence with the Danube to Donji Miholjac (70.0 km) - class IV to the Osijek port, class III from the Osijek port to Belišće and class II from Belišće to Donji Miholjac. Further upstream from Terezino polje, in the section from 128.6 km, the Drava is an international waterway of class II. The Sava River is an international waterway from the border with Serbia to Sisak, in the length of 383.2 km, of class IV to Slavonski Šamac (102.9 km) and in the section from Oprisavci-Slavonski Brod (33.0 km), while class III in the section from Slavonski Šamac-Oprisavci (24.5 km) and from Slavonski Brod to Sisak (222.8 km). In the section from Sisak to Rugvica (68.0 km), the Sava River is a state waterway of class II, and from Rugvica to the state border with Slovenia a state waterway of class I (53.0 km). The most downstream 5.9 km of the Kupa River is an international waterway of class I, while the upstream part of the Kupa to the dam of the HPP Ozalj (155.60 km) is a state waterway of class I. The

Una River is an international waterway on the most downstream 15.0 km (class II on the first 4 km and class I on the upstream 11 km).

The port system of inland waterways includes four international ports - Vukovar, Osijek Slavonski Brod and Sisak. In addition to ports for goods traffic, there are also docks for passenger ships in Ilok, Vukovar and Osijek. The Port of Vukovar and the Port of Osijek are the largest Croatian river ports according to the share in the total traffic realised in inland navigation. In the Port of Vukovar, the largest Croatian river port, manipulative operations of trans-shipment and storage of all types of cargo for various business entities are most often performed.



Fig. 2.4 Inland waterways and ports

Hydropower use The construction of hydropower systems was very intense in the second half of the 20th century until the start of 1990s, when it mostly stopped. The priority was given to multipurpose systems for water regulation and use, which are, as a rule, commercially and ecologically more acceptable. A series of multipurpose reservoirs was constructed, which are used for flood protection, water supply, production of electrical energy, irrigation, regulation of low water regime, sport and recreation. Hydropower is an important source of primary energy in the Republic of Croatia. Depending on hydrological conditions, hydropower annually accounts for over 50 % of Croatia's own production of electrical energy. The total water potential in the Republic of Croatia that is technically usable in hydropower plants is estimated at 12,450 GWh/year, of which less than 50 % is used. Small watercourses account for about 10 % of the total water potential (about 1000 GWh/year). Hydropower plants belong to renewable energy resources, with a possibility of accurate prediction of production. The following HPPs presently operational:

- 17 large HPPs (over 10 MW) of storage and run-of-the-river types,

- 15 small HPPs (from 0.5 to 10 MW),
- 4 mini HPPs (from 0.1 to 05 MW),
- Several micro HPPs (from 5 to 100 kW).

All large hydropower plants in the Republic of Croatia and their reservoirs are managed by Hrvatska elektroprivreda (HEP Proizvodnja).

Tab. 2.3 Technical characteristics of hydropower plants owned by Hrvatska elektroprivreda

	Hydropower plant	Reservoir	Average production (GWh/year)	Installed capacity (MW)	Installed flow (m3/s)	Year of construction
Sava sub-basin	Lešće	Yes	80,0	41,2	120	2010.
	MHE Lešće - ABM	Yes	7,3	1,09	2,7	2010.
	Gojak	Yes	213,5	56	57	1959.
	Ozalj 1	Yes	13,1	3,54	51	1908.
	Ozalj 2	Yes	10,1	2,2	34	1952.
	Zeleni Vir		7,39	1,7	4	1921.
TOTAL			331,39	105,73		
Drava and Danube sub-basin	Varaždin	Yes	443,2	94	450	1975.
	Čakovec	Yes	350	76	500	1982.
	Dubrava	Yes	385	78	500	1989.
	ABM Varaždin	Yes	3,8	0,63	8	2016.
	ABM Čakovec	Yes	4,3	1,1	8	1982.
	MHE Čakovec	Yes	0,81	0,34	6,6	1993.
	AMB Dubrava	Yes	7,28	1,1	8	1989.
	MHE Dubrava	Yes	4,0	0,68	6,6	1991.
TOTAL			1.198,39	251,85		
Danube River Basin District - TOTAL			1.529,78	357,58		
North Adriatic basins	Rijeka	Yes	84,4	36,8	21	1968.
	Senj	Yes	970	216	60	1965.
	Sklope	Yes	85	23,5	45	1970.
	Vinodol	Yes	135,3	90	18,6	1952.
	RHE Lepenica	Yes	0,27	0,8 / 1,2	6,2 / 5,3	1985.
	CHE Fužine	Yes	2,89	4,5 / 6,5	9,9 / 9,6	1957.
	UKUPNO		1.277,86	371,6		
South Adriatic basins	RHE Velebit	Yes	366	276 / 240	60 / 40	1984.
	Đale	Yes	116	40,8	220	1989.
	Kraljevac		50	46,4	55	1912./1932./1990.
	Orlovac	Yes	365	237	70	1974.
	RCP Buško Blato	Yes		10,5	70	1974.
	Peruća	Yes	112	60	120	1960.
	Zakučac	Yes	1.445	578	240	1961./1980./2017.
	MHE Prančevići	Yes	9	1,15	6	2017.
	Golubić	Yes	25	7,5	14	1981.
	Jaruga		33	7,2	31	1903./1936./1995.
	MHE Krčić		2,9	0,37	1	1988.
	Miljacka	Yes	116	24	30	1906./1956.
	Dubrovnik	Yes	1.139	235	110	1965./2015.
	Zavrelje		4,7	2,1	3	1953.
TOTAL			3.783,6	1.526,02		
Adriatic River Basin District - TOTAL			5.061,46	1.897,62		
GRAND TOTAL			6.591,24	2.255,20		

The right to use water energy for electrical power production is acquired on the basis of a concession agreement that is concluded for a limited time period. Legal and physical persons that manage reservoirs and retentions have the obligation to use them in a manner that will ensure that a flood wave is received. The volume size, i.e. free space level in reservoirs and retentions that must be maintained in individual seasons of the year and water discharge conditions are determined in the water rights permit.

The operation of some hydropower plants in the Adriatic River Basin District is directly related to transboundary waters arriving from the neighbouring Bosnia and Herzegovina. The HPP Dubrovnik uses water from the reservoir Bileća that is built in the Trebišnjica river basin, while the HPP Orlovac uses water

from the reservoirs Buško blato, Mandak and Lipa from the indirect basin of the Cetina River that is located on the territory of Bosnia – Herzegovina.

2.1.5 Relation of regulation and protection systems and ecological water status

Physical interventions in the water system for the purposes of protection from adverse effects of water or multipurpose use of water change the hydromorphological status of surface waters. In order to make hydromorphological changes resulting from the construction of regulation and protection systems as small as possible and make the quality of the environment remain as well preserved as possible, planned projects should be acceptable with regard to the state and requirements of the environment, and environmental protection measures are necessary.

Environmental impact assessment (EIA) is a procedure that determines and assesses possible direct and indirect impacts of the intended project on the soil, water, sea, air, forest, climate, people, flora and fauna, natural values, landscape, material property and cultural heritage. The assessment of the environmental impact of the project must ensure that the precautionary principle is implemented in the early stages of planning of the project. This is achieved by harmonizing and adapting the planned project to the acceptable environmental conditions in a certain area, while at the same time taking into account the safety and health of people, the protection of their property, and the planned economic development.

The procedure for assessing potential significant impacts on the environment is carried out depending on the purpose, size or location of the planned project according to the provisions of the Environmental Protection Act and the Regulation on Environmental Impact Assessment. The assessment procedure is required before issuing a location permit or other approval for a project for which the issuance of a location permit is not mandatory. For all projects for which an environmental impact assessment is mandatory⁸, as well as for those projects for which this obligation of the evaluation of the need for environmental impact assessment is determined, the environmental impact study is prepared, which represents the main expert basis for conducting the environmental impact assessment, including the evaluation and acceptability with regard to the scope, strength and duration of the impact. If the project has a significant negative impact on conservation goals and the integrity of the ecological network under special regulations governing nature protection, the content of the study also includes a chapter addressing the project's impacts on the ecological network according to these regulations.

Ecological network of the Republic of Croatia represents the areas of the ecological network EU Natura 2000. With the entry into force of the Regulation on the ecological network and the competencies of public institutions for the management of ecological network areas (OG 80/19), the previous Regulation on the ecological network (OG, 124/13 and 105/15) ceased to be valid.

With the proclamation of the Ecological Network, the following two EU directives were transposed into the legal order of the Republic of Croatia: the Directive on the conservation of wild birds on the conservation of wild birds (Council Directive 2009/147/EC) and the Directive on the conservation of natural habitats and of wild fauna and flora (Council Directive 92/43/EEC). The ecological network of the Republic of Croatia (Natura 2000) consists of Special Protection Areas important for birds (SPA), Sites of Community Importance important for species and habitat types (SCI), proposed Sites of Community Importance important for species and habitat types (pSCI) and Special Areas of Conservation important for species and habitat types (SAC)⁹. The ecological network of the Republic of Croatia covers 36.67% of the land territory and 16.26% of the coastal sea, and consists of 745 conservation areas important for species and habitat types (including pSCIs, SCIs and SACs), and 38 conservation areas important for birds (SPAa).

⁸ According to ANNEX I of the Regulation on Environmental Impact Assessment (OG 61/14 and 3/17).

⁹ According to Article 5 of the Regulation on the ecological network and the competencies of public institutions for the management of ecological network areas (OG 80/19)

The data is available to all users on the Web portal of the Nature Protection Information System (<http://www.bioportal.hr/gis/>).

Public institutions responsible for the management of the ecological network are public institutions for the management of national parks or nature parks, as well as public institutions for the management of other protected areas and/or other protected parts of nature. The Regulation on the ecological network and the competencies of public institutions for the management of ecological network areas determined the competences of public institutions that manage protected areas and ecological network areas for the management and enactment of ecological network management plans.



Fig. 2.5 Ecological network Natura 2000 – Areas according to the Habitats directive (SCIs)

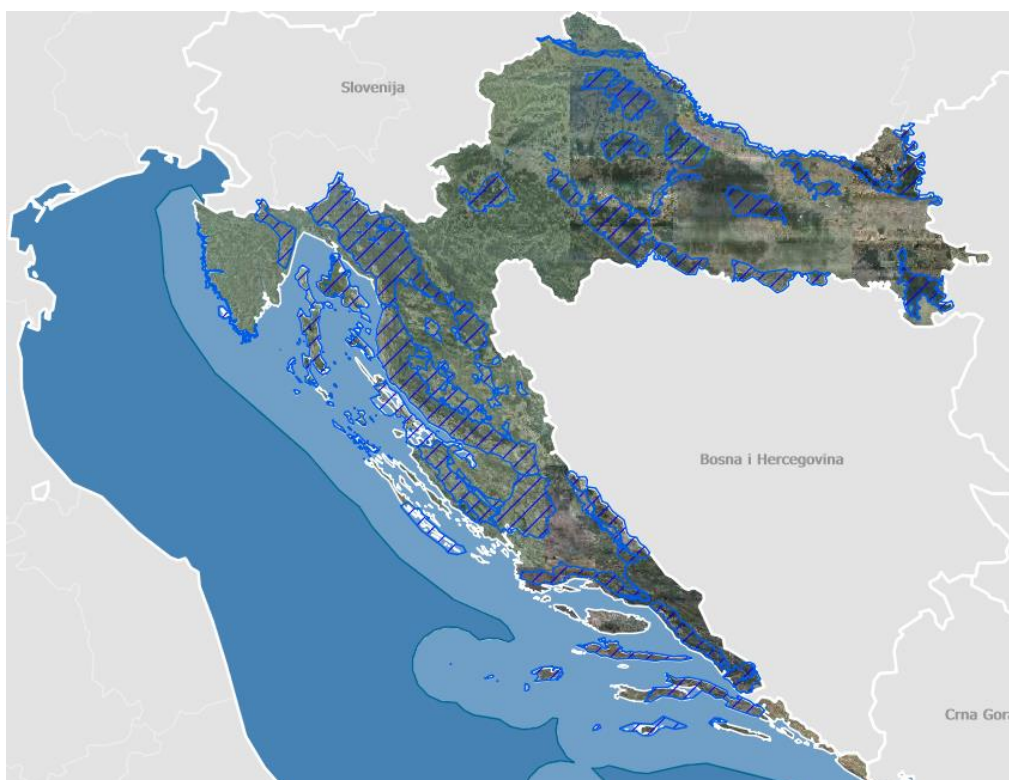


Fig. 2.6 Ecological network Natura 2000 - Areas according to the Habitats directive (SPAs)

The basic way of managing an area of the ecological network is the implementation of conservation measures for target species and habitat types, which are incorporated into the management plans of the ecological network areas and sectoral management plans for natural resources. For the purpose of managing the areas of the ecological network, the Ordinance on conservation objectives and conservation measures for target bird species in ecological network areas (OG 25/20 and 38/20) was adopted, while the Ordinance on the definition of objectives and measures for the conservation of other species and habitat types for each area of the ecological network is presently in development.

The appropriate assessment for the ecological network consists of a screening and main assessment, as well as the determination of the prevailing public interest and approval of projects with compensatory conditions. It is carried out during the preparation of the planned project and prior to the issuance of a location permit or other approval necessary for the project implementation.

2.2 Irrigation systems

2.2.1 Characteristics of agricultural production in the Republic of Croatia

The main advantages of Croatian agriculture are its three geographic and climate regions: plains area in the north influenced by the continental climate, coastal area in the south influenced by the Mediterranean climate and the mountainous area in the central part of the Republic of Croatia. Different types of climate, relief and soil enable a production of a wide variety of agricultural products, from field and industrial crops to vineyards, fruits and vegetables. A low environmental pollution level facilitates a development of ecological production. Agriculture is followed by a diverse and developed processing and food industry, and complemented by tourism, another important economic branch.

Agriculture plays an important role in the total national economy and development of the Republic of Croatia. The amount of gross value added (GVA in agriculture, forestry and fisheries together in 2015 was

HRK 10.2 billion, or 3.0 % of the gross domestic product (GDP), and in 2016, it was HRK 11.0 billion or 3.1% of the gross domestic product (GDP)¹⁰.

2.2.2 Level of development of irrigation systems

At the start of 2004, the Government of the Republic of Croatia initiated activities on the development of a strategic plan for agricultural production improvement with the implementation of irrigation with optimal use of soils and water as natural resources. The National Committee and the Expert Team for the development and coordination of the implementation of the irrigation and agricultural land and water management project was established. In July 2005, the strategic document National Project of Irrigation and Land and Water Management in the Republic of Croatia (hereinafter: NAPNAV)¹¹. NAPNAV determined, based on conducted analyses of soil suitability, available water resources and climate factors, while taking into consideration spatial limitations, i.e. areas and surfaces where irrigation projects could not be developed (water deficit, mine-suspected areas, protected areas, as well as areas in the 1st and 2nd sanitary protection zones of drinking water sources), very high or high suitability for irrigation of 484,026 ha of agricultural land. For irrigation of said surfaces in the vegetation period (April-September), the NAPNAV states that is necessary to provide about 968 million m³ of water annually (with the assumption of partial irrigation of crops with 2.000 m³ water/ha/year).

Water for irrigation is abstracted from rivers and lakes, with a presence of a wide-spread extra-institutional (uncontrolled) abstraction of groundwater. Although there is a significant number of water resources and land suitable for irrigation, only a small number of concessions for irrigation has been issued to date.

Irrigation in the continental part of Croatia is mostly implemented in individual production of vegetables and fruits, and by organised larger producers - privatised former PIKs (food and industrial combines/enterprises) and private companies with a known buyer. The largest irrigated areas in the continental part of Croatia are located in the Varaždin, Virovitica - Podravina and Osijek - Baranja Counties, while irrigation in the coastal part is mostly implemented in Istria and Dalmatia, in particular in the Neretva valley and in the Kaštela area of the Split – Dalmatia County. It is estimated that existing irrigation, together with water losses, uses an annual total of about 15 - 20 million m³ of water.

In the Drava and Danube river basins, surface water from watercourses is mostly used. In Međimurje and Podravina, however, groundwater is used for irrigation as well, although water use from constructed multipurpose reservoirs is also possible. In this area, there are sufficient water quantities that could be used for irrigation. The situation is very similar in the Sava river basin, where abundant water resources are available.

In the Adriatic River Basin District, water for irrigation is abstracted from open watercourses (the Neretva) or from combined systems for amelioration drainage and irrigation within closed karst fields (Vrbničko, Sinjsko, Imotsko, Vrgoračko, Vransko polje), and to a lesser extent also groundwater, particularly in the areas of Istria, Kaštela and Ravni kotari. A profitable cultivation of vegetables and fruits in Adriatic basins is not achievable without irrigation.

Water quality for irrigation in the continental part and in the parts of Istria and Primorje is generally satisfactory. However, in the costal parts of Primorje and Istria, and in Dalmatia in particular, water used for irrigation is in some cases salinized and alkaline.

For the cultivation of some agricultural crops (corn, sugar beet, tomato and apple) in the Republic of Croatia, an average of 100 to 600 mm of water missing in dry years, which has to be compensated by

¹⁰ Source: Croatian Bureau of Statistics, Statistical yearbook 2018

¹¹ The National Project of Irrigation and Land and Water Management in the Republic of Croatia was developed in July 2005 (commissioned by the Ministry of Agriculture, Forestry and Water Management and developed by Faculty of Agriculture, Zagreb), and by the conclusion of the Government of the Republic of Croatia and the National Commission adopted in October 2005.

irrigation. Depending on drought intensity and duration, a reduction in yields of some cultures is from 20 to 80 %.

2.2.3 Overview of activities on the implementation of the NAPNAV

The NAPNAV implementation in the period 2004 - 2020 included activities on about 152,000 ha, which consisted of a development of planning, study and design documents, from works on the rehabilitation and reconstruction of existing systems to construction of new irrigation systems. The investments amounted to about HRK 1.3 billion, and this was recorded in annual Water Management Plans.

See chapter: 11 Annexes, Table 11.2 Activities on irrigation projects in the period 2004 – 2020, pp. 217 - 220

Under the NAPNAV, implemented pilot projects, in addition to the construction of irrigation systems, have a goal to provide guidelines for design and construction of irrigation systems. The expected results of pilot projects are: methodology to determine whether investments are justified, optimisation of research and measurements necessary for system design and introduction, provision of materials for enacting regulations that will govern design, construction and management of irrigation systems, education of final beneficiaries, as well as testing ecological impacts, techniques and technologies of cultivation under irrigation conditions.

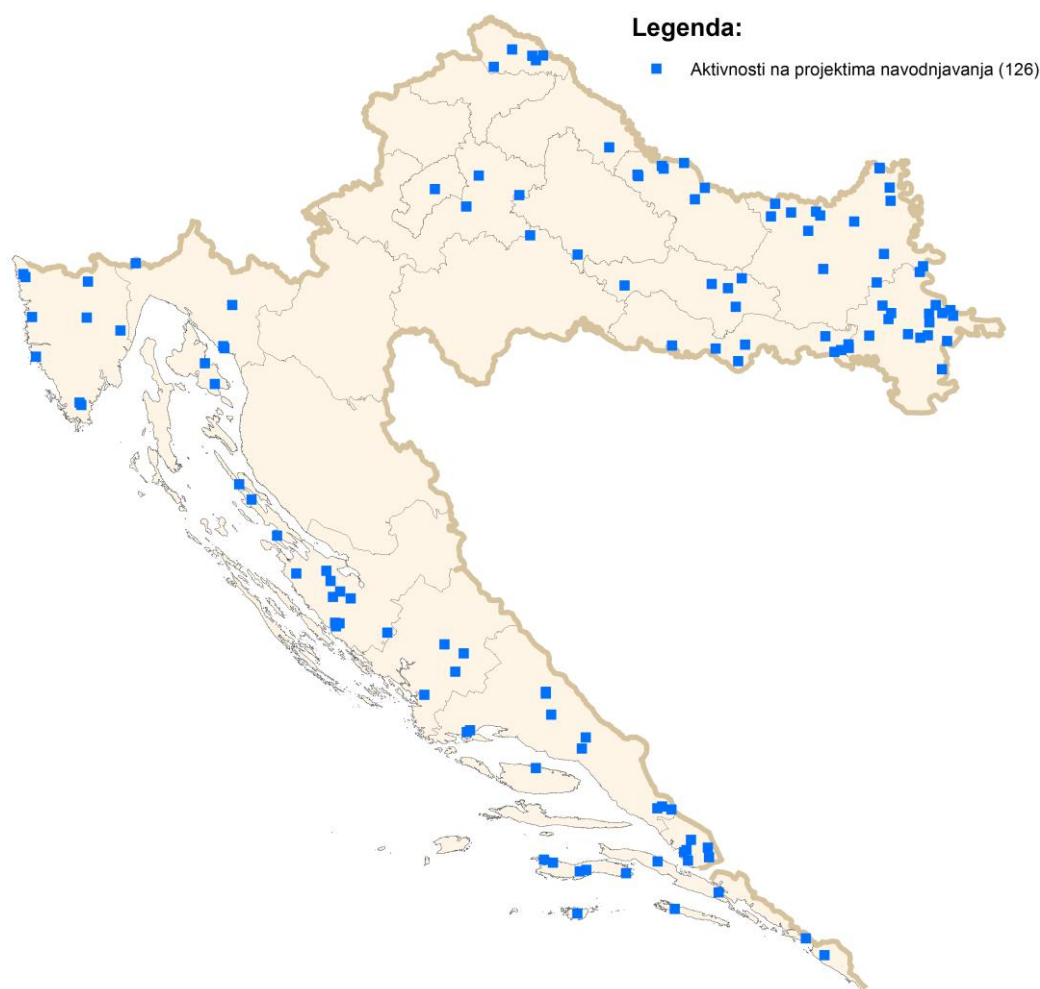


Fig. 2.7 Spatial distribution of activities on irrigation projects in the period 2004 - 2020

There are 3 active national irrigation pilot projects (NPPNs) with a total scope of 7,559 ha, 2 in the continental part and 1 in the coastal part of the Republic of Croatia.

- **NPPN Biđ - bosutsko polje** 4.060 ha in eastern Croatia in the Brod – Posavina and Vukovar – Srijem Counties. The project includes the construction of a 14.7 km long supply land reclamation canal for irrigation of Biđ - BosutSKO polje with a pumping station (through 7 sections/phases), which is also Phase 1 of the Multiple purpose canal Danube – Sava (MPCDS), for the purpose of direct water abstraction for the irrigation system whose size is about 4,060 ha gross in Phase 1. According to developed conceptual design/ solution in 2008 (by Institut IGH d.d.), the feeder amelioration canal is not only a direct water source for irrigation, but it also recharges the watercourses Bosut and Biđ, as well as smaller natural watercourses and/or artificial watercourses in low water months, thus creating conditions for irrigation of agricultural land in Biđ - Bosutsko polje (presently identified 4,514 ha within existing and planned projects of potentially 8,500 ha net in the short-term period and 10,500 ha net in long-term development). The total investment value of the canal, which was completed in 2020 when the use permit was obtained, is about HRK 498 million, while the irrigation Phase 1 is estimated at about HRK 276 million. Considering its size, multipurpose character and importance, this is the largest pilot project under the NAPNAV, into which a total of about HRK 499 million was invested in the period 2007 - 2020. The analysis of the functioning of the entire system showed its extreme sluggishness, i.e. flow velocities in the watercourses equal on average from 0.05 – 0.1 m/s. In order to achieve the optimal hydraulic functioning of the system, it is necessary, in addition to the construction of the canal itself, to also perform the following preparatory hydrotechnical works on existing watercourses and hydrotechnical facilities: reconstruction and/or rehabilitation of all canals and watercourses that receive water from the canal where necessary depending on their existing state, while the following technical measures must be implemented on existing facilities of the watercourse Bosut: (1) elevating the crest of the weir Bazjaš by 40 cm, (2) constructing the dam Trbušanci, (3) elevating the crest of the barrier Lipovac by 50 cm, and (4) constructing a sluice on the supply land reclamation canal for irrigation. As part of this investment, design documents are being developed for the stated control / regulation nodes, while the programme of construction / works performance will be carried out under the item “systems rehabilitations and constructions” of the Water Management Plan.
 - **NPPN Opatovac** 705 ha net located in the Vukovar – Srijem County in the easternmost part of the Republic of Croatia. The final beneficiaries in the pilot project area are mostly business entities and agricultural cooperatives. It includes a multipurpose reservoir with active storage of 904,350 m³ on the stream Čopinac (Mlinski potok), from which water for irrigation of 705 ha of high quality agricultural land will be abstracted. In the previous period, the construction of the reservoir and irrigation system was fully realised with an investment of about HRK 46 million.
 - **NPPN Donja Neretva (Lower Neretva)** - 2,794 ha net, planned in in the Dubrovnik – Neretva County in southern Dalmatia and divided into 2 main subsystems: (1) subsystem Opuzen (2,199 ha net) and (2) subsystem Koševo - Vrbovci (595 ha net).
- 1) Subsystem Opuzen** consists of 2 phases:
- Phase 1 – A barrier on the Neretva River is planned for the prevention of salt water intrusion from the downstream flow of the Neretva into its upstream flow, so that fresh water upstream of the barrier could be used for improving the quality of groundwater and soils, as well as for different economic uses. The barrier would be used in the summer period, while in the remaining part of the year it would be lowered to the bottom of the riverbed. This would be a submersible barrier 100 m long, which would consist of a concrete construction to which mobile (a total of 5) would be connected. A part of the facility (barrier profile) is also a navigation lock. In 2019, it was decided that the navigation lock should be larger – for ships up to 60 m on one side and a fish ladder on the other. The compressor station is a separate facility. The construction permit for the barrier with a smaller navigation lock was obtained on 20.09.2019, while the obtaining of an amendment regarding the large lock is planned in 2020.

Phase 2 – The irrigation system for 1,887 ha net agricultural land (in the final phase 2,199 ha net after the system Glog is connected), whose construction is planned in 5 phases (a separate construction permit for each phase). The main facilities are the intervention on the Mala Neretva with gravity supply canal and pipeline, pumping station (PS) Opuzen with a total installed capacity of 2,400 l/s, pressure pipeline from the PS to the micro-reservoir Ladište, micro-reservoir (MR) Ladište with active storage of about 100,000 m³, pipeline for emptying of the MR and pressure distribution network with a total length of about 116 km. In 2020, the obtaining of construction permits for all 5 phases was initiated. An integral part of Phase 2 is also the mentioned irrigation system Glog (312 ha net), which consists of a feeder pipeline from the Mala Neretva (270 m, DN 400 mm) to the temporary PS (285 l/s) that is abandoned after the connection of the network to the sub-system Opuzen, as well as the pressure distribution network with the length of 18.4 km (DN 90-900 mm). The construction of the system Glog was realised under the Rural Development Programme 2014-2020, and completed in 2020.

2) Subsystem Koševo - Vrbovci consists of:

Phase 1- water intake through 2 sub-phases (Phase 1A – until the construction of the dam, from the main irrigation canal by gravity pipeline to the connecting shaft 1 and Phase 1B – from the Neretva River through the canal Nokat and gravity pipeline to connecting shaft 1),

Phase 2- gravity pipeline to SO 1 to PS (674 l/s) and pressure distribution network with the length of 30 km (DN 90 - 700 mm).

The total value of the investment into the entire NIPP is estimated at about HRK 630 million, of which about HRK 57 million were spent from 2007 to the end of 2020.

The implementation of the NAPNAV included the rehabilitation and reconstruction of existing irrigation systems and the construction of new irrigation systems. The following 4 systems are fully rehabilitated and operational: IS Vransko polje - Jankolovica (about 403 ha) in the Zadar County, IS Grabovo (about 535 ha), IS Borinci (about 700 ha) in the Vukovar – Srijem County and IS Valtura (about 80 ha) in the Istria County. A partial rehabilitation was implemented on 5 systems on the total of 2,269 ha of state-owned land (IS Sinjsko polje - 530 ha, IS Imotsko - bekijsko polje - 800 ha, IS Rastok - 150 ha, IS Neretvansko polje - 589 ha, IS Puškaš - 200 ha). Through activities of partial or full rehabilitation, a total of about 3,987 ha were made functional. The investment was about HRK 48 million.

Hrvatske vode – Department for protection against adverse effects of water and Unit for implementation of the National Programme of Irrigation and Land and Water Management intensely performed activities on the basic prerequisites for irrigation development in an area, i.e. provision of sufficient water quantities for irrigation in the form of

- Construction of planned multipurpose reservoirs (Londža – Phase 1, Lipovac), and
- Rehabilitation of existing reservoirs (e.g. Koljak, Bistra, Vlačine, Grabovac, Kašić basin)

into which about HRK 30.2 million were invested.

By the end of 2020, the construction of 16 new public irrigation systems with a total area of 10.989 ha and total value of the construction programme of about HRK 548 million was fully completed, as follows:

- IS Gat – Phase 1 (500 ha) in Osijek – Baranja County,
- IS Baranja (5,000 ha) in the Osijek – Baranja County (the project also includes the construction of the Lateral Canal Kneževi Vinogradi - Zmajevac with the length of 13 km and reversible PS),
- IS Međimurje (250 ha) in the Međimurje County,
- IS Bašćica - Phase 1 (350 ha) in the Zadar County,
- IS Bašćica – Phase 2 (128 ha) in the Zadar County,
- IS Lišansko polje – Phase 1 (232 ha) in the Zadar County,
- IS Kaptol – Phase 1 (parts 1 and 2, 106 ha) in the Požega – Slavonia County,
- IS Ramanovci Bektež – Phase 1 (369 ha) in Požega – Slavonia County,
- NIPP Opatovac (705 ha) in the Vukovar – Srijem County,

- IS Poljoprivredno šumarske škole Vinkovci (52 ha) in the Vukovar – Srijem County,
- IS Blata - Cerna (500 ha) in the Vukovar – Srijem County,
- IS Sopot (704) in the Vukovar – Srijem County,
- IS Valtura (360 ha – without the previously rehabilitated part of 80 ha) in the Istria County,
- IS Kapinci - Vaška – Phase 1 (1,260 ha) in the Virovitica – Podravina County,
- IS Đolta – Phase 1 (161 ha) in the Virovitica – Podravina County,
- NIPP Donja Neretva - IS Glog (312 ha) in the Dubrovnik – Neretva County.

The continuation of the works on the construction of 4 new public irrigation systems with a total area of 2,482 ha and total value of the construction programme estimated at HRK 207 million is ongoing and should be completed in the same year:

- IS Novi Gradac - Detkovac (750 ha) in the Virovitica – Podravina County,
- IS Orubica (326 ha) in the Brod – Posavina County,
- IS Poreština – Phase 1 - Červar Porat - Bašarinka (490 ha) in the Istria County,
- IS Puškaš (916 ha) in the Osijek – Baranja County.

Concluding with 2020, the completed investments in the rehabilitation and construction of irrigation systems resulting from the NAPNAV facilitated irrigation on 14,976 ha.

Tab. 2.4 Comparison of irrigated land used in agriculture in 2003 and in 2020 per counties

County / City	Used area (ha)	Irrigated in 2003 (ha)	Share of irrigation in 2003	NAPNAV result (ha)	Irrigated in 2020 (ha)	Share of irrigation in 2020
Zagreb County	77.818,65	177,07	0,23 %		177,07	0,23 %
Krapina - Zagorje County	27.783,84	7,39	0,03 %		7,39	0,03 %
Sisak – Moslavina County	62.721,83	45,03	0,07 %		45,03	0,07 %
Karlovac County	34.045,18	21,98	0,06 %		21,98	0,06 %
Varaždin County	38.512,56	538,26	1,40 %		538,26	1,40 %
Koprivnica - Križevci County	76.231,54	150,81	0,20 %		150,81	0,20 %
Bjelovar - Bilogora County	91.449,01	31,52	0,03 %		31,52	0,03 %
Primorje - Gorski Kotar County	17.741,73	19,77	0,11 %		19,77	0,11 %
Lika – Senj County	24.444,44	1,17	0,00 %		1,17	0,00 %
Virovitica – Podravina County	83.751,84	929,66	1,11 %	1.421,00	2.350,66	2,81 %
Požega - Slavonia County	42.547,89	1.085,60	2,55 %	475,00	1.560,60	3,67 %
Brod – Posavina County	62.316,20	205,32	0,33 %		205,32	0,33 %
Zadar County	21.030,44	611,99	2,91 %	1.113,00	1.724,99	8,20 %
Osijek - Baranja County	184.093,72	1.389,74	0,75 %	5.700,00	7.089,74	3,85 %
Šibenik - Knin County	11.197,62	61,11	0,55 %		61,11	0,55 %
Vukovar - Srijem County	121.077,65	771,96	0,64 %	3.196,00	3.967,96	3,28 %
Split - Dalmatia County	20.738,39	1.036,55	5,00 %	1.480,00	2.516,55	12,13 %
Istria County	24.643,16	381,88	1,55 %	440,00	821,88	3,34 %
Dubrovnik - Neretva County	7.243,73	919,85	12,70 %	901,00	1.820,85	25,14 %
Međimurje County	33.520,17	620,16	1,85 %	250,00	870,16	2,60 %
City of Zagreb	14.493,58	257,93	1,78 %		257,93	1,78 %
Total:	1.077.403,17	9.264,75	0,86 %	14.976,00	24.240,75	2,25 %

An important result of the NAPNAV is the development of county irrigation plans. Concluding with 2020, of 20 counties and the City of Zagreb, a total of 19 counties and the City of Zagreb developed county irrigation plans and adopted them by county / city assemblies.

Tab. 2.5 County irrigation plans

County / City	Plan developed by	Year of development
Zagreb County	Agronomski fakultet sveučilišta u Zagrebu	2006
Krapina - Zagorje County	Nije rađen	-
Sisak – Moslavina County	IGH, Zagreb	2008
Karlovac County	IGH, Zagreb	2009
Varaždin County	Elektroprojekt d.d.	2018
Koprivnica - Križevci County	IGH, Zagreb	2008
Bjelovar - Bilogora County	IGH, Zagreb	2009
Primorje - Gorski Kotar County	Građevinski fakultet Sveučilišta u Rijeci	2006
Lika – Senj County	Elektroprojekt, Zagreb	2007
Virovitica – Podravina County	Elektroprojekt, Zagreb	2006
Požega - Slavonia County	Hidroprojekt - ing, Zagreb	2005
Brod – Posavina County	Hidroing, Osijek	2007
Zadar County	Agronomski fakultet sveučilišta u Zagrebu	2006
Osijek - Baranja County	Hidroing, Osijek	2005
Šibenik - Knin County	Agronomski fakultet sveučilišta u Zagrebu	2007
Vukovar - Srijem County	Hidrotehnika i geodezija, Vinkovci	2006
Split - Dalmatia County	Institut za jadranske kulture i melioracije krša, Split	2006
Istria County	IGH, Zagreb	2007
Dubrovnik - Neretva County	Građevinsko - arhitektonski fakultet Sveučilišta u Splitu	2006
Međimurje County	Elektroprojekt, Zagreb	2003
City of Zagreb	Agronomski fakultet sveučilišta u Zagrebu	2008

Based on the said planning documentation, it was concluded that of a total of about 3,031,000 ha of agricultural land in 19 counties and the City of Zagreb:

- About 1,165,000 ha have 1st priority in terms of soil suitability for irrigation,
- About 633,000 ha¹² are 2nd priority in view of soil suitability for irrigation.

Irrigation plans analyse the possibilities of irrigation, with the priority for irrigation development given to those areas that fulfil 3 main criteria: soil suitability, vicinity and availability of sufficient water quantities and clearly determined, interested end users. The projects proposed in county irrigation plans will be addressed in the analysis of technical aspects of this document (Chapter 6).

2.3 Multipurpose systems

Multipurpose systems of regulation and use of water and land are mostly the largest physical interventions that regulate the water regime for the purposes of: (i) reasonable use of water and protection from water, (ii) creation of conditions for achieving economic and development interests, (iii) conservation of natural and cultural heritage and other existing values in areas affected by the system. As a rule, they are used for production of electrical energy, protection of population and assets from floods, public water supply, creation of conditions for the development of agricultural production (irrigation and land drainage), as well as tourism, sporting and other activities.

With respect to multipurpose systems, it is important to implement the principles of sustainable development in order to establish an efficient and equitable distribution of water and harmonize the interests of all users, taking into account the different and often conflicting demands of the development of individual economic activities (energy, agriculture, tourism, fish farming, water supply), preservation of biodiversity of water and water-dependent ecosystems, improvement of living conditions of the population

¹² It is important to note that mentioned data on soil suitability do not take into account other criteria and limitations of areas for irrigation, and that the term „priority“ should not be mixed with areas with a very high or high suitability for irrigation determined in the NAPNAV document (484,026 ha of agricultural land have a very high or high suitability for irrigation, with respecting the limitations of nature protected areas, water deficit, mine suspicious area and areas of the deficit vode, minski sumnjiva područja, područja I i II zone sanitarne zaštite izvorišta vode za piće).

and reduction of flood risks. The issues related to flood protection within multipurpose systems of regulation and use of water and land are solved by a gradual implementation of works on the rehabilitation and reconstruction of existing facilities and implementation of development projects.

In order to adequately and timely represent the interests of all relevant system users, it is necessary to reach a mutual agreement of all interested parties (different institutions, public and market interest users, local community). For each site where the reconstruction or construction of a multipurpose system is planned, an assessment procedure of possible significant environmental impacts shall be conducted in accordance with the provisions of the Environmental Protection Act and the Regulation on Environmental Impact Assessment. The assessment procedure is performed prior to the issuance of a location permit or other approval for a project for which the issuance of a location permit is not mandatory. For such projects, an environmental impact study is developed, based on which the environmental impact assessment of the project is conducted, including its evaluation and acceptability. The content of the environmental impact study shall also include the Main Appropriate Assessment of the impact of the project on the ecological network, if so determined in the screening procedure.

Pursuant to Article 108 of the Water Act, reservoirs for use of water power are designed and constructed so as to ensure their use for protection from adverse effects of water, and may be used for other purposes as well. The multi-purpose use of reservoirs is ensured in accordance with the concession agreement, water rights conditions and location permit. The obligations and shares in the financing of the construction of a multipurpose reservoir and its maintenance during its use are specified by the agreement concluded by the investors of construction with other water users.

Proper management of reservoirs significantly reduces flood risks in downstream areas, harmonizes mutual interests of water users and ensures the prescribed minimum flow in the related watercourses. The management of existing reservoirs is carried out in accordance with adopted regulations that define competences, responsibilities, operational rules and manner in which the available hydrotechnical infrastructure functions in normal and extreme hydrological conditions, and in extraordinary circumstances. They contain data on the capacities of all facilities for the evacuation of water from the reservoir at different backwater elevations (generators, sluices, weirs, bottom outlets, tunnels, canals).

Existing multipurpose reservoirs that were constructed for flood protection, irrigation or water supply are managed by Hrvatske vode (Pakra, Vonarje, Butoniga, Letaj, Ričica, Vlačine, Grabovac), while those constructed primarily for the production of electrical energy are managed by Hrvatska elektroprivreda (HEP Proizvodnja).

3 Identification of the problem

3.1 Flood risk management

3.1.1 Starting points

Risk management against the adverse effects of water shall include: preparation of preliminary flood risk assessment, preparation and implementation of flood risk management plans and the National Flood Defence Plan, implementing and logistical plans appended thereto, water regulation, implementation of regular and emergency protection against floods, implementation of protection against ice on watercourses, protection against erosion and torrents, basic amelioration drainage, and implementation of limitation of the rights of land owners and other legal possessors of land.¹³

Defence activities against floods, defence against ice and protection from erosion and torrents is an emergency service. Flood defence includes preventive, regular and emergency flood defence. Preventive flood defence includes works on the maintenance of natural and artificial watercourses and other waters, as well as maintenance of regulation and protection water facilities and basic amelioration drainage facilities. Regular and emergency flood defence consists of measures taken immediately before the flood hazard, during the flood hazard and immediately after cessation of the hazard for the purpose of reducing potential flood damage.

The National Flood Defence Plan is the most important document for implementation of all necessary preliminary and direct activities of flood defence on the entire territory of the Republic of Croatia (OG 84/10). The provision of the National Defence Plan include territorial units for flood defence, stages of flood defence, flood defence measures, including preventive measures, bearers of flood defence, flood defence management with obligations and rights of the flood defence managers, the contents of implementation plans for flood defence, the contents of logistical plans prescribing removal and rescue measures in the case of floods, operation of emergency services and other important services in flood conditions, water supply and food supply, etc., as well as the supplier of these, the notification and warning system and the communications system, and measures of ice defence on watercourses.

3.1.2 Flood defence plans

The Flood Risk Management Plan¹⁴ contains the conclusions of the Preliminary flood risk assessment, presentation of flood hazard maps and flood risk maps, objectives for flood risk management and the programme of measures for achieving these objectives, including prevention measures, protection, preparedness, flood forecasts and notification and warning systems, with the aim of reducing potential harmful consequences of floods on human health and safety, valuable goods and assets, and aquatic and terrestrial environment.

Flood hazard maps are developed in scale 1 : 25,000 for all areas where potential significant flood risks exist, or are likely to occur, i.e. for all areas which were identified as areas with potential significant flood risks during the stage of preliminary flood risk assessment. Analyses of flood hazards include fluvial (river) floods, flash floods and coastal flooding for three flood scenarios:

- With a high probability of occurrence,
- With a moderate probability of occurrence (100-year return period),

¹³ Definition from Article 119 of the Water Act (OG 66/19 and 84/21)

¹⁴ Integral part of the River Basin Management Plan 2016 - 2021

- With a low probability of occurrence, including accidental floods caused by a dike breach on larger watercourses or failure of a large dam (artificial floods).

In addition to the spatial scope, the maps also show water depths for floods of high, moderate or low probabilities of occurrence. Water depths are grouped into four categories: < 0.5 m, 0.5 – 1.5 m, 1.5 – 2.5 m and > 2.5 m. Sole flood lines for individual scenarios are determined as envelope flood lines with different sources of flooding. For the part of areas for which detailed hydrological and hydraulic analyses were not carried out, flood lines are determined according to assessments by competent services of Hrvatske vode.

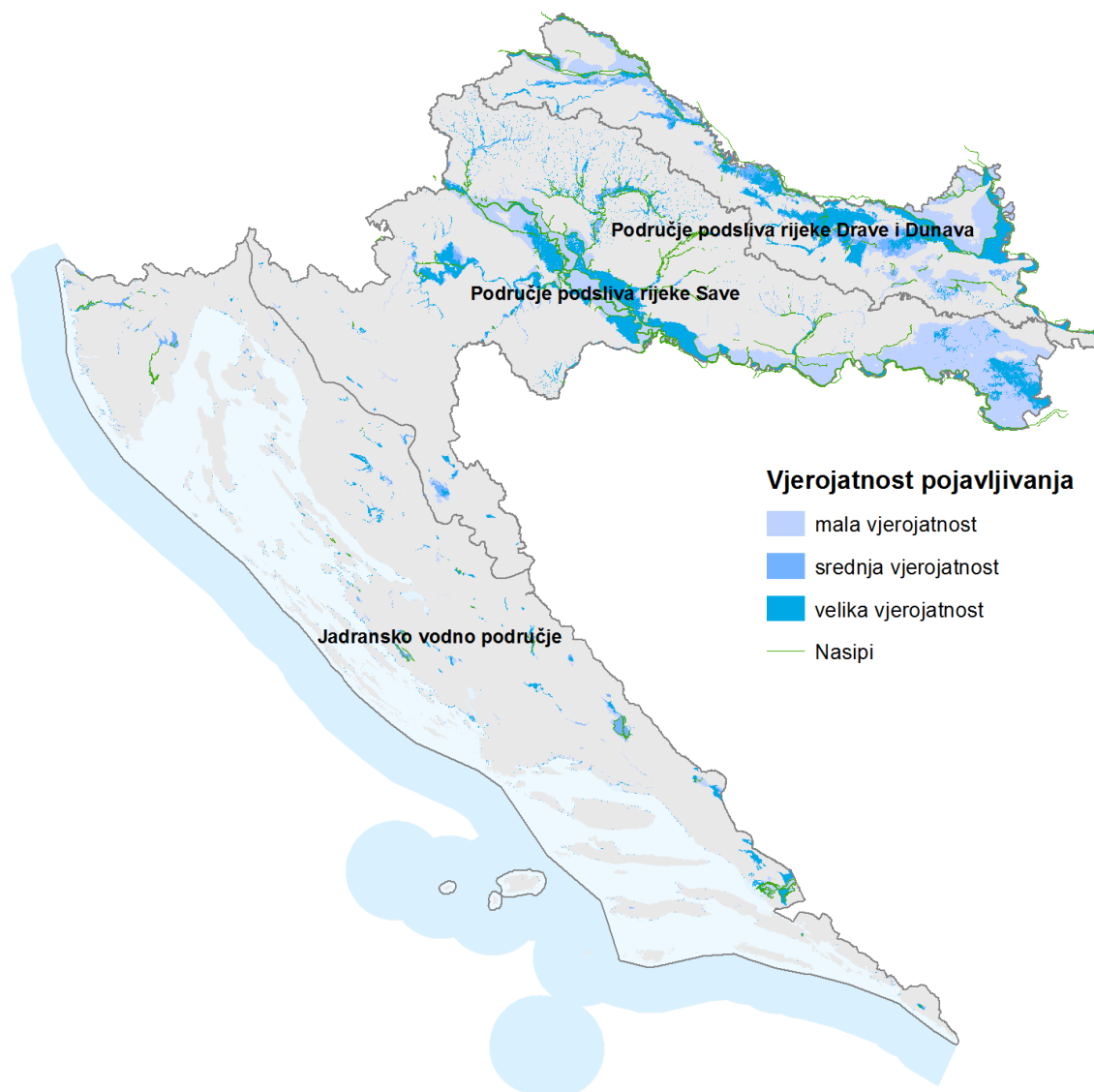


Fig. 3.1 Flood hazard map for floods with low, moderate and high probability of occurrence¹⁵

Flood hazard maps and flood risk maps indicate the presence of potential significant flood risks in about 6.2 % of the continental area of the Republic of Croatia in the case of floods with high probability of occurrence, in about 8.1 % area in the case of floods with moderate probability of occurrence, and in 17.0 % area in the case of floods with a low probability of occurrence.

¹⁵ From the RBMP 2016 - 2021 (Sl. D.6 p 488)

Tab. 3.1 Flooding areas for three scenarios according to the developed flood hazard maps

		Probability of flood occurrence			Total land and islands
		Low	Moderate	High	
Adriatic RBD - total	km ²	829	534	286	21,445
	%	3.9	2.5	1.3	100
Sub-basin of the Drava and Danube Rivers	km ²	3,477	1,840	1,398	9,353
	%	37.2	19.7	14.9	100
Sub-basin of the Sava River	km ²	5,341	2,209	1,820	25,764
	%	20.7	8.6	7.1	100
Danube RBD - total	km ²	8,818	4,049	3,218	35,117
	%	24.4	11.2	8.9	100
Republic of Croatia	km ²	9,646	4,583	3,503	56,562
	%	17.0	8.1	6.2	100

Flood risk maps indicate potential harmful consequences for three scenarios in areas for which previously developed flood hazard maps were developed, having in mind the following:

- Indicative number of potentially endangered population,
- Type of economic activities that are potentially endangered in the area,
- Plants and devices that may cause accidental pollution in the case of a flood and potentially have an impact on protected areas,
- Different useful information.

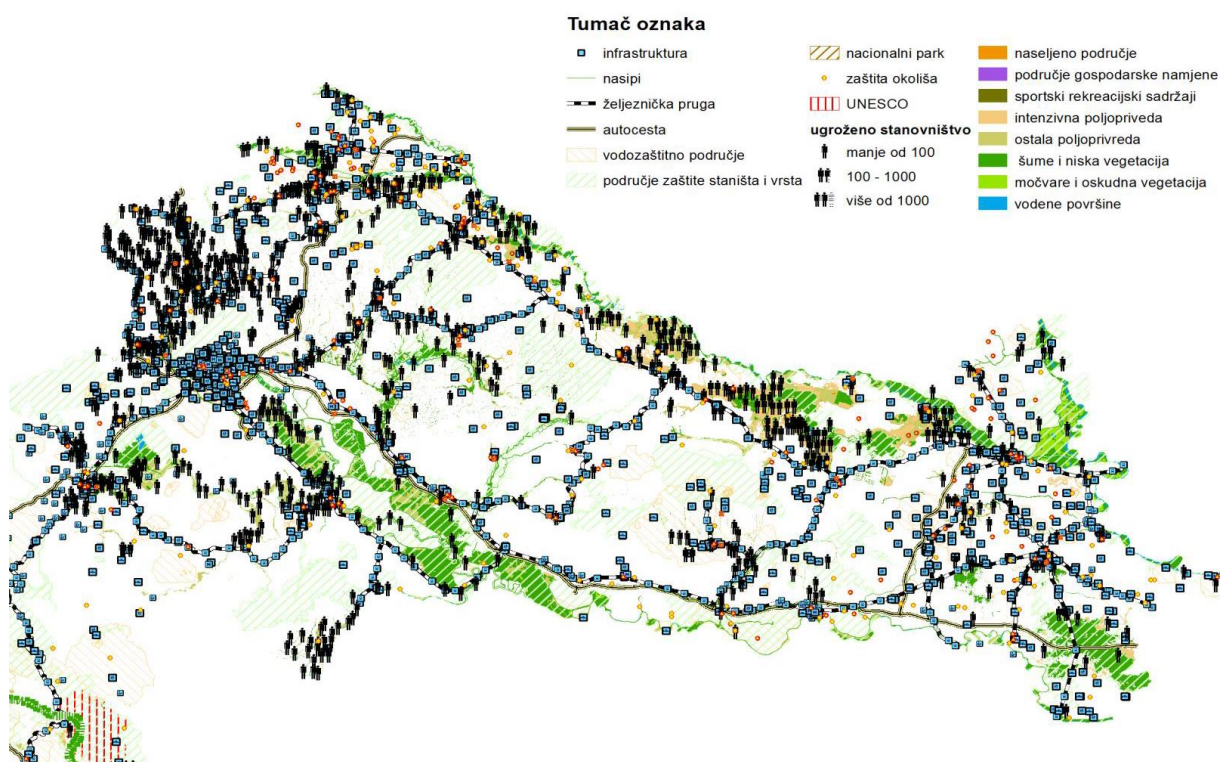


Fig. 3.2 Flood risk map for floods with high probability of occurrence in the Danube RBD (Hrvatske vode, <http://korp.voda.hr/>)

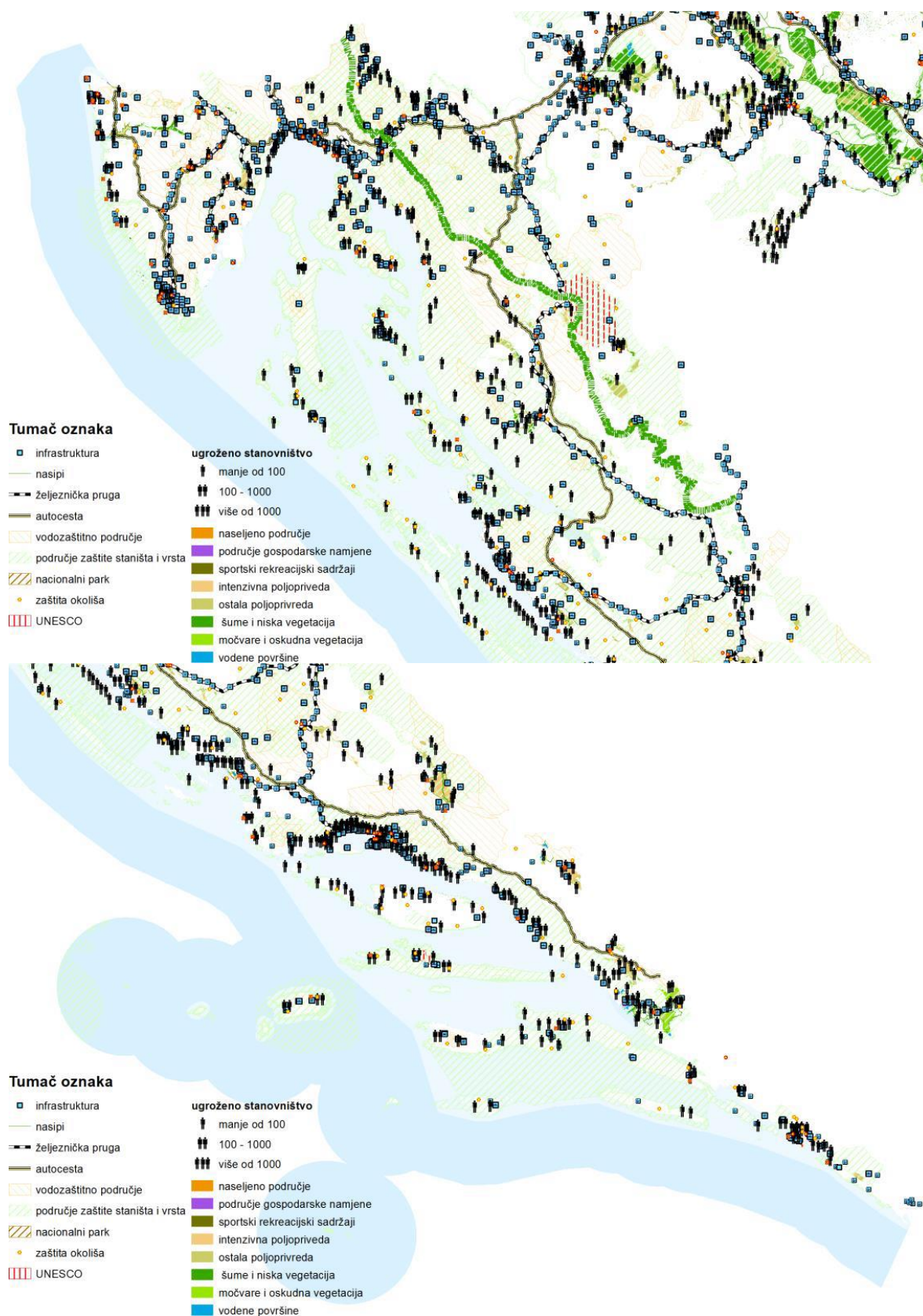


Fig. 3.3 Flood risk map for floods with high probability of occurrence in the Adriatic RBD (Hrvatske vode, <http://korp.voda.hr/>)

3.1.3 Implementation of regular and emergency flood defence and ice on watercourses

Organisation

Technical and other elements necessary for the management of regular and emergency flood defence on waters of the 1st order are specified in the Main implementation plan for flood defence, which is adopted by Hrvatske vode and implementation plans for flood defence for a total of 34 defended areas, which is adopted and updated by the chief flood defence manager upon the proposal by the sector flood defence manager.

Territorial units for flood defence are river basin districts, sectors, defended areas and sections.

River basin districts are territorial units for planning and reporting in flood risk management. The harmonisation of all flood defence activities is carried out according to the Flood Risk Management Plan, provisions of the National Flood Defence Plan and implementation plans and other supporting documents adopted on its basis.

Sectors are main operative territorial units for flood defence implementation. Coordination and operative management of flood defence in all defended areas within the sector is performed at the sector level. There are six sectors established on the national territory of the Republic of Croatia:

- Sector A – The Mura and Upper Drava with the seat in Varaždin and defended areas number:
 - 19 – The small basin Bistra (except the Drava River),
 - 20 – The small basin Plitvica–Bednja (except the Drava River),
 - 21 – The small basin Trnava (except the Mura and Drava Rivers),
 - 33 - The international rivers Mura and Drava on the small basins Bistra, Plitvica - Bednja and Trnava.
- Sector B – The Danube and Lower Drava with the seat in Osijek and defended areas number:
 - 15 - The small basin Vuka,
 - 16 - The small basin Baranja,
 - 17 - The small basin Karašica - Vučica,
 - 18 - The small basin Županijski kanal,
 - 34 - The international rivers Drava and Danube on the small basins Baranja, Vuka, Karašica - Vučica and Županijski kanal.
- Sector C – The Upper Sava with the seat in Zagreb and defended areas number:
 - 8 - The small basin Zelina - Lonja and the area of the municipality Rugvica,
 - 12 - The small basin Krapina - Sutla and the northern part of the small basin Zagrebačko Prisavlje,
 - 13 –The southern part of the small basin Zagrebačko Prisavlje,
 - 14 – The central part of the small basin Zagrebačko Prisavlje.
- Sector D – The Middle and Lower Sava with the seat in Slavonski Brod and defended areas number:
 - 1 - The small basin Biđ - Bosut,
 - 2 - The small basin Brodska Posavina,
 - 3 - The small basin Orjava - Londža,
 - 4 - The small basin Šumetlica - Crnac,
 - 5 - The small basin Subocka - Strug,
 - 6 - The small basin Ilova - Pakra,
 - 7 - The small basin Česma - Glogovnica,
 - 9 - The small basin Lonja - Trebež,
 - 10 - The small basin Banovina,
 - 11 - The small basin Kupa.
- Sector E – The North Adriatic Basins with the seat in Rijeka and defended areas number:
 - 22 - The small basins Mirna - Dragonja and Raša - Boljunčica,

- 23 - The small basins Kvarnersko primorje i otoci (Kvarner coast and islands) and Podvelebitsko primorje i otoci (Podvelebit coast and islands)
- 24 - The small basin Gorski Kotar,
- 25 - The small basin Lika.
- Sector F - The South Adriatic Basins with the seat in Split and defended areas number:
 - 26 - The small basin Zrmanja - Zadarsko primorje (Zadar coast),
 - 27 - The small basin Krka - Šibensko primorje (Šibenik coast),
 - 28 - The small basin Cetina,
 - 29 - The small basin Srednjodalmatinsko primorje i otoci (Central Dalmatian coast and islands),
 - 30 - The small basin Matica,
 - 31 - The small basin Vrljika,
 - 32 - The small basins Neretva - Korčula and Dubrovačko primorje i otoci (Dubrovnik coast and islands).

Defended areas are the base units for the implementation of operative management of flood defence. The orders of the Main Flood Defence Centre and the Sector are executed on the level of defended areas, thus ensuring self-initiative in proceeding with the defence in the case of absence of orders.

Sections are the lowest territorial units within defended areas. In case of a flood hazard, this is where the status is monitored and flood defence implemented directly on protection water facilities. The number and names of the sections are specified in the Main implementation plan for flood defence.

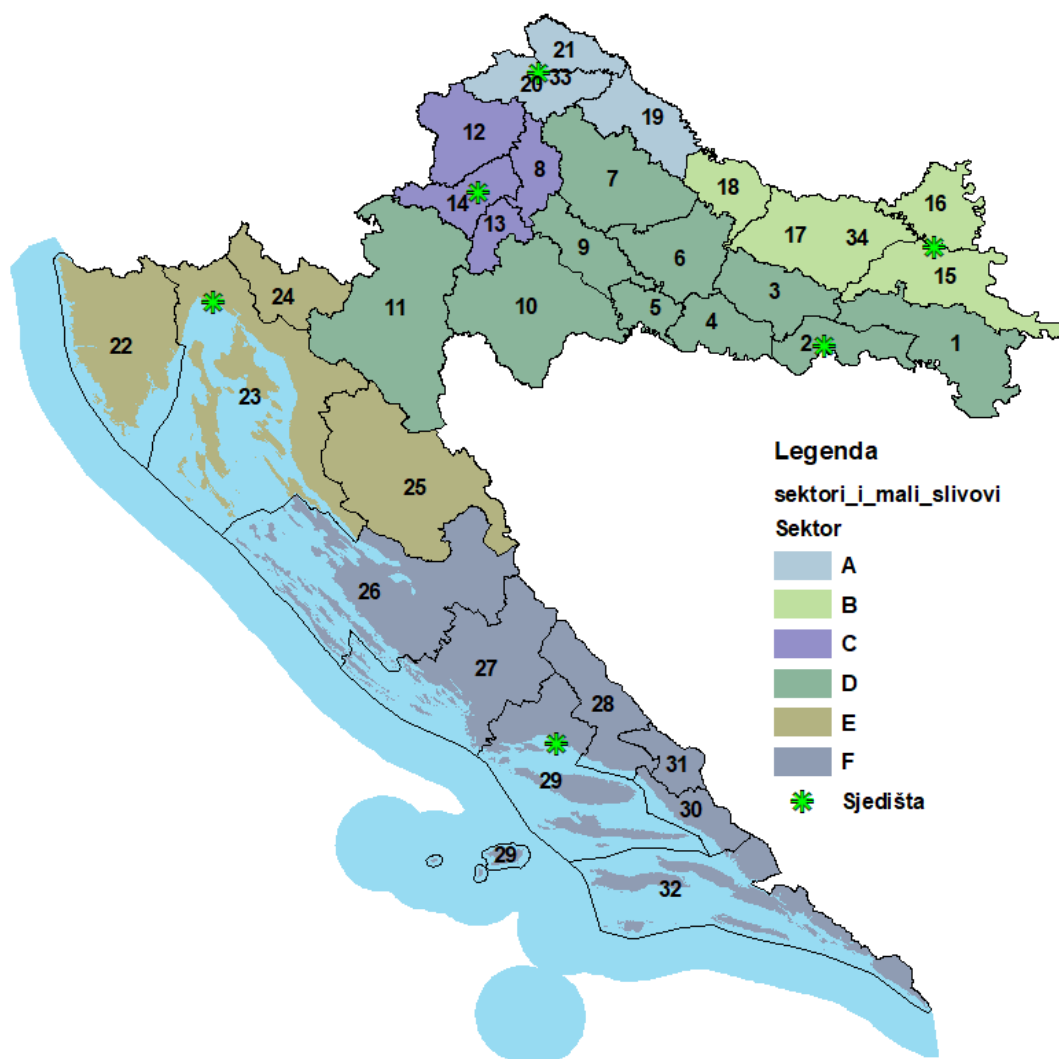


Fig. 3.4 Overview of the sectors, boundaries of defended areas and sector seats

Bearers of flood defence

Planning, organisation, financing and implementation of flood defence measures is the responsibility of Hrvatske vode. The Main Flood Defence Centre is an organisational unit of Hrvatske vode with the seat in Zagreb, and the central operative unit for regular and emergency flood defence management on the level of the Republic of Croatia. The Main Flood Defence Centre provides expert and technical support to the chief flood defence manager and unifies the work of flood defence sub-centres on the level of the six sectors. The collected hydrometeorological data, forecasts and warnings are forwarded from the Main Flood Defence Centre to flood defence sub-centres on the level of sectors and defended areas, where the operative decisions about flood defence management are made. An important task of the Main Flood Defence Centre is also maintaining direct connections with the Directorate of Civil Protection of the Ministry of the Interior, a state administration body responsible for civil protection tasks.

Flood defence management is the responsibility of the chief flood defence manager, head of the Main Flood Defence Centre and flood defence managers of the territorial units, all according to the proscribed obligations and rights.

Hrvatske vode assign implementation of preventive, regular and emergency flood defence to legal persons in defended areas, i.e. they conclude contracts for a period of four years with the selected tenderers by application of public procurement regulations. The selected tenderers have the obligation to

implement flood prevention in the defended area in which they are active, and carry out all necessary activities during regular and emergency flood defence.

Legal and natural persons managing reservoirs with ensured retention space for the acceptance of the flood wave must proceed in accordance with the provisions in their water rights permit, regulation or other general document and implement the decision of the flood defence manager regarding the maintenance of the highest permitted water level in the reservoir during the implementation of flood defence.

Croatian Meteorological and Hydrological Service (DHMZ) has the obligation to submit all available hydrological and meteorological data in real time, as well as developed forecasts and warnings about hydrological or meteorological phenomena of importance to flood defence to the Main Flood Defence Centre. The warnings are based on all available measurements covering the entire Republic of Croatia and the border areas of the neighbouring countries and contain information on the position and probable direction of atmospheric systems movements that can cause severe weather with heavy precipitation with floods as a consequence (primarily flash floods). There are three warning levels about dangerous weather that are submitted by email in the text and visual form.

The Directorate of Civil Protection of the Ministry of the Interior (RCZ MUP) receives all relevant information as soon as it is available, which contributes to a timely response and efficiency of the civil protection system. It uses obtained warning information to undertake measures for which it is competent and, according to standard operative procedures, initiates the introduction of preparedness of a part of the operative force of the civil service system. Simultaneously, it conveys the information about a possibility of an emergency event occurrence, instructions and recommendations through civil protection regional offices (Zagreb, Varaždin, Osijek, Rijeka, Split) to local and regional communities responsible for operative response. In this manner, the implementation of the Protection and Rescue Plan of the Republic of Croatia (OG 96/10) is established and supervised, with the aim of strengthening the preparedness for action in large accidents and disasters, including those due to floods and accumulation of ice in watercourses. During regular and emergency flood defence, it takes part in conveying information to competent bodies and population in potentially endangered areas about the status and forecasts in flood defence and initiates the activation and engagement of civil protection headquarters, i.e. direct participants in the civil protection system, and, if necessary, the Armed forces of the Republic of Croatia and the police when the flood danger is of such scope that defence cannot be provided by material and human resources of Hrvatske vode, legal persons and operative forces in the area of the unit of local and regional self-government, and also on the territory of the Republic of Croatia.

Other competent state administration bodies are obliged, within their scope of work and for the purpose of efficient functioning of the civil protection system, draft parts of the National plan of civil protection activities in areas of their competence. The competent bodies of local and regional self-government units and legal persons within the civil protection system have to develop and enact plans of civil protection activities and operative plans, and cooperate with the Directorate of Civil Protection of the Ministry of the Interior (RCZ MUP) in the organisation and training of civil protection headquarters, as well as organising and equipping of the civil protection operative forces, within areas of their competence.

3.1.4 Damage quantification¹⁶

Flood damage is grouped into seven types determined on the basis of general land use. Each type of land use is connected to relevant CORINNE databases distributed into individual classes:

- Urban fabric,
- Industrial or commercial units,
- Infrastructure areas,

¹⁶ According to data from the RBMP 2016-2021

- Agricultural areas,
- Permanent crops,
- Green urban areas,
- Other areas.



Fig. 3.5 Overview of land use types

The parameters affecting the assessment of damage are primarily water depth, type of endangered structure, water flow velocity, flood duration, sediment concentration, flood water pollution, efficiency of flood warning and speed and quality of response. In addition, specific characteristics of a potentially flooded area influence a damage assessment and, with respect to necessary evacuation time, periods of potential flood events and flood duration. These were taken into account when selecting the correction factor F .

Damage assessment was made for three flood scenarios:

- Floods with a high probability of occurrence,
- Floods with a moderate probability of occurrence (100-year return period),
- Floods with a low probability of occurrence (including floods caused by a potential dike breach on larger watercourses or failure of large dams (artificial floods)).

As damage assessment uses water depth as an input parameter, damage for all four depth classes were calculated, resulting in a total damage for a certain flood scenario. The damage calculation included three areas – the Adriatic RBD, the Sava sub-basin and the Drava and Danube sub-basin. The damage in the Sava sub-basin is the greatest because in the low probability scenario the cities like Zagreb, Sisak, Slavonski Brod, Županja, etc. are the most endangered.

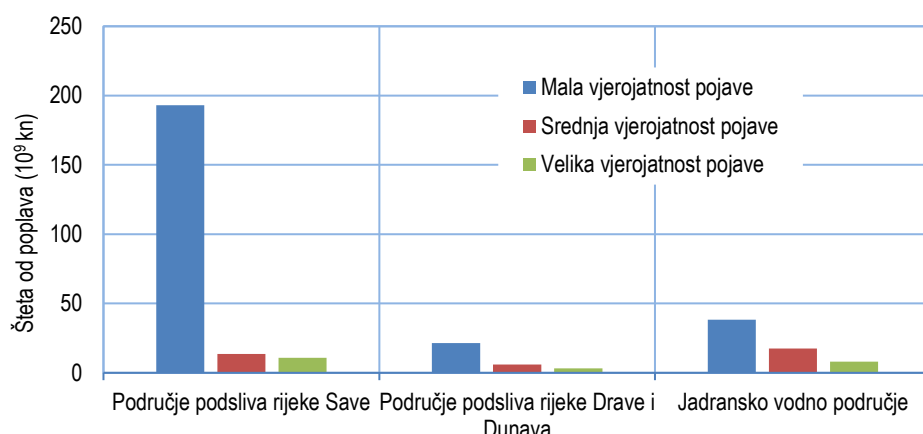


Fig. 3.6 Assessment of damage for three flood scenarios

The results of analyses on the macro level indicate that the low probability flood scenario causes the greatest damage due to the largest area covered by water. A potential damage on the level of the Republic of Croatia caused by a flood event with low probability of occurrence is ten times larger than a potential damage caused by flood with a moderate or high probability of occurrence (assessment included only direct damage). Indirect damage was not the subject of the assessment – in the absence of other data and information, it is assessed as a percentage of total direct flood damage.

3.2 Irrigation

3.2.1 The role of agriculture and damage on agricultural land

As the main rural activity, agriculture is an important sector of the national economy. Persons employed in agriculture make 2.6 % of the total employed persons. The share of agriculture in the generation of the gross national GDP is 3.6 %. Agriculture and agricultural and food processing industry generate approximately 10 % of foreign trade (13.5 % in 2018).

The Danube RBD accounts for 84 % of the total number of persons employed in agriculture, forestry and fisheries, with the Sava sub-basin participating with 48 %, and the Drava and Danube sub-basin with 36 %. The above-average representation of agriculture in the structure of economy characterises the Drava and Danube sub-basin.

Tab. 3.2 Agriculture, forestry and fisheries in 2018¹⁷

Description	Sava sub-basin	Drava and Danube sub-basin	Danube RBD	Adriatic RBD	Republic of Croatia
Number of employed persons	24,326	18,245	42,571	8,109	50,680
RoC = 100	48 %	36 %	84 %	16 %	100 %
RBD / sub-basin = 100	5 %	11 %	6 %	3 %	5 %
Specialisation index	0.9	2.1	1.2	0.5	1.0
Note: Employed persons only includes those employed in legal entities or employed insured farmers.					

Research shows that the potentials of Croatian agriculture are insufficiently used. If the territory of the Republic of Croatia is divided according to agroecological characteristics into the Pannonian, Mediterranean and Alpine regions, than the Pannonian region, which can be considered equal to the Danube River Basin District, is where the majority types of agricultural production and capacities are located. Nearly the entire production of production of cereal crops, sugar beet and industrial plants, as well

¹⁷ Source: Croatian Bureau of Statistics, Statistics data 2019

as the major part of livestock production and the production of fruits, fodder crops and grapes is taking part in this region. The Mediterranean region within the Adriatic River Basin District abounds with pastures, olive groves and vineyards and is an important wine and olives producer.

Farms owning up to 10 ha of agricultural land are considered commercial or potentially commercial. There are 139 thousand such agricultural farms in Croatia (88 % of the total number of agricultural farms), which farm 343,930 ha of agricultural land (30 % of the total cultivated agricultural land). Only 5.5 % farms use more than 20 ha of land. It is considered that farm size¹⁸ and numerous small agricultural farms are the limiting factors in agricultural production, including related livestock breeding.

The major part of agricultural activities in Croatia are carried out by family farms that manage about 80% of land and livestock and participate with about 38% in the purchase of agricultural products and 53% in the total value of agricultural production and services. The total value of purchased and sold agricultural products in 2018 was HRK 7.35 billion.

On an international scale, Croatian agriculture is uncompetitive. This is primarily the result of underdeveloped market infrastructure, inefficient distribution channels, underdeveloped land market, etc.¹⁹.

Since irrigation potentials are unused, irrigation currently does not represent a significant burden on water resources. According to the size of irrigated areas, the Republic of Croatia is among the last countries in Europe. In dry years (2000, 2003, 2007, 2011 and 2012), damage from droughts accounted for 80 to 90% of total damages from natural disasters. Cumulatively, in the period from 2000 to 2018, damages from natural disasters amounted to a total of HRK 34,657 million, of which damages from droughts equalled HRK 14,904 million, or 43%.

Tab. 3.3 Irrigation of agricultural land and reported damage in agriculture caused by droughts in the period 2011 - 2019

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019
Irrigated area (ha)	15,380	15,540	15,909	15,909	16,269	22,529	22,529	22,529	24,187
Reported damage from droughts (in HRK million)	2,077	2,616	51	-	1,381	242	1,156	13	-
Total reported damage from natural disasters (in HRK million)	2,599	3,789	406	4,642	2,044	1,554	2,498	194	-
Share of drought-related damage in total damage (%)	79.93	69.04	12.66	-	67.60	15.63	46.27	6.78	-

The consequences of droughts, in addition to large financial damages, are also reflected in negative foreign trade exchange and low competitiveness of domestic production, thus certainly making irrigation one of extremely important measures and needs that can reduce these damages and, in certain circumstances, fully avoid them.

3.2.2 Irrigation – a cultivation measure and a yield stability measure

Considering the natural potentials of the Republic of Croatia, irrigation is not implemented to an extent that corresponds to the actual possibilities, importance and needs.

Irrigation as a land reclamation measure has the goal to compensate for water shortage that occurs during the cultivation of agricultural crops in order to achieve their biological potential. In the Republic of Croatia,

¹⁸ Small agricultural farms produce different products predominantly for their own needs, which reduces the economy of scale, production efficiency and yields.

¹⁹ More detailed in Švaljek (2007).

irrigation can be a regular and a supplementary cultivation measure. Suitable soils and sufficient water quantities are the main prerequisites for the implementation of such a measure.

Water shortage is one of the limiting factors for a successful cultivation of agricultural crops. It results in changes in many physico-chemical processes in the soil, as well as in plant physiological processes, leading up to a reduction in yield. Ensuring water for normal plant growth and development, naturally with other factors as well, leads to the achievement of the full genetic potential of a cultivated crop. Water shortages during the growing season are not the same on the entire national territory, thus the role of irrigation is not the same in all areas.

For some crops in the continental part of the country irrigation is a supplemental cultivation measure, whereas for some crops in the same area it is a regular cultivation measure. In the Mediterranean region, However, irrigation is a regular cultivation measure for most crops.

Regardless of the area, however, irrigation is a yield stability factor for cultivated crops.

4 Strategic objectives

4.1 Protection from adverse effects of water / flood risk management

Water management in the Republic of Croatia should strive for sustainable protection against floods and other forms of adverse effects of water, which implies achieving economically justified levels of protection of population, material assets and other endangered values, while at the same time encouraging the preservation and improvement of the ecological status of waters and floodplains.

According to the Water Management Strategy, one of the objectives to be achieved in the protection against adverse effects of water is to increase the necessary functionality of the flood protection system on waters of the 1st and 2nd order:

- Up to the level of approx. 87 % by the end of 2023
- Up to the level of 100 % by the end of 2038.

Flood safety status can be improved by carrying out works on the rehabilitation and reconstruction of regulation and protection water facilities and land reclamation drainage facilities, and through further development of protection systems. One half of the necessary works are planned to be carried out in the period until 2023, and one half in the period until 2038. The functionality of the flood protection system should be maintained and upgraded in accordance with current experiences and knowledge about their effectiveness, conducted assessments of the degree of threat to the population and material assets, and available financial resources. Maintenance of protection systems on waters of the 1st and 2nd order is performed by Hrvatske vode, whereas maintenance of detailed canal network for drainage and irrigation has been carried out by counties since 2009.

Analyses of the structure of costs of investing in regulation and protection water systems in order to achieve strategic objectives indicate that the ratio of necessary investments in maintenance, as well as bringing the system to a functional state and developing the system on an annual level amounts approximately to 70% : 30%, which ensures sustainability in managing flood risks.

Tab. 4.1 Costs of investments for the purpose of protection against adverse effects of water in the period 2017 - 2020

Investments according to Water Management Plan	2017	2018	2019	2020
Maintenance of waters of the 1 st and 2 nd order, public water estate, regulation and protection water facilities, facilities for basic land reclamation drainage and facilities for torrential water drainage	HRK 699,955,000	HRK 747,243,000	HRK 649,193,000	HRK 630,192,000
Construction of regulation and protection water facilities and facilities for basic land reclamation drainage	HRK 178,928,000	HRK 160,324,000	HRK 193,984,000	HRK 264,176,000
Rehabilitation and maintenance of detailed land reclamation drainage facilities	HRK 31,767,000	HRK 44,929,000	HRK 67,999,000	HRK 69,589,000
Technical affairs of general interest for water management (preparing studies, monitoring etc.)	HRK 53,598,000	HRK 61,927,000	HRK 56,428,000	HRK 58,018,000
Total	HRK 964,248,000	HRK 1,014,423,000	HRK 967,604,000	HRK 1,021,975,000

By observing the structure of investments in the period 2017- 2020, the following can be noticed:

- Total annual investments in regular management and technical maintenance of existing protection systems are significantly lower than the amounts proposed by the Strategy.

- Investments in the construction of regulation and protection water facilities and basic land reclamation drainage facilities were significantly lower than the amounts proposed by the Strategy, whereas in 2020 there was a more pronounced increase in investments compared to previous years.

4.2 Irrigation

Natural advantages and deficit in food production, as well as the reform of the agricultural sector with a view to encourage development, require the improvement of land reclamation systems. The development priority is to stop the deterioration of the existing land reclamation systems and bring them into operational readiness in accordance with new conditions and needs, where there is interest. The efficient operation of land reclamation systems is also affected by fragmented agricultural plots, and this issue needs to be addressed as a matter of priority. The Water Management Strategy points out that the National Plan of Irrigation and Agricultural Soil and Water Management (National Irrigation Plan - NAPNAV) will be the basis for the operation of water management in ensuring the necessary amounts of water for irrigation.

The following is foreseen in the further development of irrigation:

- increased use of water for irrigation, based on the assumption that the structure of agricultural production will change in the traditionally agricultural area within the Danube river basin, that horticultural and fruit crops will be introduced into plant production system, and that certain agricultural crops and industrial plants (climate change impact) will be more and more irrigated; a significant boost to irrigation will be given by the construction of new irrigation systems, for which water will be provided by the construction of larger water facilities (Biđ - Bosutsko polje land reclamation canal, Baranja lateral canal) or will be abstracted from large rivers (Sava, Drava and Danube) to irrigate larger agricultural areas; in this area there are sufficient volumes of water that could be used for irrigation,
- for the area of the Adriatic river basins, where, during the summer months, available water volumes are generally not sufficient, the use of irrigation technologies and equipment that use minimal water volumes; it should be noted that the available water volumes from certain watercourses for irrigation purposes are sometimes of a limited nature; for example, the need for irrigation is highest during droughts, that is, during unfavorable hydrological periods, which means that the necessary volumes can be secured by accumulating water during the rainy part of the year; on islands and in areas with scarce water, local accumulation of water is planned during the wet part of the year for irrigation purposes; a special role will be played by the use of overflow water from springs that are used for water supply during the wet part of the year, and whose water will be accumulated through the existing water supply infrastructure in small reservoir systems for irrigation purposes in the dry part of the year, thus achieving better efficiency and economic sustainability of the existing water supply systems due to the large fluctuation of consumers during the year (seasonal tourism fluctuation); that is, by introducing into use other non-conventional sources of water, such as the use of treated wastewater or desalination where there are conditions for this; this could reduce to a certain extent the use of water from public water supply systems in the coastal area and on the islands (during tourist season and the highest need for water) for the needs of individual agricultural production.

The long-term objective of the NAPNAV is to increase the share of irrigated surfaces out of total arable surfaces from 0.86 % to 6 %²⁰.

The NAPNAV plans the following investments in irrigation systems ²¹:

- by 2010, build irrigation systems on new 35,000 ha of agricultural land with an investment value of HRK 2.389 billion,

²⁰ Status in 2005, the time when the NAPNAV was prepared.

²¹ Amounts were calculated into HRK from original estimates in euro (per exchange rate 1 eur =HRK 7.5).

- by 2020, build the infrastructure and apply the cultivation measure of irrigation on a total of 65,000 ha of agricultural land, with an additional HRK 2.048 billion,

which means that the total planned resources for irrigation amount to HRK 4.436 billion.

The NAPNAV foresees that the construction of water intake structures and distribution networks will be financed by the Government of the Republic of Croatia and regional self-government units in the amount of HRK 3.0 billion, whereas the final users, agricultural producers will invest in the rest of the irrigation systems in the amount of HRK 1.436 billion.

With Croatia becoming a full EU member state, the conditions for financing the construction of new irrigation canals through the rural development fund were met, which resulted in increased building of new irrigation systems starting in 2016.

Tab. 4.2 Comparison of strategic objectives and achieved activities in irrigation

Description	Foreseen by Strategy/ NAPNAV	Achieved- constructed	Covered by activities through the NAPNAV ²²
Period	until 2020	until 2019	until 2020
Total irrigated surfaces in 2004 amounted to 9,300 ha	65,000 ha	24,729 ha	
Total in relation to what is foreseen by the Strategy:		38 % out of planned 2020	200 %

Analyses of the planned and achieved dynamics of the implementation of the NAPNAV in the past years indicate that significant steps forward have been made until 2020, even though the plan has not been realized. Almost the entire surface of the Republic of Croatia is covered by county irrigation plans (with the exception of Krapina-Zagorje County, which did not express interest), and a significant part of the necessary technical documents has been prepared. Irrigation systems were rehabilitated and part of the national irrigation pilot projects were built. The availability of resources from the European Fund for Rural Development since 2016 has given a new impetus in the sense of faster achievement of determined objectives. It can be concluded that the process of introducing irrigation, as part of the necessary land reclamation in agriculture, has been initiated. The originally planned objective - the implementation of irrigation on 65,000 ha by 2020 – has not been achieved, however the NAPNAV is being updated in order to achieve an acceptable level of irrigation development in addition to redefining future objectives and ensuring the continuation of funding for the design and construction of irrigation systems from the EU rural development fund, especially in the light of the response to existing climate change and the requirement to ensure the self-sufficiency of Croatian agriculture.

²² Activities cover a wider area in order to define projects for financing construction and achieving strategic objectives of 65,000 ha until 2020.

5 Financial framework

5.1 Protection from adverse effects of water / flood risk management

According to the current financing model, the construction of water facilities of the flood protection system is financed by special-purpose water fees, with the possibility of co-financing from the state budget of the Republic of Croatia and other domestic and foreign sources (loans from financial institutions, EU funds, assistance from international organizations). The relevant water fees are: water contribution and water regulation fee.

The water contribution is a public levy that is paid for the construction of facilities according to the tariff depending on the type of facility prescribed by the Government of the Republic of Croatia. The funds collected from the water contribution represent the income of Hrvatske vode, except for 8% of the funds collected, which are transferred to the local self-government units in the area where they were collected for storm water drainage in those areas. Income from water contribution is the only permanent special-purpose source of funds for financing the construction of regulation and protection water facilities.

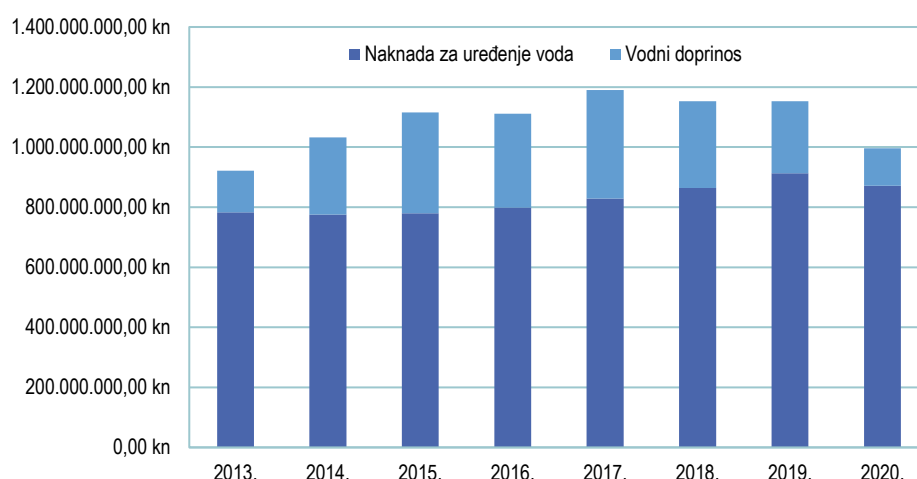


Fig. 5.1 Overview of income from water regulation fees and water contribution in the period 2013- 2020

Together with the revenue from the water regulation fee which is paid for any real estate except agricultural land, the water contribution is also a significant source of funds for:

- implementation of prevention, regular and emergency flood defense,
- construction of basic land reclamation drainage facilities,
- removal of river sediment in the maritime estate,
- financing the construction of urban stormwater drainage facilities (reservoirs, retentions and boundary channels) when the receiving capacity of constructed urban stormwater drainage facilities or existing watercourses is not sufficient to receive excess stormwater,
- covering the costs of preparation and legal actions for the purpose of entering the public water estate into the land register and cadastre, and purchase and expropriation of real estate in favour of the public water estate.

The revenue collected from the water contribution is used according to the principles of solidarity and priority in needs on the national territory of the Republic of Croatia.

The reduction of original revenues in 2020 compared to 2019 is caused partly by the covid pandemic and partly by the application of new water contribution calculation tariffs. The total amount of the original revenue for 2019 is about 3.5% lower compared to the amount in 2018 due to the reduced number of received requests for the calculation of the water contribution in the process of legalization of illegally built buildings, as well as due to the decrease in revenue from the water use fee because, according to the final calculation for the year 2018, in 2019 Hrvatska elektroprivreda (Croatian national energy company) started applying price calculations resulting from the relation between the total electricity produced and the costs of electricity production. In 2019, revenues from the state budget amounted to HRK 737.7 million, of which HRK 104.45 million related to non-reimbursable EU funds for projects related to protection from adverse effects of water that are transferred through the competent ministry.

The structure of revenues realized in the period 2013 – 2020 indicates that the largest share of State Budget funds was realized in 2016 (34%) with a total amount of HRK 1,216.64 million, and in 2020 (36.5%). with a total amount of HRK 1,248,199 million, primarily as a result of larger absorption of EU funds.

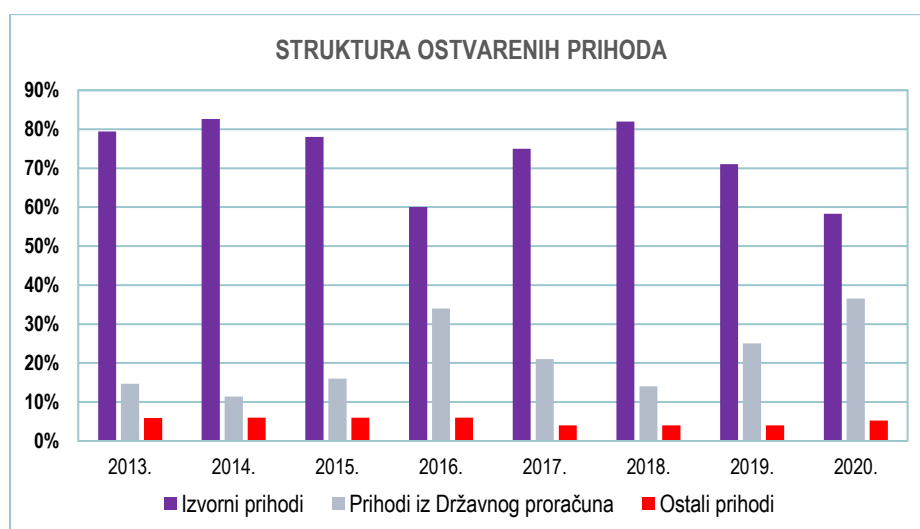


Fig. 5.2 Overview of the structure of Hrvatske vode's revenue realized in the period 2013 - 2020

The expenditure side follows the dynamics of revenue growth, especially in the key item, the costs of regular maintenance and restoration of watercourses, regulation and protection water facilities and water estate. Significant investments were aimed at the rehabilitation and maintenance of detailed canal network for drainage and irrigation, which was a legal obligation of Hrvatske vode and a prerequisite for handing over detailed land reclamation facilities to the jurisdiction of counties.

The projection of expected revenues and expenditures of Hrvatske vode for the construction of regulation and protection water facilities and land reclamation drainage facilities, for the period until the end of 2023, due to uncertain macroeconomic and financial projections at the global and national level, is quite conservative.

Hrvatske vode's reduced investment capacity additionally emphasizes the importance of defining the updated Multiannual Program well, in order to raise the necessary functionality of the flood protection system on waters of the 1st and 2nd order in an efficient and rational way. The following sources can be used as additional sources of financing:

- Loans by international financial institutions,
- National resources (state budget of the Republic of Croatia, budgets of local self-government units, etc),
- Non-reimbursable EU funds.

When dealing with protection water facilities, financing conditions should be sought on the market of investment development loans that offer lower interest rates, longer loan repayment periods, grace periods adjusted to the planned construction period, and maturity of instalments/annuities adjusted to the dynamics and method of raising funds.

According to the provisions of the Act on Water Management Financing (Official Gazette, No. 153/09, 90/11, 56/13, 154/14, 119/15, 120/16, 127/17 and 66/19), water fees that can be used to finance investments under this updated Multiannual Programme are water contribution and water regulation fee.

5.2 Irrigation

Pursuant to the Water Act, the owners of public irrigation systems are local (regional) self-government units and they represent system investor. The previously established model of financing the construction of irrigation water facilities will continue in the next programme period 2021 - 2027 through the following sources of financing:

- National resources:
 - State budget of the Republic of Croatia,
 - Hrvatske vode's original resources,
 - Budgets of local (regional) self-government units,
 - Final users' resources,
- EU funds:
 - Rural Development Programme of the Republic of Croatia for the Period 2014- 2020,
 - Rural Development Programme of the Republic of Croatia for the Period 2021 - 2027,
 - Recovery and Resilience Facility 2021- 2025,
- Loans granted by international financial institutions.

The main source of funds for the implementation of the NAPNAV until 2016 was the State Budget of the Republic of Croatia through national financing mechanisms.²³ Since 2017, the main role has been assumed by the national Rural Development Program for the Period 2014 - 2020 (RDP 2014 - 2020). Projects will continue to be prepared with national funds, whereas construction costs and other eligible costs will be financed through Measure 4 "Investments in physical assets", Sub-measure 4.3 "Support for investments in infrastructure related to the development, modernization and adaptation of agriculture and forestry", type of operation 4.3.1 "Investments in basic public irrigation infrastructure" from the RDP 2014-2020. Projects that will not be eligible for financing from EU funds will be financed by national funds through national financing mechanisms. The Programme envisages that one part of projects will be financed through loans granted by international financial institutions.

Financing of the construction of irrigation systems in the past few years is shown in the following graphs.

²³ Ratios of financing from the State Budget of the Republic of Croatia and units of local and regional (regional) self-government are determined in the NAPNAV.

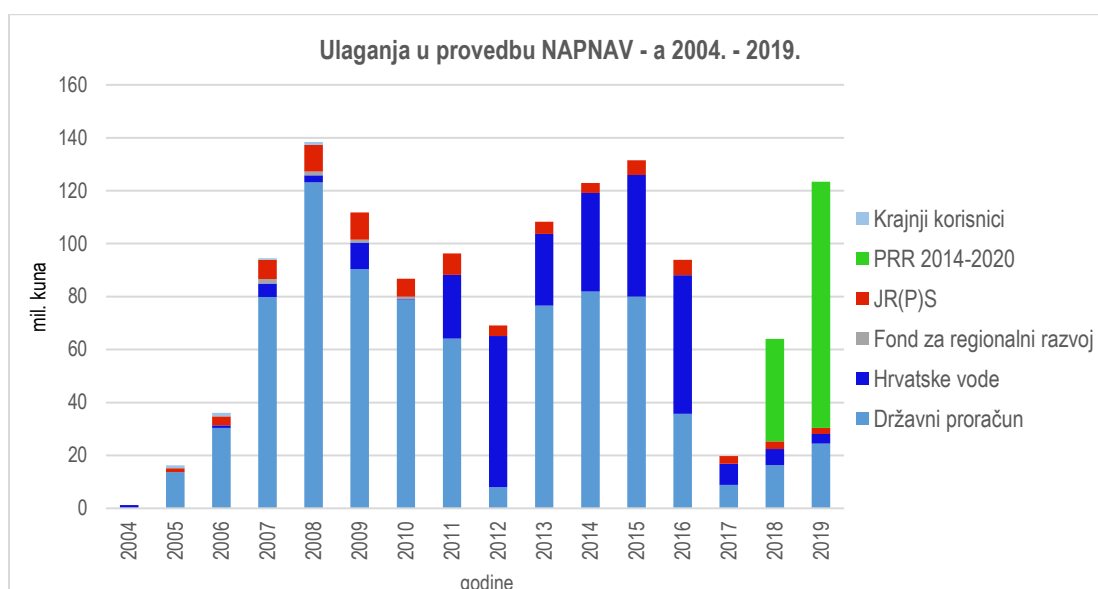


Fig. 5.3 Investments in the implementation of the NAPNAV 2004 - 2019

Funding for irrigation systems varies significantly. The transfer of the State Budget of the Republic of Croatia varies the most, and since 2011 the share of Hrvatske vode's original funds has been significant, and since 2018 the share of the Rural Development Programme 2014 - 2020.

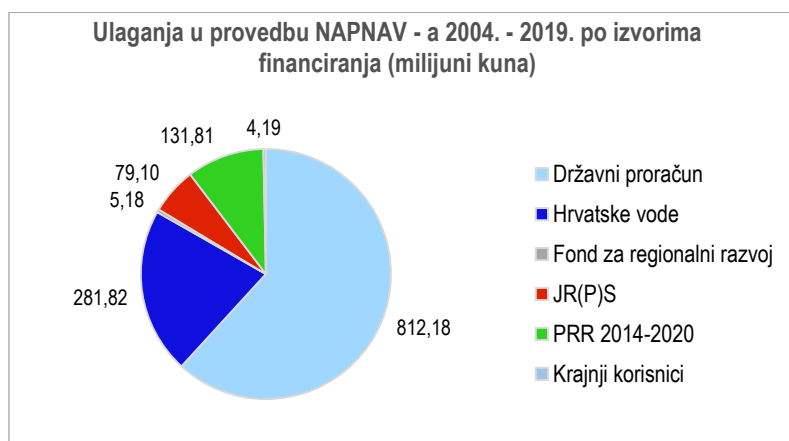


Fig. 5.4 Investments in the implementation of the NAPNAV 2004 – 2019 according to sources of funding

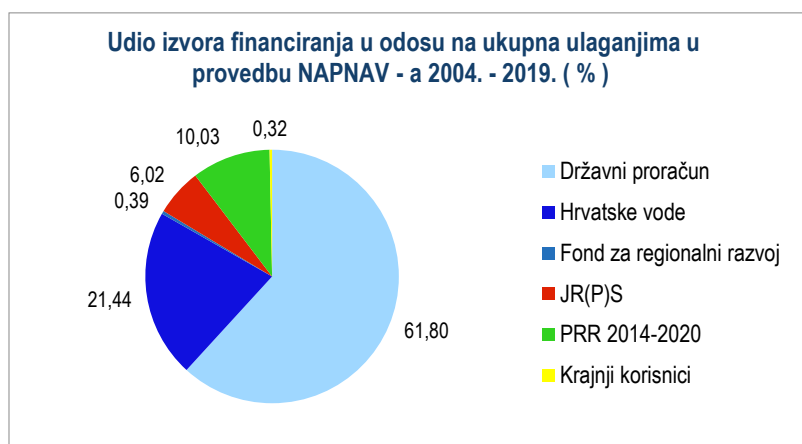


Fig. 5.5 Share of funding in relation to total investments in the implementation of the NAPNAV 2004 - 2019

6 Technical aspects

6.1 Type of facilities covered by the Multiannual Programme

Water facilities covered by the updated Programme are facilities or groups of facilities together with the pertaining plants and equipment, comprising technical or technological units, and used for protection from adverse effects of water and irrigation.

With respect to their purpose, they are divided into the following types:

- I. Regulation and protection water facilities - dikes, bank revetments, artificial watercourse channels, relief canals, lateral canals, drainage tunnels, dams with reservoirs, sluices, retentions and other pertaining structures, pumping stations for flood defence, multiple purpose reservoirs, stilling pools, erosion and torrent control facilities, and other pertaining facilities,
- II. Land reclamation water facilities:
 - a. Land reclamation drainage facilities - canals with pertaining pumping stations, underdrains, concrete culverts, plugs, siphons, channel falls, chutes, anti-erosion lining, sluices and other pertaining facilities, plants and equipment, and can be divided into:
 - Basic land reclamation drainage facilities²⁴,
 - ✓ Land reclamation facilities of the 1st order - main drainage canals for collection of all waters from the land reclamation system or parts of the system, transported via the detailed canal network and taken into land reclamation facilities,
 - ✓ Land reclamation facilities of the 2nd order - main drainage canals for collection of all waters from the land reclamation system or parts of the system, transported via the detailed land reclamation network and taken into land reclamation facilities of the 1st order,
 - b. Irrigation facilities - accumulation and other intake facilities, distribution network and other pertaining facilities,
 - c. Combined land reclamation facilities are facilities that are used both for the purpose of land reclamation drainage and for the purpose of irrigation.

Construction and maintenance of the stated water facilities is in the interest of the Republic of Croatia.

Regulation and protection water facilities and basic land reclamation drainage facilities are in the ownership of the Republic of Croatia and are managed by Hrvatske vode. The list of basic land reclamation drainage facilities and combined land reclamation facilities of interest to the Republic of Croatia is specified by decision of the Minister.

Public irrigation means the activity of abstracting groundwater and surface water and its delivery for irrigating agricultural land through irrigation facilities owned by regional self-government units or mixed-use land reclamation facilities owned by the Republic of Croatia. Irrigation facilities in the ownership of regional self-government units are managed by the stated self-government units.

The right to use water for irrigation is exercised in accordance with the Water Act and for the purposes of achieving the objectives of the National Plan of Irrigation and Agricultural Soil and Water Management in

²⁴ Facilities for detailed land reclamation drainage (land reclamation facilities of the 3rd and 4th order – collection and land lot canals for collection of waters from agricultural surfaces and transport into basic land reclamation drainage facilities, land reclamation facilities of the 2nd order, or detailed canals for immediate collection of waters from agricultural or other other surfaces and transport into amelioration facilities of the 3rd order) are not covered by this Programme.

the Republic of Croatia, irrigation plans and programmes of regional self-government units, and for meeting the needs for irrigation of various users for various purposes. A legal or natural person may acquire the right to provide public irrigation services and/or the right to perform works in the field of public irrigation on the basis of a concession. A concession for the provision of public irrigation services is granted for a period of three to five years, and a concession for public irrigation works is granted for a maximum period of 20 years.

Companies, cooperatives or associations of water users (water land reclamation organizations) may be established in accordance with special regulations for the purposes of construction, maintenance and use of irrigation systems of interest to several owners or legal possessors of land. The regulation on management, technical and other conditions for the regulation of irrigation systems, the obligation to report on system condition and use, the basis for determining the costs of system maintenance and the method of distribution of these costs to the users is issued by the Minister.

6.2 Protection from adverse effects of water / flood risk management

6.2.1 Starting point

When planning activities, special attention is paid to selecting a suitable combination between the following:

- Regulating river basins, i.e. improving retention capacities of the land in question, particularly taking into account the selection of technical solutions based on the concept of "green and blue infrastructure", rehabilitation of watercourse sections according to their natural flow characteristics or ecoremediation principles of flow regulation, as well as ensuring natural lowland areas for controlled flooding and retaining / reducing flood water (Strategy of adaptation, measure HM-02-05) and
- Construction and hydraulic measures that have an impact on:
 - Reducing flood waves and protecting the backshore in order to maintain and increase the safety of life and property,
 - Ensuring sufficient water volumes when water levels are low of priority importance for maintaining good status of water and water-dependent ecosystems
 - Protection of water and water-dependent ecosystems from adverse effects of floods.

It should be noted that this Multiannual Programme does not anticipate projects whose goal is to reduce anthropogenic impacts on climate change, i.e. the Multiannual Programme contains only projects of adaptation to negative impacts of climate change on the increase of flood risks. Additionally, during the preparation of the technical documentation, the use of construction with a lower impact on climate change can be proposed in the technical conditions, i.e. in the conditions of a public tendering, when selecting the economically most advantageous tender, criteria of green or ecologically more favourable construction, i.e. construction with a lesser impact on climate change can be added.

6.2.2 Activities

Technical aspects of the updated Multiannual Programme are reviewed through the following activities:

- Project identification,
- Project evaluation,
- Classifying projects into priority groups,
- Forming project groups,
- Harmonizing projects with preliminary flood risk assessments,
- Preparation of project proposals.

Project identification

Project were identified by Hrvatske vode's Water Management Departments. Project investment value was estimated on the basis of the following principles:

- for technical solutions that have been elaborated in more detail in previous documents and for which there are already appropriate estimates, the values have been taken over and are presented in the updated Multiannual Programme;
- for technical solutions that have not been elaborated in more detail in previous documents, estimates were made using the Standard Calculation of Water Management Works²⁵.

Given that project values, i.e. costs of constructing individual facilities, depend on geo-mechanical conditions, construction method and technology, and various local and time-depending factors, it is impossible to provide more reliable data on the values of planned investments at the programme level.

Total investment value of **504** identified projects of protection against adverse effects of water is estimated at **HRK 12.436 billion** (incl. VAT).

Chapter 11 entitled Annexes contains the following:

- Related numbers and names of all 58 defined project groups (Tab.11.1. page 217 - 218).
- All identified projects per water management departments bearing the code of project group and related small river basin area, county and local self-government unit (Tab.11.3. page 224- 226, Tab.11.4. page 227 - 230, Tab.11.5. page 231- 232, Tab.11.6. page 233 - 239, Tab.11.7. page 240 - 241, Tab.11.8. page 242 - 247). Each project bears its identification number (ID), retained in all subsequent analyses and overviews.

²⁵ Hrvatske vode's bulletin, whose purpose is to create standard descriptions of cost items for works and unit prices. The standard calculation of water management works was made on the basis of practical experience in designing and performing works.

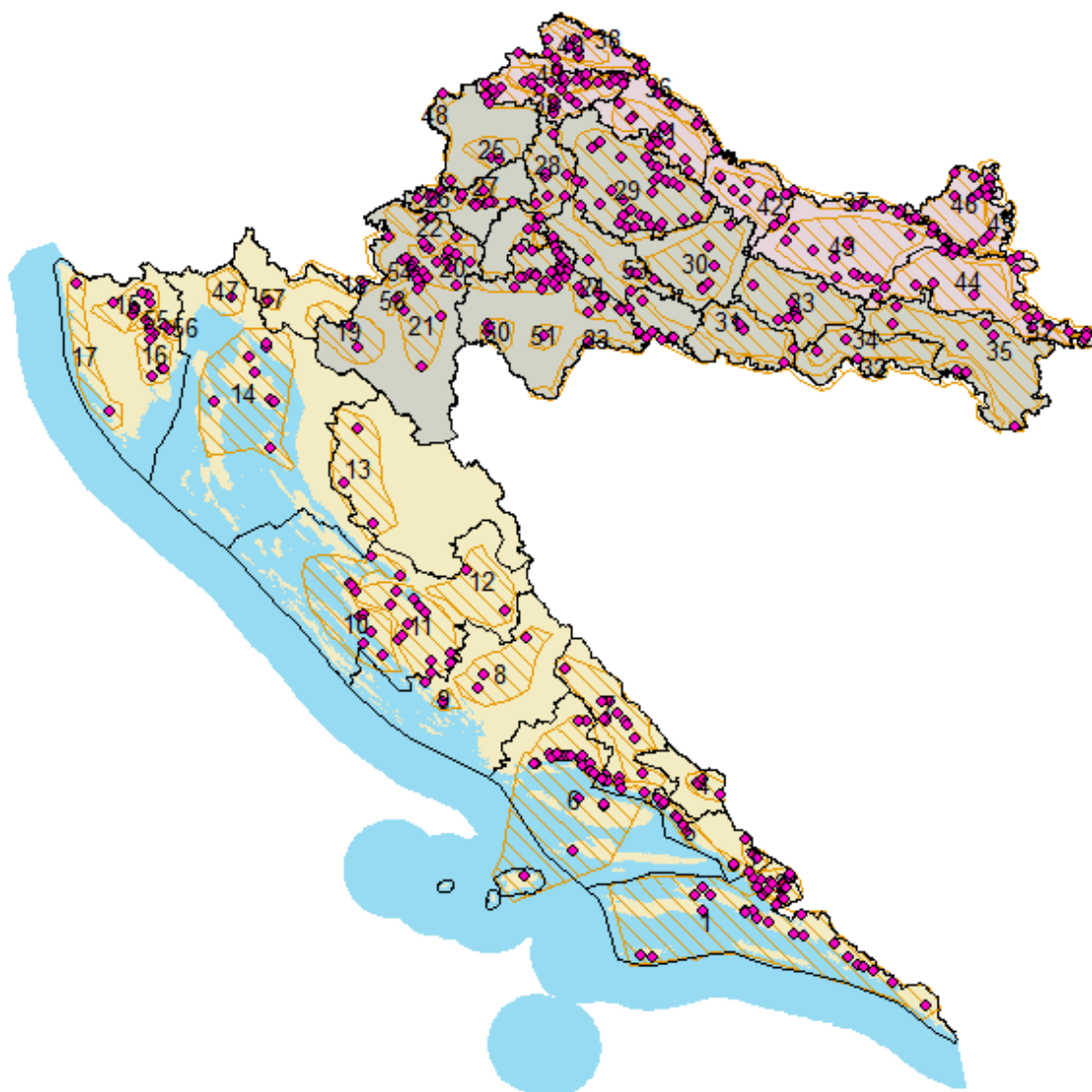


Fig. 6.1 Spatial distribution of identified projects of protection against adverse effects of water with related project groups and related small river basin area

Project evaluation

Projects were evaluated on the basis of 6 selected criteria that were used to evaluate: (1) the significance of the project for a narrower or wider area, (2) the possibility of use for other purposes (multipurpose use), (3) the size of the population protected from floods, (4) the impact of the project on the protection of material assets, environment, cultural heritage and other values, (5) the availability of design documents and necessary permits for construction, i.e. readiness for implementation, and (6) the possibility of performing works in phases.

Tab. 6.1 Criteria for determining priority order of identified projects of protection against adverse effects of water

Number	Ponder	Project characteristics	Rating	Evaluation elements	Points
1	5 %	Significance (1 answer)	a	international / national	3
			b	regional	2
			c	local	1

Number	Ponder	Project characteristics	Rating	Evaluation elements	Points
2	10 %	Purpose (several answers)	a	flood defence	5
			b	water supply	4
			c	achieving good water status	4
			d	navigation	3
			e	energy	3
			f	land reclamation drainage	2
			g	irrigation	2
			h	sport and recreation	1
			i	other	1
3	35 %	Protection of population (1 answer)	a	more than 1000 inhabitants	3
			b	100 - 1000 inhabitants	2
			c	less than 100 inhabitants	1
4	25 %	Protection of material assets and other values (several answers)	a	economic purposes	5
			b	infrastructures (roads, institutions, water intakes)	5
			c	intensive agriculture	4
			d	permanent crops	4
			e	natural values	4
			f	waste treatment and disposal	3
			g	locations of wastewater treatment plants	3
			h	cultural and historical heritage	2
			i	other purposes	1
5	20 %	Available design documents and permits (several answers)	a	cost estimates	5
			b	implementation designs	5
			c	building permit	4
			d	detailed design	4
			e	plot plan	3
			f	location permit	3
			g	environmental impact study	3
			h	preliminary design	2
			i	conceptual design	2
			j	program of works (terms of reference)	1
6	5 %	Possibility of construction in phases (1 answer)	a	yes	2
			b	no	1

Classification of projects into priority groups

On the basis of the criteria listed above, the position of each individual project was determined, whereby the projects with the highest number of points (highest priority rating) were placed at the beginning of the list in descending order (method of classification by weight).

The list of projects is divided into two priority groups (1 and 2) in such a way that scores are determined for each water management department. The priority group designated as 1 refers to projects whose implementation should begin in the period until 2023, and the priority group designated as 2 includes projects whose preparation is ongoing and which are scheduled for implementation after 2023.

Total estimated costs of the updated Multiannual Programme amount to HRK 12.436 billion, out of which:

- HRK 4.274 billion are costs of priority group 1,
- HRK 8.162 billion are costs of priority group 2.

On the list of both priority groups, priority is given to projects with a higher level of maturity for performing works, i.e., projects with issued building permits, and projects for which the preparation of design documents has been completed or is ongoing, however the building permit has not been obtained.

Tab. 6.2 Overview of the total number and value of projects of priority group 1 according to the status of available design documents

Water Management Department	Priority 1					
	Building permit available		Detailed design available without building permit		Low project maturity	
	No. of projects	Investment value	No. of projects	Investment value	No. of projects	Investment value
For Mura and Upper Drava Rivers	2	HRK 71,000,000	2	HRK 54,800,000	19	HRK 145,400,000
For Danube and Lower Drava Rivers	6	HRK 425,430,000	1	HRK 33,000,000	1	HRK 15,550,000
For Upper Sava	7	HRK 122,790,000	4	HRK 215,465,000	9	HRK 299,406,000
For Middle and Lower Sava	15	HRK 577,266,380	13	HRK 425,268,250	62	HRK 966,902,155
For Northern Adriatic Basins	0	HRK 0	0	HRK 0	1	HRK 3,500,000
For Southern Adriatic Basins	22	HRK 208,823,000	15	HRK 55,050,000	72	HRK 654,070,000
Total:	52	HRK 1,405,309,380	35	HRK 783,583,250	164	HRK 2,084,828,155

Tab. 6.3 Overview of the total number and value of projects of priority group 2 according to the status of available design documents

Water Management Department	Priority 2					
	Building permit available		Detailed design available		Location permit or environmental impact study available	
	No. of projects	Investment value	No. of projects	Investment value	No. of projects	Investment value
For Mura and Upper Drava Rivers	0	0	0	HRK 0	5	HRK 54,000,000
For Danube and Lower Drava Rivers	4	HRK 52,130,000	4	HRK 60,000,000	7	HRK 122,742,000
For Upper Sava	1	HRK 6,440,000	1	HRK 4,880,000	0	HRK 0
For Middle and Lower Sava	2	HRK 21,250,000	4	HRK 29,864,000	4	HRK 63,253,000
For Northern Adriatic Basins	1	HRK 22,000,000	0	HRK 0	6	HRK 48,200,000
For Southern Adriatic Basins	0	HRK 0	2	HRK 525,300,000	3	HRK 40,500,000
Total:	8	HRK 101,820,000	11	HRK 620,044,000	25	HRK 328,695,000

Proposal of project implementation schedule

According to estimated costs of the updated Multiannual Programme, a total of HRK 4.274 billion has to be ensured for the implementation of 251 projects of protection against adverse effects of water in the period until the end of 2023, whereas HRK 8.162 billion has to be ensured for the implementation of 253 projects in the second programme period (after 2023).

Tab. 6.4 Time schedule for the implementation of projects of protection against adverse effects of water according to river basin districts

River basin district	Sub-basin area	Priority 1	Priority 2	Project investment value (incl. VAT)
		Planned implementation 2021-2023	Planned implementation after 2023	
Adriatic River Basin District		HRK 921,443,000	HRK 1,287,915,000	HRK 2,209,358,000
Danube River Basin District	Drava and Danube Rivers	HRK 745,180,000	HRK 5,393,811,000	HRK 6,138,991,000
	Sava River	HRK 2,607,097,785	HRK 1,480,853,000	HRK 4,087,950,785
Total:		HRK 4,273,720,785	HRK 8,162,579,000	HRK 12,436,299,785

Competent organizational units of Hrvatske vode are in charge of finishing preparation activities for all identified projects in accordance with priorities, planned beginning of construction and secured funding.

Hrvatske vode's partners in the preparation of projects are local and regional self-government units, which have instruments for resolving spatial, planning and property-related issues at the location of individual projects, and in this way they can help prevent delays during project implementation.

The actual schedule of the completion of preparation activities will certainly deviate, to a greater or lesser extent, from the estimated schedule. Therefore, this Multiannual Programme envisages the beginning of preparation activities for a larger number of projects thereby avoiding delays in future investment activities caused by a lack of prepared projects.

This results in the optimal absorption of financial resources from revenues from special-purpose water fees (Hrvatske vode's original resources) and other available sources such as the state budget, EU funds, various domestic and foreign credits, loans and donations.

6.3 Irrigation

6.3.1 Starting point

In its basic document from 2005, the NAPNAV identified priority areas for irrigation (suitability of land for irrigation) by analysing:

- natural potential (conditioned by the suitability of the soil for irrigation and water resources potential), and
- water deficit.

A map of priority areas for the development of irrigation in the Republic of Croatia was created on the national level.

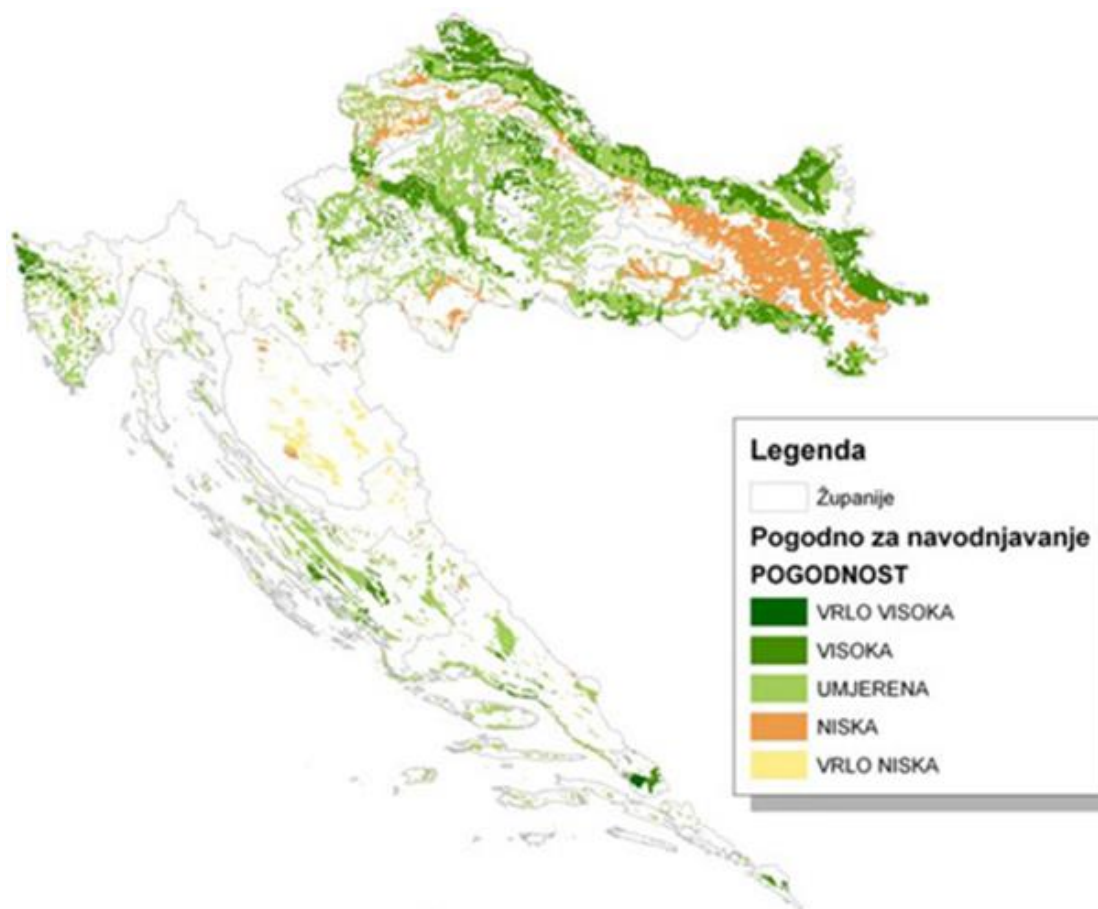


Fig. 6.2 Map of priority areas for irrigation in the Republic of Croatia

The map is accompanied by an inventory survey of agricultural land according to priority classes per counties.

Tab. 6.5 Potential of land for irrigation per counties²⁶

County name	Potential of land for irrigation (ha)				
	Very high	High	Moderate	Low	Very low
Zagreb County		39.004	120.329	3.453	7
Krapina-Zagorje County			31.093	23.193	3.751
Sisak-Moslavina County		22.916	99.433	19.463	79
Karlovac County		6.125	40.981	4.737	362
Varaždin County		21.437	34.933	9.496	193
Koprivnica-Križevci County		39.483	53.817	9.383	
Bjelovar-Bilogora County		36.406	99.463	3.999	42
Primorje-Gorski Kotar County			16.711	2.066	1.959
Lika-Senj County			928	5.139	41.413
Virovitica-Podravina County		33.881	51.449	31.796	360
Požega-Slavonia County		83	32.020	25.699	74
Brod-Posavina County		34.818	67.123	7.216	7
Zadar County		7.654	53.948	275	5.811
Osijek-Baranja County		81.837	59.699	138.023	17
Šibenik-Knin County		11.536	33.250	969	20
Vukovar-Srijem County		60.099	29.215	72.465	
Split-Dalmatia County	44	6.795	58.328	2.110	305
Istra County	1.627	20.464	59.763	3.491	141
Dubrovnik-Neretva County	4.306	8.741	10.450	14	3
Međimurje County		37.400	7.016		
City of Zagreb		9.369	19.226	283	
TOTAL:	5.977	478.048	979.175	363.270	54.544

Land potential takes into consideration spatial restrictions, such as mine-suspected areas, designated protected areas and areas of sanitary protection zones 1 and 2.

Furthermore, the document ranks the counties with regard to irrigation potential at the national level. A multi-criteria analysis was carried out, which, in addition to the already used criteria of natural resources and water deficit, also introduces socio-economic criteria. The criteria are divided into 4 groups:

- characteristics of agricultural holdings,
- cultivated crops,
- natural resources,
- water deficit.

On the basis of conducted analysis, counties are ranked at the national level in four groups, where the 1st group represents counties with a very high priority for irrigation down to the 4th group with normal priority for irrigation, as follows:

- 1st priority group for irrigation:
 - Dubrovnik-Neretva County,
 - Osijek-Baranja County,
 - Split-Dalmatia County,
 - Istra County,
 - Vukovar-Srijem County,
 - Zadar County.
- 2nd priority group for irrigation:
 - Međimurje County,

²⁶ Source, NAPNAV, 2005

- Koprivnica-Križevci County,
- Virovitica-Podravina County,
- Brod-Posavina County,
- Zagreb County.
- 3rd priority group for irrigation:
 - Bjelovar-Bilogora County,
 - Sisak-Moslavina County,
 - Primorje-Gorski Kotar County,
 - Varaždin County,
 - City of Zagreb,
 - Šibenik-Knin County,
 - Požega-Slavonia County.
- 4th priority group for irrigation:
 - Karlovac County,
 - Krapina-Zagorje County,
 - Lika-Senj County.

A more detailed evaluation of the suitability of individual areas in lower-ranking counties can be carried out by further elaboration of technical documents (determining locations that are very suitable and suitable for irrigation within the areas of the 3rd and 4th priority groups).

During the preparation of technical documentation for individual project, whenever possible, an analysis of alternatives will be conducted, and the selection and construction of innovative irrigation systems will be encouraged (Strategy of adaptation, measure P-05-02).

6.3.2 Activities

Technical aspects of the Multiannual Programme have been analysed through the following activities:

- Project identification,
- Systematization of projects in relation to priority groups determined at the national level and additional criteria,
- Verification of project proposals in relation to vulnerable areas (additional limitation),
- Project proposals.

Project identification

County irrigation plans analyse in more detail available agricultural areas and water resources, economic capacities (production, processing, storage capacities), final users, and at the level of individual counties propose projects and priorities for implementation of interest to the county. County irrigation plans form the basis for the development of irrigation systems in the planning, design and performance coordination segment with the effects of changing the structure of market-oriented agricultural production (more profitable crops) using the comparative advantages of soil and climate. County irrigation plans are strategic county documents that provide the basis for operational projects and programs. Expert reports and results of comprehensive analyses of soil, climate, sources and quality of water and existing agriculture provide a basis for determining the possibilities and priorities of irrigation for the development of existing or the introduction of new agricultural production.

Within the framework of county irrigation plans, the initial identification of projects was carried out. This procedure, in addition to the listed criteria and spatial limitations, takes into consideration the following criteria:

- analysis of cost effectiveness (profitability),

- relative increase in income per surface area,
- co-financing,
- sociological criteria (number of farms or other beneficiaries involved in the project, employment opportunities, development of rural areas, etc.),
- degree to which areas that are planned to be irrigated are regulated,
- consent of the beneficiary.

Based on the results of the irrigation plans, the counties annually nominate individual projects (additionally motivated by the interest of the final beneficiaries) to the Unit for Implementation of the National Plan for Irrigation and Management of Agricultural Land and Water Resources in Hrvatske vode, which consolidates and verifies them, and prepares annual irrigation programs adopted by the Expert Team for the implementation of the national irrigation project²⁷.

Nominated projects have to confirm/document:

- the interest of final beneficiaries in the form of final beneficiaries' questionnaire,
- existing and planned sowing structure,
- the possibility of securing funds from regional self-government units to co-finance the preparation of projects.

The Regulation on irrigation system management and regulation (Official Gazette, no. 83/10 and 76/14) establishes the conditions for project implementation on the basis of statement by final beneficiary (questionnaire) in the project preparation phase, i.e. on the basis of a contractual agreement between final beneficiaries and regional self-government units in the construction phase.

Possible conceptual solutions and project scope are elaborated in a pre-investment study for the proposed projects, as well as a cost-effectiveness analysis, and preliminary design, detailed project documents, and a feasibility study are prepared subsequently in the next phase for the selected variant. The county irrigation plans set out the possibilities and conditions for developing irrigation, and certain locations are recognized as priority given the availability of natural resources (soil and water) and the level of interest of economic entities, i.e. final beneficiaries of the irrigation system.

Within the framework of the NAPNAV implementation, 117 projects on 67,500 ha of agricultural land were identified within 17 counties until 2020. During this period, 26 identified projects (15,054 ha) were successfully implemented and put into operation.

Table 6.6. contains summarized data: (1) proposed agricultural areas for developing irrigation through county irrigation plans, (2) surface of identified projects through the NAPNAV Implementation Unit, (3) surface of irrigation systems constructed through the NAPNAV and (4) surfaces of proposed projects for the Programme 2021 - 2030. More detailed information about the proposed and identified projects is presented in Chapter 11 Annexes, in Tab. 11.10. Identified irrigation projects, on p. 270 - 275.

²⁷ Expert team for the implementation of the national irrigation project is appointed by the competent minister.

Tab. 6.6 Irrigation surfaces (ha) and levels of investment according to counties

County	Covered by county plans		Identified through the NAPNAV Implementation Unit (2005-2020)		Implemented through the NAPNAV (2005-2020)		Proposed projects for Programme 2021-2030	
	Proposed surface (ha)	Estimated costs (HRK million)	Covered surface (ha)	Estimated costs (HRK million)	Surface (ha)	Amount (HRK million)	Surface (ha)	Amount (HRK million)
Bjelovar-Bilogora	7.500	112,50	424	114,00			424	114,00
Brod-Posavina	17.210	321,05	3.539	464,27		249,27	1.509	51,00
Dubrovnik-Neretva	26.845	1.530,16	6.306	1.187,52	901	28,28	1.206	253,00
City of Zagreb	1.357	77,35						
Istra	10.252	584,36	8.845	975,88	440	66,82	2.369	311,00
Karlovac	7.800	117,00						
Koprivnica-Križevci	6.900	124,50	520	101,50			520	101,00
Lika-Senj	6.259	233,40						
Međimurje	7.430	285,00	2.702	196,36	250	27,11	1.123	102,00
Osijek-Baranja	75.700	295,88	14.424	759,84	5.700	169,86	8.356	579,00
Požega-Slavonia	4.280	88,03	2.272	65,00	475	10,60	1.797	90,00
Primorje-Gorski Kotar	2.181	150,12	1.387	72,64			777	34,00
Sisak-Moslavina	6.800	112,00	453	83,50			453	85,00
Split-Dalmatia	6.550	373,35	2.564	90,44	1.480	15,44	584	51,00
Šibenik-Knin	13.878	791,05	397	85,90			397	86,00
Varaždin	11.326	442,50	600	33,00			200	11,00
Virovitica-Podravina	832	47,42	6.116	394,96	1.421	88,80	2.495	125,00
Vukovar-Srijem	93.223	5.313,71	10.701	932,48	3.196	374,45	4.158	384,00
Zadar	7.323	221,45	4.033	563,83	1.113	62,95	1.524	322,00
Zagreb	8.953	510,32	2.194	327,75			2.194	328,00
Total:	311.273	11.731,16	67.477	6.448,89	14.976	1.093,57	30.086	3.027,00

The implementation of identified projects would fulfil the long-term objective of the National Plan for Irrigation and Management of Agricultural Land (65.000 ha)²⁸ by which approx. 6% of arable agricultural land would be rendered suitable for the application of the agricultural-technical measure of irrigation in agricultural production.

The fulfilment of the long-term objective does not stop the activities on the development of irrigation in Croatia. They continue through the identification and preparation of projects for the next programme phases. Priority will be given to projects that are implemented in areas with very high and high suitability for irrigation.

Given the financial possibilities of the Republic of Croatia, the degree of maturity of individual projects, the interest of final beneficiaries in using irrigation systems, the updated Multiannual Programme proposes 58 projects for implementation (30,086 ha) with a value of approx. HRK 3 billion (including VAT).

See Chapter: 11 Annexes, Tab.11.11. *Proposed implementation of irrigation projects*, p. 276 - 278.

If any of the identified projects are ready for implementation in this period, they can also be implemented through the updated Multiannual Programme, which is why the Strategic Plan Evaluation was conducted for all identified projects.

²⁸ One of the objectives of the NAPNAV.

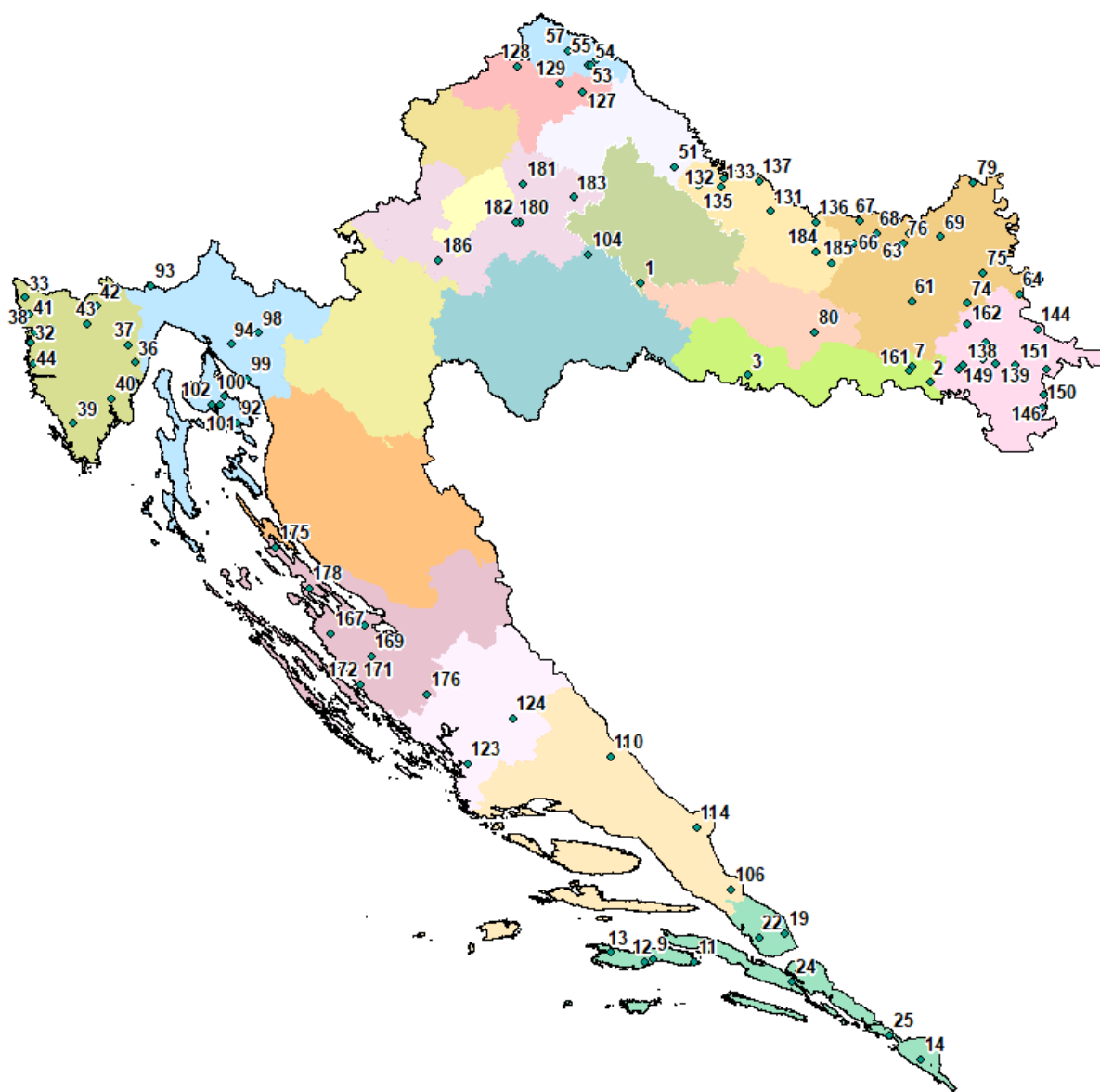


Fig. 6.3 Spatial distribution of identified irrigation project according to counties according to the 2021-2030 Programme (numbers represent project ID)

Systematization of projects in relation to priority groups and additional criteria

The updated Multiannual Programme systematized projects/investments in the area of counties in relation to:

- Priorities determined on the national level²⁹,
- Significance of agriculture measured through the share of Gross Value Added (GVA)³⁰ of the county in the national GVA,
- Irrigation as a regular or additional cultivation measure in relation to the dominant crop.

The importance of the county's agriculture will be measured by the proportion of agriculture, forestry and fishing activities in the total gross added value of the Republic of Croatia.

²⁹ Presented in Chapter 6.3.1.

³⁰ Gross value added is a measure of the value created by production, defined as the value of production minus intermediate consumption.

With the intention of stopping the constant decline of the share of agriculture in GDP, and taking into consideration the shares of GVA by counties in relation to the national level, projects in the area of counties will be characterized by two indicators:

- A. investments in counties with the share of agriculture in total GVA (average 2000- 2010) of more than 4 % (12 counties),
- B. investments in counties with the share of agriculture in total GVA (average 2000 - 2010) of up to 4 % (9 counties).

The criterion related to irrigation as a regular or additional cultivation measure in relation to the dominant crop is based on findings in the documents, the NAPNAV, and county irrigation plans, which recognize crops with multiple increased yield as a result of irrigation (invested / return). These are mainly vegetable and fruit crops, and for them irrigation is a regular cultivation measure. The stated crops are predominantly produced in the counties on the Adriatic coast and in Požega-Slavonia County³¹.

Tab. 6.7 Systematization of surfaces for irrigation according to counties, categorized according to priority groups on the national level and additional criteria

County	Proposed projects (ha)	Share of surface in total proposed	Criteria		
			Priority-national level	Share of county in national GVA	Cultivation measure (for dominant cultures)
Total:	30.086	100 %			
Bjelovar-Bilogora	424	1,41 %	III	A	
Brod-Posavina	1.509	5,02 %	II	A	
Dubrovnik-Neretva	1.206	4,01 %	I	B	Regular
Istra	2.369	7,87 %	I	B	Regular
Koprivnica-Križevci	520	1,73 %	II	A	
Međimurje	1.1230	3,73 %	II	A	
Osijek-Baranja	8.356	27,77 %	I	A	
Požega-Slavonia	1.797	5,97 %	III	B	Regular
Primorje-Gorski Kotar	777	2,58 %	III	B	Regular
Sisak-Moslavina	453	1,51 %	III	A	
Split-Dalmatia	584	1,94 %	I	A	
Šibenik-Knin	397	1,32 %	III	B	Regular
Varaždin	200	0,66 %	III	A	
Virovitica-Podravina	2.495	8,29 %	II	A	
Vukovar-Srijem	4.158	13,82 %	I	A	
Zadar	1.524	5,07 %	I	B	Regular
Zagreb	2.194	7,29 %	II	A	
Share of surfaces in total planned surfaces for irrigation- national level priority					
		60,48 %	1 st priority		
		26,06 %	2 nd priority		
		13,45 %	3 rd priority		
Share of surfaces in total planned surfaces for irrigation – according to county's share in the national GVA					
		73,18 %		A (≥ 4 %)	
		26,82 %		B (< 4 %)	

Analysis concludes the following:

³¹Vegetable and fruit crops are also presented in other counties, but in the selected 5 counties it can be determined with certainty that they are dominant.

- investments are planned for 86.54% of the total proposed surfaces that are rated on the national level as areas of 1st and 2nd priority (1st priority dominates),
- investments are planned for 73.18% of the total proposed surfaces in the counties whose share in the national GVA in agriculture, forestry and fishing activities is larger than 4%,
- in all counties where the share of GVA in agriculture, forestry and fishing activities is less than 4%, irrigation is a regular cultivation measure that achieves multiple income in relation to the investment.

Therefore, at the program level, it can be concluded that the planned investments per county are acceptable. The specific justification of investment in each project is demonstrated by the preparation of feasibility studies at the project level.

Project proposal verification in relation to vulnerable areas (limitations)

Vulnerable areas are areas where increased measures of protection of water from pollution by nitrates from agricultural sources have to be implemented. For areas designated as vulnerable, the Minister competent for agriculture enacts action programmes with mandatory measures for the reduction of pollution by nitrates from agricultural sources for a period of four years. The action programme also designates entities under obligation to implement the proscribed measures³².

The Decision on Designating Vulnerable Areas in the Republic of Croatia (Official Gazette, no. 130/12) designated vulnerable areas covering an area of 9% of the national territory and established the framework for the implementation of the EU legal act, the Nitrates Directive - the Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources.³³ In addition, the same Decision prescribes the implementation of monitoring of the concentration of nitrates of agricultural origin in surface and underground waters in vulnerable areas.

The 1st Action Programme for the protection of waters against pollution caused by nitrates from agricultural sources is in force (Official Gazette, no. 15/13 and 22/15), which prescribes the conditions and method of handling stable manure on agricultural land and facilities within areas designated as vulnerable areas, including the construction of storage capacities and keeping records on the use of stable manure and mineral fertilizers on farms. The following studies were prepared: "Impact of agriculture on the pollution of surface and underground waters in the Republic of Croatia" by the Faculty of Agriculture, University of Zagreb, 2015 ([Utjecaj poljoprivrede na onečišćenje površinskih i podzemnih voda u Republici Hrvatskoj](#)) and „Designating priority areas for groundwater monitoring within intensive agricultural area“, by the Faculty of Agriculture, University of Zagreb, 2019 ([Utjecaj poljoprivrede na onečišćenje površinskih i podzemnih voda u Republici Hrvatskoj](#)), which have defined the proposal for monitoring the status of surface and groundwater for the purpose of determining agriculture load and impact on water in the Republic of Croatia.

Limitations and obligations in vulnerable areas were not taken into consideration in the county irrigation plans, because the Decision on Designating Vulnerable Areas in the Republic of Croatia was made after they were prepared. Therefore, the updated Multiannual Programme indicates general limitations and mandatory measures in areas that are vulnerable to nitrates.

Out of a total of 93 identified irrigation projects, 15 projects are located in vulnerable areas (Figure 6.4) where the implementation of the 1st Action Programme for the protection of waters against pollution caused by nitrates from agricultural sources is mandatory.

³² Pursuant to Article 57 of the Water Act (Official Gazette no. 66/19 and 84/21)

³³ Source, EN: Council Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources

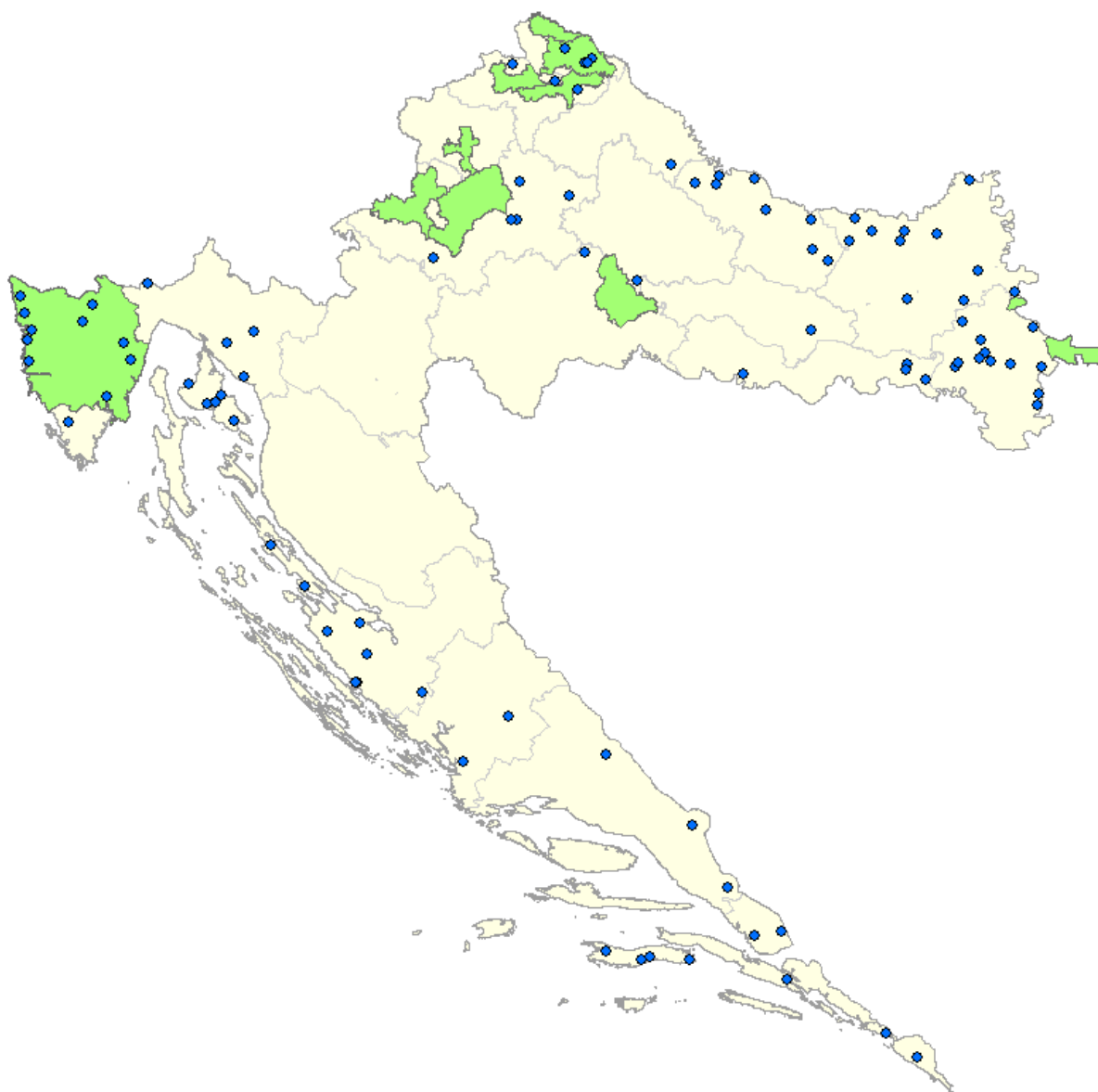


Fig. 6.4 Spatial distribution of identified irrigation projects in relation to designated vulnerable areas

Project proposal

In accordance with priorities, first of all the maturity of the studies and design documents and the interest expressed by final beneficiaries, and bearing in mind financial possibilities, 58 irrigation projects with an estimated value of HRK 3.03 billion are proposed to be implemented. The implementation of the proposed projects will ensure the possibility of applying agro-cultural and technical irrigation measures to an additional 30,000 ha of agricultural land. Bearing in mind the systematization described above, the interest by final beneficiaries of the system and the maturity of the project for implementation, a proposal was made for the implementation of projects year by year.

Tab. 6.8 Time schedule of programme implementation in the part that relates to irrigation according to counties

Counties	Planned implementation in HRK						
	2021	2022	2023	2024	2025	Period 2021 - 2025	Period 2026 - 2030
Bjelovar-Bilogora	0	0	0	0	0	0	114.000.000

Counties	Planned implementation in HRK						
	2021	2022	2023	2024	2025	Period 2021 - 2025	Period 2026 - 2030
Brod-Posavina	4.000.000	0	0	0	0	4.000.000	47.000.000
Dubrovnik-Neretva	0	0	20.000.000	49.000.000	42.000.000	111.000.000	142.000.000
City of Zagreb	0	0	0	0	0	0	0
Istra	25.000.000	11.000.000	15.000.000	45.000.000	30.000.000	126.000.000	185.000.000
Koprivnica-Križevci	0	0	0	0	0	0	101.000.000
Međimurje	0	0	39.000.000	49.000.000	14.000.000	102.000.000	0
Osijek-Baranja	30.000.000	35.000.000	116.000.000	112.000.000	99.000.000	392.000.000	187.000.000
Požega-Slavonia	0	0	0	0	0	0	90.000.000
Primorje-Gorski Kotar	0	0	2.000.000	0	0	2.000.000	32.000.000
Sisak-Moslavina	0	0	25.000.000	35.000.000	25.000.000	85.000.000	0
Split-Dalmatia	0	0	9.000.000	10.000.000		19.000.000	32.000.000
Šibenik-Knin	40.000.000	40.000.000	0	0	0	80.000.000	6.000.000
Varaždin	0	0	0	0	0	0	11.000.000
Virovitica-Podravina	22.000.000	19.000.000	32.000.000	25.000.000		98.000.000	27000000
Vukovar-Srijem	81.000.000	66.000.000	0	35.000.000	80.000.000	262.000.000	122.000.000
Zadar	4.000.000	5.000.000	0	78.000.000	78.000.000	165.000.000	157.000.000
Zagreb	0	0	0	0	55.000.000	55.000.000	273.000.000
Total:	206.000.000	176.000.000	258.000.000	438.000.000	423.000.000	1.501.000.000	1.526.000.000

In the first part of the programme period 2021 – 2025 one half of the total investments foreseen in the program are expected to be realized.

Chapter 11 Annexes contains:

- Overview of proposed implementation of irrigation projects by year within the period 2021 - 2030 (Figure 11.11. on p. 276 - 278)
- Spatial distribution of irrigation projects for the northern part of Croatia (Figure 11.1 on p. 279)
- Spatial distribution of irrigation projects for the southern part of Croatia (Fig. 11.2 on p. 280)

7 Financial aspects

7.1 Protection from adverse effects of water / flood risk management

7.1.1 Estimated costs

Estimated costs of constructing regulation and protection water facilities and land reclamation drainage facilities according to Water Management Departments and programme periods amount to:

Tab. 7.1 Total investments in the protection against adverse effects of water according to Water Management Departments and programme periods

Water Management Department	Investment value of projects (incl. VAT)	Priority 1	Priority 2
		Planned realization 2021- 2023	Planned realization after 2023
For Mura and Upper Drava River Basins	HRK 905,200,000	HRK 271,200,000	HRK 634,000,000
For Danube and Lower Drava River Basins	HRK 5,233,791,000	HRK 473,980,000	HRK 4,759,811,000
For Upper Sava	HRK 744,871,000	HRK 637,661,000	HRK 107,210,000
For Middle and Lower Sava	HRK 3,343,079,785	HRK 1,969,436,785	HRK 1,373,643,000
For Northern Adriatic Basins	HRK 495,250,000	HRK 3,500,000	HRK 491,750,000
For Sothern Adriatic Basins	HRK 1,714,108,000	HRK 917,943,000	HRK 796,165,000
Total:	HRK 12,436,299,785	HRK 4,273,720,785	HRK 8,162,579,000

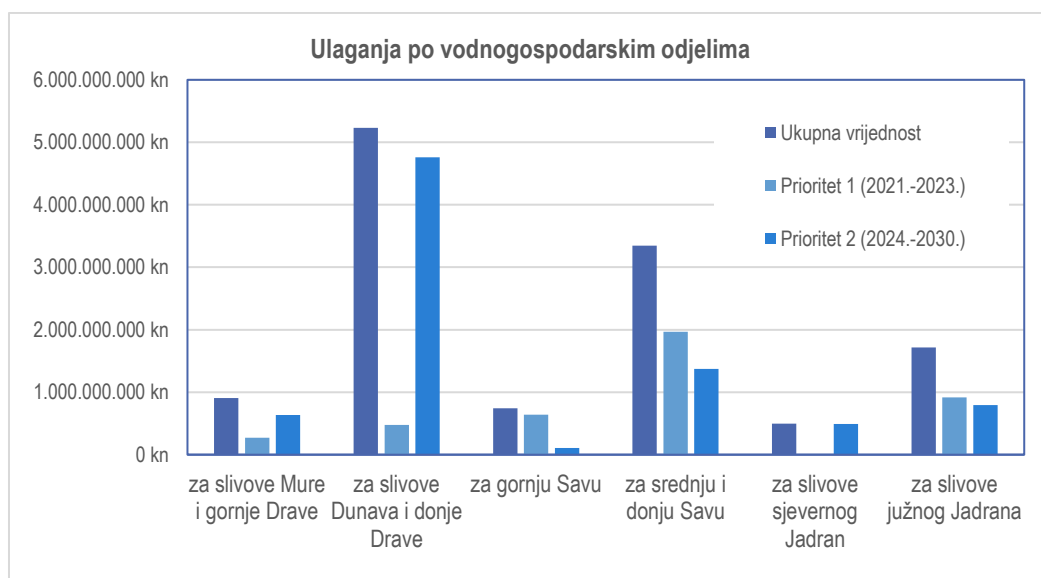


Fig. 7.1 Overview of investments in projects of protection against adverse effects of water according to Water Management Departments and programme periods

7.1.2 Implementation

The construction of regulation and protection water facilities and land reclamation drainage facilities in the period by the end of 2023 will be financed:

- From EU funds,
- Using the usual national financing mechanism,
- Through assistance from international organizations, institutions and bodies,

- Through loans granted by financial institutions.

Projects of protection against adverse effects of water are part of the updated Multiannual Programme, which foresees the realization of individual projects in a designated / given period under precisely defined conditions and methods of financing. The implementation of these projects by the end of 2023 is possible according to two scenarios:

Scenario 1 - Individual projects belonging to priority group 1 are implemented by Water Management Departments, regardless of which project group they belong to, but depending on the maturity of design documents for construction and the fulfilment of all necessary conditions and the issuance of building permits. The level of investment by Water Management Departments in the period until the end of 2023 is predicted according to the following schedule:

- up to 20% of the total foreseen amount of the estimated costs of implementing projects of priority group 1
- up to 30% of the total foreseen amount of the estimated costs of implementing projects of priority group 1
- up to 50% of the total foreseen amount of the estimated costs of implementing projects of priority group 1

Tab. 7.2 Level of investments according to Water Management Departments according to Scenario 1

Water Management Department	2021	2022	2023	2021 - 2023	2024 - 2030
	Share 20 %	Share 30 %	Share 50 %	Total	Total
For Mura and Upper Drava River Basins	HRK 54,240,000	HRK 81,360,000	HRK 135,600,000	HRK 271,200,000	HRK 634,000,000
For Danube and Lower Drava River Basins	HRK 94,796,000	HRK 142,194,000	HRK 236,990,000	HRK 473,980,000	HRK 4,759,811,000
For Upper Sava	HRK 127,532,200	HRK 191,298,300	HRK 318,830,500	HRK 637,661,000	HRK 107,210,000
For Middle and Lower Sava	HRK 393,887,357	HRK 590,831,036	HRK 984,718,393	HRK 1,969,436,785	HRK 1,373,643,000
For Northern Adriatic Basins	HRK 700,000	HRK 1,050,000	HRK 1,750,000	HRK 3,500,000	HRK 491,750,000
For Sothern Adriatic Basins	HRK 183,588,600	HRK 275,382,900	HRK 458,971,500	HRK 917,943,000	HRK 796,165,000
Total:	HRK 854,744,157	HRK 1,282,116,236	HRK 2,136,860,393	HRK 4,273,720,785	HRK 8,162,579,000

Scenario 2 – Individual projects belonging to priority group 1 are implemented according to project groups regardless of which Water Management Department they belong to. The level of annual investments depends on the maturity of design documents for construction and the fulfilment of all necessary conditions and the issuance of building permits. Investments in the period until the end of 2023 are foreseen according to the following schedule:

Tab. 7.3 Share of costs according to project groups according to Scenario 2 (in %)

Project group	Share of costs per year in %					Project group	Share of costs per year in %				
	2021	2022	2023	2021 - 2023	2024 - 2030		2021	2022	2023	2021 - 2023	2024 - 2030
1	10	15	20	45	55	30	5	10	25	40	60
2	5	10	15	30	70	31	5	20	30	55	45
3	5	10	10	25	75	32	30	30	40	100	0
4	10	25	35	70	30	33	10	10	15	35	65
5	5	20	25	50	50	34	15	25	35	75	25
6	20	25	35	80	20	35	10	15	20	45	55
7	5	20	25	50	50	36	10	15	20	45	55
8	5	15	20	40	60	37	5	10	15	30	70
9	0	5	5	10	90	38	10	15	15	40	60
10	10	15	15	40	60	39	5	10	20	35	65
11	10	15	20	45	55	40	5	10	20	35	65
12	10	15	20	45	55	41	5	10	15	30	70
13	0	5	5	10	90	42	5	10	10	25	75
14	5	5	5	15	85	43	5	10	10	25	75
15	0	5	5	10	90	44	5	5	10	20	80
16	5	5	5	15	85	45	10	10	10	30	70

Project group	Share of costs per year in %					Project group	Share of costs per year in %				
	2021	2022	2023	2021 - 2023	2024 - 2030		2021	2022	2023	2021 - 2023	2024 - 2030
17	5	5	5	15	85	46	5	5	10	20	80
18	5	20	45	70	30	47	0	0	0	0	100
19	20	30	50	100	0	48	5	15	80	100	0
20	20	20	20	60	40	49	5	15	30	50	50
21	10	10	10	30	70	50	5	5	10	20	80
22	10	20	30	60	40	51	0	0	0	0	100
23	5	10	25	40	60	52	0	5	10	15	85
24	10	15	20	45	55	53	15	30	40	85	15
25	5	10	20	35	65	54	15	30	45	90	10
26	10	15	20	45	55	55	0	0	0	0	100
27	20	80	0	100	0	56	0	0	0	0	100
28	10	20	10	40	60	57	0	0	0	0	100
29	5	10	10	25	75	58	0	0	0	0	100

Tab. 7.4 Share of costs according to project groups according to Scenario 2 (in HRK)

Project group	Share of costs per year in HRK					Total costs
	2021	2022	2023	2021 - 2023	2024 - 2030	
1	15.150.000	22.725.000	30.300.000	68.175.000	83.325.000	151.500.000 kn
2	45.747.500	91.495.000	137.242.500	274.485.000	640.465.000	914.950.000 kn
3	8.550.000	17.100.000	17.100.000	42.750.000	128.250.000	171.000.000 kn
4	1.140.000	2.850.000	3.990.000	7.980.000	3.420.000	11.400.000 kn
5	3.914.500	15.658.000	19.572.500	39.145.000	39.145.000	78.290.000 kn
6	17.254.600	21.568.250	30.195.550	69.018.400	17.254.600	86.273.000 kn
7	1.707.500	6.830.000	8.537.500	17.075.000	17.075.000	34.150.000 kn
8	425.000	1.275.000	1.700.000	3.400.000	5.100.000	8.500.000 kn
9	0	75.000	75.000	150.000	1.350.000	1.500.000 kn
10	18.672.500	28.008.750	28.008.750	74.690.000	112.035.000	186.725.000 kn
11	6.448.000	9.672.000	12.896.000	29.016.000	35.464.000	64.480.000 kn
12	534.000	801.000	1.068.000	2.403.000	2.937.000	5.340.000 kn
13	0	5.950.000	5.950.000	11.900.000	107.100.000	119.000.000 kn
14	3.400.000	3.400.000	3.400.000	10.200.000	57.800.000	68.000.000 kn
15	0	7.352.500	7.352.500	14.705.000	132.345.000	147.050.000 kn
16	1.810.000	1.810.000	1.810.000	5.430.000	30.770.000	36.200.000 kn
17	1.700.000	1.700.000	1.700.000	5.100.000	28.900.000	34.000.000 kn
18	300.000	1.200.000	2.700.000	4.200.000	1.800.000	6.000.000 kn
19	11.055.810	16.583.715	27.639.525	55.279.050	0	55.279.050 kn
20	217.328.400	217.328.400	217.328.400	651.985.200	434.656.800	1.086.642.000 kn
21	12.550.000	12.550.000	12.550.000	37.650.000	87.850.000	125.500.000 kn
22	4.459.100	8.918.200	13.377.300	26.754.600	17.836.400	44.591.000 kn
23	1.070.000	2.140.000	5.350.000	8.560.000	12.840.000	21.400.000 kn
24	72.600.983	108.901.475	145.201.966	326.704.424	399.305.407	726.009.830 kn
25	1.376.000	2.752.000	5.504.000	9.632.000	17.888.000	27.520.000 kn
26	8.080.000	12.120.000	16.160.000	36.360.000	44.440.000	80.800.000 kn
27	3.021.000	12.084.000	0	15.105.000	0	15.105.000 kn
28	7.224.000	14.448.000	7.224.000	28.896.000	43.344.000	72.240.000 kn
29	42.979.658	85.959.316	85.959.316	214.898.289	644.694.866	859.593.155 kn
30	4.306.125	8.612.250	21.530.625	34.449.000	51.673.500	86.122.500 kn
31	1.625.750	6.503.000	9.754.500	17.883.250	14.631.750	32.515.000 kn
32	124.424.400	124.424.400	165.899.200	414.748.000	0	414.748.000 kn
33	17.290.000	17.290.000	25.935.000	60.515.000	112.385.000	172.900.000 kn
34	7.184.588	11.974.313	16.764.038	35.922.938	11.974.313	47.897.250 kn
35	11.167.000	16.750.500	22.334.000	50.251.500	61.418.500	111.670.000 kn
36	38.130.000	57.195.000	76.260.000	171.585.000	209.715.000	381.300.000 kn
37	172.838.350	345.676.700	518.515.050	1.037.030.100	2.419.736.900	3.456.767.000 kn
38	16.950.000	25.425.000	25.425.000	67.800.000	101.700.000	169.500.000 kn
39	7.500.000	15.000.000	30.000.000	52.500.000	97.500.000	150.000.000 kn
40	1.135.000	2.270.000	4.540.000	7.945.000	14.755.000	22.700.000 kn
41	3.190.000	6.380.000	9.570.000	19.140.000	44.660.000	63.800.000 kn
42	10.930.900	21.861.800	21.861.800	54.654.500	163.963.500	218.618.000 kn
43	15.240.150	30.480.300	30.480.300	76.200.750	228.602.250	304.803.000 kn
44	8.723.350	8.723.350	17.446.700	34.893.400	139.573.600	174.467.000 kn
45	93.824.500	93.824.500	93.824.500	281.473.500	656.771.500	938.245.000 kn
46	2.771.300	2.771.300	5.542.600	11.085.200	44.340.800	55.426.000 kn
47	0	0	0	0	28.000.000	28.000.000 kn
48	350.500	1.051.500	5.608.000	7.010.000	0	7.010.000 kn
49	5.925.000	17.775.000	35.550.000	59.250.000	59.250.000	118.500.000 kn
50	1.975.000	1.975.000	3.950.000	7.900.000	31.600.000	39.500.000 kn
51	0	0	0	0	20.000.000	20.000.000 kn
52	0	4.273.250	8.546.500	12.819.750	72.645.250	85.465.000 kn
53	2.517.450	5.034.900	6.713.200	14.265.550	2.517.450	16.783.000 kn
54	2.478.750	4.957.500	7.436.250	14.872.500	1.652.500	16.525.000 kn

Project group	Share of costs per year in HRK					Total costs
	2021	2022	2023	2021 - 2023	2024 - 2030	
55	0	0	0	0	5.500.000	5.500.000 kn
56	0	0	0	0	35.500.000	35.500.000 kn
57	0	0	0	0	22.000.000	22.000.000 kn
58	0	0	0	0	1.000.000	1.000.000 kn
Total	1.058.976.663	1.563.485.168	2.013.380.069	4.635.841.900	7.800.457.885	12.436.299.785 kn
				37,28 %	62,72 %	100 %

Financing projects from EU funds

The preparation and implementation of projects for financing from EU funds starts with calls for project nominations. The scope, conditions and schedule cannot be predicted, but they will be actively included in their preparation. The percentage of co-financing project costs from EU structural funds can amount to a maximum of 85%, whereas the mandatory share of national co-financing amounting to at least 15% is provided by the state budget of the Republic of Croatia.

Project application must contain all relevant administrative, technical, environmental, economic and financial data related to the project, as defined by Article 101 of Regulation (EU) No. 1303/2013. In addition to the properly completed application form, all supporting documents requested by the application document have to be attached, in order for it to be accepted by the competent national authorities and by the European Commission.

The application should be made according to the new application form for projects in accordance with the requirements of the Operational Program Competitiveness and Cohesion 2014 - 2020. The application forms have to be made in accordance with the instructions given by national bodies responsible for the project approval procedure, and in particular by Hrvatske vode - Intermediate Body Level 2.

Financing projects using national resources

Projects that are not eligible for co-financing from EU structural funds will be financed exclusively using national resources, through the usual national financing mechanisms (funds from special-purpose water fees with the possibility of co-financing from the state budget of the Republic of Croatia).

Financing projects with loans

For projects that are not eligible for co-financing from structural EU funds, and that cannot be fully financed using national resources whose total amount is limited, it is necessary to consider the possibility of using loans granted by international financial institutions. The conditions for co-financing such projects will be determined through financial arrangements between competent authorities and banking institutions.

7.1.3 Proposed financing models

Taking into consideration possible sources of financing, elaborated in the previous section at the project level, it is proposed to finance the Multiannual Programme, in the part related to the construction of regulation and protection water facilities and facilities for land reclamation drainage, through three models using national resources, EU funds and loans.

Model 1 For the implementation of projects in 2021, according to Scenario 1, the share of financing using national resources is estimated at about 40%, from EU funds 30% and loans 30%. For implementation carried out according to Scenario 2, the share of financing using national resources is estimated at around 30%, from EU funds 25% and loans 45%.

Model 2 For the implementation of projects in 2022, according to Scenario 1, the share of financing using national resources is estimated at around 35%, from EU funds 40% and

loans 25%. For implementation carried out according to Scenario 2, the share of financing using national resources is estimated at around 30%, from EU funds 50% and loans 20%.

Model 3 For the implementation of projects in 2023 and according to Scenario 1 and 2, the share of financing using national resources is estimated at around 25%, from EU funds 60% and loans 15%.

7.2 Irrigation

7.2.1 Estimated construction costs

After a preliminary overview of the condition of water facilities for irrigation, and the direction and possibilities of development, an assessment was made of the necessary funding to achieve the objectives of the NAPNAV - described in Chapter 6.3.

The investors in the construction of irrigation system are counties, and therefore, the Multiannual Programme performs cost analysis and monitoring of the results at the level of counties.

Tab. 7.5 Overview of investments in irrigation projects according to counties and project periods

County	Cost estimate	Investments 2021 - 2025	Investments 2026 - 2030
Bjelovar-Bilogora	HRK 114,000,000	HRK 0	HRK 114,000,000
Brod-Posavina	HRK 51,000,000	HRK 4,000,000	HRK 47,000,000
Dubrovnik-Neretva	HRK 253,000,000	HRK 111,000,000	HRK 142,000,000
City of Zagreb	HRK 0	HRK 0	HRK 0
Istra	HRK 311,000,000	HRK 126,000,000	HRK 185,000,000
Koprivnica-Križevci	HRK 101,000,000	HRK 0	HRK 101,000,000
Međimurje	HRK 102,000,000	HRK 102,000,000	HRK 0
Osijek-Baranja	HRK 579,000,000	HRK 392,000,000	HRK 187,000,000
Požega-Slavonia	HRK 90,000,000	HRK 0	HRK 90,000,000
Primorje-Gorski Kotar	HRK 34,000,000	HRK 2,000,000	HRK 32,000,000
Sisak-Moslavina	HRK 85,000,000	HRK 85,000,000	HRK 0
Split-Dalmatia	HRK 51,000,000	HRK 19,000,000	HRK 32,000,000
Šibenik-Knin	HRK 86,000,000	HRK 80,000,000	HRK 6,000,000
Varaždin	HRK 11,000,000	HRK 0	HRK 11,000,000
Virovitica-Podravina	HRK 125,000,000	HRK 98,000,000	HRK 27,000,000
Vukovar-Srijem	HRK 384,000,000	HRK 262,000,000	HRK 122,000,000
Zadar	HRK 322,000,000	HRK 165,000,000	HRK 157,000,000
Zagreb	HRK 328,000,000	HRK 55,000,000	HRK 273,000,000
Total:	HRK 3,027,000,000	HRK 1,501,000,000	HRK 1,526,000,000

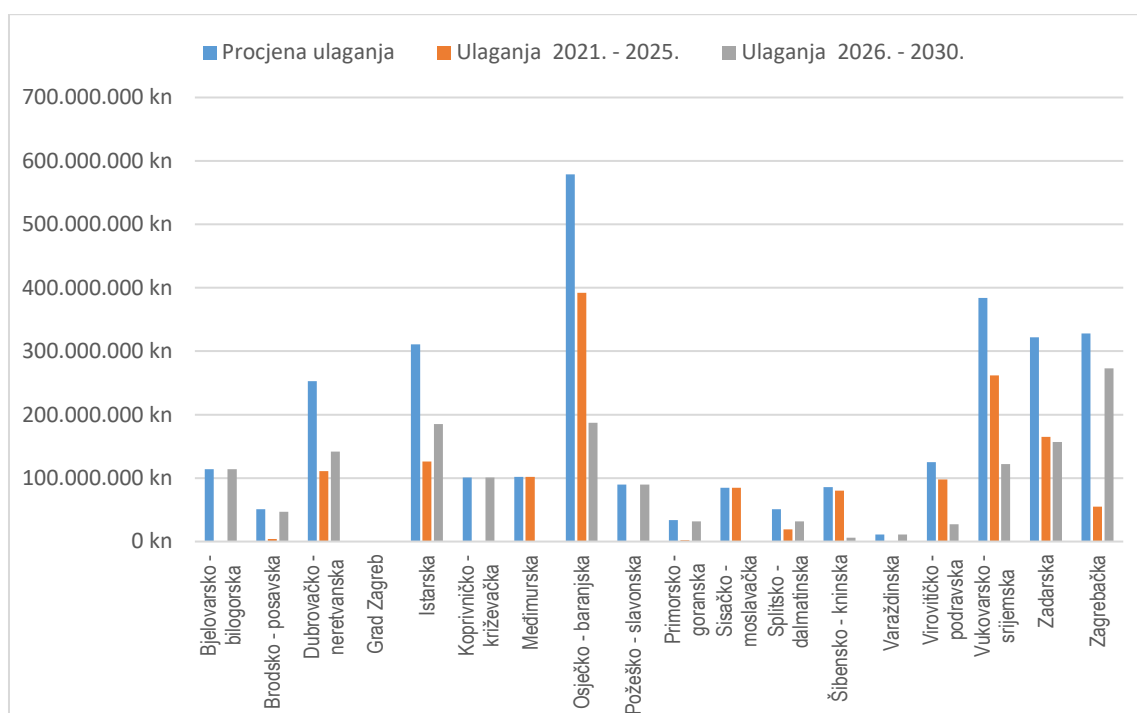


Fig. 7.2 Investments in irrigation projects according to counties

Below is a description of the dynamics of the increase in agricultural surfaces equipped with irrigation infrastructure through the implementation of the updated Multiannual Programme in relation to the long-term NAPNAV (implementation of NAPNAV 2005 - 2020; construction program plan 2021 - 2030; projection of the development of private systems and total). By implementing this Multiannual Programme (30,000 ha), along with constructed systems (15,000 ha) and the estimate of the development of private irrigation systems (15,000 ha), the Republic of Croatia would reach 60,000 ha of agricultural land equipped with irrigation infrastructure in 2030.

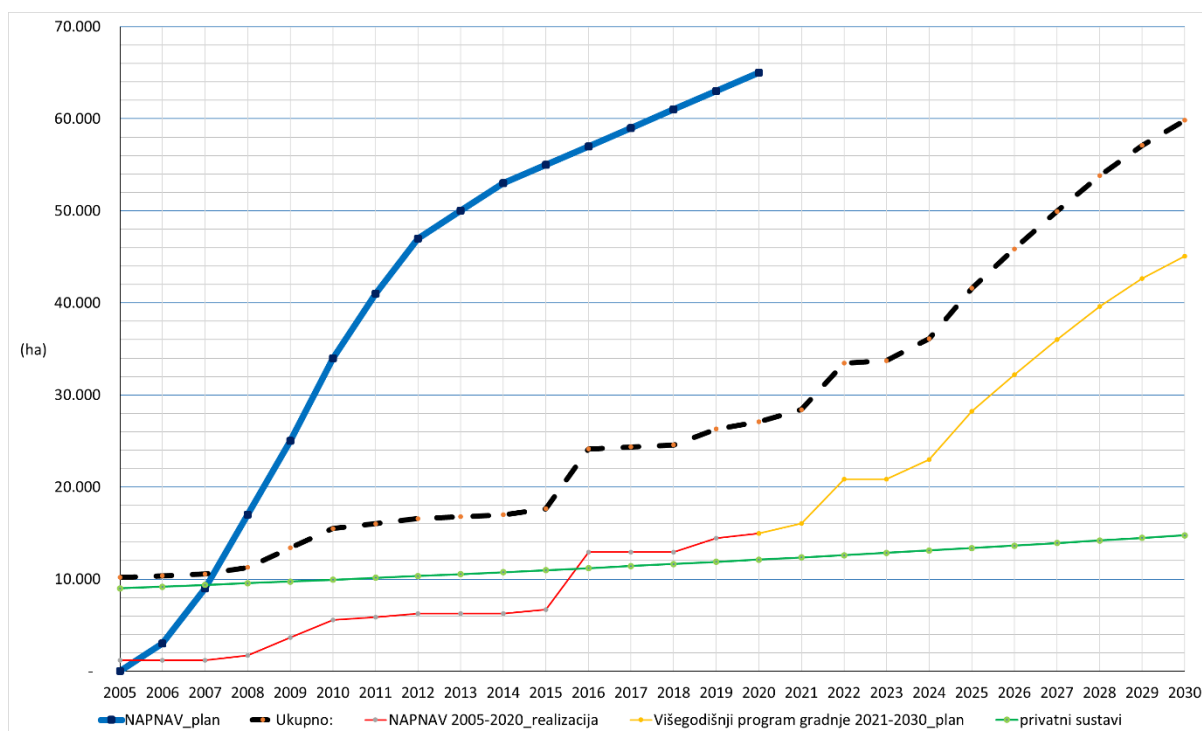


Fig. 7.3 Planned dynamics of the increase in agricultural land with irrigation infrastructure

7.2.2 Implementation

Chapter 5.2 of this Multiannual Programme defines the sources of financing for the realization of the proposed projects, which, depending on the sources of funding, will be financed as follows:

- From EU funds,
- Through national financing mechanisms,
- Through loans granted by international financial institutions.

Irrigation projects represent a part of the Multiannual Programme that foresees the implementation of individual projects in a designated / given period under precisely defined conditions and methods of financing.

Projects financed by EU funds

In 2015 the Republic of Croatia adopted the National Rural Development Program for the Period 2014 - 2020 (RDP 2014 - 2020). Within the general framework of the EU's Common Agricultural Policy, support for rural development contributes to the achievement of the following objectives:

- Ensuring agriculture competitiveness,
- Ensuring sustainable management of natural resources and activities against climate change,
- Balanced territorial development of rural economies and communities, including job maintenance.

The RDP 2014 - 2020 contains a range of measures in order to fulfil the stated objectives. Support to constructing public irrigation infrastructures in the Republic of Croatia is foreseen through Measure M04 "Investments in physical assets", Sub-measure 4.3 "Support for investments in infrastructure related to the development, modernization and adaptation of agriculture and forestry", type of operation 4.3.1 "Investments in basic public irrigation infrastructure". For this type of projects, the competent ministry adopted a regulation on the implementation of measures in order to define: jurisdiction, beneficiaries of support, conditions of project eligibility, amount of financial support, cost eligibility, and conditions for submission of applications, selection of beneficiaries, payment etc.

Support is eligible for co-financing if the following conditions are met:

- Water body status is identified as having at least good status in the relevant River Basin Management Plan for reasons related to water volume.
- The investment must be related exclusively to new irrigation infrastructure, which leads to an increase in net irrigated surface.
- Abstracted water quantities have to be metered or metering has to be established as part of the investment at the level of the investment for which the support is granted.
- Environmental impact analysis must demonstrate that the investment does not have a significant negative impact on the environment and/or ecological network, and that the investment, with the implementation of mitigation measures, does not have a significant negative impact on the environment and/or the ecological network.
- The investment must comply with the requirements of the Water Framework Directive.
- In the feasibility study the beneficiary must demonstrate that the project requires co-financing, that the project benefits society and that the project does not generate net income for the beneficiary.
- In order to invest in the construction of an irrigation system, a minimum of 70% of agricultural land within the scope of the irrigation system must have a contractually defined relationship between the beneficiaries of the support and the final beneficiaries of the irrigation system.
- The soil for irrigation on the entire net agricultural area covered by the project must be suitable for irrigation.

In order to make the most efficient use of EU funds, when preparing projects, it is necessary to respect the basic conditions for the design and purpose of the projects.

The support funds are provided from the budget of the European Agricultural Fund for Rural Development (EAFRD) and the state budget of the Republic of Croatia, out of which the EAFRD participates with 85% of the share, and the Republic of Croatia with 15% of the share, and the intensity of public support per project is up to 100% of the total eligible costs. The number of projects approved for an individual beneficiary in the programme period is not limited. The maximum value of public support per project can amount to 15,000,000 euros.

In the upcoming programming period, the Republic of Croatia will, through the Rural Development Program for the transitional period 2021 - 2022 (RDP 2021 - 2022) and the Strategic Plan of the Common Agricultural Policy 2023 - 2027 (Strategic Plan CAP 2023 – 2027, provide the necessary funds to support the construction of public irrigation infrastructure) through one of measures. It is estimated that after the programming and adoption of the Strategic Plan of the Common Agricultural Policy and the regulation for the implementation of the measures, most of the irrigation projects from the proposed list of projects will be suitable for financing with EU funds.

Projects financed through national financing mechanisms

Part of the proposed projects will be financed through national financing mechanisms, depending on the amount of funds available to support the construction of public irrigation infrastructure through operational programs for the period 2021 - 2030. Projects that are not eligible for EU co-financing will be financed exclusively with national funds through the usual national financing mechanisms.

Projects financed through loans granted by international financial institutions

In order to achieve defined plans and objectives, part of the projects will be financed through loans granted by international financial institutions. The conditions of (co)financing will be determined in financial arrangements of competent authorities and banking institutions.

7.2.3 Proposed financing models

Bearing in mind possible sources of financing, elaborated in the previous section at the level of irrigation projects, it is proposed to finance the Multiannual Programme in the part related to the construction of irrigation water facilities, through three models.

Model 1 Financing projects through RDP 2014 - 2020

Projects approved in the previous programme period, whose construction will be completed by the end of 2023, will be financed from the RDP 2014-2020. Out of 58 proposed projects, 11 projects worth HRK 363,000,000 will be financed through this model, which represents 12% of the Multiannual Programme;

Model 2 Financing projects through EU funds (RDP 2021 - 2022 and CAP Strategic Plan 2023 - 2027)

According to this model, the plan is to finance projects with funds from the RDP 2021 - 2022 and the CAP Strategic Plan 2023 - 2027 in accordance with the conditions of the operational programs. Financing according to Model 2 is estimated at about 50% of the Multiannual Programme, out of which about 66% in the first part of the programme period from 2021 - 2025, and 33% in the second part of the programme period from 2026 - 2030.

Model 3 Financing using national financing mechanisms

According to this model, funding will be provided from the state budget of the Republic of Croatia and the budget of the counties according to the following co-financing ratio:

Source of financing	For systems > 200 ha (%)	For systems ≤ 200 ha (%)
State budget and / or Hrvatske vode's original resources	80	50
Budget of regional self-government units and / or project final beneficiaries	20	50

Financing according to Model 3 is estimated at about 10% of the Multiannual Programme, out of which about 50% in the first part of the programme period from 2021 - 2025, and 50% in the second part of the programme period from 2026 - 2030.

Model 4 Financing through loans granted by international financial institutions

This model foresees financing through loans granted by international financial institutions. Financing according to Model 4 is estimated at about 28% of the Programme, entirely in the second part of the programme period from 2026 to 2030.

Below is an overview of financing shares and ratios according to financing models and planning periods.

Tab. 7.6 Estimated shares of financing models

Financing period	2021 - 2030	2021 - 2025	2026 - 2030
Model 1	HRK 363,000,000	HRK 363,000,000	-
Model 2	HRK 1,500,000,000	HRK 1,000,000,000	HRK 500,000,000
Model 3	HRK 300,000,000	HRK 138,000,000	HRK 162,000,000
Model 4	HRK 864,000,000	-	HRK 864,000,000
Total Programme:	HRK 3,027,000,000	HRK 1,501,000,000	HRK 1,526,000,000

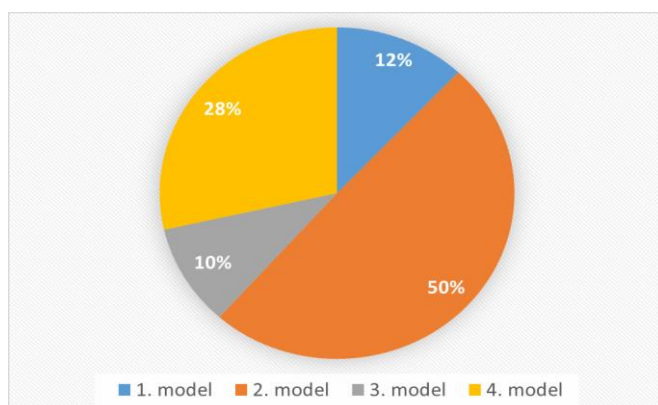


Fig. 7.4 Ratios of models of programme financing in the part that relates to irrigation

Potential financing models generate three basic sources of funds: EU funds, national resources and funds from international financial institutions. Funding ratios, according to sources of funding, in relation to the proposed financing models and programme periods were reviewed.

Tab. 7.7 Shares of financing the construction of irrigation projects according to periods and cost structure

Source of funding	2021 - 2030	2021 - 2025	2026 - 2030
National resources	HRK 579,450,000	HRK 342,450,000	HRK 237,000,000
EU funds	HRK 1,583,550,000	HRK 1,158,550,000	HRK 425,000,000
Loans granted by international financial institutions	HRK 864,000,000	-	HRK 864,000,000
Total Programme:	HRK 3,027,000,000	HRK 1,501,000,000	HRK 1,526,000,000

Structure of costs	Total	Net amount	VAT
National resources	HRK 579,450,000	HRK 463,560,000	HRK 115,890,000
EU funds	HRK 1,583,550,000	HRK 1,266,840,000	HRK 316,710,000
Loans granted by international financial institutions	HRK 864,000,000	HRK 691,200,000	HRK 172,800,000
Total Programme:	HRK 3,027,000,000	HRK 2,421,600,000	HRK 605,400,000

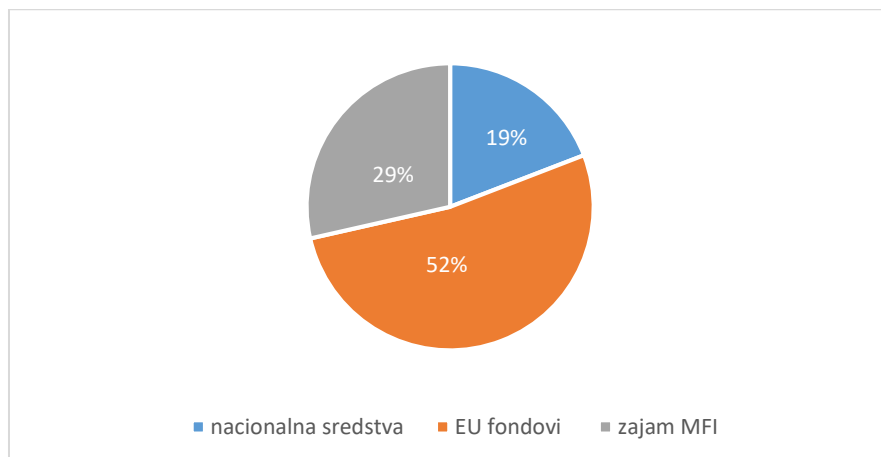


Fig. 7.5 Ratios of sources of programme funding in the part that relates to irrigation

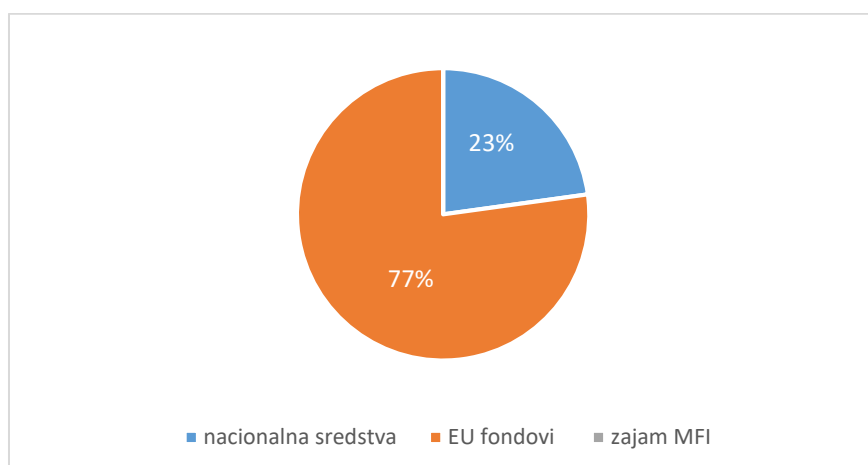


Fig. 7.6 Ratios of sources of programme funding in the part that relates to irrigation for the period 2021 - 2025.

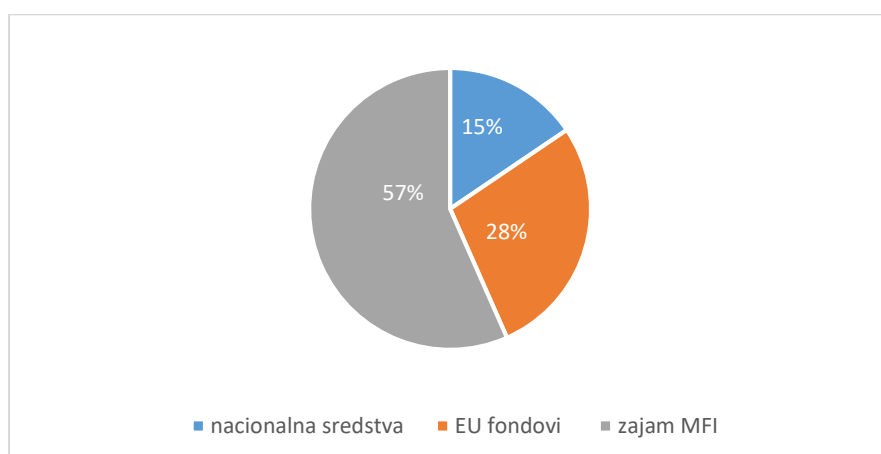


Fig. 7.7 Ratios of sources of programme funding in the part that relates to irrigation for the period 2026 - 2030

In the first part of the programme period from 2021 - 2025, the main source of funding are national rural development programmes and the CAP Strategic Plan 2023 - 2027, and to a lesser extent national resources. Loan granted by international financial institutions is foreseen for the period from 2026.

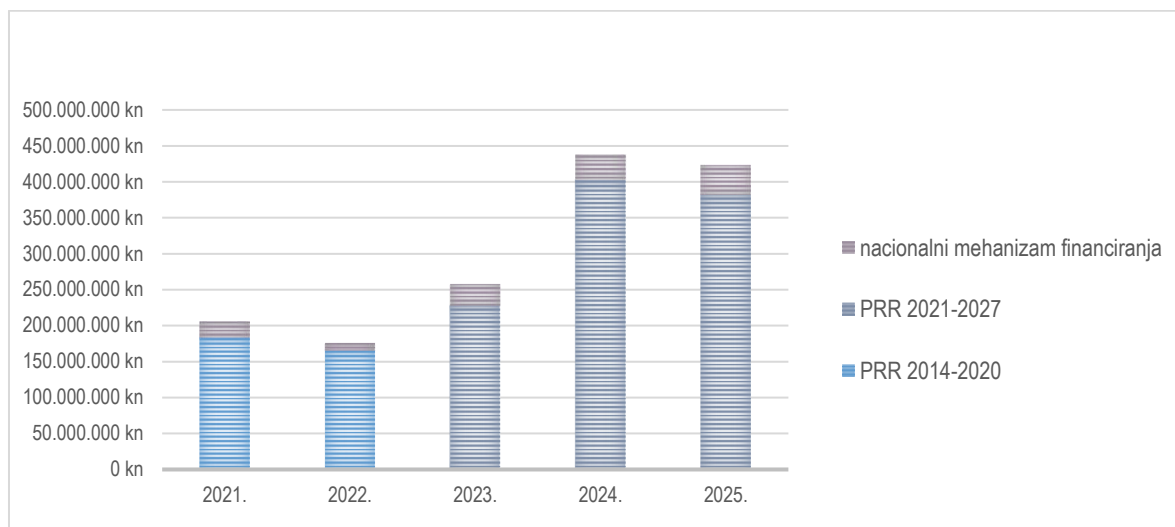


Fig. 7.8 Sources of funding for irrigation projects in the first programme period 2021 - 2025

8 Implementation plan

8.1 Project preparation

Project preparation in its full scope includes the following elements:

- (i) On the programme level:
 - Preparation of multiannual programmes,
 - Preparation of flood risk assessments,
 - Preparation of strategic environmental impact assessments,
- (ii) On the project level:
 - Analysis of conditions for implementation through a specific project,
 - Project selection depending on priorities,
- (iii) On the level of individual projects:
 - Preparation of analyses and pre-investment studies,
 - Preparation of investment studies,
 - Preparation of technical studies and conceptual designs,
 - Preparation of preliminary design,
 - Preparation of detailed design,
 - Preparation of implementation designs,
 - Preparation of environmental impact assessments,
 - Preparation of appropriate assessments,
 - Additional assessment (in the scope of ecological network),
 - Resolving spatial and planning issues,
 - Resolving property related issues,
 - Obtaining location permits,
 - Obtaining building permits,
 - Preparation of financing plan.

The preparation of individual projects, as seen in this Multiannual Programme, includes only a certain number of listed elements, depending on the complexity of the specific project, the current state of its technical and administrative maturity for implementation (technical documents prepared, property related issues resolved, building permits obtained), and implies the entire undertaking in a certain period, with foreseen cost plan.

The first step of the implementation plan, mandatory for all projects, is a detailed review of the state of maturity, with the purpose of identifying the remaining preparation activities and technical parameters for creating the terms of reference, i.e., for initiating the public procurement procedure and contracting the execution of individual activities.

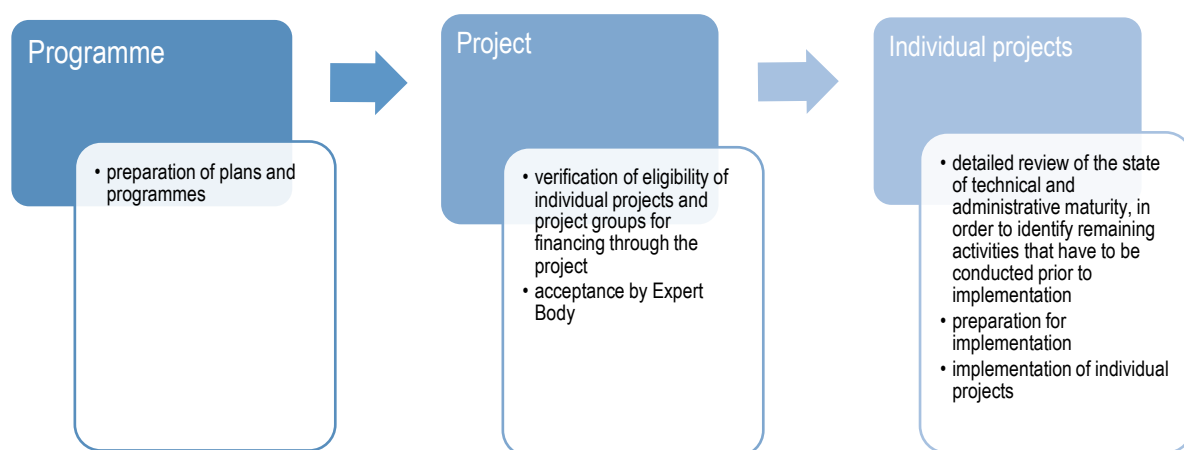


Fig. 8.1 Project preparation overview

8.2 Implementation indicators and benefits

The implementation of the updated Multiannual Programme will be monitored in order to harmonize it with changes that occurred during implementation. Groups of result indicators are proposed, which establish a framework for monitoring the achievement of objectives and benefits on multiple levels: Programme, Project and individual projects, which could also indicate problems in implementation.

8.2.1 Protection from adverse effects of water / flood risk management

Framework and monitoring of results

Programme objectives	Programme result indicators	Programme result benefits
– Flood protection in endangered areas – Using available agricultural land – Improving hydromorphological status of water – Protection of Natura 2000 network – Creating space for rivers and retention areas in order to render watercourse capacities capable of retaining retain high water	– Increasing territory with acceptable flood risk (resilience to flooding) – encouraging flood protection within the framework of multi-purpose systems for regulation and use of water and land (this objective will be achieved by the gradual implementation of works on rehabilitation and reconstruction of facilities and the implementation of development projects) – reduction of agricultural areas with inadequate drainage	– reduced material damages, human casualties and adverse effects of floods on the environment and human health – reduced agricultural areas exposed to frequent flooding – preservation of areas of importance for birds and areas of importance for species and habitat types – increasing areas along watercourses where environmental protection objectives are met in relation to the hydromorphological elements of water status
Project development objectives	Project result indicators	Project result benefits
– improvement of regulation and protection water systems in the area of project implementation – reducing the risk of flooding in the area of project implementation – introduction of innovative solutions for efficient management of flood defence systems – improvement of hydromorphological characteristics of watercourses	– increased number of inhabitants with acceptable flood risk level – increased use of available agricultural land – preservation and protection of areas of importance for birds, species and habitat types – increased level of functionality of regulation and protection water systems	– reduced material damages and negative impacts of floods on the environment and human health – increased yields on agricultural land protected from frequent flooding – improvement of hydromorphological status – preservation of areas of importance for birds and areas of importance for species and habitat types

– reduction of pollution reaching water and soil after floods – better knowledge of new technical solutions in the construction and maintenance of regulation and protection water facilities – improvement of methods for using an environmentally friendly approach to flood risk reduction	– increased number of flood defence systems with technical solutions based on an environmentally friendly approach	– identification of bottlenecks in achieving objectives

Transitional results	Transitional result indicators	Use of transitional result monitoring
Quantifiable per Water Management Departments		
Investing in facilities for protection against adverse effects of water		
– investments in regulation and protection water facilities (dikes, bank revetments, artificial watercourse channels, relief canals, lateral canals, drainage tunnels, dams with reservoirs, sluices, retentions and other pertaining structures, pumping stations, multiple purpose reservoirs, stilling pools, erosion and torrent control facilities) – invests in land reclamation drainage facilities (canals with pertaining pumping stations, underdrains, concrete culverts, plugs, siphons, channel falls, chutes, anti-erosion lining, sluices and other pertaining facilities, plant and equipment)	– number of projects with defined scope (terms of reference) – number of projects ready for construction – number of building contracts – number of constructed systems (facilities) put into operation – constructed dikes in km – number of constructed reservoirs (with characteristics) – number of constructed retentions (with characteristics) – number of constructed facilities in the system (with characteristics)	– evaluate the progress of physical investments implemented as part of the Programme
Investing in facilities for improving hydromorphological status of water		
– investments in regulation and protection water facilities (dikes, bank revetments, artificial watercourse channels, relief canals, lateral canals, drainage tunnels, dams with reservoirs, sluices, retentions and other pertaining structures, pumping stations, multiple purpose reservoirs, stilling pools, facilities for protection against erosion and torrents)	– number of projects with defined scope (terms of reference) – number of projects ready for construction – number of building contracts – number of constructed systems (facilities) put into operation – constructed dikes in km – number of constructed reservoirs (with characteristics) – number of constructed retentions (with characteristics) – number of constructed facilities in the system (with characteristics)	– evaluate the progress of physical investments implemented as part of the Programme

	Description	Initial value	Target value	Period	Link to indicators of other strategic documents
Impacts indicator	Number of areas with potentially significant flood risk where <u>significant flood risk</u> has been reduced according to the River Basin	1545	1250	In 2027 and in 2030 - harmonised with the River Basin Management Plan reporting cycles	Strategija prilagodbe: Vodni resursi alineja 2

	Management Plan 2022 – 2027 by the implementation of the Multiannual Programme (acc. to the total assessment of endangerment level)				
Outcomes indicator	Reduction of potential average annual damage (according to the River Basin Management Plan 2022 – 2027)	HRK 7,505 million annually	HRK 7,000 million annually	every 3 years (2024, 2027, 2030) - harmonised with the River Basin Management Plan reporting cycles	
	Reduction of the number of inhabitants endangered by floods with medium probability of occurrence (according to the River Basin Management Plan 2022 – 2027)	137,145	110,000	every 3 years (2024, 2027, 2030) - harmonised with the River Basin Management Plan reporting cycles	Adaptation Strategy – Water resources, indent 5*; National Recovery and Resilience Plan indicator: Inhabitants covered by improved flood protection measures
	Reduction of agricultural surfaces endangered by floods with high probability of occurrence (according to the River Basin Management Plan 2022 – 2027)	1,456 km ²	1,170 km ²	every 3 years (2024, 2027, 2030) - harmonised with the River Basin Management Plan reporting cycles	
Results indicator	Number of projects for which technical documentation has been prepared			annually	National Recovery and Resilience Plan indicator
	Number of projects under construction (works contracts concluded for flood protection projects)		20	annually	National Recovery and Resilience Plan indicator
	Number of completed projects			annually	
	Total investments in the implementation of the Multiannual Programme	HRK	HRK	annually	
	Constructed flood protection facilities (incl. length of constructed dikes)	0 km	155 km	annually	National Recovery and Resilience Plan indicator
	Number of constructed reservoirs			annually	
	Number of constructed retentions (incl. their characteristics)			annually	
	Revitalised watercourses	0	18 pcs	annually	National Recovery and Resilience Plan indicator
Note	The initial and target values of indicators need to be updated in the River Basin Management Plan 2028 - 2033				
*	Instead of the indicator proposed in the Adaptation Strategy: "Number of inhabitants in the area for which a state of natural disaster has been declared due to a flood occurrence", we propose the indicator: "Reduction of the number of inhabitants endangered by floods with medium probability of occurrence (according to the River Basin Management Plan 2022 – 2027)". The explanation: This indicator is easier to determine, i.e. it is determined according to the adopted Flood Hazard Maps, while the areas where a state of natural disaster has been declared due to a flood occurrence change with time and the declaration of natural disaster itself does not depend only on a flood occurrence, but also on the assessed level of damage and on the self-government units' decision to declare a flood a natural disaster.				

8.2.2 Irrigation

Framework and result monitoring

Programme objectives	Programme result indicators	Programme result benefits
– irrigation of agricultural areas exposed to frequent droughts – increased cultivation of crops with increased yields due to irrigation, and multiple income in relation to resources invested in irrigation	– increased agricultural areas that are irrigated – improved quality of underground water and soil, and thus increased yields, by building irrigation systems on agricultural areas in the coastal area where there is soil salinization – irrigation provided through multi-purpose systems of regulation and use of water and land (by gradual implementation of works on rehabilitation and reconstruction of facilities, and implementation of development projects)	– reduced agricultural areas exposed to frequent droughts in order to stabilize agricultural production / yields – increased income from agriculture – reduced trend of salinization of agricultural areas in the coastal area – rational use of water resources through the construction of multipurpose facilities

Project development objectives	Project result indicators	Project result benefits
– improvement of irrigation system in order to achieve effective protection against droughts in the areas where the projects are implemented – reduced damage caused by drought in the area of project implementation – introduction of innovative solutions for effective management of irrigation systems – better knowledge of new technical solutions in the construction and maintenance of irrigation systems	– increased percentage of agricultural area where exposure to droughts is reduced – increased percentage of use of available agricultural area – increased production of high-yielding crops – percentage of increased functionality of irrigation systems	– evaluate the progress towards achieving the objectives of the Programme – evaluate the achievement of Project objectives related to increased functionality of irrigation systems

Transitional results	Transitional result indicators	Use of transitional result monitoring
Quantifiable per counties		
Investments in irrigation water facilities		
investments in irrigation facilities (reservoir and other intake facilities, distribution network and other pertaining facilities)	- number of projects with defined scope (terms of reference) - number of projects ready for construction - number of building contracts - number of constructed systems (facilities) put into operation - total constructed distribution network in km - number of constructed reservoirs (with characteristics) - number of constructed retentions (with characteristics) - number of constructed facilities in the system (with characteristics)	evaluate the progress of physical investments implemented as part of the Programme

8.3 Result monitoring criteria and frequency

The collection of data on the projects of protection against adverse effects of water and irrigation started with the preparation of the Multiannual Programme and will continue during its implementation and update. This document presents the situation in the sector, identifies and proposes projects, estimates total costs and defines target benefits.

Hrvatske vode will collect, present in the form of tables and analyse data for the annual monitoring of the results of the Multiannual Programme. Data will be collected simultaneously with the development of the projects each year during their implementation. Basic data will be organized into a database, which will facilitate future monitoring, evaluation and analysis. Project monitoring indicators, their interpretation and analysis will be included in the annual reports on the progress of the Multiannual Programme. An extensive analysis of the situation will be conducted and proposals for possible improvements will be put forward in the middle of the implementation period of the Multiannual Programme.

Monitoring the implementation of individual projects of varying degrees of importance differs from monitoring the implementation of the entire Multiannual Programme. In this sense, reports on project implementation are collected and systematized by the Water Management Departments and counties, which are then used to monitor their implementation. Data will be collected on the physical and operational progress of each individual project. Compliance with spatial and planning documents (plans are adopted by local and regional self-government units) has to be discussed when defining the project and/or project groups, and they have to be monitored and evaluated during their implementation.

This way ensures the coordination of all activities and participants in the project. In addition, coordination between local and regional self-government units involved in the project, Hrvatske vode and competent authorities for the protection and preservation of the environment and nature (governmental and non-governmental organizations) will also be ensured.

8.4 Partner arrangements

The Multiannual Programme continues to strengthen the role and responsibility of the main participants in the water management sector, the water management activity of protection against the adverse effects of water and irrigation.

In cooperation with the Ministry of Regional Development and Funds of the European Union, Hrvatske vode and the organizational Unit for the Preparation and Implementation of EU Projects for Protection against Adverse Effects of Water participate in:

- The preparation of programme documents for flood risk management projects financed by EU funds, as well as monitoring the implementation of approved programs,
- coordination, control and preparation of application documents for co-financing flood risk management projects with EU funds and monitoring the implementation of approved projects.

In cooperation with the Ministry of Agriculture and local government, the role of Hrvatske vode and the organizational Unit for Implementation of the National Program for Irrigation and Management of Agricultural Land and Water Resources is to stimulate irrigation projects through co-financing and coordination related to:

- preparation of plans (National Irrigation Plan, county irrigation plans),
- preparation of design documents for public irrigation systems,
- construction of public irrigation systems.

8.5 Spatial connection in water management

The Programme improves water management at the national level and at the levels of river basin districts and river basins, in order to reduce the risk of floods and develop irrigation. This also strengthens the role and responsibility of each participant.

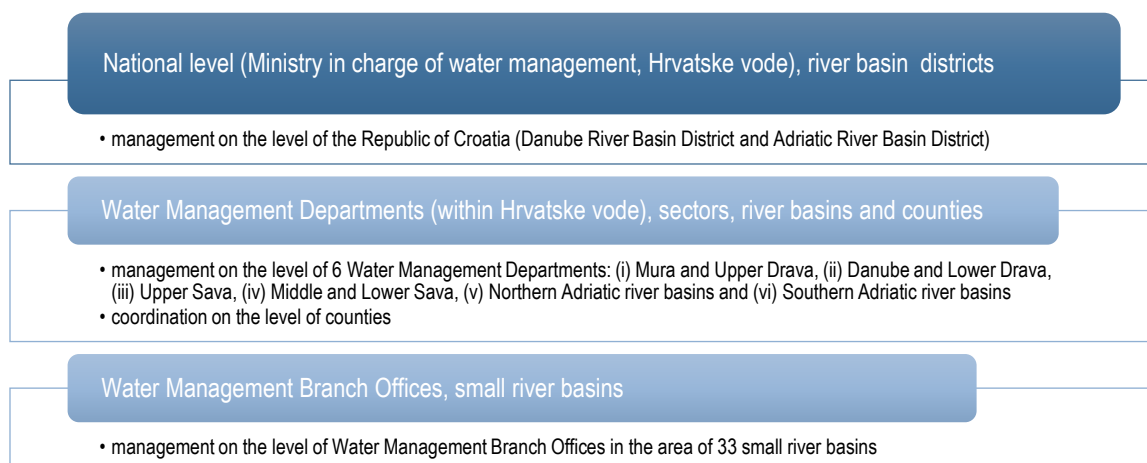


Fig. 8.2 Spatial connection in water management

8.6 Risks and possible issues

Technical characteristics of investments, high professional capacities for implementation and the commitment of all levels of government and interested parties guarantee the sustainability of the project. Sustainability is further strengthened by updating the Multiannual Programme, whose long-term goals in the area of protection against the adverse effects of water and irrigation are supported at the national level and are harmonized with EU requirements.

Hrvatske vode have the ability to prepare projects and implement them in accordance with the requirements of the Republic of Croatia. Hrvatske vode also successfully implement other projects financed by international banks and European funds and are familiar with the procedures and policies of relevant institutions. This experience will be used in the implementation of this Multiannual Programme, but also to improve the selection, preparation and monitoring of projects at program level and especially at project level.

Based on the experience of implementing similar projects, some of the risks listed below still remain, according to the assessment, especially because of the larger scope of the Multiannual Programme. The experience gained by Hrvatske vode, together with mitigation measures, reduce the risk for the implementation of planned projects. There are no issues at hand for the implementation of this Multiannual Programme.

Tab. 8.1 Description of project implementation risk and mitigation measures

Risk factors	Risk description	Risk rating	Mitigation measures	Rating of remaining risk
Technical / formation	Individual projects are not appropriately designed or are oversized.	Moderate	All projects must meet eligibility criteria. Independent experts (reviewers) will carry out project control. Performance will be evaluated through a strengthened monitoring network. Special attention is paid to technical planning and conceptual documents.	Low
Implementation capacity and sustainability	Although Hrvatske vode employ a significant number of experts, it is estimated that there is not enough capacity to implement the Multiannual Programme, with the number of people working in water management departments who are directly involved in implementing projects in the field being considered the most critical.	Significant	Hrvatske vode will redistribute and employ staff and thus strengthen the capacity of the implementation team.	Moderate
Financial management	Hrvatske vode have good experience with the implementation of similar projects. They have experienced employees for financial management. Increased scope of activities may lead to increased implementation risk.	Moderate	Given the scope of the Multiannual Programme, it will be necessary to hire an additional number or reassign employees who will be involved in financial activities on the project.	Low
Procurement	The implementation of the Multiannual Programme requires a large number of public procurements, all on the basis of the Public Procurement Act, which may be somewhat time-consuming due to complaints lodged by tenderers or due to cancellation and repetition of tenders. As a result of disputing the right to determine the minimum qualification criteria for selection, the investor is forced to contract works with insufficiently qualified companies at low prices that are not able to perform appropriately, so the success of project implementation is at stake.	Significant	In the previous period, Hrvatske vode have gained additional experience in conducting procurement procedures and will continue with the same procedure with constant training of the staff working on the project.	Significant
Social protection mechanisms	With some projects, there will be problems with land acquisition that might lead to delays in implementation.	Moderate	Hrvatske vode have good experience. All issues are resolved in advance. Land acquisition plans are ready for investments in the first year.	Moderate

Spatial and planning documents	Compliance of design solutions with spatial and planning documents.	Moderate	The preparation of projects is a long-term process that arises from or is gradually harmonized with spatial and planning documents. Strategic assessment of documents and accompanying public discussions contribute to reducing the risk of non-compliance.	Low
Environmental protection mechanisms	Prior to obtaining a construction permit, environmental management plans or environmental impact assessments have to be prepared for projects, and for projects within Natura 2000 network, an appropriate assessment has to be carried out and appropriate decisions have to be obtained from competent institutions, which may lead to delays in implementation.	Significant	Hrvatske vode have good experience. All issues are resolved in advance. Additionally, the Strategic Environmental Impact Assessment of the Multiannual Programme, which identifies the impacts on individual components of the environment in the area of scope and proposed environmental protection measures, also helps.	Moderate
Beginning of construction	The administrative procedures for obtaining permits take longer than expected, which can lead to delays in implementation.	Moderate	In cooperation with the competent authorities, the implementation of administrative procedures within the prescribed period should be insisted upon, given that these are projects of national importance.	Low
Total risk:		Moderate		Moderate

9 Implementation

9.1 Institutions involved in implementation

The following national and regional institutions are expected to be included in the implementation of projects from the updated Multiannual Programme:

- *Ministry in charge of finance* is responsible for payments, returns and certification of funds in the capacity of the Certifying Body in the EU programme implementation system. It is also responsible for relations with international financial institutions in implementing EU programmes and projects financed from loans and grants from other foreign sources.
- *Ministry in charge of regional development policy and EU funds* performs administrative and other affairs of significance for the implementation of the Multiannual Programme:
 - establishment and management of the entire system of strategic development planning at the national level, coordination of preparation of the national development strategy and compliance with objectives and priorities at the EU level,
 - preparation of strategic documents that regulate national development objectives and priorities for using EU funds, and monitoring the implementation of measures and activities established in such strategic documents,
 - coordination of tasks related to the management of EU programmes open to the Republic of Croatia, and cooperation with the ministry responsible for finance and other competent ministries, institutions and bodies of the EU and member states.
- *Ministry in charge of protection and preservation of environment and nature* represents public interest related to environment and nature protection, and is responsible for carrying out environmental impact assessment procedures and/or appropriate assessments, as well as prescribing the conditions and measures for environment and nature protection, which has a huge impact on the timetable for the implementation of the Programme, and thus its effectiveness. In addition to monitoring the implementation of environmental and nature protection conditions and measures in accordance with national standards, it also carries out tasks related to climate change mitigation and climate change adaptation.
- *Ministry in charge of spatial planning and construction* performs administrative and other tasks that affect the implementation of the Multiannual Programme, and relate to: spatial planning of the Republic of Croatia and harmonization of spatial development, planning, use and protection of space, international cooperation in spatial planning, spatial planning information system, monitoring of spatial situation and implementation of spatial plans of the Republic of Croatia, location permits, preparation and monitoring of the implementation of the Spatial Development Strategy of the Republic of Croatia.
- *Ministry in charge of water management* carries out a strategic environmental impact assessment of the Multiannual Programme, is actively involved in institutional strengthening of the water sector and activities related to the implementation of the Multiannual Programme, monitors and approves investments from its scope that are executed through Hrvatske vode, coordinates and supervises the preparation and implementation of projects within its scope, participates in programming and preparation of projects for protection against adverse effects of water, land reclamation drainage and irrigation for EU co-financing.
- *Units of regional self-government*, in the role of investor, participate in the implementation of irrigation projects, especially in terms of making decisions related to project evaluation (in cooperation with the Expert Irrigation Team³⁴) and financing.

³⁴ Expert Team for Irrigation formed in 2005 according to Decision by the Ministry of Agriculture.

9.2 Competence and obligations

Hrvatske vode are in charge of implementing projects from the list of the updated Multiannual Programme and are obliged to perform the following:

- Establish a project implementation plan and ensure its functioning within Hrvatske vode's organizational units,
- Participate in decision-making related to the Multiannual Programme through the Expert Body for Project Evaluation,
- Ensure that the Multiannual Programme is acceptable in the professional and operational sense and approve financial and technical characteristics of the proposed projects,
- Represent national interests in the area of protection of assets and population from adverse effects of water,
- Plan necessary resources for financing the Multiannual Programme in annual water management plans, including transfers/participation of the state budget of the Republic of Croatia and/or banks and enable their distribution,
- Conclude and monitor contracts for the procurement of goods and services with consultants/contractors,
- Carry out financial management of projects,
- Put into operation constructed regulation and protection water facilities and land reclamation drainage facilities, whose implementation is foreseen in the updated Multiannual Programme,
- Put into operation and hand over constructed water facilities for irrigation to counties for management, whose implementation is foreseen in the updated Multiannual Programme,
- Monitor the status of projects financed by loans until the final repayment of the loan.

For the purposes of using loan funds to finance projects, accompanying contracts will be concluded between Hrvatske vode and the ministry in charge of finance and/or international financial institutions.

Hrvatske vode, through its implementation teams, with the support of the ministry in charge of water management and local and regional self-government units, will be responsible for the implementation of the Programme within the limits of provided funds. Implementation teams consisting of Hrvatske vode's employees will be responsible for the formation, preparation and implementation of project groups/individual projects, including reporting, procurement, monitoring of contracts, spending of funds, putting water facilities in question into operation, ensuring information sharing with local and regional self-government units and the wider public during implementation, especially using Hrvatske vode's website and local media.

10 Expected impacts of the Multiannual Programme on environment and nature

10.1 Introduction

According to the Article 43 of Water Act (Official Gazette 66/19, 84/21), the Multiannual Programme for the Construction of Regulation, Protection and Land Reclamation Water Facilities for the period until 2030 (hereinafter referred to as the Multiannual Programme) defines water management for activities of protection against adverse effects of water and irrigation. It determines individual projects, the method and period of implementation, participants in implementation, investment amounts and sources of funds, and the order of priority in implementation, where applicable.

The Multiannual Programme is prepared by Hrvatske vode (Croatian waters), and it should be adopted by the Government of the Republic of Croatia. According to the Article 43, paragraph 2, of Water Act (Official Gazette 66/19, 84/21), the Multiannual Programme must be harmonized with the Water Management Strategy and the River Basin Management Plan. Compliance with European directives such as the Water Framework Directive (2000/60/EC) and the Flood Risk Assessment and Management Directive (2007/60/EC) is also necessary.

The previous Multiannual Programme was developed and adopted back in 2015 (Official Gazette 117/15), when the River Basin Management Plan 2013-2015 was in force. It is a framework investment programme into: (i) water regulation for the protection from adverse effects of water through the construction of regulation, protection and basic land reclamation water facilities, which can serve for receiving and evacuation of floods; and (ii) irrigation through the construction of water facilities for irrigation. The presented investments are dealt with in two separate units for the reason that they have different starting points, objectives, beneficiaries, sources of financing, technical and financial aspects.

The implementation of the previous Programme is foreseen over a long period, with the possibility of adaptation, in order to achieve clearly described goals and priorities, as well as to control activities and monitor the achieved effects. Although the Programme considered a longer period of time (2013-2022), the implementation of projects was primarily focused on the first program period ending in 2017, after which the proposed list of projects will be updated in order to better adapt to new needs and align with the current River Basin Management Plan).

In parallel with the preparation of the Multiannual Programme, the process of strategic environmental assessment of the Multiannual Programme is carried out according to the Law on Environmental Protection (Official Gazette 80/13, 153/13, 78/15, 12/18 and 118/18) and the Regulation on Strategic Environmental Assessment of the Strategy, Plan and Program (OG 3/17).

The strategic environmental assessment procedure (hereinafter: SEA) was launched in September 2018 with the adoption of the *Decision on the implementation of the strategic environmental assessment procedure of the Updated Multiannual Programme for the Construction of Regulation, Protection and Land Reclamation Water Facilities* (CLASS: 325-09/ 07-01/01, Reg. No: 517-07-1-3-1-18-8 from 06.09.2018). The competent authority for the SEA procedure is the Ministry of Economy and Sustainable Development (formerly the Ministry of Environmental Protection and Energy).

The area covered by the Multiannual Programme is the whole Croatia, and thus the area of strategic environmental assessment is the same as the coverage of the Multiannual Programme, while Strategic assessment study analyses projects in relation to each WMD - water management department (Croatian: Vodnogospodarski odjel- VGO).

For the purpose of determining the content of the Strategic Study, the Competent Authority obtained opinions from the bodies and/or persons designated by special regulations on the content and level of coverage of the data that must be analysed in the Strategic Study. In order to harmonize opinions on the content of the Strategic Study and determine the final content, the Competent Authority held consultations with the bodies that submitted opinions on the content of the Strategic Study during the process of determining the content of the Strategic Study. After obtaining the opinions of bodies and/or persons designated by special regulations, on January 23, 2020, the Competent Body issued a Decision on the contents of the Strategic Environmental Impact Study of the Updated Multiannual Programme for the Construction of Regulation, Protection and Land Reclamation Water Facilities (CLASS: 325-09 /17-01/01, Reg. No: 517-07-1-20-17).

A strategic study on the impact on the environment is prepared as an expert basis for the implementation of the SEA procedure. The strategic study determines, describes and evaluates likely significant impacts on the environment that may arise from the implementation of the Multiannual Programme and proposes environmental protection measures and a monitoring program depending on the identified impacts. The company OIKON d.o.o. – The Institute of Applied Ecology from Zagreb is authorized to prepare the Strategic Study on the impacts of the Multiannual Programme on the environment and has the Consent of the Ministry of Economy and Sustainable Development for the performance of professional environmental and nature protection work, including the preparation of strategic studies.

The procedure of the preliminary assessment of acceptability for the ecological network was carried out, and the Ministry of Environmental Protection and Energy issued a Decision, CLASS: UP/I 612-07/17-60/147, REG.NO: 517-05-2-18-6 dated July 26, 2018 that for the planned Updated Multiannual Programme for the Construction of Regulation, Protection and Land Reclamation Water Facilities, it is necessary to carry out the Appropriate Assessment.

The Multiannual Programme contains construction measures to reduce the risk of floods, primarily the construction of regulation, protection and land reclamation water facilities. The construction measures covered are subject to processing and elaboration at the level of preparation of technical documentation of a higher degree of details (analysis carried out in the framework of feasibility studies, conceptual or main project, and the requirements and conditions set out in the process of obtaining location and building permits, i.e. in the process of determining the acceptability of environmental impacts of the project).

The Multiannual Programme covers all areas where there are or are likely to be potentially significant flood risks according to flood hazard maps and flood risk maps contained in the Flood Risk Management Plan, which is an integral part of the Water Management Plan 2016-2021. In addition to new projects, the remaining 210 unrealized projects from the existing Program were included on the list of the Multiannual Programme, some of which were novelized if there was a change of the situation on the ground or conditions for the application of different technical solutions.

The Multiannual Programme contains a total of 504 water protection projects, of which 325 projects relate to the Danube River Basin District and 179 projects to the Adriatic basin District.

The realization of projects from the list of the updated Multiannual Programme is expected in the following dynamics:

- Starting with the construction or completing a total of 251 projects until 2023, when the new update of the Multiannual Programme is planned in order to harmonise it with the River Basin Management Plan 2022 - 2027
- Leaving the implementation of the remaining 253 projects for the period after 2023

Public irrigation is the activity of abstracting groundwater and surface waters and their delivery for irrigation of agricultural land using irrigation facilities owned by units of regional self-government or combined land reclamation facilities owned by the Republic of Croatia. The right to use water for irrigation is realised in accordance with the Water Act for the purpose of achieving the objectives of the National Project of

Irrigation and Agricultural Soil and Water Management in the Republic of Croatia and irrigation plans and programmes of regional self-government units, and for meeting the needs for irrigation of various users for various purposes.

The basis for the development of the updated Multiannual Programme is the National Project of Irrigation and Agricultural Soil and Water Management in the Republic of Croatia (July 2005) and county irrigation plans (developed in the period from 2003 to 2019).

The project proposal took into account the spatial limitations (protected areas, sanitary protection zones, etc.), which were noted during the development of county irrigation plans. As part of the updated Multiannual Programme, the projects were additionally checked with regard to vulnerable areas.

The Multiannual Programme plans the construction of a number of water protection projects systematized into project units formed according to the corresponding flood defence systems, spatial location and area of influence (area of a small basin, municipality or city, etc.). The grouping was done in order to better understand the wider effects of the planned projects on increasing the level of flood protection and the formation of the corresponding project units with the aim of more efficiently applying for financing from EU funds.

The selection of relevant project units, that is, the spatial grouping of proposed projects, avoids partial observation of the effects of the implementation of each individual project and enables a more efficient assessment and monitoring of the achievement of set goals and benefits in a wider area. This approach makes it much easier to assess the impact of planned projects on the environment, because the assessment of the cumulative effects of the program on the environment is carried out at the level of project units, and not at the level of individual projects. In addition, during the selection of project units, possible cross-border impacts were taken into account, in order to single out projects that may require the implementation of appropriate procedures according to a special procedure.

Due to the complexity and comprehensiveness of the Multiannual Programme, only the framework activities necessary to achieve the set goals were defined for the mentioned projects, without prior analysis of possible variant solutions, investment and maintenance costs, socio-economic benefits, as well as other relevant criteria. All interdependent or functionally connected projects that need to be implemented in a certain area are grouped into project units that include wider parts of the area within which the proposed procedures improve the existing damaged condition and do not endanger the existing condition (biological and hydromorphological elements of quality). For each individual planned project from the list of the Multiannual Programme, it is possible to arrive at a better technical solution when creating more detailed project documentation or a feasibility study.

10.2 Existing condition and possible impacts on the environment

Soil and agriculture

Based on geographical and geological diversity, the main feature of soils in the Republic of Croatia is their diversity. Natural and anthropogenic pressures are the causes of degradation, which is evident in the form of erosion, landslide formation, alkalinization, salinization, pollution, and loss of soil as a valuable natural resource. Furthermore, the agricultural potential of Croatia is insufficiently exploited despite its abundance and value. The largest problems are abandoned agricultural land, lack of strategic approach to development of agricultural sector and underdevelopment of the irrigation system. The importance of sustainable management of water resources in food production is gaining more importance recently. Climate change and natural hazards such as droughts and floods have high impact on the availability of water resources and food production. Implementation of hydrotechnical projects in agriculture (drainage and irrigation) secures the adequate production through a more efficient use of water resources. The development of protective measures against detrimental effects of water and adequate use of

agrochemicals are basic preconditions for the achievement of sustainable and environmentally acceptable agriculture.

During the assessment of Strategy's potential influence on soil and agriculture and determination of measures, only activities that could have significant positive and/or negative effect were considered.

Based on existing conditions and environmental problems, as well as available data, projects that will have an effect on agriculture and/or soil were determined. The construction of reservoirs will have a negative effect on soil, especially if they are planned on particularly valuable (P1) and valuable cultivated (P2) agricultural land. At the same time, reservoirs that will be used for irrigation, as well as land reclamation facilities, will have a positive impact on agriculture because they will enable irrigation and will increase the resistance of agricultural sector to climate changes. Projects of the regulation of torrents in the Adriatic basin will have a positive influence on soil, especially in areas with a high risk of water erosion because they will reduced this risk. Also, a positive impact on agriculture is expected if regulation of torrent is carried out in areas with considerable agricultural production. Construction and reconstruction of embankments in the area of Danube River Basin will have a positive impact on agriculture if agricultural land is located near rivers and/or is prone to flooding. Negative impacts can occur when locations from which soil material will be excavated for dikes construction are located on particularly valuable (P1) and valuable cultivated (P2) agricultural land. Reconstruction of existing facilities will not have significant long term impacts.

Geology

With regard to the geological structure on the territory of Croatia, two areas can be singled out: the Pannonian one, which includes the northern part, and the Dinaric one that extends from west to south along the Adriatic Sea. In the structure of the Pannonian area, mainly igneous, metamorphic and clastical sedimentary rocks appear, while the Dinaric area is characterized mainly by carbonate rocks.

Structurally tectonic relations on the territory of the Republic of Croatia are complex, and four main tectonic units can be singled out: Pannonian basin, Inland Dinarides, Outer Dinarides and Adriatic.

The Pannonian basin is extending through Croatia and the surrounding countries, and is surrounded by the Alpine-Carpathian-Dinarides orogenic system. The Croatian part of the Pannonian Basin is spread over 26,000 km² and is divided into four main sub-pools: Sava and Drava basin, Northwestern Croatia and Slavonia. In this area there are the oldest rocks of Paleozoic age that build fundamental mountains, represented by igneous and metamorphic and less often sedimentary rocks with granites, gnaeuses, shale and metamorphic rocks of different lower degree of metamorphosis on them lie deposits of mesozoic-Paleozoic and neogene-quaternary age.

The Dinarides are a wide northwest-south-eastern belt stretching from southwestern Slovenia to Montenegro and runs along the Croatian part of the Adriatic coast and inland. The inner Dinarides represent the young, concatenated mountains formed by alpine orogenesis within the framework of the creation of the Tethys Ocean due to the collision and underscore of the African craton under the European part of the Eurasian Plate. They cover the area from Žumberak, Karlovac, Duga Resa, Banovina and Kordun and continue to neighbouring Bosnia and Herzegovina. All types of rocks are present, and structures extend in the direction of NW-SE.

The outer Dinarides were formed on the Adriatic-Dinaric carbonate platform. The most prominent structures of the Dinarides are the northwest-southeastern reverse faults that directly border the southwestern border of the Pannonian Basin. They stretch from Karlovac and Ozalj, through Istria all the way to Dubrovnik and include all the islands of the Adriatic. In the structure, limestones and dolomites predominate mainly with the frequent appearance of carbonate clastics. The sequence of carbonate deposits is very thick, interspersed with more than 8000 m, stratigraphic range from Carbon to Eocene.

Geotectonic unit Adriatic is located on the carbonate base of Mesozoic age. Carbonates and clastics of Paleogene age are present, and of the Oligocene, clasts with terrigenous influence predominate. The islands have carbonate builds except Apple, Brusnik and Svetac (gabbro). Tuffs are present inside the Neogenic clastics.

Hidrogeology

The territory of the Croatian territory, given the hydrogeological characteristics, can be divided into two areas: the Pannonian area and the karst.

The Pannonian region is dominated by alluvial aquifers of inter-grain porosity formed within large sedimentation basins of the Drava and Sava rivers. Between them stretch mountainous and hilly areas also mainly built from deposits of inter-grain porosity, and carbonate aquifer rocks of crack porosity are found only in the highest parts of the mountainous regions. Alluvial aquifers in the Drava and Sava basins are rich in water and represent the main water supply resource of the northern part of Croatia.

The fundamental features of karst basins are spacious water collection zones in mountainous areas very rich in precipitation and very complex conditions of emerging on the contacts of karstified water-permeable carbonate aquifers and waterproof clastic rocks, or under the slow action of the sea. Karstification and underground flows are deeper than today's sea level, thanks to much lower sea levels in the quaternary period. Groundwater flows are tied to cavernous-fissure systems, they are relatively high speeds of underground flows (up to 30 cm/s), and the amplitudes of leakage at karst springs vary up to 200 m³/s.

The natural vulnerability of the aquifer was separately assessed for the Pannonian and karst parts of the water area. In the Pannonian area, a very high natural vulnerability is the Drava aquifer and the area of the Sava River basin from the Slovenian border to Sisak. Significant areas of very large vulnerabilities of karst aquifers are separated in the groundwater units central Istria, Rijeka Bay, Lika-Gacka and Cetina and on the islands of Krk and Cres.

Seismic activity

The locations of seismic activities correlate with the locations of regional faults or fault zones, especially along their intersections and along the edges of larger tectonic units. According to the global distribution of earthquakes depending on their strength, the area of the intervention belongs to the Mediterranean-Asian seismic zone.

In accordance with the map of earthquake areas for the return period of 95 years, on the territory of the Republic of Croatia horizontal peak acceleration of the soil starts in the value of 0.04 - 0.20 g. According to the map of the earthquake areas for the return period of 475 years, the horizontal peak acceleration of the soil starts in the value of 0.06 - 0.38 g. The most pronounced in the area of Dalmatia, Primorje and the wider Zagreb area.

Forest and foresting

All forests and forest land in the Republic of Croatia are united into one forest management area forming a functional unit to ensure unique, permanent, and sustainable management. Total forest management area, determined by the Forest management plan for the Republic of Croatia (General FMAP) for the period from 2016 to 2025, amounts to 2.759.039 ha, which is 49,3 % of the land territory of Croatia. The share of vegetated area amounts 90 %. Considering the ownership structure, 76 % of forests and forest land are owned by the Republic of Croatia, of which 97 % are managed by the Croatian Forests Ltd, and 3 % by the state administration bodies or legal entities founded by the Republic of Croatia. The remaining 24 % of the forests and forest land are owned by the private forest owners. Forests are managed according to the principles of sustainable management, which means that an effort is made to achieve a permanent balance between the total production of wood biomass and the general forest benefits that

refers to all those services, impacts, and values that forest provides to man, community, the environment, and the overall nature.

One of the fundamental problems of forestry in water management department (WMD) for the Mura and upper Drava and the Danube and lower Drava, related to the management of water resources are numerous large hydrotechnical interventions built in the past (hydroelectric power plants, construction of large canals, revetments, etc.), which resulted in the deepening of the riverbed and lowering of the groundwater level and, consequently, in drying of floodplain forests. Due to the hilly characteristics, problems of the forests in the WMD for the upper Sava are primarily related to the occurrence of torrential flows that cause erosion and soil washing. Also, forest management is difficult due to the reduced forest road infrastructure. Because of the proximity to urban areas, almost every infrastructural intervention represents a certain encroachment on forest habitats. The problem of forests in the WMD for middle and lower Sava is mainly related to the conversion of forests and forest land in the past for the needs of building the existing infrastructure and energy network, which led to the fragmentation of forest ecosystems. In lowland floodplain forests, sudden changes in the water regime caused by land reclamation, hydrotechnical and other interventions on larger areas represent a significant pressure. In the entire distribution area, ash stands (*Fraxinus angustifolia* and *F. excelsior*) are particularly threatened due to the complex interplay of abiotic and biotic factors.

Also, a particular threat to the floodplain forests is the false indigo-bush (*Amorpha fruticosa*), whose aggressive spread is favoured by the floods. The WMD for the basins of the northern Adriatic is partly characterized by the forests of the Istrian area that are endangered due to frequent erosive and torrential processes in the flysch area, which cause ecological and economic damage due to the loss of soil and vegetation. On the other hand, in the forests in Gorski Kotar, the biggest problems are windbreaks, windthrows, icebreaks and snowbreaks caused by the increasingly frequent and pronounced climatic oscillations. Forests in the WMD for the Southern Adriatic basins are mainly of a protective character and have low economic value. The reason for this is degradation of a forests because of systematic exploitation in the past (cutting, grazing, conversion of land). There are very few high forests that have remained preserved due to the difficult accessibility of these areas. The main problem in this area is forest fires caused by climatic extremes or human activities and carelessness, as well as soil erosion caused by frequent torrents, which is especially pronounced on burned forest areas due to the lack of vegetation.

Given that this Program plans interventions that concern water management and that can potentially change the water regime, emphasis is placed on those WMD-s and project units that should be paid attention to when planning and implementing interventions. The greatest impact can be expected in the case of encroachment on lowland floodplain forests, i.e., in forests communities where pedunculate oak (*Quercus robur*), field ash (*Fraxinus angustifolia*) and black alder (*Alnus glutinosa*) are present or in alluvial willow (*Salix* sp.) and poplar (*Populus* sp.) forests. For the WMD for Mura and upper Drava this refers to project units 36, 38, 40 and 41, for the WMD for the Danube and lower Drava to project units 37, 43, 44, 45 and 46, for the WMD for the upper Sava to project units 24 and 28 and for the WMD for middle and lower Sava to project units 20, 24, 32, 35 and part of project units 29 and 30. As for interventions in the WMDs for northern and southern Adriatic, the impacts are mainly concentrated on landslides and erosion due to torrential flows and loss of vegetation due to the fire or land conversion.

Analysing the possible impacts of the projects planned in the Multiannual Programme, it was observed that the construction of certain projects can result in the loss of forest areas and their exclusion from regular management, first by establishment of reservoirs on forest land. Possible negative impacts on forests can also occur through the construction of retention basins in case of surface water stagnation, especially in those forest communities that are not adapted to flood conditions. The construction of embankments can disrupt the flooding regime of forest communities dependent on floods. In cases where construction may lead to the absence of flooding in otherwise flooded areas, this will lead to succession towards drier forest communities. Furthermore, hydrotechnical interventions such as the construction of channels and dams can have both negative and positive impact, depending on the water regime trends.

For example, if the water level has already been lowered, then technical measures can be used to ensure groundwater recharge in open aquifers. On the other hand, the construction of deep channels can affect the lowering of groundwater level, which leads to the changes in habitat conditions and physiological weakening of trees. In any case, before any major hydrotechnical intervention, which is estimated to have an impact on the surrounding alluvial and floodplain forests, it is necessary to establish monitoring of the surface (floodwater) and groundwater regime, as well as the forest health status to regulate the depth of channels and the height of the dams.

Positive impact on forests will be achieved by carrying out works on the restoration of torrential flows, as further landslides, soil erosion and degradation will be prevented. The important role of forest vegetation as a key element in soil rehabilitation should be emphasized.

No negative impacts of the construction of land reclamation facilities are expected, but it should be ensured that pumping water for irrigation does not endanger the water regime of the nearby forest communities that depends on it.

Climate and climate changes

The climate of some area may change over a longer period. Climate change should be distinguished from variations within a certain climatic period. Variations refer to differences in the values of the meteorological element within short periods, for example from one year to the next. It is an experiential knowledge that two consecutive winters are not equal - one winter can be noticeably colder (or warmer) than the other. Climatic variation does not indicate that climate change has occurred. It is possible that in a shorter period the climate variation even works against the long-term climate change. But if there is a significant and permanent change in the statistical distribution of meteorological (climatic) elements or weather phenomena, usually over a period of several decades to millions of years, then we are talking about climate change.

State of the climate for the period 1971-2000 (reference period) and climate changes for future time periods 2011-2040 and 2041-2070 were analysed for the area of Croatia based on the results of numerical integrations with the regional climate model (RCM) RegCM. The spatial domain integration covered the wider area of Europe (Euro-CORDEX domain) using boundary conditions from four global climate models (GCMs), Cm5, EC-Earth, MPI-ESM and HadGEM2, at a horizontal resolution of 50 km. Climate changes in the future are modelled according to the RCP4.5 scenario of the IPCC, according to which a moderate increase in greenhouse gases is expected until the end of the 21st century.

In the future, the **average air temperature** is expected to rise in all seasons throughout Croatia. In the period 2011-2040 this increase could be from 0.7 to 1.4 °C; the largest in winter and summer, and slightly smaller in spring. The biggest increase in temperature is expected in the coastal parts of Croatia. By 2070, the largest increase in mean air temperature, up to 2.2 °C, is expected in the coastal area in summer and autumn, and a slightly smaller increase is expected in continental regions in winter and spring. Like the average daily temperature, an increase in the **average maximum and average minimum temperature** is expected. By 2040, the maximum increase would be up to 1.5 °C for the maximum temperature, and up to 1.4 °C for the minimum temperature; by 2070, the projected increase in the maximum temperature would be 2.2 °C, and the minimum temperature up to 2.4 °C. Expected future changes in the **total amount of precipitation** are not unambiguous as for temperature. In the period 2011-2040 a smaller increase in precipitation is expected in winter and in most of Croatia in spring, while a decrease in precipitation would prevail in summer and autumn. These changes in the future climate would be between 5 and 10% (compared to the reference period), so they would not have a significant impact on the annual averages of total precipitation. By 2070, a further decrease in the total amount of precipitation is expected in all seasons except winter, and the largest decrease would be up to 15%. The biggest change, a decrease of almost 50%, is expected for the **snow cover** in the mountain areas. Evapotranspiration would increase by about 15% by 2070, and surface runoff would decrease by up to 10% in mountainous regions. The

expected change in **solar radiation** is 2-5%, but it is of opposite signs: a decrease in winter and spring, and an increase in summer and autumn. The **maximum wind speed** would not change significantly, except in the southern Adriatic in winter, with expected decrease of 5-10%.

Mitigation of climate change

The construction of water protective and regulatory facilities and amelioration facilities will not have a significant impact on climate change as themselves, given that these are facilities that do not emit greenhouse gases during their use. Greenhouse gas emissions will occur during their construction as a result of the operation of machinery and vehicles that use fossil fuels. However, viewed at this strategic level, these are temporary emissions that can be further reduced by regular maintenance and the use of more modern machines with reduced emissions. Considering the significant number of facilities that are planned to be built by 2030, it should be noted that their construction indirectly leads to greenhouse gas emissions due to the use of construction materials, primarily concrete, i.e. cement, the production of which is a significant source of greenhouse gas emissions. By using natural materials where possible and technically justified, these emissions can be partly avoided. Some of the planned operations may also lead to the occupation of forest areas, which represents an unfavourable impact on climate change, considering the importance of forests as sinks for greenhouse gases. However, by avoiding and reducing the occupation of forest areas, this impact can be considered acceptable. Likewise, some of the revitalization projects of old riverbeds and backwaters will have a favourable effect on the swamp forests that depend on the flooding regime. Also, a large number of projects will ultimately not be realized, either for financial or technical reasons.

Adaptation to climate changes

According to the Climate Change Adaptation Strategy in the Republic of Croatia for the period up to 2040 with a view to 2070 (Official Gazette 46/20), the main expected impacts that can lead to a high degree of vulnerability of water resources are: reduction of water quantities in watercourses and at sources; reduction of underground water supplies and lowering of groundwater levels; reduction of the water level in lakes and other dammed natural or constructed systems; sea level rise, salinization of coastal aquifers and aquatic systems; an increase in water temperatures accompanied by a decrease in the reception capacity of aquatic receivers; increase in the frequency and intensity of floods in threatened areas; increase in the frequency and intensity of torrents; increase in the frequency and intensity of rainwater floods in urban areas; increase in sea level, and thus the probability of flooding at the estuary of watercourses; reducing the effectiveness of coastal infrastructure and intensifying the salinization of river estuaries and coastal aquifers.

The projects planned by the Multiannual Programme represent an adaptation to expected climate changes, such as an increase in the frequency of floods and erosion caused by short-term heavy rains and storms, which protect settlements, but also the economy. Revitalization projects represent an adaptation to climate change because they increase biodiversity, for example, in areas of swamp forests that depend on the flooding regime of watercourses, in addition to flood protection. However, when building reservoirs, it is necessary to ensure an ecologically acceptable minimum downstream of the reservoir in order not to endanger the biodiversity of watercourses downstream of the reservoir. The construction of irrigation facilities increases the resistance of agricultural production to the extension of dry periods and the increase in temperatures that are expected in the future. At the same time, it is important that, at the project level, water intakes are dimensioned in such a way that they do not endanger the amount of water for other purposes, primarily for human consumption.

Game and Hunting

According to the Law on Hunting (Official Gazette 99/18, 32/19, 32/20), game is of interest of the Republic of Croatia and has its special protection. Hunting is an activity that includes breeding, protection, hunting

and use of game. In a wider sense, hunting is an economic, scientific, educational, touristic, sports and recreational component of several activities.

The territory of the Republic of Croatia, in accordance with the Law on Hunting, is divided into hunting grounds that are managed by the hunting licensees according to the valid contract on the lease of hunting rights and in accordance with valid hunting management plans.

The problem of hunting is mostly reduced to illegal hunting, especially in parts of Croatia where the emigration of the population is pronounced. The same reason is the decrease in the number of hunters in such rural areas and the impossibility of implementing the planned shooting, which is why game damage occurs.

Regarding the impacts that may arise from the implementation of the Multiannual Programme, they are mainly manifested in the occupation of the area, i.e., the loss of hunting productive areas, the removal of forest cover that provides shelter and safety for game, habitat fragmentation and changes in the established migration corridors.

In case if Multiannual Programme is not implemented, the impact will be neither negative nor positive because the state will remain unchanged.

Water

The territory of the Republic of Croatia hydrographically belongs to the Adriatic Sea basin and the Black Sea basin and is divided into two water areas: the Danube River Water Area (62 % of the territory) and the Adriatic Water Area (38 % of the territory). The waterworks that represents the boundary between the two basins passes through the highest mountain peaks of Croatia.

The condition of surface water bodies, according to the Regulation on water quality standards (OG 96/19), is determined by its ecological and chemical condition, and depending on this, the final assessment cannot be higher than the worst observation item.

The assessment of the ecological condition of water bodies integrates biological and accompanying physico-chemical, chemical and hydromorphological elements. On the territory of the Republic of Croatia, 42 % of river water bodies are in very good and good, 19 % in moderate and 39 % in poor and very poor ecological condition. Measured in length, 66 % of river water bodies are in moderate, poor and very poor ecological condition. The ecological condition of the lake water bodies is as follows: 46 % very good and good, 14 % moderate and 40 % bad and very bad condition.

The assessment of the chemical condition of rivers is based on the results of monitoring of priority substances in rivers in the water column. About 8 % of river water bodies do not meet the prescribed environmental quality standards. Measured in length, this is just over 9 % of the length of all rivers greater than 10 km². Most often, it is pollution with metals and their compounds. No lake has been subject to exceed the permitted concentrations of priority substances, according to which all lakes are in good chemical condition.

In the transitional waters of the Adriatic water area, 25 water bodies have been designated. The transitional waters of the Neretva, Cetina, Krka and Zrmanja have the largest number of water bodies and the greatest diversity of types, and therefore related ecosystems. The overall condition of water bodies in the area of transitional waters was rated as good in 28 % of cases, in 64 % of cases as moderate and in 4 % of cases as poor, or very poor, which would be 33.3 % as good in terms of area, 46.7 % as moderate, 16.7 % as poor and 3.3 % as very poor.

Coastal water typology is the main criteria when determining water bodies. Based on typology, 26 water bodies of coastal waters were determined. Water bodies in coastal waters are located in a relatively large range of areas from 0.63 km² to 4,238.76 km². Expert analysis of hydromorphological loads and impacts

has shown that four coastal water bodies are possible candidates for significantly altered water bodies. The overall situation in the coastal water area was slightly better, i.e. in 5.9 % of cases as well, in 42.3 % of cases as moderate and in 3.9 % of cases as very bad, which in terms of area would be 81.6 % as good, 18.3 % as moderate and 0.04 % as very poor.

In the Water Area of the Danube River, 20 grouped groundwater bodies (GWBs) were separated, while in the Adriatic water area 12 were separated. The chemical condition of almost all groundwater bodies is rated as good. The poor chemical condition is experienced by GWB Varaždin, then in the grouped body of groundwater Zagreb - its basic body HR204, GWB South Istria and GWB Bokanjac-Poličnik. The quantitative condition of all groundwater bodies was rated as good. On the basis of the overall assessment of the situation, it is evident that only for the Bokanjac - Poličnik GWB (JKGN-09) the situation was rated as poor (due to the over-exhaustion of renewable groundwater reserves during the prolonged summer dry spells on Bokanjac water intake), while in all others it was rated as good.

In the Republic of Croatia, 16 protected areas of surface water and 320 protected areas of groundwater are designated from which it is affected or reserved for the abstraction of water intended for human consumption.

Protected areas for the life of freshwater fish are determined on 151 river bodies of water, with a total length of 2833 km and on a lake with area of 2745 km². Protected areas of water suitable for bivalve molluscs have been declared on parts of the Adriatic Sea by the Decision on the determination of waters suitable for the life and growth of bivalves (OG 78/11).

Protected areas of water for swimming and recreation are declared every year before the start of the bathing season. In 2012, decisions were made on 3 bathing areas (in 2014 an additional 3 were declared) on inland waters and 905 (in 2014 an additional 13) of sea beaches.

In the Adriatic water area, 54 isolated areas of estuary and coastal waters have been declared vulnerable, which are eutrophic or could become eutrophic due to poor water changes or the intake of a large amount of nutrients. The declared areas subject to eutrophication include an area of 1 732 km², namely 72 km² of transitional waters, 813 km² of coastal waters and 847 km² of open sea outside the borders of the Adriatic water area. The basins of declared areas subject to eutrophication cover an area of 10 466 km², of which 651 km² are on the islands. Areas intended to capture water for human consumption (where it is difficult to extract groundwater from surface water) and surface water in protected areas of nature have also been declared vulnerable. The waterfront of the sensitive area has been declared a water area of the Danube River in its entirety, due to the eutrophic Danube Delta. The total area of sensitive areas of coastal waters is 813,80 km², and the transitional waters are 122,90 km².

The decision on the determination of vulnerable areas (nitrates) in the Republic of Croatia (OG 130/12), which entered into force in December 2012 and has not changed in the meantime, identified 6 vulnerable areas covering an area of 5 090 km² (9 % of the territory of the Republic of Croatia), that is, 75 municipalities in 7 counties and the City of Zagreb.

The total flooded area of treated historical floods, in the Republic of Croatia, is about 633 km², of which about two thirds relate to flood events recorded in the water area of the Danube River. Of the approximately 15 000 inhabitants at risk of flooding, just over 15 % are located in the Adriatic water area. Looking only at the recorded historical floods, it can be concluded that according to the number of vulnerable inhabitants from floods, the water area of the Danube River is at a somewhat disadvantage compared to the Adriatic water area.

The construction of regulatory and protective water structures is carried out for the purpose of protecting against the adverse effects of waters, thus achieving the goals of protecting people and their property from floods and other forms of water adverse effects.

However, the construction of these procedures will also have a negative impact on the condition of water bodies, primarily on hydromorphological elements depending on the type of procedure.

The construction of embankments and walls will lead to a change in the morphology of the coast and riverbeds. These facilities will affect the hydrological regime of the watercourse during high waters in terms of retaining large waters in the riverbed and increasing the speed and energy of the flow when conducting it into the downstream area. Due to the increase in flow energy, one can expect to increase the adverse effects of large waters in terms of disrupting the longitudinal continuity of the watercourse: deep erosion and stopping the drifts on the downstream parts of the stream, especially on parts of the trough where there are partitions, omissions, bridges or meanders. This would also occur in the natural state of the watercourse during large waters, however to a lesser extent. The construction of embankments on the other hand protects the population and property threatened by the spill of large waters from the riverbed, alleviates erosion and deposition of sediments in the floodplain. The construction of walls as a protective structure against large waters is chosen in cases where there is no possibility to apply other protective hydrotechnical structures. This solution is applied in areas where there is a lack of space along the riverbed, either because of the already built facilities along the river bank, or due to the morphology of the terrain. These facilities are therefore usually incorporated with protective embankments and if the design and construction of walls are carried out in accordance with professional practice, erosion around the contact of the wall with natural terrain can be avoided.

The impact of retention construction on some hydromorphological elements during high waters is lasting and positive. During high waters, there will be a change in the hydrological regime of the watercourse, since temporary inspection will be created in the area of retention, while the watercourse downstream from the retention will have reduced flows. Flow continuity will be interrupted. Upstream of the retention slowdown, the hydrological regime of the watercourse is not expected to be affected. During lower hydrological conditions than those on which the retention is dimensioned, there is no effect on the hydromorphological elements of the watercourse.

The construction of reservoirs, mainly downstream from the reservoir, will improve the impact on those hydromorphological elements that are important for flood protection, especially during high water levels – erosion and damage caused by floodwaters will be prevented. A permanent water source will be provided for various purposes as well as raising groundwater levels. However, the negative impact of the reservoir on the hydromorphological elements of the watercourse is direct and lasting. The construction of the reservoir will change the hydrological regime of the observed area in terms of creating permanent low water levels. Upstream of the reservoir slowdown area, the hydrological regime will remain unchanged, while downstream from the dam the hydrological regime of the watercourse will be changed as the water from the reservoir will be released in a controlled manner. The construction of hydrotechnical facilities will also break the continuity of flow in the area of the reservoir.

In some areas (depending on the surrounding terrain of the reservoir and its slowdown) it is possible that there will be a change in the groundwater regime in terms of the recharge of the surrounding underground during lower underground water levels. The stated influence is local.

Also, the construction of reservoir leads to a change in sediment deposition regime. Dragged sediment is mainly deposited in the upstream part of the reservoir. Suspended sediment settles mainly in the lake itself. The above causes a reduced transfer of sediment to the river bed downstream from the dam of the reservoir. In addition to the already mentioned reduced discharge of water from the reservoir lake, the water level in the riverbed is consequently lowered and the groundwater level in the aquifer near the riverbed is lowered. Newly created hydrological - hydraulic conditions when large waters occur cause deepening of the watercourse bed downstream of the dam. This is the case with large hydrotechnical systems (hydroelectric power plants), where there are several consecutive hydrotechnical facilities on one watercourse. This kind of influence is not expected to such a pronounced extent in the case of reservoir lakes with other purposes (eg water supply, irrigation).

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Basin partitions in the riverbed permanently affect the continuity of the flow of the watercourse. The continuity of the watercourse as it was in its natural state is interrupted. The hydrological regime of the watercourse changes during high waters, when the structure causes the backwater. The impact of partitions on groundwater is negligible.

The morphology of the terrain is changing in the area of the partition itself, but erosion is also possible by the action of backwater on the coast upstream of the partition.

The regulation of the watercourse will prevent further erosion of the watercourse and surrounding terrain and the depositing of sediments in the trough, which will allow water to flow continuously in the trough. The regulation of watercourses can have an impact on groundwater in terms of breaking the connection of groundwater with the surface flow. The morphology of the watercourse and surrounding terrain will be permanently altered. By arranging the riverbed the hydrological regime of the watercourse should not be changed.

Revitalization of a riverbed will have a positive impact on groundwater dynamics. The revitalization of the watercourse changes the hydrological regime of the watercourse, but in a positive way, allowing water dynamics as in the natural state.

If the amount of pumped water is not adequately dimensioned, water interventions may affect the hydrological regime of surface water as they may affect the groundwater regime around the operation. An unacceptable reduction in groundwater and surface water levels could be due to the pumping of large amounts of water during low water levels. Excessive pumping can cause a sharp decrease in surface or groundwater, which may result in the appearance of erosion and collapse of soil deposits in the area from which it is pumped.

Biodiversity and protected areas

The scope of the Multiannual Programme belongs zoogeographically to the European and Mediterranean sub-regions, and geobotanically to the Eurosiberia-North America, Alps, and Mediterranean regions. Along the banks of large watercourses predominate lowland floodplain forests and mixed oak-hornbeam forests, permanent watercourses, mosaics of cultivated areas and mesophilous meadows. According to the Ordinance on Strictly Protected Species (OG 144/13, 73/16), 388 strictly protected plant species were recorded in the area covered by the Multiannual Programme, of which 170 species belong to the higher endangerment categories, mostly related to forest, wetland and meadow habitats along large streams. In addition, a total of 489 strictly protected animal species have been recorded in the geographic scope of the Program, mostly associated with forest, aquatic and meadow habitats.

In total, 418 areas in various categories are protected in the Republic of Croatia. Protected areas account for 8.56% of the total area of the Republic of Croatia, i.e. 12.20% of the land area and 1.94% of the coastal sea. Nature parks (4.79% of the total area) have the largest share in the area of all protected areas. The scope of the Multiannual Programme includes 225 protected areas (Nature Protection Act OG 80/13, 15/18, 14/19, 127/19). Of these, most are monuments of park architecture (68), followed by significant

landscapes (53). The largest area is occupied by the Velebit and Lonjsko polje Nature Parks and the Mura-Drava Regional Park.

The impact of the objectives of the Multiannual Programme, which refer to the improvement of the regulation and irrigation systems of watercourses and the regular implementation of technical maintenance works on watercourses, floods and hydraulic structures, will have a secondary positive impact on biodiversity and protected areas due to the reduction of the risk of possible pollution of the aquatic environment and riverbanks, as well as possible incidents. On the other hand, program actions that involve the construction of new and/or additional infrastructure may have potentially negative impacts in the form of habitat loss and fragmentation, pollution, harassment or direct harm to fauna, and changes in riverbed structure. To minimize negative impacts, it is necessary to strategically plan the locations of new hydrotechnical structures and later implement project-level protection measures. Negative impacts will be more intense outside of urban areas and so will their significance, therefore sensitive, rare, and endangered habitats should be avoided when planning new water regulation infrastructure. For some projects, such as riverbed regulation and stabilization of riverbanks, it is suggested that they be carried out outside protected areas whenever possible. When constructing infrastructure in the floodplains of the Sava, Drava and Danube rivers, cumulative impacts of settlement and habitat fragmentation are also possible and should be avoided at the planning stage for biodiversity protection reasons. The cumulative impact of habitat loss could also occur when the impacts of planned projects are added or when the new impacts are added to the already existing negative environmental impacts; e.g. stabilization of the banks of the Sava River (especially in the area of Turopolje and Lonjsko polje), Kupa River, the Neretva Delta, the upper and lower reaches of the Drava River and the Danube River.

The strategic study identified 23 projects for the construction of flood protection and regulation facilities and 7 irrigation projects that may have an impact on protected areas. Problems that may arise during the implementation of these projects include alteration and loss of terrestrial and aquatic habitats, disturbance of species due to noise, vibration, and emission of dust and exhaust fumes, spread of invasive alien species, and possible incidents (e.g., release of large amounts of chemical substances into the environment).

Landscape

According to the *Landscape Regionalization of Croatia about natural features* (Bralić I., 1995), the territory of the Republic of Croatia is divided into three basic natural-geographical regions - Pannonian, Highland and Adriatic Croatia, i.e. 16 landscape units.

Furthermore, the Republic of Croatia is divided into 6 water management departments (WMD). **The water management department for the Mura and upper Drava** is the northernmost VMD, and it includes 3 landscape units: *Lowland areas of northern Croatia, North-western Croatia and the Bilogora-Moslavina area*. The north-eastern part of the Republic of Croatia belongs to the **Water management department for the Danube and Lower Drava**. The greater part of the VMD covers the *lowland areas of northern Croatia*, while a smaller part falls on the *Bilogora-Moslavina region* and the *Pannonian Mountains*. The central part of the Republic of Croatia is under the **Water management department for Upper Sava**. Much of the area is within *Northwestern Croatia*, and the rest covers *Žumberak and the Samobor Mountains*, the *lowland areas of northern Croatia* and the *Bilogora-Moslavina area*. The **Water management department for the middle and lower Sava** covers a diverse area. The top northern part belongs to *Northwestern Croatia*, followed by the *Bilogora-Moslavina area* and the *Pannonian Mountains* surrounded by the *Lowlands of northern Croatia*. In the west of the WMD are several landscape units: *Žumberak and Samoborsko gorje, Kordunska zaravan, Gorski kotar and Lika*. The western part of the Republic of Croatia is under the **Water Management Department for the basins of the northern Adriatic**, which covers the area of *Istria, the Kvarner-Velebit area, the Gorski Kotar, Lika and the Peak Velebit belt*. Southern Croatia belongs to the **Water Management Department for the basins of the southern Adriatic**. The northern part includes parts of the *Kvarner-Velebit area, the Velebit peak and*

Lika. In the direction of the south, the North Dalmatian Plain, the Zadar-Šibenik Archipelago, the Dalmatian Zagora, the Coastal Area of Central and Southern Dalmatia and the Lower Neretva follow.

The implementation of the Multiannual Programme would potentially lead to the degradation of valuable landscape structures. During the implementation of the planned projects, changes in the surface cover and morphology of the terrain are possible, which can directly affect the change in the landscape character and its visual quality. On the other hand, without the implementation of the Multiannual Programme, which foresees the construction of regulation and protection water facilities and land reclamation facilities, the current situation would be maintained. This alone would not have potential negative impacts on the physical structure, as well as on the visual qualities of the landscape. However, the Multiannual Programme also foresees rehabilitation, reconstruction, revitalization, etc. interventions, the implementation of which, in compliance with the prescribed measures, will make it possible to improve the existing situation in terms of residential quality and in terms of visual experience.

The significance of individual impacts depends on the characteristics of individual projects, that is, the activities they encompass. Likewise, the significance depends on the character and values of the area, among other things, the visual - experiential values of the landscape areas where the activities are planned, and the visual exposure of the planned activities. For the planned measures and activities of the Multiannual Programme, at the strategic level, it was established that projects will not cause undesirable impacts on the landscape that could not be mitigated by the application of protection measures at the project level. Therefore, the planned projects can be considered acceptable from the landscape aspect. The cumulative impact on landscape features is only possible in certain projects at the area of the WMD for the Mura and the upper Drava, the WMD for the Danube and lower Drava, and the northern part of the WMD for the middle and lower Sava. In these areas, there are many projects that have a negative impact on the landscape (construction of reservoirs, retentions, canals, regulation of watercourses, etc.) within the same basin or in a narrow area. Therefore, if all the planned projects are realized, they will potentially change the character of the landscape, which can then probably cause significant impacts on the landscape.

Cultural and historical heritage

The territory of the Republic of Croatia is extremely rich in cultural and historical heritage. Thanks to its favourable geographical position and climatic characteristics, the settlement of this area began in the earliest historical periods and can be traced continuously until today. A good communication base is conditioned by the presence of branched river corridors - rivers on the territory of the Croatian inland and near islands in the coastal area of the Republic of Croatia, where communication with the cultural sign took place in the past, which led to the establishment of numerous settlements of temporary or permanent character, many of which are still present today.

Cultural heritage is classified as immovable individual cultural property, cultural-historical entity, cultural landscape, archaeology, and intangible cultural property of the Republic of Croatia and is entered in the Register of Cultural Property of the Republic of Croatia. It should be noted that the number of cultural properties in the Register of Cultural Properties of the Republic of Croatia is not constant and is updated depending on the activities of specialized services in the field.

The official data of the Ministry of Culture and Media for the territory of the Republic of Croatia as of February 24, 2022 indicate a number of 5,473 permanently or preventively protected immovable cultural properties. In total, there were 5,236 permanently protected immovable cultural properties. Preventively protected immovable properties (i.e. protected for a period of three or six years) totalled 147. Most cultural and historical values are recorded in the spatial planning documentation.

The Strategic Study on the Environmental Impact of the Multiannual Program for the Construction of Regulation, Protection and Land Reclamation Facilities in the Republic of Croatia, planned for a period until 2030, envisages numerous projects involving the construction of new infrastructure, improvement of

existing ones and other interventions aimed at the development and protection of the planned area. These projects represent interventions in the space, so it can be assumed that their implementation will have an impact on protected cultural assets and recorded cultural and historical values. In accordance with the typology of projects, the study identifies potential impacts that we can categorize based on their character, some of which may threaten or affect the physical condition of certain cultural properties and violate their spatial and visual integrity. In addition, it should be noted that possible archaeological sites and finds whose existence is not yet known are particularly at risk during the execution of this work, unless they are covered by lists of protected or recorded cultural properties. A particularly sensitive category is represented by the material remains of the past in riverbeds, the existence of which is foreseeable due to previous chance finds or extremely rare archaeological investigations of riverbeds.

Since the locations and extent of each infrastructure project are not specified, a more detailed analysis and evaluation of the impacts of each project will be possible during the implementation of environmental impact assessment procedures, when appropriate protection measures will also be imposed. Consultation measures will be listed to avoid and/or mitigate impacts, and in a situation where protective documentation is required, protective measures for the procedures concerned will also be specified. In addition, monitoring measures to be applied by the relevant institutions are indicated if the works contain previously unknown cultural-historical sites or finds.

In addition to the possible (negative) impacts in the implementation of the Multiannual Program for the Construction of Regulation, Protection and Land Reclamation Facilities on the territory of the Republic of Croatia, especially the parts related to cultural heritage, positive aspects related to the cultural heritage segment can also be highlighted. This part primarily refers to the prevention, protection and preservation of cultural heritage from the possible negative effects of floods and other natural disasters. Therefore, in the long term and cumulatively, one can expect a positive impact of the Multiannual Program for the Construction of Regulation, Protection and Land Reclamation Facilities on the territory of the Republic of Croatia on the cultural heritage of the Republic of Croatia.

Transportation Infrastructure

Transportation infrastructure is one of the most important components of the economy, which depends on the development of the local or regional system.

Motorways by sectors:

- **Sector A** – A4 (G. P. Goričan (border of the Republic of Croatia) Hungary) - Varaždin - Zagreb (junction Ivanja Reka, A3))
- **Sector B** – A5 (G. P. Branjin Vrh (border of the Republic of Hungary) - Beli Manastir - Osijek - Đakovo - Sredanci junction (A3) - G. P. Svilaj (border of Bosnia and Herzegovina))
- **Sector C** – A1 (Zagreb (junction Lučko, A3) - Karlovac - Bosiljevo - Split - Ploče - Opuzen - border of Bosnia and Herzegovina) and the border of Bosnia and Herzegovina - Dubrovnik), A2 (G. P. Macelj (border of the Republic of Croatia) Slovenia) - Trakošćan - Krapina - Zagreb (junction Jankomir, A3), A3 (G. P. Bregana (border of the Rep. Slovenia) - Zagreb - Fig. Brod - G. P. Bajakovo (border Rep. Serbia)), A4 (G. P. Goričan (border of the Republic of Serbia) Hungary) - Varaždin - Zagreb (junction Ivanja Reka, A3)) and A11 (Zagreb (junction Jakuševac, A3) - Velika Gorica - Sisak).
- **Sector D** – A1 (Zagreb (junction Lučko, A3) - Karlovac - Bosiljevo - Split - Ploče - Opuzen - border of Bosnia and Herzegovina) and the border of Bosnia and Herzegovina - Dubrovnik), A3 (G. P. Bregana (border Rep. Slovenia) - Zagreb - Fig. Brod - G. P. Bajakovo (border Rep. Serbia)), A5 (G. P. Branjin Vrh (border Rep. Hungary) - Beli Manastir - Osijek - Đakovo - junction Sredanci (A3) - G. P. Svilaj (border Rep. Bosnia and Herzegovina)), A11 (Zagreb (junction Jakuševac, A3) - Velika Gorica - Sisak)
- **Sector E** – A1 ((Zagreb (junction Lučko, A3) - Karlovac - Bosiljevo - Split - Ploče - Opuzen - border of Bosnia and Herzegovina) and border of Bosnia and Herzegovina - Dubrovnik), A6 (junction Bosiljevo 2 (A1) - Delnice - Rijeka (junction Orehovica, A7)), A7 (G. P. Rupa (border Rep. Slovenia) - Matulji - Orehovica - Sv. Kuzam - Hreljin - Šmrika (D8)), A8 (junction Kanfanar (A9) - Pazin - Lupoglav - junction Matulji (A7)), A9 (junction Umag (D510) - Kanfanar - junction Pula (D66))

- **Sector F** – A1 (Zagreb (junction Lučko, A3) - Karlovac - Bosiljevo - Split - Ploče - Opuzen - border of Bosnia and Herzegovina) and the border of Bosnia and Herzegovina - Dubrovnik)

Major state roads by sectors according to the Decision on Classification of Public Roads (OG 17/20):

- **Sector A** – DC2, DC3, DC41, DC24, DC35, DC227, DC209, DC20
- **Sector B** – DC 2, DC 7, DC 53, DC 518
- **Sector C** – DC 1, DC 3, DC 31, DC 206, DC 3, DC 24
- **Sector D** – DC 46, DC 7, DC 51, DC 53, DC 5, DC 47, DC 45, DC 26, DC 43, DC 6, DC 23, DC 42
- **Sector E** – DC 50, DC 1, DC 8, DC 100, DC 66, DC 44, DC 48, DC 64, DC 75, DC 50, DC 25, DC 218
- **Sector F** – DC 27, DC 8, DC 33, DC 109, DC 110, DC 1, DC 56, DC 60, DC 220, DC 70, DC 62, DC 113, DC 116, DC 118, DC 414, DC 120, DC 516

In the vicinity of the project in question there are also county and municipal roads, as well as unclassified roads, a high percentage of which run around the settlement.

Railway lines on the territory of the Republic of Croatia are classified in the following categories: railway lines for international traffic (code: M), railway lines of importance for regional traffic (code: R), railway lines of importance for local traffic (code: L) (Decision on Classification of Railway Lines (OG 72/17)):

Railway lines on the territory of the sector:

- **Sector A** – M501 DG - Čakovec - Kotoriba - DG, L201 Varaždin - Golubovec, L101 Čakovec - M. Središće - DG, R202 Varaždin - Dalj
- **Sector B** – R202 Varaždin - Dalj, L205 Nova Kapela - Nasice, M302 Osijek - Strizivojna-Vrpolje, L208 Vinkovci - Osijek, R104 Vukovar-B.n. - Erdut - DG
- **Sector C** – M101 DG - S. Marof - Zagreb Gk, M401 Sesvete - Sava, M201 DG - Botovo - Dugo Selo, M202 Zagreb Gk - Rijeka
- **Sector D** – M103 Dugo Selo - Novska - M502 Zagreb Gk - Sisak - Novska, L204 Banova Jaruga - Beetic L205 Nova Kapela - Nasice, M302 Osijek - Strizivojna-Vrpolje, R105 Vinkovci - Drenovci - DG, L103 Karlovac - Kamanje - DG
- **Sector E** – M602 Škrlevo - Bakar, M203 Rijeka - Šapjane - DG, R101 DG - Buzet - Pula,
- **Sector F** – L213 Lupoglav - Rasa, M604 Oštrije - Knin - Split, R103 DG - L. D. Polje - Knin, M606 Perković - Sibenik, M607 Perković - Sibenik, M304 DG - Metković - Ploče

Inland waterways are usually divided into navigable and non-navigable waterways. Inland waterways of the Republic of Croatia are located on five Croatian rivers with a total length of 1,016.80 km and four river ports: Vukovar, Osijek, Slavonski Brod and Sisak.

Inland waterways by sectors:

- **Sector B** – includes navigable waterways along the rivers: Drava and Danube
- **Sector D** – includes navigable waterways along the rivers: Sava, Kupa and Una

Waste management

The Law on Waste Management (Official Gazette 84/21) and the Waste Management Plan of the Republic of Croatia for the period 2017-2021 (Official Gazette 3/17) and the Amendments to the Waste Management Plan of the Republic of Croatia for the period 2017-2022 establish measures for prevention or reduction of the adverse effects of waste on human health and the environment, primarily through the reduction of the created waste during production and waste management without the use of risky procedures for human health and the environment, while using the valuable properties of waste.

According to the priority order of waste management, prevention of waste generation has priority over other procedures, followed by preparation for reuse, then recycling and other recovery procedures, while the waste disposal procedure, which includes landfilling, is the least desirable waste management procedure.

According to the data on the state of waste management specified in the Plan, in the territory of the Republic of Croatia in 2014, the total recorded amount of produced waste (municipal and industrial) were about 3.7 million tons, which is 10.5% more than in 2012. In the total amount of waste, 97% is non-hazardous waste, while the remaining 3% is hazardous waste.

In addition to certain types of municipal waste (e.g. mixed municipal waste), in the total amount of waste produced, the most represented types are waste metals (13%), soil (9%), mineral construction waste (9%), animal faeces, urine and fertilizer (7 %) and waste paper (6%).

The total amount of construction waste generated in 2020 was estimated at 1,399,192.7 t, which is an increase of 2.5% compared to 2019. The largest share of construction waste is soil, stones and dredging waste (37.7 %) and mixed construction waste and waste from the demolition of buildings (17.7%). This is followed by concrete, bricks, tiles and ceramics (17.4%), metals and their alloys (15.9%), bitumen mixtures, i.e. old asphalt (9.2%) and other types of waste represented by around 2%.

Mineral (non-hazardous) construction waste (not including excavations WN 17 05 04), which has great potential for reuse and recycling, accounts for 44.5% of the total construction waste.

In contrast to the generated waste, the data on processing construction waste are not based on estimates, but exclusively on reports from the companies. According to data reported to the Register of Environmental Pollution (Croatian: Registar onečišćavanja okoliša - ROO), the total amount of processed waste in 2020 was 1,144,214.2 t of construction waste (6.3% more than in 2019).

In 2020, there is a decrease in the amount of produced municipal waste compared to the amount from the previous year. One of the reasons that influenced the reduction of the total amount of generated waste is the COVID-19 pandemic, which led to a significant reduction in work in the service sector. The recorded decrease in the generated amount is in line with the goal from the national Waste Management Program of the Republic of Croatia, according to which by 2022 it is necessary to reduce the total amount of produced (generated) municipal waste by 5% compared to 2015 (the target value is 1,571,300 t).

As for construction waste, the comparison of data on reported construction waste with economic and other indicators for the construction sector continuously indicates insufficient data quality and, consequently, insufficient knowledge of the flows of this special category of waste and the need to strengthen supervision.

The Multiannual Programme, i.e. the goals of construction of regulation and protection water facilities and facilities for melioration in order to reduce the risk of floods and establish the functionality of areas intended for the reception of large waters are not directly related to the issue of waste management. However, during the construction of certain buildings, different types of waste will be generated, which must be handled in accordance with existing regulations with a special emphasis on reducing the generation, separate collection by individual types so that the waste can be further used, but also in a way that will prevent soil and water pollution. Additionally, the prevention of flooding of populated areas will affect the reduction of the generation of waste that would otherwise occur as a result of water penetrating into the basements of the houses and buildings of the residents of the flooded area.

Population and human health

According to the last census 2021, Republic of Croatia has a population of 3,888,529, of which 1,874,566 are men and 2,013,963 are women. In relation to the estimation in the 2019, the population decreased by 176,724 inhabitants by 4.35%. One of the main demographic problems of the Republic of Croatia is the aging of the population. The main indicator of this is the share of the young population (0 - 19 years), which for 2021 is only 19.1%. The Primorje-Gorski Kotar County has the smallest share of the young population, 16.5%, and Međimurje the largest at 21.4%. Observing only the recorded historical floods, it can be concluded that according to the number of inhabitants threatened by floods, the water area of the Danube River is in a slightly less favourable position in relation to the Adriatic water area.

The most significant expected impact of the construction of Regulation and protection water facilities on the population is positive, because the adverse effects of water will be prevented, primarily due to the prevention of floods that can result in the loss of human life, material property, endangerment of economic activities and infrastructure, impact on the environment, etc. Settlements which were threatened by flash floods until now will be protected from further material and non-material damage (such as Pelješac peninsula, the area of Kaštelan Bay near Split, the island of Krk, the area of the Virovitica-Podravina County along the Karašica River, the area of Osijek-Baranja County along Drava and Danube rivers as well as the area of Sisak-Moslavina County and Vukovar-Srijem County along the Sava River.

Projects of the construction of land reclamation facilities will also have a positive impact on the development of the economy, primarily agriculture in areas where it was limited due to lack of water. At the same time, care should be taken not to endanger water supplies for other purposes.

The Air Quality

Almost all economic and social activities are a source of emissions of pollutants into the air. As stated in the Report on Air Quality Monitoring in the Republic of Croatia for 2020, MINGOR, October 2021, a large number of pollutants in the air have been proven or suspected to have negative effects on human health and the environment. Elevated concentrations of pollutants in the air and/or long-term exposure to them can lead to serious health symptoms and conditions in humans. This primarily refers to the respiratory system and inflammatory processes in the body, but it can also cause more serious conditions such as heart disease and cancer.

According to air pollution levels, the territory of the Republic of Croatia is classified into five zones and four agglomerations in accordance with the Air Protection Act (Official Gazette 127/19) and the Regulation on determining zones and agglomerations according to air pollution levels on the territory of the Republic of Croatia (Official Gazette 01/14).

In addition to measurements at permanent measuring points at stations of the state network and local networks for permanent monitoring of air quality, the assessment of the level of air pollution in the areas of zones and agglomerations of the Republic of Croatia is also carried out using the method of objective assessment. In the Report on Air Quality Monitoring in the Republic of Croatia for 2020, MINGOR, October 2021, a summary assessment of the pollution (non-compliance) of zones and agglomerations by pollutants was given.

The problem of air pollution by particulate matter (PM) is still pronounced in the populated areas of the continental part of Croatia in the winter months, i.e. in the agglomerations of Zagreb and Osijek and the Industrial Zone (Kutina, Sisak and Slavonski Brod), in the colder part of the year, while ground pollution ozone (O₃) is more pronounced in the coastal areas of Croatia and in the summer months.

Unlike primary pollutants, which are emitted directly into the air, ground-level (tropospheric) ozone (O₃) is not released directly into the atmosphere, but is formed by complex chemical reactions and is affected by emissions of its precursors, such as nitrogen oxides (known as NO_x including NO and NO₂) and non-methane volatile organic compounds (NMVOCs). These reactions are stimulated by solar radiation. The target values for ground ozone in 2020 were exceeded at Hum and Pula Fižela monitoring stations.

According to the latest Information Report on the Inventory of Air Pollutant Emissions in the Republic of Croatia 2019 (1990 - 2019), MINGOR, March 2021, pollutant emissions show a general trend of reduction in the period from 1990 to 2019. The reasons are multiple: stricter regulations on permitted concentrations of pollutants in the air and limit values of emissions from stationary sources, banning the sale of gasoline containing lead, the use of catalysts in vehicles, the introduction of stricter standards for emissions from road traffic, gasification and connection to the heating network, the use of low-sulphur coal and, to a lesser extent, the development of public transport, reduction in the use of fertilizers in agriculture, decline in industrial production and reduction in energy production due to the economic crisis, etc.

The implementation of the Multi-Year Program has no impact on air quality. These are buildings that do not emit pollutants into the air during their use. Emissions may occur during their construction, but these are only temporary and short-term impacts that are not considered significant at a strategic level.

Noise

Noise is any unwanted sound caused by human activity and is one of the main causes of reducing the quality of life, especially in urban areas where it is constantly present and affects many aspects of everyday life. In urban areas, traffic noise plays a significant role in polluting the human environment and is a serious environmental problem, and its occurrence is related to technical progress, urbanization and increased traffic volume.

The adverse impact of noise has an accumulative character, which means that it is noticed only after a long time. There are two types of adverse effects of noise, namely aural and extraaural. Aural leading to hearing loss or acute hearing loss. The term "extraaural effect of noise" refers to all human reactions to noise outside the auditory system. Extraaural action is characterized by the fact that the human body reacts to every sound stimulus in different areas, such as neural, vegetative, hormonal or psychological. Such a adverse impact of noise manifests itself as bad mood, irritability, fatigue, insomnia, headache and loss of concentration, interference with communication, interference during rest, all of which results in reduced work ability.

The Law on Noise Protection (Official Gazette 30/09, 55/13, 153/13, 41/16, 114/18, 14/21) establishes measures aimed at avoiding, preventing or reducing adverse effects on human health caused by noise in the environment.

Noise emissions are an inevitable side effect related to economic development, i.e. to the development of transport infrastructure, industry and communal economy. In doing so, we can distinguish two basic groups of noise sources: mobile and stationary. Mobile noise sources are primarily related to the traffic infrastructure that takes place within the city area. The emission levels of this noise directly depend on the condition of the roads and the traffic load, as well as on the condition of the vehicles that use them, including the river traffic in question. Stationary sources of noise are related to industrial and economic facilities, the operation of hydropower plants, and areas of temporary storage, processing and final disposal of waste. The noise emission levels of these facilities and areas directly depend on the applied technology, including the machinery and vehicle fleet used.

Amelioration facilities and water regulation and protection facilities, by their characteristics, do not affect the noise level, except during construction-related works and possibly from maintenance machinery, so no changes in noise levels in the environment are expected.

Possible cumulative impacts

Potential cumulative impacts at the strategic level for individual projects were reviewed and analysed in the light of existing projects.

Contribution to cumulative impacts on biodiversity, protected areas and strictly protected species, and endangered and rare habitat types is possible for the following projects:

- In the Neretva River basin, the construction of the planned bank stabilization structures, flood protection, renewal, or construction of irrigation objects, hydrotechnical tunnel, regulation of small or temporary watercourses and revitalization (Projects No. 2 and 3) will have impacts on overall biodiversity and protected areas. Since the proposed projects along the Neretva River include river sections that are already under significant anthropogenic pressure, the contribution to cumulative impacts is not significant. Individual sub-projects that may have a major or significant impact on their own, and thus contribute to cumulative impacts, are the construction of a self-regulating dam near Norin and the construction of a movable dam to protect the soil along the Neretva River from progressive salinization. In order to reduce the impact of the above sub-projects, the technical design

must in any case provide for a functional fish passage to avoid the fragmentation of aquatic habitats in the mainstream of the Neretva River, which certain fish species use for their upstream and downstream migrations. Among the other projects, the construction of several levees (dikes) to protect settlements along the Neretva River from flooding stands out.

- Along the Neretva River through the construction of linear hydrotechnical structures in the floodplain of the river (Project No. 2). In addition to existing pressures (channelization of streams, dikes, changes in hydrological regime due to intensive agriculture and irrigation), additional impacts are possible in the form of more severe hydromorphological changes such as sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g., disruption of migration routes of fish species). By adhering to the proposed protective measures, the contribution to the aforementioned adverse cumulative impacts can be reduced to an acceptable level.
- Cumulative impacts are possible along the Zrmanja River (Project No. 12), which is located in the protected area of the Velebit Nature Park, as the total length of individual proposed bank stabilization is approximately 1% of the river's course. The contribution to cumulative impacts could be reduced as much as possible at the project level by planning bioengineering solutions for bank stabilization wherever possible, and stabilizing banks only where there is no other solution, and it is necessary to ensure flood protection.
- Along the tributaries of Lake Butoniga, cumulative impacts to species of ichthyofauna, astacofauna, and herpetofauna are possible due to the construction of a barrier in the riverbed (Project No. 15). In addition to existing pressures (significant pollution from intensive agriculture and irrigation, reservoir, and deposition of large amounts of alluvial sediments), additional impacts are possible in the form of greater hydromorphological changes such as sediment transport, alteration of habitat conditions for strictly protected and endangered species (e.g., disruption of migratory routes of fish species). By applying the proposed protection measures, the contribution to the aforementioned negative cumulative impacts can be reduced to an acceptable level.
- The construction of pumping stations in Bosut and in the central Posavlje region (Projects No. 24 and 35), in addition to existing human activities, has impacts on the components of biodiversity: surface and groundwater pollution, anthropogenic changes in hydrological conditions, channelization and construction of watercourses. The above cumulative impacts can be mitigated through the application of the proposed project-level conservation measures. Reconstruction measures, at the strategic level, are acceptable, provided they do not include moving the levee closer to the riverbed or lengthening the levee.
- Dikes, riverbank stabilization, flood protection, renovation of irrigation structures, construction of a hydrotechnical tunnel, reservoirs, detention basins, etc. on the Sava River (Project No. 20) have an impact on overall biodiversity and protected areas. To mitigate this impact, projects must be planned in such a way as to prevent the degradation of riverbanks and allow natural processes, including natural erosion and sediment deposition. All future projects (not yet constructed and/or approved) must be designed to seek alternative engineering solutions wherever possible, for example by implementing (burying) a stone landfill in the immediate vicinity of the river, i.e., by implementing other suitable, less "aggressive" designs in the riverbed and outside the riverbank habitats. Primarily, riverbank stabilization should be conducted exceptionally on the shortest stretches of bank and only where necessary. To reduce the cumulative impact, it is proposed to plan for the revitalization of natural riverbank habitats along the Sava River, in which the possibilities of restoring natural habitats and river processes would be analysed from a hydrotechnical and an ecological point of view.
- Linear hydrotechnical structures in the riverbed and floodplain of Kupa, Una, Mrežnica and middle Posavlje (Projects No. 20, 23, 24 and 58) might have cumulative effects on the components of biodiversity with regard to the existing threat from human activities: pollution of surface and underground water, anthropogenic changes in hydrological conditions, watercourse canalization and water flow diversion. The cumulative impact can be mitigated by applying the proposed nature protection measures at the project level. The cumulative impacts can be mitigated by applying the proposed conservation measures at the project level. Reconstruction of existing hydrotechnical features at the strategic level is acceptable, provided that the levee is not relocated or extended closer to the riverbed.
- Barriers in the riverbed of Kupa (Projects No. 18, 20) and the Česma river basin (Project No. 29) might have cumulative effects on ichthyofauna, astacofauna and herpetofauna. In addition to the

existing pressures (significant pollution due to intensive agriculture and irrigation, accumulation and deposition of large quantities of torrential sediments) an additional impact is possible in the form of more pronounced hydromorphological changes such as changes in the downstream transfer of sediments, the change in habitat conditions for strictly protected and endangered species (e.g. disrupting the migratory paths of fish species). By applying the proposed protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.

- The construction of hydrotechnical objects in the area of central Posavlje (Project No. 24) and flood protection projects in the part of Sava basin around Samobor (Project No. 26) on the overall biodiversity and protected areas in addition of the existing threats to the area by human activity: pollution of surface and underground water, anthropogenic changes in hydrological conditions, watercourse canalization and water flow diversion. The cumulative impact can be mitigated by applying the proposed nature protection measures at the project level. Reconstructions of existing hydrotechnical objects, at the strategic level, are acceptable, provided that they do not include moving the levee closer to the riverbed or lengthening it. Also, interventions along the Sava river must be planned in the future in such a way as to prevent the degradation of natural riverbank habitats and allow natural processes, including erosion and sediment deposition.
- The construction of hydrotechnical objects in the Krapina river basin (Project No. 25) in the protected area of the Medvednica Nature Park may have a cumulative impact if it will include barriers, i.e. if the interventions lead to the fragmentation of aquatic habitats. The before mentioned impact can be mitigated by the proposed measure to design detentions basins without physical barriers to aquatic fauna, such as weirs, that is, to apply technical solutions that ensure the upstream movement of aquatic animals in the watercourse and that the downstream regulation of the banks and riverbed is carried out only to the necessary extent.
- Linear hydrotechnical objects, such as construction of levees in the of Mura and Drava river basin (Projects No. 36, 38, 39 and 40), can contribute to cumulative effects, having in mind the existing threat to the upper course of the Drava by human activity: pollution of surface and underground waters, anthropogenic changes in hydrological conditions, canalization and changing direction of watercourses. The cumulative impact can be mitigated by applying the proposed nature protection measures at the project level. Sub-projects need to be planned in such a way as to preserve the diversity of natural habitats along the riverbanks and in the riverbed as well as natural hydromorphological processes.
- Cumulative effects may arise from stabilization of riverbanks, various flood protection objects, reconstruction of irrigation hydrotechnical objects, construction of hydrotechnical tunnel, reservoir and detention basin, revitalization, watercourse regulations and linear hydrotechnical objects in the riverbed of the Drava and Danube rivers (Projects No. 37, 42, 45, 46). In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). By complying with the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.
- Construction of irrigation hydrotechnical objects in the Drava River riverbed (Project No. 63) may have cumulative impacts on biodiversity in general and protected areas. In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes in sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). By complying with the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.
- Construction of irrigation hydrotechnical objects along Neretva and Cetina rivers (Projects No. 110, 9) and extraction of groundwater (Project No. 123) will impact biodiversity. In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes in sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species,

especially those that seasonally migrate into underground streams). By complying with the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.

- Construction of irrigation hydrotechnical objects in the Bosut riverbed (Projects No. 61, 146, 147) may have impact on biodiversity. In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes in sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). By implementing the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.
- Construction of irrigation hydrotechnical objects in the Bosut riverbed (Project 139) on can have impact on biodiversity. In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes in sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). By implementing the proposed protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.
- Construction of irrigation hydrotechnical objects in the Bosut riverbed (Projects No. 61, 146, 147) on biodiversity. In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes in sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). By implementing to the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.
- Construction of irrigation hydrotechnical objects may have additional cumulative effects for biodiversity in the Sava riverbed (Projects No. 180, 182). In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). By implementing the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.
- Construction of irrigation hydrotechnical objects may have additional cumulative effects for biodiversity in in Drava river (Projects No. 129, 128, 127). In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). Cumulative impact may also arise from construction of several hydrotechnical objects in the same basin. By implementing the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.
- Construction of irrigation hydrotechnical objects (Projects No. 18, 64, 69, 132, 136) may have cumulative effects on biodiversity. In addition to existing pressures (channelization of streams, levees and revetments, changes in the hydrological regime due to intensive agriculture and irrigation), an additional impact is possible in the form of more pronounced hydromorphological changes such as changes sediment transport, changes in habitat conditions for strictly protected and endangered species (e.g. disruption of migration routes of fish species). By implementing the proposed nature protection measures, the contribution to the mentioned negative cumulative impacts can be reduced to an acceptable level.

Cumulative impact on game and hunting in the area of WMD for the Danube and lower Drava and WMD for Mura and upper Drava is possible due to the large number of projects that mostly result in the loss of productive hunting areas.

A cumulative impact is also possible on the landscape features in the area of the WMD for the Mura and upper Drava, the WMD for the Danube and the lower Drava and the northern part of the WMD for the middle and lower Sava. In these areas, there are large number of projects that have a negative impact on the landscape (construction of reservoirs, retention, canals, Regulation of watercourses, etc.) within the same basin or in a narrow area. Therefore, if all the planned projects are realized, there will potentially be a change in the character of the landscape, which can cause probably significant impacts on the landscape.

Cumulative impact on forests and forestry is possible in WMD for the middle and lower Sava and the WMD for the Danube and lower Drava, where larger interventions are planned, such as the construction of embankments that may affect the flooding regime of floodplain and alluvial forests, as well as a larger number of reservoirs, which, if they are realized, can lead to a reduction of areas under forests. By following the suggested protection measures, the cumulative impact can be reduced to an acceptable level.

Cross-border Impacts

A large part of Croatian waters has a border and cross-border character. Almost all major rivers in the territory of the Republic of Croatia are border or cross-border watercourses and have international significance.

The Danube River Basin borders four countries: Slovenia, Hungary, Serbia and Bosnia and Herzegovina. The Adriatic water area has a border, i.e. it shares surface waters with: Slovenia, Bosnia and Herzegovina, Montenegro and Italy.

62 water bodies border Bosnia and Herzegovina, 48 with Slovenia, 21 with Serbia and 31 in total with Hungary (Source: Strategic study on the environmental impact of the Water Area Management Plan 2016-2021, Oikon d.o.o., 2016).

As stated in the Water Area Management Plan 2016 – 2021, most of the GWB - groundwater bodies in the Pannonian part of the Danube River Basin have transboundary character, i.e. they extend into neighbouring countries: Slovenia, Hungary, Serbia and Bosnia and Herzegovina.

Out of a total of 20 grouped ground water bodies, 15 of them have a transboundary character. In the karst part of the Danube River Basin, out of 5 GWBs, three extend into neighbouring countries, i.e. they have a cross-border character.

It is important to point out that the majority of GWBs in the Adriatic sea Basin set aside in Croatia extend into the neighbouring countries of Slovenia and Bosnia and Herzegovina. This refers to the GWB in the Istrian (Northern Istria) and Rijeka area, which are partly in Slovenia, and the GWB Krka, Cetina and Neretva, which are partly in Bosnia and Herzegovina. Towards the south, the share of the cross-border part of the GWB increases, so in the Dubrovnik area practically only the source zones of the Neretva GWB are located in Croatia, and its largest part is in Bosnia and Herzegovina. Below are presented the possible impacts of the Multiannual Programme viewed through the possible impacts of grouped projects of construction of regulation and protection water structures, i.e. structures for melioration along border watercourses separately for each neighbouring state.

Republic of Hungary

Protection and regulation facilities

Tab. 10.1 Presentation of the possible impacts of the construction of protection and regulation facilities on the territory of the Republic of Hungary

No	Name	Theme	Possible impacts
WMD for the Mura and upper Drava			
36	Flood protection project of the Drava River from the Slovenian border to Pitomača	Water	The construction and reconstruction of dikes in the territory of the Republic of Croatia will have a positive impact on the territory of the Republic of Hungary in terms of reducing the adverse effects of large waters that can cause phenomena that could disrupt the continuity of water flows. The embankments will change the morphology of the coast in the area of the catchment itself, while there is no influence on the morphology of the watercourse upstream of the catchment. The construction of the embankment will not disturb the hydrological regime of the watercourse, nor the continuity of the flow upstream of the impoundment area, nor in the area of the impoundment itself. The impact of the embankment on the groundwater is not expected either, as the embankments do not represent an obstacle to the flow of underground water. However, it is necessary to harmonize the input hydrological data between the two countries so that the dimensioning of the embankment is optimal.
		Biodiversity	During the planned works on the levees along the Drava River, due to the construction works, there may be a temporary change in habitat conditions, temporary pollution of watercourses downstream of the project due to siltation, i.e., a temporary change in habitat conditions and, consequently, a temporary disturbance of the existing individuals of animal species whose populations may be present on both sides of the Drava River bank. Designing new levees that preserve existing forest, grassland, aquatic, and wetland habitats in the area of natural inundation (flooding) will avoid permanent impacts to hydrologic conditions and habitat fragmentation. Revitalization of the old branch of the Drava River may have short-term negative impacts in the form of loss of existing suitable habitat for populations of wildlife species living on both sides of the Drava River, but in the long term there will be positive impacts on the conservation of aquatic, wetland, and floodplain habitats if revitalization is planned in accordance with biological and ecological objectives and its long-term sustainability (with minimal future interventions) is ensured. Transboundary impacts are minor and acceptable.
		Protected areas	During the planned works on the levees (dikes) along the Drava River, due to the construction works, there may be a temporary change in habitat conditions, temporary pollution of watercourses downstream of the project due to silting, i.e. a temporary change in habitat conditions and consequently a temporary disturbance of the existing individuals of strictly protected and endangered species of the Republic of Hungary, whose populations may occur on both sides of the Drava River bank. The revitalization of the old branch of the river Drava (Čambina) may have short-term negative impacts in the form of loss of existing suitable habitats for some strictly protected populations of aquatic species of fauna and flora of the Republic of Hungary living on both sides of the Drava, the revitalization is planned in accordance with biological and ecological objectives and ensures its long-term sustainability (with minimal interventions in the future).

No	Name	Theme	Possible impacts
			By applying measures that prevent the introduction and spread of invasive alien plant species and their immediate eradication in case of occurrence during construction and maintenance works, the risk of negative impacts of invasive alien species on natural habitats will be reduced. Transboundary impacts are minor and acceptable.
		Landscape	The revitalization of Čambana (an old branch of the Drava River) will potentially change the image of the landscape, due to the change in surface cover and terrain morphology. However, there can also be a positive impact from the aspect of improving the existing condition in a visual-experiential sense. Given that a part of that backwater belongs to the Republic of Hungary, it is possible that this will affect its territory as well.
		Forests	The revitalization of the backwater will have a long-term positive impact on the improvement of water relations, ecological conditions, and the diversity of alluvial forests.
38	Flood protection project of the Mura River	Water	The reconstruction of the embankment will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and upstream of the intervention area in the form of water turbidity during the implementation of the project.
		Biodiversity	During the proposed work on the existing flood control embankments (dikes) along the Mura River, there may be temporary changes in habitat conditions and, consequently, temporary disturbance to existing individuals of wildlife species whose populations may be present on both sides of the Mura River bank. These are local and short-term impacts. Transboundary impacts are minor and acceptable.
		Protected areas	During the proposed work on the existing flood control levees (dikes) along the Mura River, temporary changes in habitat conditions, and consequently temporary disturbance, may occur to animal species whose populations may be present on both sides of the Mura River bank. These are local and short-term impacts that are minor and acceptable. The application of measures to prevent the introduction and spread of invasive alien plant species and their immediate eradication if they occur during construction and regular maintenance will reduce the risk of adverse impacts of invasive alien species on protected areas. Transboundary impacts are minor and acceptable.
WMD for Danube and Lower Drava			
37	Flood protection project of the Drava River from Pitomača to the mouth of the Danube	Water	The revitalization of the watercourse changes the hydrological regime of the watercourse, but in a positive sense, enabling the dynamics of the water as in its natural state. Revitalization of the riverbed will have a positive impact on the dynamics of groundwater. Because of the above, a change in the hydrological regime and dynamics of the watercourse is possible. The continuity of the flow will not be disturbed by the construction of these structures, it will be improved, i.e. the impact on the watercourse is positive. The morphology of the watercourse and the surrounding terrain will be permanently changed in the catchment area and the surrounding area. The reconstruction of the dikes will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and upstream of the project area in the form of water turbidity during the implementation of the project.
		Biodiversity	During the planned works on the levees (dikes) along the Drava River, due to the construction works, there may be a temporary change in the quality of the habitat, temporary pollution of the

No	Name	Theme	Possible impacts
			watercourse downstream of the project, i.e. a temporary change in the habitat conditions and, consequently, a temporary disturbance of the existing individuals of animal species. Revitalization of the old branch of Drava River (Boroš) may have short-term negative impacts in the form of loss of existing suitable habitat for populations of animal species living on both sides of the Drava River, but long-term positive impacts on the conservation of aquatic, wetland, and floodplain habitats if planned with clear biological and ecological objectives to ensure their sustainability (with minimal future interventions). Transboundary impacts are minor and acceptable
		Protected areas	During the planned works on the levees (dikes) along the Drava River, there may be a temporary change in the quality of the habitat due to the construction works and consequently a temporary disturbance of the existing individuals of strictly protected and endangered species. Revitalization of the old branch of Drava River (Boroš) may have short-term negative impacts in the form of loss of existing suitable habitats for strictly protected populations of aquatic species of fauna and flora of the Republic of Hungary living on both sides of the Drava, but long-term positive impacts if planned with clear biological and ecological objectives to ensure their sustainability (with minimal interventions in the future). The application of measures to prevent the introduction and spread of invasive alien plant species, their eradication in case of the occurrence during regular maintenance will reduce the risk of negative impacts of invasive alien species on the natural habitats of the protected areas of the Republic of Hungary. The transboundary impacts are low and acceptable.
		Landscape	The ecological revitalization of the Boroš Drava will potentially affect the change in the image of the landscape, due to the change in surface cover and terrain morphology. However, there can also be a positive impact from the aspect of improving the existing condition in a visual-experiential sense. Given that a part of that backwater belongs to the Republic of Hungary, it is possible that this will affect its territory as well.
		Forests	The revitalization of the backwater will have a long-term positive impact on the improvement of water relations, ecological conditions, and the diversity of alluvial forests.
46	Flood protection project in the area of Baranja	Water	The reconstruction of water facilities will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and larger project area in the form of water turbidity during the project.
		Biodiversity	During the planned works for the reconstruction of hydrotechnical infrastructure along the Drava River, there may be a temporary change in habitat conditions and consequently a temporary disturbance of the existing individuals of animal species whose populations may be present on both sides of the Drava River bank. Revitalization of Topoljski Dunavac will have short-term negative impacts in the form of loss of existing suitable habitats for strictly protected populations of aquatic animal and plant species, but long-term positive impacts on the conservation of natural aquatic, wetland and floodplain habitats. Transboundary impacts are minor and acceptable.
		Protected areas	During the planned works for the reconstruction of hydrotechnical infrastructure along the Drava River, there may be a temporary change in habitat conditions and consequently a temporary disturbance of the existing individuals of strictly protected plant and

No	Name	Theme	Possible impacts
			animal species of the Republic of Hungary, whose populations may occur on both sides of the Drava River bank. The revitalization of Topoljski Dunavac has negative short-term effects in the form of loss of existing suitable habitats for strictly protected populations of aquatic animal and plant species, but in the long term it has positive effects on the conservation of natural habitats of water bodies, wetlands and floodplains. The application of appropriate measures to prevent the introduction and spread of invasive alien plant species, their eradication in case of occurrence during regular maintenance will reduce the risk of negative impacts of invasive alien species on natural habitats. Transboundary impacts are minor and acceptable.

Land reclamation projects

Tab. 10.2 Presentation of the possible impacts of the construction of land reclamation facilities on the territory of the Republic of Hungary

No	Name	Component	Possible impacts
53	Water intake from the existing reservoir of HPP Dubrava, Irrigation system Prelog	Water	Water intake will not have a cross-border impact on hydromorphological elements.
		Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.
54	Water intake from the existing reservoir of HPP Dubrava, Irrigation system Donji Kraljevac	Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.
132	Intake of water from Drava River (max. 1000 l/sec), pumping stations, pressure distribution network, Irrigation system Lukač	Biodiversity	There is a potential impact on hydrological conditions downstream and on strictly protected species that are directly or indirectly dependent on the water regime of the Drava River. Therefore, an adequate water regime, i.e., ecologically acceptable flow, must be ensured. The construction works themselves will have temporary impacts on strictly protected animal species occurring on both sides of the Drava River, e.g. due to noise or disturbance.
		Protected areas	There is a potential impact on hydrological conditions downstream and on strictly protected species that are directly or indirectly dependent on the water regime of the Drava River. Therefore, an adequate water regime, i.e., ecologically acceptable flow, must be ensured. The construction works themselves will have temporary impacts on strictly protected animal species occurring on both sides of the Drava, e.g. due to noise or disturbance. The application of appropriate measures to prevent the introduction and spread of invasive alien plant species and their eradication if they occur during regular maintenance will reduce the risk of negative impacts of invasive alien species on natural habitats in protected areas.
137	Intake of water from Drava River (max. 600 l/sec), pumping stations, pressure distribution network, Irrigation system Novi Gradac-Detkovac	Biodiversity	There is a potential impact on hydrological conditions downstream and on strictly protected species that are directly or indirectly dependent on the water regime of the Drava River. Therefore, an adequate water regime, i.e., ecologically acceptable flow, must be ensured. The construction works themselves will have temporary impacts on strictly protected animal species occurring on both sides of the Drava, e.g. due to noise or disturbance.
		Protected areas	There is a potential impact on hydrological conditions downstream and on strictly protected species that are directly or indirectly dependent on the water regime of the Drava River. Therefore, an adequate water regime, i.e., ecologically acceptable flow, must be

No	Name	Component	Possible impacts
			ensured. The construction works themselves will have temporary impacts on strictly protected animal species occurring on both sides of the Drava, e.g. due to noise or disturbance. The application of appropriate measures to prevent the introduction and spread of invasive alien plant species and their eradication if they occur during regular maintenance will reduce the risk of negative impacts of invasive alien species on natural habitats in protected areas.
136	Intake of water from Drava River, Irrigation system Čadavica	Biodiversity	Considering relatively small irrigation system area (only around 500 ha), water extraction from Drava River will not have significant impact on the water regime, therefore it does not pose the risk on biodiversity, i.e., species and habitats dependent on the water regime. Construction itself will result in temporary impacts on animal species present on both sides of Drava River, such as noise or disturbance.
		Protected areas	Considering relatively small irrigation system area (only around 500 ha), water extraction from Drava River will not have significant impact on the water regime, therefore it does not pose the risk on biodiversity, i.e., species and habitats dependent on the water regime. The application of appropriate measures to prevent the introduction and spread of invasive alien plant species and their eradication in case of their occurrence during regular maintenance will reduce the risk of negative impacts of invasive alien species on natural habitats in protected areas.
67	Intake of water from Karašica River, pumping stations, pressure distribution network, Irrigation system Miholjac-Viljevo	Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.
79	Intake of water from Lake Topoljski Dunavac, which will be replenished with water from the Danube via the canal and the future pumping station (PS) Draž, an open canal network. Irrigation system Puškaš	Biodiversity	The impact on hydrological conditions downstream and on species directly or indirectly dependent on the water regime of the Drava River is possible. Therefore, it is necessary to ensure an adequate water regime, i.e., ecologically acceptable flow.
		Protected areas	The impact on hydrological conditions downstream and on species directly or indirectly dependent on the water regime of the Drava River is possible. Therefore, it is necessary to ensure an adequate water regime, i.e., ecologically acceptable flow. The application of appropriate measures to prevent the introduction and spread of invasive alien plant species and their eradication in case of their occurrence during regular maintenance will reduce the risk of negative impacts of invasive alien species on natural habitats in protected areas.

Bosnia and Herzegovina

The border with Bosnia and Herzegovina in a significant part of its course is formed by the rivers Una and Sava. Below are presented the possible impacts of individual projects within the area of water management department for **the upper and lower Sava** and water management department **for the South Adriatic**, as well as the description and nature of the mentioned impacts.

Protection and regulation facilities

Tab. 10.3 Presentation of the possible impacts of the construction of protection and regulation facilities on the territory of the Bosnia and Herzegovina

No	Name	Component	Possible impacts
WMD for Southern Adriatic			

No	Name	Component	Possible impacts
2	Flood protection project in the Neretva river basin	Water	The measure to protect the town of Metković from flooding includes a dike in the Municipality of Čapljina (BiH). The dikes will not disrupt the hydrological regime of the watercourse, nor the continuity of the flow upstream of the catchment area, nor in the area of the catchment itself, only improvement is possible in terms of reducing the damaging effects of large waters that can cause phenomena that could disrupt the continuity of the watercourse. The impact of the dike on the groundwater is not expected because the dikes do not represent an obstacle to the flow of underground water. The dikes will change the morphology of the coast in the area of the catchment itself, there is no influence on the morphology of the watercourse upstream of the catchment. It is necessary to harmonize the input hydrological data between the two countries so that the dimensioning of the dike is optimal. Stabilization of the coast will not affect the hydrological regime and the continuity of the flow, as well as the groundwater regime. The morphology of the coast will be permanently changed, which will have a positive effect on the stability of the coast-erosion. The impact of the collection channel on the hydromorphological elements of the watercourse across the border will be positive, as it will manifest itself in an increase in flow, which will also prevent the degradation of the terrain upstream.
		Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.
		Landscape	The measure to protect the town of Metković from flooding includes an embankment in the municipality of Čapljina (BiH), which can have a negative impact on that area in the form of a change in terrain morphology and surface cover.
4	Flood protection project in the Imotsko-Bekijsko polje basin	Landcsape	The culvert construction project at the canal mouths will potentially have a negative impact on the landscape image due to the change in surface cover. Given that the planned interventions are located in the area of Imotski polje, which extends into the neighbouring country, it is possible that this will be reflected in the territory of BiH as well.
		Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.
WMD for the Middle and Upper Sava			
23	Protection from Una River floods	Water	There is a possible cross-border impact on the hydrological regime of watercourses in terms of flooding of the right bank of the Una, which is at lower altitudes or is not protected from flood waters. This can impact the terrain morphology of the right bank of the Una. Transboundary impact on flow continuity and groundwater regime is not expected.
		Biodiversity	During the proposed work on the existing levees along the Una River, construction activities may result in temporary habitat alteration, temporary pollution of watercourses downstream of the sub-project, i.e., temporary alteration of habitat conditions and, consequently, temporary disturbance of existing individuals of wildlife species whose populations may be present on both sides of the bank of the Una River.

No	Name	Component	Possible impacts
24	Flood protection project in the area of Middle Sava river basin	Protected areas	During the planned works on the existing levees along the Una River, due to the construction works, there may be a temporary change in the habitat, temporary pollution of the watercourses downstream of the sub-project, i.e., temporary change in the habitat conditions and consequently a temporary disturbance of the existing individuals of the populations of strictly protected bird and fish species and the components of the protected landscape area of the Una River in Bosnia and Herzegovina. The application of measures that prevent the introduction and spread of invasive alien plant species and their immediate removal in case of occurrence during regular maintenance will reduce the risk of negative impacts of invasive species on natural habitats in strictly protected areas in Bosnia and Herzegovina.
		Landscape	The construction of a protective wall and revetments and the rehabilitation of the embankment on the Una River will potentially affect the landscape picture and considering the location of the intervention on the border itself, it is possible that this will also affect the territory of Bosnia and Herzegovina. The impact can be negative in the form of changes in terrain morphology and surface cover, but it can also be positive from the aspect of improving the existing condition in a visual and experiential sense during the rehabilitation of existing operations.
		Water	The reconstruction of the dike will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and upstream of the project area in the form of water turbidity during the implementation of the project. The construction of the protective wall and revetment will not have a cross-border impact on the hydromorphological elements.
		Biodiversity	During the planned reconstruction works on the existing dikes along the Sava River, due to the construction works, there may be a temporary change in the habitat, temporary pollution of the watercourses downstream of the subproject, i.e. a temporary change in the habitat conditions and, consequently, a temporary disturbance of the existing individuals of animal species whose populations may be present on both sides of the Sava River bank. Reconstruction and construction of revetments to stabilize the Sava riverbank will result in permanent alteration and loss of natural habitats on the riverbank and in the riverbed, which may negatively affect populations of bird and fish species that are tied to these habitats and live on both sides of the Sava riverbank.
		Protected areas	During the planned reconstruction works on the existing dikes along the Sava River, due to the construction works, there may be a temporary change in the habitat, temporary pollution of the watercourses downstream of the sub-project, i.e. a temporary change in the habitat conditions and, consequently, a temporary disturbance of the existing individuals of strictly protected animal and plant species in Bosnia and Herzegovina, whose populations may occur on both sides of the Sava River bank. Reconstruction and construction of revetments to stabilize the Sava riverbank will result in permanent alteration and loss of natural habitats on the riverbank and in the riverbed, which may negatively affect populations of strictly protected bird and fish species in Bosnia and Herzegovina that are tied to these habitats and live on both sides of the Sava riverbank. Application of measures to prevent invasion and spread of invasive alien plant species and their immediate removal in case of their occurrence during regular maintenance will reduce the risk of negative impact of invasive alien species on natural habitats in protected areas in Bosnia and Herzegovina.

No	Name	Component	Possible impacts
		Landscape	The rehabilitation of the coast with the construction of a revetments and the reconstruction of the embankment on the Sava River will potentially affect the landscape image, and considering the location of the project on the border itself, it is possible that this will also affect the territory of Bosnia and Herzegovina. The impact can be negative in the form of a change in terrain morphology and surface cover, but it can also be positive in terms of improving the existing condition in a visual-experiential sense.
32	Flood protection project of the Sava River on the section from Nova Gradiška to Račinovac	Water	The reconstruction of the dike will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and upstream of the project area in the form of water turbidity during the iproject construction. The construction of the revetments will not have a cross-border impact on the hydromorphological elements.
		Biodiversity	Reconstruction and construction of new riverbank revetments in order to stabilize the banks of the Sava River will result in permanent changes and loss of riparian habitats and riverbed habitats, which may negatively affect populations of bird and fish species that are tied to such habitats and live on both sides of the Sava River bank. In addition, during the construction works, there may be a temporary change in the habitat due to the construction works and temporary pollution of the watercourses downstream of the project area, i.e. a temporary change in the habitat conditions and, consequently, a temporary disturbance of the existing individuals of animal species whose populations may occur on both sides of the banks of the Sava River. Therefore, it is necessary to limit the works to the smallest possible area so that the impact itself is as small as possible. Stabilization of riverbanks changes their structure and leads to permanent loss of habitat types that develop on the banks of watercourses (habitats with flat muddy and sandy banks, alluvial forest habitats). Stabilization of riverbanks changes their structure and morphology and affects the natural fluvial processes of erosion, transport, and deposition of materials, and indirectly, the availability of river habitats. Both planned sub-projects will result in a total change of about 1.3 km of the river bank, and a contribution to the cumulative impact on BiH biodiversity components is possible.
		Protected areas	Reconstruction and construction of new riverbank revetments in order to stabilize the banks of the Sava River will result in permanent changes and loss of riparian habitats and habitats in the riverbed, which may negatively affect populations of strictly protected bird and fish species that are tied to such habitats and live on both sides of the Sava River bank. In addition, during the construction works, there may be a temporary change in the habitat due to the construction works, temporary pollution of watercourses downstream of the project, i.e. a temporary change in habitat conditions and, consequently, a temporary disturbance of the existing individuals of strictly protected species, whose populations may occur on both sides of the banks of the Sava River. Therefore, it is necessary to limit the works to the smallest possible area so that the impact itself is as small as possible. Stabilization of riverbanks changes their structure and leads to permanent loss of habitat types that develop on the banks of watercourses (habitats with flat muddy and sandy banks, alluvial forest habitats). Stabilization of riverbanks changes their structure and morphology and affects the natural fluvial processes of erosion, transport, and deposition of materials, and indirectly, the availability of river habitats. The two planned sub-projects will result in a total change of about 1.3 km of the river bank, and a contribution to the cumulative impact on BiH biodiversity components is possible. The application of measures that prevent the introduction and spread of invasive alien plant species and their immediate removal in case of

No	Name	Component	Possible impacts
			occurrence during regular maintenance will reduce the risk of negative impacts of invasive species on natural habitats in strictly protected areas of BiH.
		Landscape	The rehabilitation of the coast with the construction of a revetments and the reconstruction of the dikes on the Sava River will potentially affect the image of the landscape, and considering the location of the project on the border itself, it is possible that this will also affect the territory of Bosnia and Herzegovina. The impact can be negative in the form of a change in terrain morphology and surface cover, but it can also be positive in terms of improving the existing condition in a visual-experiential sense.
34	Flood protection project in the Brodska Posavina	Water	The reconstruction of the dike will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and upstream of the project area in the form of water turbidity during the project construction.
		Biodiversity	The reconstruction of the levees (dikes) along the Sava River will have short-term and local impacts on the hydro morphological elements of the watercourse upstream of the intervention area and possibly in the form of higher water turbidity during the construction of the intervention, therefore there are possible impacts on plant and animal species that may live on both sides of the Sava River. Transboundary impacts due to disturbance of individuals and populations of animal species during the works carried out are also possible.
		Protected areas	Reconstruction of the levees (dikes) along the Sava River will have a short-term and local impact on the hydro morphological elements of the watercourse upstream of the intervention area and possibly in the form of higher water turbidity during the construction of the intervention, therefore there is a possible impact on strictly protected plant and animal species that may live on both sides of the Sava River. There is also a possible transboundary impact of disturbance of strictly protected individuals and populations of animal species during the performed works. The application of measures to prevent the introduction and spread of invasive alien plant species and their immediate removal in case of occurrence during regular maintenance works will reduce the risk of negative impact of invasive alien species on natural habitats in protected areas of BiH.
		Landscape	The construction of an embankment on the Glogova stream can affect the landscape picture, and considering the location of the project on the border itself, it is possible that this will also affect the territory of Bosnia and Herzegovina. The impact can be negative in the form of a change in terrain morphology and surface cover, but it can also be positive in terms of improving the existing condition in a visual-experiential sense.
35	Flood protection project in the Bid and Bosut basins	Water	Transboundary impact of pumping station on hydromorphological elements are not expected.
		Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.

Land reclamation projects

Tab. 10.4 Presentation of the possible impacts of the construction of land reclamation facilities on the territory of the Bosnia and Herzegovina

No	Name	Component	Possible impacts
114	Water intake from the Ričica reservoir, Imotsko - Bekijsko polje	Water	Water intake will not have a cross-border impact on hydromorphological elements.
		Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.

Republic of Serbia

The border with the Republic of Serbia is mostly represented by the Danube River.

Tab. 10.5 Presentation of the possible impacts of the construction of regulation and protection facilities on the territory of the Republic of Serbia

No	Name	Component	Possible impacts
WMD for Dunav and lower Drava			
45	Flood protection project of the Danube River	Water	The construction of the revetment will not have a cross-border impact on the hydromorphological elements. The revitalization of the watercourse changes the hydrological regime of the watercourse, but in a positive sense, enabling the dynamics of the water as in its natural state. Revitalization of the riverbed will have a positive impact on the dynamics of groundwater. Because of the above, a change in the hydrological regime and the dynamics of watercourses is possible. The continuity of the flow will not be disturbed by the construction of these structures, it will be improved, the impact on the water flow is positive. The morphology of the watercourse and the surrounding terrain will be permanently changed in the affected area and the surrounding area. The reconstruction of the dike will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and upstream of the project area in the form of water turbidity during the project construction.
		Biodiversity	During the planned works on the existing levees (dikes) along the Danube River, there may be a temporary change in habitat due to the construction works, temporary pollution of watercourses downstream of the project, i.e., a temporary change in habitat conditions and, consequently, a temporary disturbance of animal species whose populations may be present on both sides of the Danube riverbanks. In addition, the construction of new dikes may result in a change in hydrological conditions along the river. Therefore, it is necessary to ensure an adequate water regime for the existing flora and fauna. Revitalization projects along the Danube may have short-term impacts in the form of losses of existing habitats and changes in habitat conditions. At the same time, they have a positive long-term impact on biodiversity components if they are planned with clear biological and ecological objectives to ensure their long-term sustainability (with minimal future interventions). Projects to stabilize the banks of the Danube with revetments result in permanent changes and loss of riparian habitats and riverbed habitats, which can negatively impact populations of bird and fish species that are tied to such habitats and live on both sides of the Danube. Bank stabilization also has long-term negative effects on

No	Name	Component	Possible impacts
			natural hydromorphological processes. Since the AA within this SEA Study proposes to exclude interventions with potentially significant effects, no significant effects on biodiversity in general are expected either if all proposals from the AA are implemented.
		Protected areas	During the proposed work on the existing levees along the Danube River, there may be a temporary change in habitat due to construction, temporary pollution of watercourses downstream of the project, i.e., a temporary change in habitat conditions, and consequently, temporary disturbance of existing individuals of strictly protected species whose populations may be present on both sides of the Danube riverbank. In addition, the construction of new dikes may result in a change in hydrological conditions along the river. Therefore, an adequate water regime for strictly protected plant and animal species must be ensured. Revitalization projects along the Danube may have short-term impacts in the form of losses of existing habitats and changes in habitat conditions. At the same time, they have long-term positive impacts on strictly protected environmental components (species, habitats, and protected areas) if they are planned with clear biological and ecological objectives to ensure their long-term sustainability (with minimal future interventions). Bank stabilization projects on the Danube River with revetments lead to permanent changes and loss of riparian habitats and habitats in the riverbed, which can negatively affect the strictly protected populations of bird and fish species that are tied to such habitats and live on both sides of the Danube riverbank. Bank stabilization also has long-term negative impacts on natural hydromorphological processes, but since the AA proposes the exclusion of interventions with potentially significant impacts as part of this SEA study, no significant impacts on the river banks are expected if all of the AA proposals are implemented. With the application of measures that prevent the introduction and spread of invasive alien plant species, and their immediate eradication in case of occurrence during regular maintenance, the risk of negative impacts of invasive alien species on natural habitats in protected areas of the Republic of Serbia will be reduced.
		Landscape	The activities of improving the coast, construction of revetments, and the construction and reconstruction of embankments on the Danube River will potentially affect the landscape picture, and considering the location of the activities on the border itself, it is possible that this will be reflected in the territory of the Republic of Serbia. The impact can be negative in the form of changes in terrain morphology and surface cover, but it can also be positive from the aspect of improving the existing condition in a visual and experiential sense during rehabilitation, reconstruction and revitalization interventions.
52	Flood protection project in the Danube river basins downstream of Vukovar	Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.

Land reclamation facilities

Tab. 10.6 Presentation of the possible impacts of the construction of land reclamation facilities on the territory of the Republic of Serbia

No.	Name	Component	Possible impacts
64	Water intake from the Danube, pumping stations, pressure distribution network in the floodplain area, pumping stations, settling tanks outside floodplain area, pressure distribution network, Irrigation system Dalj	Water	Water intake will not have a cross-border impact on hydromorphological elements.
		Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.
144	Intake from existing reservoir Grabovo, which will be supplemented with additional water quantities from the Danube over the planned pumping station Sokolovac and supply pipeline, pumping stations, pressure distribution network, Irrigation System Grabovo	Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.
150	Increasing the water level in the Bosut watercourse downstream from Vinkovci in order to ensure the necessary amount of water for IS Lipovac, Lipovac Dam	Biodiversity	Transboundary impacts on the biodiversity have not been identified.
		Protected areas	Transboundary impacts on protected areas have not been identified.

Republic of Slovenia

Protection and regulation facilities

Tab. 10.7 Presentation of the possible impacts of the construction of protection and regulation facilities on the territory of the Republic of Slovenia

No	Name	Component	Possible Impact
WMD for Upper Sava			
48	Flood protection project in the Sutla basin	Water	The Regulation of the riverbed and the construction of the bridge will increase the flow rate of the riverbed, which will reduce the negative impact on the hydromorphological elements of the morphology of the riverbed and the continuity of the flow.
		Biodiversity	The regulation of the Sutla riverbed may have significant impacts on fish species and other aquatic species that occur on both sides of the Sutla's banks in the form of occupation of in-stream habitat (bed and banks), disturbance of individuals, pollution of the watercourse, potential accidents, and risk of introduction and spread of invasive alien species, particularly aquatic invertebrates

			and fish. It is also possible that habitat conditions downstream from the location of the proposed impact could change due to temporary siltation or pollution. The effects of permanent loss of suitable habitat would be more pronounced for fish species that are tied to the upper sections of the river with faster flow and gravelly bottoms. Detailed engineering data on the sub-project are not known, but if the design includes construction of sills or water stairs, habitat fragmentation is possible if upstream migrations of fish are prevented.
		Protected areas	The regulation of the Sutla riverbed may have significant impacts on strictly protected fish species and other aquatic animals, as well as on the protected areas of the Sutla River in the Republic of Slovenia, in the form of occupation of in-stream habitats (bed and banks), disturbance of individuals, pollution of the watercourse, possible accidents, and the risk of introduction and spread of invasive alien species, especially aquatic invertebrates and fish. It is also possible that habitat conditions could change downstream from the site of the proposed intervention due to temporary siltation or pollution. Impacts from permanent loss of suitable habitat would be more pronounced for strictly protected fish species associated with the upper sections of the river with faster flow and gravelly bottoms. Detailed engineering data on the sub-project are not known, but if the design includes construction of sills or water stairs, habitat fragmentation is possible if upstream fish migration is prevented. The application of measures that prevent the introduction and spread of invasive plant species, as well as their removal in case of the occurrence during regular maintenance will reduce the risk of negative impacts of invasive species on natural habitats in protected areas of the Republic of Slovenia.
		Landscape	The Regulation of the Sutla riverbed will potentially affect the landscape, and given the location of the project on the border itself, it is possible that this will also affect the territory of the Republic of Slovenia. The impact can be negative in the form of a change in terrain morphology and surface cover, but it can also be positive in terms of improving the existing condition in a visual-experiential sense.
WMD for the Middle and Lower Sava			
18	Flood protection project in the Gornja Kupa basin	Biodiversity	During the execution of the planned projects for the reconstruction of the existing barriers (sills), there will be works in the riverbed and along the banks, and temporary disturbance of aquatic species (invertebrates, fish) due to noise is expected. Also, during the works, rise in turbidity of water is possible. There is a possibility of a minor permanent loss of favourable habitats for animal species whose populations can live on both sides of the Kupa River, as well as habitat types, especially along the riverbanks and in the riverbed, but the mentioned impact is not considered potentially significant because it is related to existing hydrotechnical structures. The aforementioned impacts can be significantly reduced by planning the execution of works outside the period of reproduction and higher activity of endangered species of fish and invertebrates, and by planning the scope of the project within the dimensions of existing structures. Since the mentioned hydrotechnical objects are existing, they already represent a certain (larger or smaller, depending on the individual species) disturbance for the upstream-downstream movement of animals. If there will be no elevation of the barriers due to their reconstruction, and if they are constructed in their downstream part in a cascade, with a gentle slope and lined with natural material (stone), the impact during use will not significantly change compared to the

			existing state, i.e., there will be no additional fragmentation of the water flow for rheophilic and migratory endangered species of fish and other aquatic species. If there is an increase in the height of the existing barriers, this will cause the fragmentation of water habitats, a change in hydrology upstream and downstream, and a significant impact due to the change in hydrology as a consequence of the possible elevation of the barriers through reconstruction.
		Protected areas	During the execution of the planned projects for the reconstruction of the existing barriers (sills), there will be works in the riverbed and along the banks, and temporary disturbance of aquatic species (invertebrates, fish) due to noise is expected. Also, during the works, rise in turbidity of water is possible. There is a possibility of a minor permanent loss of favourable habitats for strictly protected animal species whose populations can live on both sides of the Kupa River, as well as endangered habitat types, especially along the riverbanks and in the riverbed, but the mentioned impact is not considered potentially significant because it is related to existing hydrotechnical structures. The aforementioned impacts can be significantly reduced by planning the execution of works outside the period of reproduction and higher activity of endangered and strictly protected species of fish and invertebrates, and by planning the scope of the project within the dimensions of existing structures. Since the mentioned hydrotechnical objects are existing, they already represent a certain (larger or smaller, depending on the individual species) disturbance for the upstream-downstream movement of animals. If there will be no elevation of the barriers due to their reconstruction, and if they are constructed in their downstream part in a cascade, with a gentle slope and lined with natural material (stone), the impact during use will not significantly change compared to the existing state, i.e., there will be no additional fragmentation of the water flow for rheophilic and migratory endangered species of fish and other aquatic species. If there is an increase in the height of the existing barriers, this will cause the fragmentation of water habitats, a change in hydrology upstream and downstream, and a significant impact due to the change in hydrology as a consequence of the possible elevation of the barriers through reconstruction. With the application of measures that prevent the introduction and spread of invasive alien plant species and their immediate removal in case of the occurrence during regular maintenance, the risk of negative effects of invasive alien species on natural habitats in protected areas of the Republic of Slovenia is reduced.
		Landscape	The operations of the reconstruction of the waterfall on the Kupa river will potentially have a positive impact in terms of improving the existing condition in a visual-experiential sense. However, during the works, there may be a negative impact primarily due to the removal of the surface cover in order to access the bed. Given that the intervention is located on the border itself, it is possible that it will also affect the territory of the Republic of Slovenia.
WMD for the Mura and Upper Drava			
36	Flood protection project of the Drava River from the Slovenian border to Pitomača	Water	The reconstruction of the dike will possibly have a short-term and local impact on the hydromorphological elements of the watercourse and upstream of the project area in the form of water turbidity during the project construction.
		Biodiversity	Reconstruction of the existing levees could cause temporary and localized impacts to the hydromorphological elements of the watercourse in the vicinity of the intervention site, as well as temporarily increased turbidity during construction. This could

			cause temporary and minor impacts to flora and fauna on both sides of the river.
		Protected areas	Reconstruction of the existing levees could cause temporary and localized impacts to the hydromorphological elements of the watercourse in the vicinity of the intervention site, as well as temporarily increased turbidity during construction. This could cause temporary and minor impacts to flora and fauna on both sides of the river. With the application of measures that prevent the introduction and spread of invasive alien plant species and their immediate removal in case of the occurrence during regular maintenance, the risk of negative effects of invasive alien species on natural habitats in protected areas of the Republic of Slovenia is reduced.
40	Flood protection project in the Trnava basin	Biodiversity	During the planned works for the construction of the retention levees (dikes) on the Zelena watercourse, which flows into the Drava River, there may be a temporary change in habitat due to the construction works, minor permanent loss of natural habitats and temporary change in habitat conditions, and thus temporary disturbance of the existing individuals of animal species whose populations can live with both sides of the Drava River. Because this is a tributary of the Drava River whose levees serve to regulate floodwaters primarily from the Zelena River, no major impacts in the form of habitat fragmentation and significant permanent loss of natural habitats or changes in hydrologic conditions in the Drava River floodplain are identified.
		Protected areas	During the planned works for the construction of the retention levees (dikes) on the Zelena watercourse, which flows into the Drava River, there may be a temporary change in habitat due to the construction works, minor permanent loss of natural habitats and temporary change in habitat conditions, and thus temporary disturbance of the existing individuals of strictly protected animal species whose populations can live with both sides of the Drava River. Because this is a tributary of the Drava River whose levees serve to regulate floodwaters primarily from the Zelena River, no major impacts in the form of habitat fragmentation and significant permanent loss of natural habitats or changes in hydrologic conditions in the Drava River floodplain are identified. With the application of measures that prevent the introduction and spread of invasive alien plant species and their immediate removal in case of the occurrence during regular maintenance, the risk of negative effects of invasive alien species on natural habitats in protected areas of the Republic of Slovenia is reduced.
		Landscape	The construction of a dike along the Trnava watercourse will potentially affect the image of the landscape in the form of a change in the morphology of the terrain and surface cover, and considering the location of the project on the border itself, it is possible that this will also affect the territory of the Republic of Slovenia.

Land reclamation facilities

Tab. 10.8 Presentation of the possible impacts of the construction of land reclamation facilities on the territory of the Republic of Slovenia

No	Name	Component	Possible Impacts
128	Intake of water from the Drava, Ormoško lake, IS Varaždin west	Water	Water intake will not have a cross-border impact on hydromorphological elements.
		Biodiversity	Negative effects are possible on hydrological condition of Drava River downstream from the planned projects. Therefore it is necessary to ensure ecologically acceptable flow.

		Protected areas	Negative effects are possible on hydrological condition of Drava River downstream from the planned interventions. Therefore it is necessary to ensure ecologically acceptable flow. The application of measures to prevent the introduction and spread of invasive alien plant species and their immediate eradication in case of occurrence during construction and maintenance works will reduce the risk of negative impacts of invasive alien species on natural habitats.
		Landscape	The intake of water from the Drava will potentially affect the landscape in the form of changes in terrain morphology and surface cover, and given the location of the intake on the border itself, it is possible that this will also affect the territory of the Republic of Slovenia.

10.3 Appropriate Assessment

The geographical scope of the Multiannual Programme covers the ecological network Natura 2000 on the territory of the Republic of Croatia (Regulation on the ecological network and responsibilities of public bodies for the management of the ecological network areas, NN 80/19). Based on the Nature Protection Act (Official Gazette 80/13, 15/18, 14/19, 127/19), the procedure for assessing the acceptability of a strategy, programme or plan for the ecological network evaluates the impact of the programme alone or in combination with other plans, programmes and strategies on the target species and habitats, as well as the integrity of the ecological network area. The appropriate assessment is conducted for the programme or parts of the programme that, alone or in combination with other strategic and planning documents, may have a significant impact on the conservation objectives and integrity of the ecological network. As part of the SEA procedure for the Multiannual Programme, which began with the Decision on the Implementation of the Strategic Environmental Assessment Procedure (CLASS: 325-09/17-01/01, UR NO: 517-07-1-3-1-18-8 dated September 6, 2018), the procedure of appropriate assessment of the Multi-Year Program for the Ecological Network is carried out (based on the opinion of the Ministry of Environmental Protection and Energy, CLASS: UP /I 612-07/17- 60/147, URBROJ: 517-05-2-18-6 dated July 26, 2018).

The objective of the appropriate assessment is to evaluate the degree of significance of the impacts of the programme in question on the conservation objectives and integrity of the ecological network. In doing so, it is necessary to examine the nature (intensity, duration, significance) of the independent and cumulative, direct and indirect impacts of the Multiannual Programme on the target species and habitats, i.e., the integrity of the ecological network area, and to propose measures to mitigate the significant adverse impacts if such impacts are identified during the Appropriate assessment process.

The biodiversity of aquatic ecosystems in the world, including in Croatia, is under serious threat. The reasons for threats to freshwater ecosystems are numerous: regulation and channelization of watercourses, disruption of watercourse continuity, drainage of wetlands, irrigation and land conversion, removal of sediments from rivers (gravel and sand), wastewater and pollution of surface and groundwater, excessive use of artificial fertilisers, and changes in native communities (due to altered habitat conditions, introduction of invasive alien species, etc.).

The impact of the Multiannual Programme on target species and habitats, as well as on the integrity of the ecological network, is seen at the strategic level, as it is a state-level programme that entails a very large number of planned interventions (works) through its programme measures, most of which are geographically defined (although often not precise enough, especially in terms of their scope). The analysis and presentation of the potential impact of the Programme was carried out at the level of projects related to the regulation of streams and rivers (a project or project unit is a set of proposed sub-projects, i.e. interventions that, within the project unit, ensure the solution of problems related to flood protection,

as well as the achievement of the programme objective of protection from the adverse effects of flooding, and at the level of projects related to irrigation.

The flood protection project units, as well as the construction projects of irrigation structures are grouped geographically by water management sectors and, moreover, by larger basins, hydrologically, but also in terms of the characteristics of the ecological network (target species, target habitat types, ecological conditions that must be maintained for their preservation). For the evaluation of the construction of flood protection and relief subprojects, impacts were assessed at the project unit level, while for the evaluation of irrigation projects and cumulative impacts, impacts were spatially assessed at the level of larger catchment areas (Sava, Drava and Danube, Northern Adriatic, Southern Adriatic).

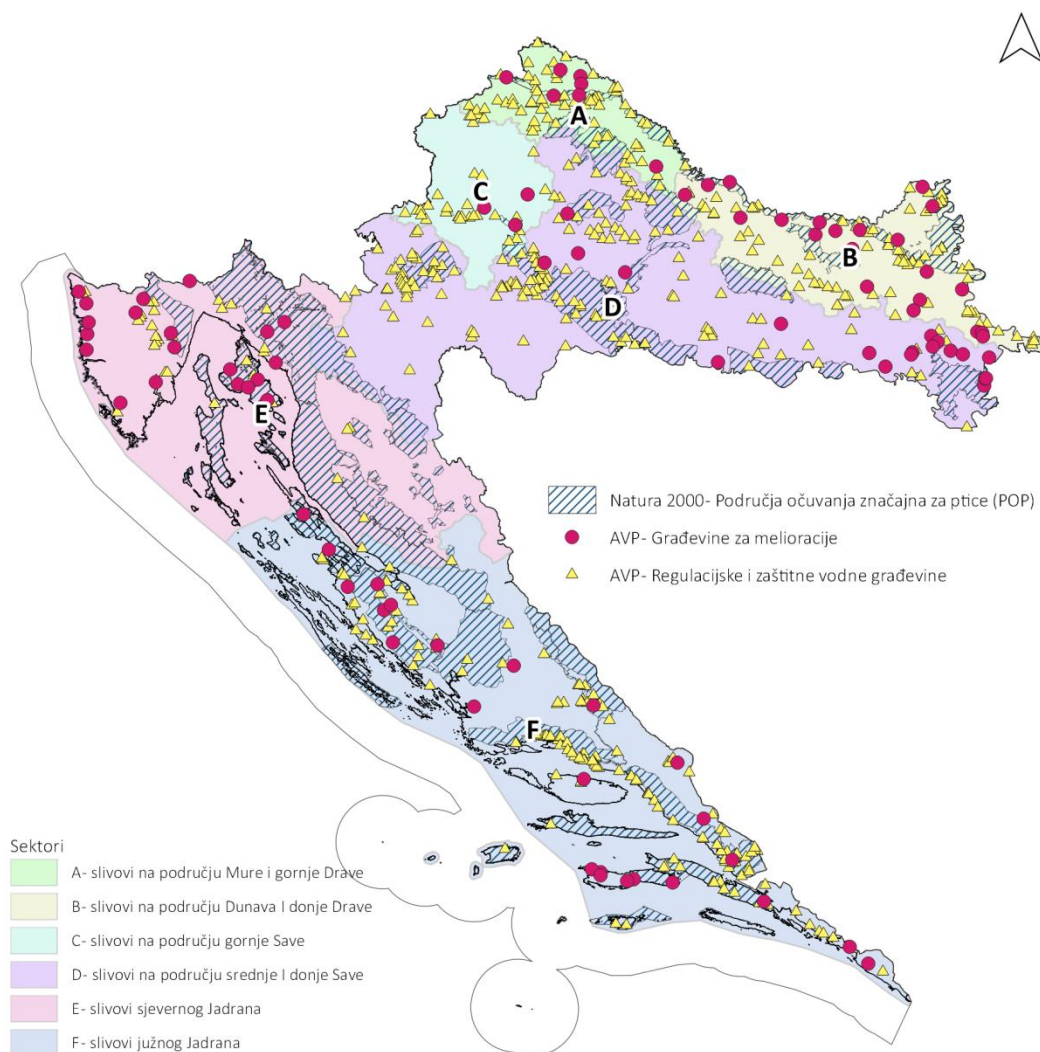


Fig. 10.1 Flood protection and regulation sub-projects and land reclamation projects planned by the Multiannual Program according to water management sectors in relation to Special Protection Areas (SPAs, in Croatian: POP)

The implementation of the activities planned under the Multiannual Programme, which include the implementation of various interventions in the area, may have adverse impacts on the ecological network during construction and use in relation to the conservation of target species, their suitable habitats, and target habitat types associated with aquatic ecosystems and surrounding terrestrial ecosystems in the area of construction of certain interventions (e.g., temporary disturbance of wildlife species; long-term and/or temporary habitat loss, habitat degradation and fragmentation). The aforementioned negative impacts, if present, can be mitigated or avoided during the design and planning stages of an individual

intervention, i.e., through the identification of mitigation measures as part of the assessment of the acceptability of an intervention for the ecological network. In addition, in order to avoid potential negative impacts and/or to make an even better contribution to achieving a water status suitable for the target species and habitats, it is necessary to consult appropriate experts in the field of nature conservation and responsible authorities for nature conservation at the early stages of the development of plans/projects at the state level. Indeed, the level of detail of data on the scope of an individual project, i.e., subproject and encroachment, is often insufficient to assess with certainty the impacts on a particular target species or target habitat type. In cases where this was not possible or existing data were insufficient, it is suggested that a preliminary survey of target species and/or target habitats in the ecological network should be conducted during the preparation of the technical documentation or prior to the start of technical design. The goal is to obtain current and accurate data on the status and distribution of target species and target habitat types that would serve as input data for planning, and to be able to accurately limit the scope of the project or find appropriate technical solutions in cooperation with planners that reduce or avoid impacts on the ecological network as much as possible.

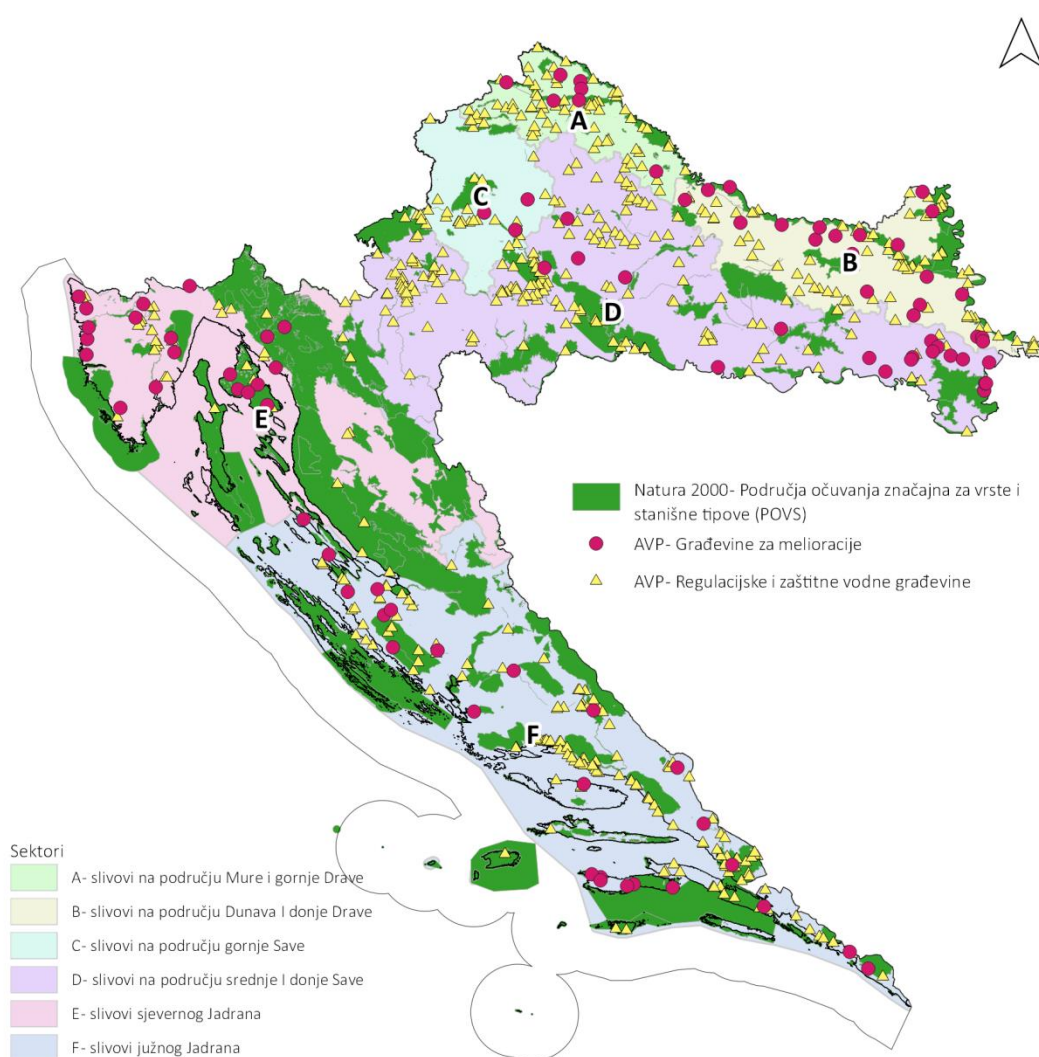


Fig. 10.2 Flood protection and regulation sub-projects and land reclamation projects planned by the Multiannual Programme according to water management sectors in relation to Sites of Community Interest (SCIs, in Croatian: POVS)

As a result, certain types of hydrotechnical interventions have a pronounced cumulative character. This is particularly true of projects with purpose of stream or river beds regulation and river banks stabilization. For such projects, mitigation measures proposed in the appropriate assessment to reduce independent

and concurrent cumulative impacts are primarily aimed at reducing the scale of the intervention to the lowest possible level and applying bioengineering solutions or less aggressive structural solutions (depending on the watercourse, as appropriate) that would avoid a direct and permanent impact on natural riverbanks. In addition, it is proposed to use engineered and landscape solutions to increase habitat diversity at such hydrotechnical objects. In this way, the cumulative contribution to existing impacts can be reduced.

Actions that may result in greater permanent loss of natural habitats in the ecological network are reservoirs planned in the ecological network. The appropriate assessment suggests that such interventions should be planned at a scale that does not significantly affect the status of target habitats or favourable habitats for target species, i.e., planning detention basins instead of reservoirs when appropriate and compatible with conservation objectives and when no other technical solution is available. For detention basins, reservoirs, and other types of interventions that involve barriers or dams, it is necessary to maintain continuity of water flow, i.e., to prevent fragmentation of aquatic habitats through engineering measures and to allow upstream-downstream migrations of aquatic fauna.

The Multiannual Programme includes a larger number of revitalization sub-projects. These sub-projects can have significant positive impacts if implemented in a manner that ensures their long-term sustainability with minimal future intervention and achievement of hydrologic, hydromorphologic, and biological ecological objectives by restoring floodplain dynamics, structure, and morphology to their natural state while maintaining important forest, wetland, and aquatic habitats. Revitalization projects in the ecological network should be designed to be consistent with the conservation goals of the ecological network area, i.e., to contribute to the long-term maintenance or improvement of the status of populations of target species and/or the status of target habitat types.

Potential impacts resulting from implementation of irrigation projects include habitat loss and fragmentation in the vicinity of water withdrawals and water supply (distribution) network. Indirect impacts include changes in habitat conditions along riverbanks, either hydrologically or due to potential soil and groundwater contamination from increased uptake of agrochemicals. Significant changes in hydrologic conditions in the stream downstream of the water intake and in the immediate vicinity can only be avoided through good design of irrigation projects in accordance with the capacity of the stream and other water sources. Therefore, for outdated irrigation plans, it is necessary to review water use options based on the most recent hydrologic data.

The following is a brief summary of the implications for larger catchment areas.

1) Northern Adriatic Basin

Within the framework of 9 projects (project units) of flood protection and relief, sub-projects for the construction of hydrotechnical objects in the catchment area of the Northern Adriatic were analysed. By analysing the spatial relationship of the sub-projects and projects to the ecological network sites and according to the characteristics of each project and the characteristics of the ecological network sites, 5 ecological network sites were identified as been potentially affected by significant negative impacts, and it was mandatory to propose appropriate compensatory measures:

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR5000022 Park prirode Velebit	13	-2	-1	Construction of 2 retention ponds (Brušanka, Tisovac)
HR2001012 Ličko polje		-2	-1	

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR2000619 Mirna i šire područje Butonige	15	-2	-1	Construction of retention and barriers on the Mirna watercourse and its tributaries
HR5000019 Gorski kotar i sjeverna Lika	57	-2	-1?	Reservoir Križ potok
HR2001353 Lokve-Sunger-Fužine		-2	-1?	

Most of the sub-projects identified as having a potentially significant adverse effect on the conservation objectives and integrity of the ecological network involve the construction of detention basins, the construction of which generally has localised impacts in the area of the detention dam (barrier) and on shorter stream segments upstream and downstream of the dam if engineering measures are taken to ensure continuity of stream flow (construction of detention basin without barriers to aquatic fauna, such as e.g., target fish species, crayfish). Since several detention basins are planned along the Mirna River and in the area SCI HR2000619 Mirna i šire područje Butonige, as well as the construction of a barrier on one of the watercourses, the potential cumulative impacts of these interventions were also identified for the mentioned ecological network site. In particular, the planned reservoir at Križ potok may result in significant and permanent loss of target habitats and favourable habitats for target species within SCI HR5000019 Gorski Kotar i Sjeverna Lika and SCI HR2001353 Lokve-Sunger-Fužine. The most obvious potential impact is on crayfish, for which the Križ potok is a suitable habitat according to available data. Flooding of a portion of the stream and its impoundment would result in a significant loss of suitable habitat and habitat fragmentation. Mitigation measures have been proposed for the Križ potok reservoir, and a site survey will also need to be conducted and the importance for conservation of target species and target habitat types determined. It is assumed that if the mitigation measures are applied, the impacts of the entire project unit can be mitigated to an acceptable level by developing a different technical solution (e.g., by constructing a detention basin instead of the reservoir with the dam). However, if the impacts cannot be reduced to an acceptable level with the above measures, the need for construction of a reservoir should be reviewed and the sub-project for construction of the Križ Potok reservoir should be excluded from the Multiannual Programme if the site is considered to be of high importance for the conservation of the target species and habitat types of the ecological network.

Fifteen proposed irrigation projects have been identified that could have negative impacts on ecological network sites. These are irrigation activities that use water from existing and proposed reservoirs, water supplies, or watercourses. In order to avoid possible cumulative impacts, especially on watercourses (Mirna, Boljunčica, Raša) and their downstream water regimes, which may be a consequence of water use, it is proposed to review the possibilities of water use on a larger spatial scale (e.g. individual counties) in accordance with the latest hydrological data. Given the larger number of reservoirs and micro-dams that will need to be planned for implementation of these projects, it is important to plan the scale of reservoirs and irrigation networks so that there is not a major permanent loss of target habitats and beneficial habitats for target species in ecological network areas. This is especially true for the scope of Project No. 36 (which involves the withdrawal of water from the Boljunčica or Raša River, Čepić polje irrigation system), which should be planned outside the SCI HR2001486 Istra - Čepićko polje and the island of Krk (SPA HR1000033 Kvarnerski otoci, SCI HR2001357 Otok Krk).

2) Southern Adriatic Basin

In the area of responsibility of the Water Management Department for the southern Adriatic basin, sub-projects for the construction of hydrotechnical objects were analysed within the framework of 12 projects

(project units) of flood protection and relief. By analysing the spatial relationships between the projects and the sub-projects and the ecological network sites, and based on the characteristics of the individual projects and the characteristics of the ecological network sites, 24 ecological network sites were identified as sites with potentially significant adverse impacts for which it was essential to propose appropriate mitigation measures:

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR2000946 Snježnica i Konavosko polje	1	-2	-2?	Regulation of torrents of Konavosko polje
HR2001007 Orašac – kanjon	1	-2	-1	Regulation of watercourses (torrents) Orašac
HR5000031 Delta Neretve	2	-2	-1	More projects:
HR1000031 Delta Neretve	2	-2	-1	stabilization of the Neretva banks; self-regulating weir Norin, protection against salinization of the soil and waters of the lower Neretva (movable partition in the riverbed), Black river – sediment cleaning;
HR5000031 Delta Neretve	3	-2	-1	Flood protection in the Rastoke and Vrgorsko polje basins (excess water drainage system)
HR2001046 Matica – Vrgoračko polje	3	-2	-1	
HR2001315 Rastočko polje	3	-2	-1	
HR2000951 Krotuša	3	-2	-1	
HR1000031 Delta Neretve	3	-2	-1?	Regulation of the Bačina Lakes
HR5000031 Delta Neretve	3	-2	-2?	
HR2001313 Srednji tok Cetine s Hrvatačkim i Sinjskim poljem	7	-2	-1	Regulation of the river Cetina in Hrvatačko polje
HR2001325 Ninski stanovi – livade	10	-2	-1	Construction of retention in the Miljašić ravine upstream from the town of Nin
HR2001361 Ravni kotari	11	-2	-1	Reconstruction of the drainage system Kličevica – Nadin – Polača – Vrana – sea and the GOK of Nadinsko mud
HR2001366 Bokanjačko blato	11	-2	-1	Reconstruction of the hydrotechnical tunnel Bokanjac
HR2000641 Zrmanja	12	-2	-1	Stabilization of the banks of Zrmanja
HR5000022 Park prirode Velebit	12	-2	-1	
HR1000022 Velebit	12	-2	-1	
HR1000026 Krka i okolni plato	12	-2	-1	
HR2001268 Otuča	12	-2	-1	Stabilization of the banks of the Otuča watercourse
HR2000919 Čikola	mg_124	-2	-2?	Access from underground, IS Petrovo polje
HR2001266 Vrba	mg_124	-2	-2?	
HR2001236 Kanjon Badnjevice	mg_114	-2	-1	Intake of water from the existing Ričica reservoir, Imotsko - Bekijo polje
HR2001229 Bočni kanal uz Vrljiku	mg_114	-2	-1	
HR2000933 Vrljika	mg_114	-2	-1	
HR2000932 Prološko blato	mg_114	-2	-1	

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR2001313 Srednji tok Cetine s Hrvatačkim i Sinjskim poljem	mg_110	-2	-1	Water intake from the Cetina River and the irrigation system (pumping stations, pressure distribution network)
HR3000376 Stračinčica	mg_13	-2	-1	Extraction of water from the public water supply and underground, SN Bradat, Vrbovica-Kruševo Potoračje
HR1000024 Ravni kotari	mg_167	-2	-2?	Intake of water from the future Bokanjac reservoir (part of the accumulated water from the basin, and part of it replenished from the underground, 1.0 million M3, pumping stations, pressure distribution network, IS Bokanjac and Rašinovac
HR2001366 Bokanjačko blato	mg_167	-2	-2?	

A large proportion of the sub-projects relate to stabilization and protection of riverbanks, particularly the Neretva, Cetina and Zrmanja rivers, most of which are designed as bank revetments. These sub-projects have a pronounced cumulative effect, as they lead directly and in the long term to changes and loss of natural riverbanks and consequently to loss of favourable habitats for the target species associated with them (e.g., target bird species, target habitats, target fish species). For such sub-projects, measures should be taken to reduce the extent of bank stabilization to what is necessary, and engineering biological solutions or less aggressive structural solutions should be applied that would avoid direct and permanent impacts to natural riverbanks. In addition, engineering and landscape solutions should increase habitat diversity at such structures. Among the projects studied are two planned structural interventions at the confluence of the Norin and Neretva rivers and a movable barrier on the Neretva River, which may lead to fragmentation of aquatic habitats and disruption of water flow continuity. Due to insufficient data, the proposed sub-project at Baćina Lakes, the importance of Baćina Lakes as habitat for certain target species, and the consequent inability to determine adequate mitigation measures to avoid significant impacts with certainty, the above sub-project should be excluded from the Multiannual Programme.

Of the proposed irrigation projects, 18 projects were identified as having the potential to adversely impact the ecological network. In order to prevent potential cumulative impacts to the water regime of surface waters downstream of the water withdrawal and in the floodplain that may be a result of water use, water use capacities should be reviewed at a larger spatial scale (e.g., individual counties) consistent with the most recent hydrologic data. A potentially significant impact has been identified for the Petrovo polje irrigation project, as it is not possible to assess the significance of project impacts with certainty at the level of a strategic assessment. The proposed reservoir on the Čikola River has already been assessed as a significant and unacceptable adverse impact at the project level (appropriate assessment, environmental impact assessment), and it is not clear from the Multiannual Programme whether the reservoir is still planned as part of the Petrovo polje irrigation system. If the reservoir is still planned and the Petrovo polje irrigation system will not be functional without the Čikola reservoir (the Petrovo polje irrigation system without the Čikola reservoir would represent a substantial change to the project), then the entire project should be excluded from the Multiannual Programme. The construction of the Bokanjac reservoir would result in a significant loss of favorable habitat for populations of the target species SPA HR1000024 Ravni kotari due to its location (according to available data from spatial planning documents) and the size of the reservoir. In particular, this refers to the significant and permanent loss of favorable habitat for nesting of the European roller (*Coracias garrulus*). In addition, implementation of the proposed irrigation project would result in potentially significant alteration of favorable habitat for the target species

SCI HR2001366 Bokanjačko blato, through construction of the reservoir, but also during use of the project through land use change and potential intensification of agriculture.

3) River Sava Basin

The Sava River basin falls under the jurisdiction of two water management departments: the Upper Sava Water Management Department and the Middle and Lower Sava Water Management Departments. In the Sava River basin, 24 projects (project units) for flood protection were analysed. By analysing the spatial relationship of the subprojects and projects to the ecological network sites, and based on the characteristics of the individual projects and the characteristics of the ecological network sites, a total of 21 ecological network sites were identified where significant negative impacts are possible, and it was imperative to propose appropriate mitigation measures:

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR2000592 Ogulinsko-plašćansko područje	19	-2	-1	Regulation of the Ratković stream
HR2001505 Korana nizvodno od Slunja	21	-2	-2?	Reservoir Lučica on Korana River
HR2000450 Ribnjaci Draganići	22	-2	-1	Construction of the connecting canal Stojnica - Kupčina and regulation of Stojnica from the foundation to the distribution facility at Kupčina in Franetići
HR2000586 Žumberak – Samoborsko gorje	22	-2	-1	Planned retentions (Lipovečka Gradna, retentions on the Bregana stream basin)
HR2000234 Draganička šuma – Ješevica 1	22	-2	-1	Construction of the connecting canal Stojnica - Kupčina and regulation of Stojnica from the foundation to the distribution facility at Kupčina in Franetići
HR2000583 Medvednica	25	-2	-1	Planned retentions (Reka, Slani potok)
HR2000586 Žumberak – Samoborsko gorje	26	-2	-1	Construction of retentions and reservoirs in the Kupčina basin
HR2001506 Sava uzvodno od Zagreba	26	-2	-1	Retention in the Bregana stream basin, regulation of the Lipovečka Gradna stream
HR1000004 Donja Posavina	24	-2	-1	Several sub-projects for the stabilization of the Sava banks (construction of reventments)
HR1000003 Turopolje	24	-2	-1	Several sub-projects for the stabilization of the Sava banks (construction of reventments)
HR2001311 Sava nizvodno od Hrušćice	24	-2	-1	Several sub-projects for the stabilization of the Sava banks (construction of reventments)
HR2001208 Bilogora	29	-2	-1	Construction of the Toplovica reservoir
HR1000008 Bilogora i Kalničko gorje	29	-2	-1	Several sub-projects for the construction of reservoirs (Kreševine, Rovišće, Toplovica, Bedenička)
HR2001220 Livade uz potok Injaticu	29	-2	-2?	Construction of Kreševina reservoirs
HR2001216 Ilova	30	-2	-1	Construction of Miletinac retention
HR2001293 Livade kod Grubišnog polja	30	-2	-1	Construction of Miletinac retention

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR2001330 Pakra i Bijela	30	-2	-1	Regulation of the Bijela watercourse with the construction of a discharge channel for large water and regulation of the existing riverbed from km 25+474 to km 28+411 in Sirač
HR2001286 Orľjavac	33	-2	-2?	Construction of the Kamensko reservoir, a dam with accompanying structures on the left tributary of the Orľjava, the Brzaja watercourse
HR2001329 Potoci oko Papuka	33	-2	-2?	
HR2001328 Londža, Glogovica, Breznica	35	-2	-2?	Construction of the reservoir Breznica
HR2000459 Petrinjčica	51	-2	-1	Construction of Petrinjčica retention
HR2001070 Sutla	48	-2	-1	Regulation of the Sutla riverbed on a section of 900 m near Hum na Sutli

Projects with potentially significant impacts on ecological network sites include sub-projects for riverbed regulation (Sutla River), bank protection and stabilisation (along the Sava and Kupa Rivers), rehabilitation and construction of levees along the Sava River, and hydrotechnical objects in the riverbed (riverbed sills). These sub-projects have a pronounced cumulative effect, as they lead to immediate and long-term changes and loss of natural riverbanks and consequently loss of favourable habitats for the target species associated with them (e.g., the target bird species kingfisher and sand martin, the target habitats and target fish species). Several detention basins are planned (Medvednica, Žumberak - Samoborsko gorje). Reconstruction of existing levees for flood control purposes will result in minor local impacts if planned along the route of existing levees. Several sub-projects involve the construction of new levees, and negative impacts can be reduced in such projects by providing adequate floodplain width and avoiding fragmentation of valuable forest and grassland habitats in natural floodplains and aquatic and wetland habitats along watercourses. There are several stream regulation sub-projects that may adversely affect the ecological network. Since not all of the technical aspects of these projects are known at the strategic impact assessment level, the appropriate assessment identified that further technical documentation should be prepared to reduce the scale (magnitude) of the intervention where possible and apply less aggressive engineering or bioengineering solutions where appropriate, while maintaining the natural structure and morphology of the watercourse (streambed and banks). If data on target species and target habitat types are insufficient, or if it is necessary to determine the exact status and distribution of target species and habitat types for planning a single hydrotechnical intervention, preliminary biological surveys should be conducted in the area of impact. Riparian stabilisation projects along the Sava River are among the individual sub-projects that pose a potentially high risk to the conservation of ecological network target species because they will result in permanent loss of natural riparian habitat along the riverbanks and will have potentially significant cumulative impacts.

Among the planned irrigation projects, there are several large irrigation projects that may have a (likely non-significant) impact on the ecological network, particularly at SCI HR2001311 Sava nizvodno od Hruščice. These are planned irrigation schemes using surface water from the Sava River. In order to avoid possible cumulative impacts, especially on the Sava River and its downstream water regime, as well as on the Kupa River, which may be a consequence of surface water use, water use capacity should be reviewed at a larger spatial scale (e.g. individual districts) in accordance with the latest hydrological data.

In addition, there are several proposed reservoir interventions that may result in significant and permanent loss of ecological network habitat and/or fragmentation of aquatic habitats and disruption of water flow continuity, as well as significant changes in water regime and physicochemical conditions for target species. The construction of the planned reservoirs as part of the flood protection project in the Česma and Glogovnica river basins is considered to pose a very high risk to the conservation of target species and target habitat types, in particular HR2001281 Bilogora, HR1000008 Bilogora i Kalničko gorje (cumulative impacts) and HR2001220 Livade uz potok Injaticu. The above sub-projects need to be significantly modified and further designed as detention basins rather than reservoirs. Considering the small area of SCI HR2001220 Livade uz potok Injaticu, it is not even possible to determine with certainty whether the detention basin would have an acceptable impact on this site without a precise scale of intervention. If it is not possible to reduce the impact of the overall project to an acceptable level through compensatory measures, the construction of the Kreševina detention basin should be excluded from the implementation of the Multiannual Programme. The proposed Breznica Reservoir and the Brzaja Reservoir may also have potentially significant impacts. In order for Project Units 33 and 35 to be acceptable to the ecological network, the above sub-projects must be substantially modified or excluded from implementation of the Multiannual Programme. As the Lučica reservoir on the Korana River has already been excluded from the spatial plan due to the identified significant impacts on SCI HR2001505 Korana nizvodno od Slunja, the construction of this reservoir should be excluded from the implementation of the Multiannual Programme due to the lack of appropriate measures to mitigate the significant impacts at the project level or (as indicated in the mitigation measures) to substantially change the technical solution (location, extent of intervention) of the subproject to make it acceptable for the ecological network, i.e. i.e., define a different technical solution to achieve the flood control objectives while minimising negative impacts on the ecological network.

4) River Danube and Drava Basin

The Drava and Danube River Basin also fall under the jurisdiction of the Water Management Department for the Mura and Upper Drava and the Water Management Department for the Danube and Lower Drava. In this area, sub-projects for the construction of flood protection and stream regulation hydrotechnical objects were analysed as part of 13 projects (project units) of flood protection. By analysing the spatial relationship of the sub-projects and projects with the areas of the ecological network and based on the characteristics of each project and the characteristics of the ecological network, a total of 6 ecological network sites were identified where potential significant impacts is expected and it was imperative to propose appropriate mitigation measures:

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR2001408 Livade uz Bednju I	39	-2	-2?	Construction of reservoir on Bednja river
HR1000016 Podunavlje i donje Podravlje	37	-2	-2?	Construction of VHS Osijek
HR1000016 Podunavlje i donje Podravlje	37	-2	-2?	Drava - rehabilitation and maintenance of the right bank (km 38-Nehaj)
HR2001308 Donji tok Drave	37	-2	-2?	Construction of the multipurpose hydrotechnical system Osijek
HR2001006 Županijski kanal (Gornje Bazje – Zidina)	42	-2	-1	Regulation of the water regime of the Županijski kanal for the purposes of flood defence and multi-purpose use
HR2001329 Potoci oko Papuka	43	-2	-1	Reservoir /retention Šašika

Natura 2000 Site	Project	Significance of impact of the project without mitigation measures implemented	Significance of impact of the project with mitigation measures implemented	Sub-projects with potentially significant adverse impact
HR2000372 Dunav – Vukovar	45	-2	-2?	Danube river - stabilization of the right bank from Vukovar to Vučedol (rkm 1328 - 1333)
HR1000016 Podunavlje i donje Podravlje	45	-2	-2?	Regulation of the right bank of the Danube River downstream from the Aljmaš settlement rkm 1375+000 - 1378+000 (Staklara)

Most of the sub-projects identified as having the potential to affect the conservation objectives and integrity of the ecological network area are reconstructions of existing levees for flood control purposes, the construction of which will result in minor, localized impacts if the interventions are planned along the route of existing levees. A smaller portion of the sub-projects relate to the construction of new levees, where adverse impacts for such projects can be reduced by designing the levees alignments to maximize the width of the natural floodplain and prevent the fragmentation of valuable forest and grassland habitats in the floodplain, as well as aquatic, and wetland habitats along the watercourses. There are several stream management sub-projects that may impact ecological network. Since not all technical aspects of these sub-projects are known at the level of strategic impact assessment, for them the scope in the ecological network should be reduced during the preparation of further technical documents, and the least aggressive technical solutions or biotechnical solutions should be applied, maintaining the naturalness of the structure and morphology of the watercourse.

In the Drava River basin, several detention basins and a larger number of reservoirs are also planned, which may have an impact on the ecological network. Of the projects mentioned, the planned reservoir on the Bednja River near the Bednja settlement is noteworthy and may result in a potentially significant permanent loss of target habitats and favorable habitats for target species within the SCI HR2001408 Livade uz Bednju I. Appropriate mitigation measures for the subproject do not exist, however, as part of the mitigating the impact of the whole project unit, it is necessary to review the need for construction of a reservoir on Bednja River for flood control purposes and exclude this sub-project from the implementation if it is not necessary, or give preference to construction of detention basin, or substantially modify the subproject in terms of location or scope. Project Unit 39 was given a final score of "-2?" because the final score depends on which mitigation measures are applied (abandonment of the Bednja reservoir sub-project or substantial changes to the sub-project's technical solution).

Of the planned irrigation projects in the Mura and Upper Drava River basins, 6 planned projects were identified that may have impacts on the ecological network sites. These are irrigation projects that use water from the Drava River, i.e., Drava reservoirs. To prevent possible cumulative impacts, especially on the Drava River and its downstream water regime, which may be a consequence of surface water use, it is necessary to review the possibilities (capacities) of water use on a larger spatial scale (e.g., individual counties) in accordance with the latest hydrological data.

A large part of the sub-projects is related to the stabilization and protection of the Danube and Drava riverbanks, which is foreseen mainly through the construction of bank revetments. These sub-projects have a pronounced cumulative effect, as they lead directly and in the long term to changes and loss of natural riverbanks and consequently to loss of favorable habitats for the target species associated with them (e.g., bird target species, e.g., kingfisher and sand martin, target fish species). For such sub-projects, measures must be taken to reduce the extent of the bank stabilization to what is necessary, as well as bioengineering solutions or less aggressive structural solution along the riverbank, which would

avoid a direct and permanent impact on natural stream banks. In addition, engineering and landscaping solutions should increase habitat diversity at such structures. For the two sub-projects on stabilization of the Danube riverbanks, it was concluded that they should be excluded from the implementation of the Multiannual Programme or another technical solution should be developed under the overall project that would not have a significant impact on the conservation objectives and integrity of the ecological network.

Among the sub-projects assessed, the proposed construction of the Osijek Hydrotechnical Multipurpose System (VHS Osijek) on Drava river should also be highlighted, as it may result in a significant permanent loss of target habitats and favorable habitats for target species within SPA HR1000016 Dunav i donje Podravlje and SCI HR2001308 Donja Drava. The appropriate assessment concluded that the implementation of the mentioned sub-project under the Multiannual Programme should be abandoned and that another technical solution should be developed under this project unit, which would achieve all the objectives of the Osijek VHS and especially the objective of protection from adverse effects of water, which is the subject of the Multiannual Programme. In fact, there are no suitable mitigation measures for this sub-project, and the sub-project can only be rated "-2" (potentially significant adverse impact). Project Unit 37, on the other hand, was given a final score of "-2" because it depends on the implementation of measures within the project unit by developer of the Multiannual Programme: the exclusion of the sub-project, i.e., the development of a different technical solution for the multipurpose use of the waters of the Drava River, which, due to the obvious significant negative impacts, does not include impoundment in this area, as it is now planned according to the spatial planning documents.

Among the planned irrigation systems in the area of the Drava and Danube basins, 14 projects have been identified that may have an impact on the ecological network sites. These are the projects that mainly use surface water from the Drava, Danube and Karašica rivers. In order to prevent possible cumulative impacts, especially on the Drava, Danube and Karašica rivers and their downstream water regimes, which may be a consequence of water use, the possibility of water use on a larger spatial scale (e.g. individual counties, or whole watercourses) should be reviewed in accordance with the latest hydrological data.

Final Evaluation of the Programme

The appropriate assessment identified sub-projects for the construction of hydrotechnical objects for flood control and relief, and for the construction of hydrotechnical objects for irrigation, which were rated "-2" (= potentially significant impact) due to possible significant adverse independent and/or cumulative impacts on the conservation objectives of the ecological network (see the following table). For these sub-projects and projects, given the assumed size (scale) and intensity of their impacts at the strategic level of impact assessment, it was not possible to propose appropriate mitigation measures that would reduce the impacts on the conservation objectives and integrity of the ecological network below a significant negative level with sufficient certainty, and it is necessary to exclude their implementation under the Multiannual Programme. In order to achieve the Programme's objectives of protection from the adverse effects of water and the need for water use for irrigation purposes, it is necessary to apply various technical solutions to the highlighted interventions that do not result in a significant negative impact on the target species and habitat types and the integrity of the ecological network. If this is not possible even after the procedure prescribed by law is implemented, the planned sub-project or the project of the cannot be implemented.

Project	Sub-project	Natura 2000 Site identified as the site of potentially significant adverse impact
Flood protection and relief projects		
Water Management Department for North Adriatic Basin		
1 Flash flood protection project in the areas of Dubrovačko primorje, the Pelješac peninsula and the islands of Korčula, Mljet and Lastovo	6082 Regulation of Konavle area torrents	POVS HR2000946 Snježnica i Konavosko polje

Project	Sub-project	Natura 2000 Site identified as the site of potentially significant adverse impact
3 Flood protection project in the Vrgorsko polje basin	6061 Regulation of the Bačina Lakes	POVS HR5000031 Delta Neretve
Water Management Department for the Middle and Lower Sava River		
21 Flood protection project in the Korana river basin	4009 Construction of the reservoir Lučica on Korana river	POVS HR2001505 Korana nizvodno od Slunja
29 Flood protection project in the Česma and Glogovnica basins	4057 Construction of the reservoir Kreševine	POVS HR2001220 Livade uz potok Injaticu
33 Flood protection project in the Orljava river basin	16 Construction of the reservoir Kamensko, a dam with pertaining facilities on the watercourse Brzaja, a left tributary of the Orljava, for flood defence, improvement of small watercourses downstream, irrigation and water supply	POVS HR2001286 Orljavac HR2001329 Potoci oko Papuka
35 Flood protection project in the Biđ and Bosut basins	49 Construction of the reservoir Breznica	POVS HR2001328 Londža, Glogovica, Breznica
Water Management Department for Mura and Upper Drava River		
39 Flood protection project in the Bednja basin	287 Construction of a reservoir on the Bednja river near the Bednja settlement	POVS HR2001408 Livade uz Bednju I
Water Management Department for Danube and Lower Drava River		
37 Flood protection project of the Drava River from Pitomača to the mouth of the Danube	2109 Construction of multipurpose hydrotechnical system Osijek	POP HR1000015 Srednji tok Drave POVS HR5000015 Srednji tok Drave POP HR1000016 Podunavlje i donje Podravlje POVS HR2001308 Donji tok Drave
	345 Drava - rehabilitation and maintenance of the right bank (km 38-Nehaj)	POP HR1000016 Podunavlje i donje Podravlj POVS HR2001308 Donji tok Drave
45 Danube river flood protection project	331 Danube River – stabilization of its right bank from Vukovar to Vučedol (rkm 1328-1333)	POVS HR2000372 Dunav-Vukovar
	2043 Improvement of the right Danube bank downstream of the settlement Aljmaš rkm 1375+000 - 1378+000 (Staklara)	
Land reclamation projects		
167 Intake of water from the future Bokanjac reservoir		POVS HR2001366 Bokanjačko blato HR1000024 Ravni kotari
124 Irrigation system Petrovo polje (Čikola reservoir)		POVS HR2000919 Čikola HR2001266 Vrba

At the level of strategic impact assessment, in accordance with the analysis of potential negative impacts carried out, including cumulative impacts on the target species and habitat types of the Natura 2000 ecological network, the implementation of the Multiannual Programme, assuming the implementation of all proposed mitigation measures (including the modification of planned technical solutions for interventions with potentially significant negative impacts or the exclusion of such interventions from the Multiannual Programme), is acceptable for the ecological network, nor will it have significant negative impacts on the conservation objectives and integrity of the ecological network.

10.4 Proposal of measures to mitigate the adverse impacts on the ecological network

Mitigation measures for planned flood protection and stream regulation hydrotechnical objects

PROJECT (PROJECT UNIT)	NATURA 2000 SITE	IMPACT ASSESSMENT with mitigation measures implemented	MITIGATION MEASURES
1	Flash flood protection project in the areas of Dubrovačko primorje, the Pelješac peninsula and the islands of Korčula, Mljet and Lastovo	HR1000036 Srednjedalmatinski otoci i Pelješac	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Carry out the works on the channel regulation of torrents and other watercourses during the dry period (if applicable, during period of dry streambed). Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favorable habitats for target species, especially grasslands, garrigue, maquis and small water bodies (ponds). Preserve the natural structure and morphology of the streambed and streambanks. Preserve riparian vegetation and restore it after construction works if it is damaged. The sub-projects within this project unit should planned in such a way as to ensure the permeability of the streambed and the connection of the surface flow with the underground; design the banks of the torrential streams with a slight (gentle) slope and with the use of natural materials so that smaller animals can get out of the streambed. Minimize the scope of regulation and stabilization of the streambed of torrential and other streams and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure. Sub-project No. 172, 6079, 6080: On the project level, the dynamics, and the manner of performing the construction works of each intervention should be planned in such a way as to minimize the disturbance of target bat species of SCI HR2001010 Paleombla – Ombla during important periods of their life cycles. Minimize the degradation of natural habitats, especially dry grasslands, garrigues, and maquis. Sub-project No. 6016, 6122: Dynamics and the manner of performing the construction works should be planned in such a way as to minimize the disturbance of target species of SCI HR5000038 Park prirode Lastovsko otočje during important periods of their life cycles. Minimize the degradation or permanent loss of natural habitats, especially dry grassland, garrigues, maquis. During construction works for the sub-project no. 6116, the structure and favourable condition of the ponds in Vino polje must be preserved.
		HR2001364 JI dio Pelješca	
		HR2001367 I dio Korčule	
		HR10000031 Delta Neretve	
		HR50000031 Delta Neretve	
		HR4000015 Malostonski zaljev	
		HR10000038 Lastovsko otočje	
		HR5000038 Park prirode Lastovsko otočje	
		HR2001010 Paleombla – Ombla	
		HR3000163 Stonski kanal	
		HR2000946 Snježnica i Konavosko polje	
		HR2001007 Orašac – kanjon	
		HR3000165 Uvala Slano	
		HR2001337 Područje oko Rafove (Zatonske) špilje	

				Sub-project No. 6084: The scope of the sub-project should be planned outside of SCI HR2001007 Orašac – kanjon. Sub-project No. 6083: Dynamics of the construction works should be planned in such a way as to minimize or avoid the disturbance of target bat species of SCI HR2001337 Područje oko Rafove (Zatonske) špilje. Minimize the scope of the construction works and avoid the loss and degradation of natural habitats, especially habitats favourable for bats. Sub-project No. 185: At the project level, the dynamics and manner of performing construction works should be planned in such a way as to reduce the disturbance of target species (reptiles, bats) of SCI HR2001367 I dio Korčule during significant periods of their life cycles and to avoid the loss or degradation of natural habitats, especially grasslands, garrigues, maquis. The favourable condition and the morphology of ponds in Donje blato must be preserved. When reconstructing the main drainage channel, the natural marine coastal habitats must be preserved; changes in morphology and disposal of construction material is not allowed on natural coastal habitats. Sub-project No. 6082: Due to the significant existing cumulative impact, it cannot be concluded that adequate mitigation measures can be proposed to reduce the impact of this sub-project, therefore other technical solution for the sub-project must be designed, i.e., the current design must be significantly changed. If this is not possible even after the implementation of the procedure prescribed by law, the planned sub-project must be excluded from the Multiannual Programme.
2	Flood protection project in the Neretva river basin	HR1000031 Delta Neretve	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favourable habitats for target species, especially alluvial forests, grasslands (hay meadows), wetlands and surface water bodies. Reconstructions of the existing levees (dikes) should be planned and constructed using the same alignment as the existing levees, except where the change is necessary to ensure the flood protection. The new levees alignments must be planned in such a way as to ensure the protection of valuable target habitat types and aquatic and wetland habitats important for target species within the natural floodplain (inundation area) and to ensure the favorable hydrological regime and natural flooding dynamics. Ensure favourable hydrological regime downstream and in ecologically dependent surrounding area. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already
		HR5000031 Delta Neretve	-1	

				anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Neretva River. Sub-project No. 6077: Preserve target habitat types along the coast. Natural marine coastal habitats must be preserved; changes in morphology and structure of natural habitats and disposing construction materials in coastal zone is not allowed. Sub-project No. 6123 and 6200: Preserve the water flow continuity on the dams and barriers for target fish species, i.e., prevent the fragmentation of aquatic habitats and allow for downstream and upstream fish migrations (if necessary, construct functional fish passage). Sub-project No. 6118: Plan the sub-project in several phases so that the impact is not present on the whole river section at the same time. Plan construction works dynamics in accordance with the ecological requirements of target fish species (avoid spawning and migration period) to minimize the disturbance. Preserve the riverbanks and natural riparian vegetation.
3	Flood protection project in the Vrgorsko polje basin	HR2001046 Matica – Vrgoračko polje HR2001315 Rastočko polje HR2000951 Krotuša HR5000031 Delta Neretve HR1000031 Delta Neretve	-1 -1 -1 -2? -1?	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works area in ecological network and avoid the permanent loss, changes in morphology and structure of target habitat types and favourable habitats for target species, especially riparian, aquatic and wetland habitats (alluvial forest habitats, wetlands with emergent vegetation, such as reed and cattail). Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out. Sub-project No. 6061: Preserve hydrological regime of Baćinska Lakes. Riparian habitats must be preserved, as well as their structure and morphology. Due to insufficient data about the proposed sub-project at Baćina Lakes, adequate mitigation measures cannot be determined to avoid significant impacts with certainty. technical solution

				must be designed in such a way as to avoid the significant adverse impact. If that is not possible even after the procedure prescribed by the law has been carried out, the above sub-project cannot be implemented. Sub-project No. 6062: Preserve surface water quality, physical and chemical conditions favourable for target species and hydrological regime within SCI HR2001046 Matica – Vrgorsko polje. Preserve natural morphology and structure of the riverbed. Preserve riparian vegetation and restore it if it has been damaged after construction works. Carry out the construction works on artificial channels during the dry period. Sub-project No. 6060: Preserve favourable hydrological state of the underground water bodies between Vrgoračko polje and Neretva River, between Rastočko polje and Vrgoračko polje, and between Vrgoračko polje and the sea (preserve hydrological regime of the natural sink zones of Vrgoračko polje and Rastočko polje, sources and connectivity of karst sinks, sources, and surface water bodies). Design the drainage system of Vrgoračko polje in such a way as to ensure the favourable hydrological regime (amount of water, water retention time) in Krotuša sink zone (habitat type 3180* Turloughs in SCI HR2000951 Krotuša).
4	Flood protection project in the Imotsko-bekijsko polje basin	HR2000933 Vrljika	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. The sub-projects of the regulation of torrential streams (no. 208, 209, 6115) within this project unit should be planned in such a way as to ensure the permeability of the streambed and the connection of the surface flow with the underground; design the banks of the torrent with a slight (gentle) slope and with the use of natural materials so that smaller animals can get out of the streambed. Preserve as much as possible natural banks, natural structure and morphology of the streambed, and riparian vegetation. Preserve in their natural state sources and their connection with surface flows. Technical features of all regulations of torrential streams and channels should be planned in a way that construction works, permanent occupation, and changes of natural habitats in watercourses (streambed, streambanks, and riparian zone) are minimized to the least necessary extent. Plan to carry out works on torrents and channels in the dry period when the streambed is dry and (if possible) outside the spawning period of the target fish species of SCI HR2000933 Vrljika to avoid their disturbance.
		HR2001507 Izvor Krčevac	-1	
5	Protection from flash floods in the Makarska coastal region	HR2001350 Podbiokovlje	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.

				Plan all sub-projects within this project unit in such a way as to ensure the permeability of the torrent streambed and the connection of the surface flow with the underground; design the banks of the torrent with a slight (gentle) slope and with the use of natural materials so that smaller animals can get out of the streambed. Preserve as much as possible natural streambanks, natural morphology and structure of the streambed, and riparian vegetation. Sub-project No. 6067 and 6068 should be designed in such a way that permanent loss and changes of natural habitats, in particular forest, scrub, and habitats of temporary streams in SCI HR2001350 Podbiokovlje are reduced to the least necessary extent. Plan the dynamics and manner of performing construction works in such a way as to reduce disturbance of the target species of amphibians during significant periods of their life cycle.
6	Protection from flash floods in the Middle Adriatic coastal region and the islands of Brač, Hvar, Vis, Šolta and Čiovo	HR1000039 Pučinski otoci	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Plan the dynamics and manner of performing construction works in such a way as to reduce disturbance of the target species (birds, fish, and amphibians) during significant periods of their life cycle. Plan the construction works on torrents and channels during the dry period when the bed is dry or during low water levels of permanent watercourses (Jadro, Žrnovnica). Design sub-projects within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favourable habitats for target species, especially grasslands, garrigue, maquis, small water bodies (ponds), marine coastal habitats. Preserve as much as possible the natural streambank, the natural structure and morphology of the streambed, and the riparian vegetation. Stabilization of streambed during the regulation of torrents and permanent watercourses (Jadro, Žrnovnica) should be reduced to the smallest possible extent and carried out exclusively on already anthropogenically modified sections. Use bioengineering technical solutions wherever possible. On permanent watercourses (Jadro, Žrnovnica), preserve aquatic vegetation where it is present, riparian vegetation where it is present in a minimum zone of 2 m from the banks of the watercourse, and the composition of the substrate at the bottom (sand or gravel bottom). Preserve the continuity of the water course and allow the upstream migration of fish species.
		HR2000942 Otok Vis	-1	
		HR1000036 Srednjedalmatinski otoci i Pelješac	-1	
		HR2001244 Bunar kod Franjevačkog samostana u Hvaru	-1	
		HR2001245 Bunar na Hvaru	-1	
		HR2000931 Jadro	-1	
		HR3000126 Ušće Cetine	-1	
		HR1000027 Mosor, Kozjak i Trogirska zavala	-1	
		HR2001352 Mosor	-1	
		HR2001363 Zaleđe Trogira	-1	

7	Flood protection project in the Cetina river basin	HR1000029 Cetina	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Plan all sub-projects within this project unit in such a way as to ensure the permeability of the torrential and other streams' bed and the connection of the surface flow with the underground; design the streambanks with a slight (gentle) slope and with the use of natural materials so that smaller animals can get out of the streambed. Preserve as much as possible natural streambanks, natural morphology and structure of the streambed and riparian vegetation. Plan the dynamics and the manner of performing construction works of a particular intervention in the ecological network in such a way as to reduce the disturbance of the target species (fish, birds, reptiles) during significant periods of the life cycle. Carry out the works on the channel regulation of torrential and other streams during the dry period, which is during dry streambed or low water levels ((Cetina, Kosinac). Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favourable habitats for target species, especially grasslands, scrub vegetation, small water bodies (ponds). Preserve as much as possible natural riverbanks, natural structure and morphology of the streambed, and riparian vegetation. Minimize the extent of regulation and stabilization of the streambed of torrential and permanent watercourses. Locate construction works on already anthropogenically modified stream sections. Use bioengineering technical solutions 0000000000wherever possible. Along the permanent watercourses preserve aquatic vegetation where it is present (riparian vegetation where it is present in a minimum width of 2 m from the banks of the watercourse) and the composition of the substrate at the bottom (natural, muddy, sandy or gravel bottoms). Preserve the continuity of the water flow and allow upstream migrations of fish and invertebrates along the watercourse.
		HR2000929 Rijeka Cetina – kanjonski dio	-1	
		HR2001314 Izvorišni dio Cetine s Paškim i Vrličkim poljem	-1	
		HR2000936 Ruda	-1	
		HR2001313 Srednji tok Cetine s Hrvatačkim i Sinjskim poljem	-1	
		HR1000028 Dinara	0	
		HR5000028 Dinara	0	
8	Flood protection project in the Krka river basin	HR1000026 Krka i okolni plato	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 6016, 6017: Minimize the construction works area in ecological network and avoid the permanent loss, changes in morphology and structure of target habitat types and favorable habitats for target species, especially riparian, aquatic, and wetland habitats (alluvial forest habitats, wetlands with emergent vegetation, such as reed and cattail).
		HR2000918 Šire područje NP Krka	-1	
		HR3000171 Ušće Krke	-1	

				Preserve the natural morphology and structure of the streambed (bottom and slopes) of the watercourse. Preserve riparian vegetation and restore it after construction if it is damaged. Carry out the works on the channel regulation of torrential and other periodic flows during the dry period, that is during dry streambed or low water levels (preferably during dry streambed). Plan all sub-projects within this project unit in such a way as to ensure the permeability of the torrential and other streams' bed and the connection of the surface flow with the underground; design the streambanks with a slight (gentle) slope and with the use of natural materials so that smaller animals can get out of the streambed. Minimize the scope of regulation and stabilization of the streambed of torrential and permanent watercourses and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out, especially species dependent of aquatic, wetland, and riparian habitats.
9	Protection from flash floods in the Šibenik coastal region and on the Šibenik islands	NONE	0	Mitigation measures are not proposed for Project No. 9 on strategic impact assessment level.
10	Protection from flash floods in the Zadar coastal region and on the Zadar islands	HR1000023 SZ Dalmacija i Pag HR4000005 Privlaka – Ninski zaljev – Ljubački zaljev HR3000421 Solana Nin HR3000176 Ninski zaljev HR1000024 Ravni kotari HR2001325 Ninski stanovi – livade HR1000022 Velebit HR5000022 Park prirode Velebit	-1 -1 0 -1 -1 -1 -1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Plan all sub-projects within this project unit in such a way as to ensure the permeability of the torrential and other streams' bed and the connection of the surface flow with the underground and design the streambanks with a slight slope and with the use of natural materials so that smaller animals can get out of the streambed. Preserve riparian vegetation and natural streambanks, as well as natural morphology and structure of the streambed. Minimize the scope of regulation and stabilization of the streambed of torrential and permanent watercourses and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out (SPA HR1000023 SZ Dalmacija i Pag, SPA HR1000024 Ravni kotari, SPA HR1000022 Velebit). Within the sub-project No. 223, natural sand and muddy coastal habitats in the ecological network

				must be preserved, i.e., they must not be damaged, their morphology must be preserved and construction material must not be disposed on such habitats. Sub-project No. 6005 should be planned in such a way as to minimize the construction works to the least extent possible to avoid permanent loss and permanent changes of natural habitats (especially) grassland in SCI HR2001325 Ninski stanovi – livade. The extent of the detention basin should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, and riparian and aquatic vegetation. Ensure favorable hydrological conditions for target species <i>Chouardia lithardierei</i> and for habitat type 6540 Sub Mediterranean grasslands of the alliance <i>Molinio-Hordeion secalini</i> within SCI HR2001325 Ninski stanovi – livade Within SPA HR1000024 Ravni kotari preserve riparian vegetation, especially old, developed poplar trees along the banks of watercourses and artificial channels as potential nesting sites for European roller.
11	Flood protection project in the Ravni Kotari basins	HR10000025 Vransko jezero i Jasen HR5000025 Park prirode Vransko jezero HR1000024 Ravni kotari HR2001361 Ravni kotari HR2001366 Bokanjačko blato HR2001325 Ninski stanovi – livade HR1000023 SZ Dalmacija i Pag HR4000030 Novigradsko i Karinsko more HR2001316 Karišnica i Bijela	-1 -1 -1 -1 -1 -1 -1 -1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works in ecological network to the least extent possible and avoid the permanent loss of natural habitats, especially riparian and grassland habitats. Within SPA HR1000024 Ravni kotari preserve riparian vegetation, especially old, developed poplar trees along the banks of watercourses and artificial channels as potential nesting sites for European roller. Plan construction works on temporary streams (torrents) during dry season, i.e., when the streambed is dry. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out. Plan all sub-projects within this project unit in such a way as to ensure the permeability of the torrential and other streams' bed and the connection of the surface flow with the underground and design the streambanks with a slight slope and with the use of natural materials so that smaller animals can get out of the streambed. Preserve riparian vegetation and natural streambanks, as well as natural morphology and structure of the streambed. Minimize the scope of regulation and stabilization of the streambed of torrential and permanent watercourses and locate construction works on already anthropogenically modified stream

				sections, or where floods directly threaten settlements or important infrastructure. Construction works in the ecological network within the sub-project No. 6003 should be planned outside natural sand and muddy coastal habitats. Morphology of such habitats must be preserved, nor should be construction materials disposed in the coastal zone. Reconstruction of the embankment on Karišnica River must be retained in the extent of the existing embankment. Sub-project No. 6004 (reconstruction of the drainage system Kličevica – Nadin – Polača — Vrana – sea and main drainage channel of Nadinsko blato): Plan the reconstruction of the drainage system without barriers (sills) in the streambed, Preserve natural streambanks, riparian vegetation, streambed structure and substrate composition. Carry out the works carefully, i.e., the dynamics of the construction works should be planned in successive manner, so that longer sections of the watercourses are not simultaneously affected and the potential impact (increased turbidity, change in physical and chemical conditions, water amount) on the population of the white-clawed crayfish is minimized. Sub-project No. 6102 (reconstruction of the hydrotechnical tunnel Bokanjac): Technical solution of the reconstruction of the tunnel must be planned in such a way as to ensure future availability of the tunnel as a favourable habitat for maternity colony of target bat species <i>Rhinolophus ferrumequinum</i>. Dynamics of the construction works should be planned in accordance with the target bat species to avoid the disturbance of the population. Sub-project must be planned and designed with consultation with the bat expert.
12	Flood protection project in the basins of the Zrmanja river and the Lika plateau	HR1000022 Velebit HR1000026 Krka i okolni plato HR1000021 Lička krška polja HR2000641 Zrmanja HR2001268 Otuča HR5000022 Park prirode Velebit	--1 -1 -1 -1 -1 -1	Sub-project No. 222, 225 Minimize the scope of riverbanks' stabilization (length, height) and locate construction works on already anthropogenically modified streambank sections, or where floods directly threaten human settlements or important infrastructure. Use only natural material while keeping the permeability of the riverbed and banks. Preserve favourable hydrological conditions for natural habitats in the floodplain. If weirs (sills) are planned, they should be designed in such a way as to preserve the continuity of the flow and to allow the upstream migrations of the aquatic animals, especially fish (e.g., they should be designed in the cascade manner, with slight downstream slope and with the use of natural materials, such as cobbles of different sizes). Apply bioengineering technical solutions wherever it is possible (along the whole regulated section or along the part of the section). Apply landscape and other technical solutions to diversify habitats in the riverbed and on bank slopes. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially aquatic and riparian habitats.

				Preserve as much as possible natural riparian vegetation and restore it if it has been damaged during the construction works. Preserve aquatic vegetation of the habitat type 3260 Watercourses of plain to montane levels with the <i>Ranunculus fluitans</i> and <i>Callitriche-Batrachion</i>. Carry out construction works while preserving the target habitat type 32A0 Tufa cascades of karstic rivers of the Dinaric Alps (Zrmanja River, sub-project 222). Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
13	Flood protection project in the Lika and Gacka river basins	HR1000022 Velebit	-1	Sub-project No. 137, 154: The technical aspects of the detention basins, accompanying facilities and weirs (sills) must be planned in such a way as to prevent the fragmentation of habitats for the white-clawed crayfish, i.e., to enable the species' upstream-downstream migrations. Design detention basins without barriers that would interrupt the upstream migration of aquatic fauna. The extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favorable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially forest, hygrophilous grassland, riparian, and aquatic habitats. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, aquatic, and riparian vegetation, especially the vegetation of hygrophilous tall herb fringe communities along the streams in the scope of the sub-project. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out: SPA HR1000022 Velebit and SCI HR5000022 Park prirode Velebit (sub-projects no. 137, 154), and SPA HR100021 Lička krška polja and SCI HR2001012 Ličko polje (sub-project no. 137). For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
		HR5000022 Park prirode Velebit	-1	
		HR1000021 Lička krška polja	-1	
		HR2001012 Ličko polje	-1	
		HR2000635 Gacko polje	-1	
14	Protection from flash floods in the Kvarner coastal region and on the islands of Krk, Cres, and Lošinj	HR1000033 Kvarnerski otoci	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
		HR2001357 Otok Krk	-1	
		HR2001359 Otok Rab	-1	

		HR2001358 Otok Cres	-1	The extent of the detention basins should be planned in the extent of natural flooding (sub-projects No. 143, 363). For all planned sub-projects construction works area, permanent occupation, and permanent changes of natural habitats in the ecological network must be minimized to the least extent possible. Preserve small water bodies (ponds, puddles, and similar habitats), especially the ponds with the vegetation characteristic for habitat type 3170 Mediterranean temporary ponds. Preserve as much as possible natural riverbanks, natural structure and morphology of the riverbed, and riparian vegetation. Along the sections where the stream regulation is necessary, the permeability of the streambed must be preserved and the banks must be designed with the slight (gentle) slope to avoid the "trap effect" for small animals, especially for the target reptile species. For all the planned sub-projects of stream regulation, the permeability of the streambed and banks must be maintained and the hydrological connection of the surface flow with the underground must be preserved. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out (target species of birds, bats, and reptiles). Preserve natural marine coastal habitats.
		HR2001275 Vrbnik	-1	
		HR4000029 Zaljev Soline -otok Krk	0	
15	Flood protection project in the Mirna river basin	HR2000619 Mirna i šire područje Butonige	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 142, 148, 157, 158, 5006, 5007: The technical aspects of the detention basins, accompanying facilities and weirs (sills) must be planned in such a way as to prevent the fragmentation of habitats for the white-clawed crayfish and the target species of fish, i.e., to enable their upstream-downstream migrations. Design detention basins without barriers that would interrupt the upstream migration of these species. The extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favorable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially forest, grassland, riparian, and aquatic habitats. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, and riparian vegetation. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site SCI HR2000619 Mirna i šire područje Butonige and SCI HR2001016 Kotli. Sub-project No. 5025 (Mirna River restoration): River Mirna restoration sub-project should be
		HR2001016 Kotli	-1	
		HR2000637 Motovunska šuma	-1 / +1	

				planned and designed in accordance with the conservation objectives of SCI HR2000619 Mirna i šire područje Butonige and SCI HR2000637 Motovunska šuma. By adequate technical design of revitalization ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Mirna River.
16	Flood protection project in the Raša river basin	HR2001365 Pazinština	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 150, 153 The technical aspects of the detention basins and accompanying facilities must be planned in such a way as to prevent the fragmentation of habitats for aquatic fauna, i.e., to enable upstream-downstream migrations of animal species. Design detention basins without barriers that would interrupt the upstream migration of aquatic species. The extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favorable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially forest and aquatic habitats. Preserve small water bodies (ponds, puddles, and similar habitats) within the detention basin. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, and riparian vegetation. Along the sections where stream regulation is necessary, ensure the streambed permeability and design the banks with slight (gentle) slope. Construction works dynamics should be planned in accordance with the ecological requirements of target amphibian species to avoid disturbance.
		HR3000432 Ušće Raše	-1	
17	Protection from flash floods in the Western Istria coastal region	NONE	0	Mitigation measures are not proposed for Project No. 17 on strategic impact assessment level.
18	Flood protection in the Upper Kupa River Basin	HR2000642 Kupa	-1	Sub-project No. 4021, 4020: Minimize the construction works in the riverbed and along the riverbanks of Kupa River to the least possible extent. Sub-projects of weir reconstruction must be planned within the current extent. Maintain the current height or lower the height of weir crest. Weir reconstruction must be planned in such a way as to ensure water flow continuity and to ensure downstream and upstream migration of fish and invertebrates (e.g., they should be designed in the cascade manner, with slight downstream slope and with the use of natural materials). Construction works dynamics should be planned in accordance with the ecological requirements of
		HR2001372 Područje oko špilje Vrlovka	-1	

				target species of the ecological network site where the sub-project is carried out (SCI HR2000642 Kupa), especially target fish species (avoid spawning periods). Preserve natural riparian vegetation. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
19	Flood protection project of the town of Ogulin	HR2000592 Ogulinsko-plašćansko područje	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 4016: Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favourable habitats for target species. Preserve the continuity of the flow and allow upstream and downstream migrations for present target species of aquatic fauna. Preserve as much as possible the natural morphology and structure of the streambed and streambank. Preserve the riparian vegetation and restore it in case of being damaged during construction works. Preserve the hydrological connection of the surface flow with the underground by keeping the permeability of the streambed. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out (SCI HR2000592 Ogulinsko-plašćansko područje).
20	Flood protection project in the Kupa river basin – Karlovac and Sisak areas	HR1000001 Pokupski bazen HR2001335 Jastrebarski lugovi HR2000642 Kupa HR2001505 Korana nizvodno od Slunja HR2000593 Mrežnica – Tounjčica HR1000003 Turopolje HR2000415 Odransko polje HR2001311 Sava nizvodno od Hrušćice	-1 -1 -1 -1 -1 -1 -1 -1	Mitigation measures on the strategic impact assessment level are not proposed for this project unit, since the procedures of EIA and Appropriate Assessment have already been carried out for the project unit, except for the sub-project No. 14 (Izgradnja čvora Brodarci s popratnim nasipima na Kupa i Dobri u dvije etape izgradnje u cilju regulacije vodnog režima na području Karlovca): Preserve the continuity of the flow on weirs and barriers for target fish species of SCI HR2000642 Kupa and SCI HR2001505 Korana nizvodno od Slunja, i.e., avoid the fragmentation of the aquatic habitats and allow downstream and upstream migrations of the fish (i.e., by constructing the functional fish passage).
21	Flood protection project in the Korana river basin	HR2001505 Korana nizvodno od Slunja HR2000596 Slunjčica	-2? -1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favourable habitats for target species. Preserve as much as possible natural

				riverbanks, natural structure and morphology of the riverbed and riparian vegetation. Construction works dynamics should be planned in accordance with the ecological requirements of target fish species of the ecological network site SCI HR2001505 Korana nizvodno od Slunja. Sub-project No. 4303, 4309: The new embankments alignments must be planned on the appropriate distance from the riverbanks to ensure wide inundation area, while keeping the natural flooding dynamics of the alluvial forest and wetland habitats. Minimize the scope of regulation and streambank stabilization and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure. Apply bioengineering technical solutions wherever possible. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. Sub-project No. 4009 (reservoir Lučica on Korana River): The sub-project cannot be implemented within the Multiannual Programme in the extent as it has been planned. If this sub-project is necessary to ensure the flood protection within this project unit, alternative technical solution must be designed with the same effects regarding the achievement of the flood protection as the Programme objective, or the sub-project must be significantly changed to ensure the watercourse continuity, reduce the impact area upstream and downstream from the dam below significant, especially the physical and chemical conditions of the watercourse and hydrological regime, i.e., to reduce the impact on the target species and the integrity of the ecological network. Sub-project No. 4309: Design technical solution in such a way as to keep the existing hydrotechnical object (protective wall along the bank) in the current extent.
22	Flood protection in the Kupčina basin	HR1000001 Pokupski bazen	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favourable habitats for target species. Plan all sub-projects within this project unit in such a way as to ensure the permeability of the streambed and the connection of the surface flow with the underground; design the banks with a slight slope and with the use of natural materials so that smaller animals can get out of the streambed. Preserve riparian vegetation and natural streambanks, as well as natural morphology and structure of the streambed. Minimize the scope of regulation and stabilization of the streambanks in ecological network and locate
		HR2001335 Jastrebarski lugovi	-1	
		HR2000450 Ribnjaci Draganići	-1	
		HR2000234 Draganička šuma – Ješevica 1	-1	
		HR2000586 Žumberak – Samoborsko gorje	-1	

				construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure. Apply bioengineering technical solutions for bank stabilization wherever possible. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the individual sub-project is carried out: SCI HR2000586 Žumberak – Samoborsko gorje, SPA HR1000001 Pokupski bazen, SCI HR2000450 Ribnjaci Draganići, SCI HR2001335 Jastrebarski lugovi. Sub-project No.4024 Plan detention basins instead of reservoirs on watercourses in the ecological network. Preserve the flow continuity of watercourses in SCI HR2000586 Žumberak – Samoborsko gorje. Design planned detention basins and accompanying facilities in such a way as to avoid the fragmentation of habitats for aquatic species, i.e., to allow for their upstream and downstream migrations. Design the dam on the detention basin and stream regulation work without the barrier which would prevent the upstream migration of aquatica fauna. Design fish passages on the dams of reservoirs. The extent (scope) of the detention basin and reservoirs should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin or reservoir, and favourable physical and chemical conditions for aquatic species. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially forest, grassland, riparian, and aquatic habitats. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, and riparian vegetation, especially the vegetation of hydrophilous tall herb fringe communities along the streams in the scope of the sub-project. Sub-project No.47 Adjust technical design of the sub-project to ensure favourable hydrological regime and sufficient flow during construction works and afterwards for conservation of favourable habitats for target species and target habitat types of SCI HR2000450 Ribnjaci Draganići and SCI HR2000234 Draganička šuma – Ješevica 1.
23	Protection from Una River floods	HR1000004 Donja Posavina	-1	Mitigation measures are not proposed for Project No. 23 on strategic impact assessment level.
		HR2000463 Dolina Une	-1	
		HR2001370 Područje oko	-1	

		Hrvatske Kostajnice		
24	Flood protection project in the Middle Sava River basin	HR1000004 Donja Posavina	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Reconstructions of the existing levees (dikes) should be planned and constructed using the same alignment as the existing levees, except where the change is necessary to ensure the flood protection. The new levees alignments must be planned in such a way as to ensure the protection of valuable target habitat types and habitats important for target species (alluvial forests, grasslands, aquatic, wetlands habitats) within the natural floodplain (inundation area) and to ensure the favourable hydrological regime and natural flooding dynamics. Ensure favourable hydrological regime downstream and in ecologically dependent surrounding area. Minimize the construction works to the least extent possible to avoid the permanent loss of alluvial forests, grasslands (hay meadows), aquatic (especially along natural riverbanks), and wetland habitats. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out. Bank stabilization with revetments along the banks of Sava River should be planned only exceptionally on the shortest possible sections, and only where there is no other technical solution to ensure flood protection. The scope (length, height) of revetments must be minimized. When designing revetments, apply alternative less aggressive or bioengineering technical solutions wherever possible, and landscape and other technical solutions to diversify habitats in the riverbed and on slopes along revetment. Sub-project No. 80: Ensure flow continuity for target fish species across the weir on Sunja River (Četvrtkovec). Design the technical solution of the sub-project in such a way as to avoid the habitat fragmentation and to enable the upstream and downstream migrations of the fish species. Sub-project No. 4046: Design the pumping station Prelošćica in such a way as to avoid the injury and mortality of the fish. Sub-project No. 87: By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Sava River. Sub-project No. 3010: Design the technical solution for the reconstruction of the Jankomir spillway in such a way as to ensure the favourable hydrological conditions and regime for target
		HR1000003 Turopolje	-1	
		HR2001311 Sava nizvodno od Hrušćice	-1	
		HR2000416 Lonjsko polje	-1	
		HR2000420 Sunjsko polje	-1	
		HR2000415 Odransko polje	-1	
		HR2001506 Sava uzvodno od Zagreba	-1	

				species and target habitat types of the ecological network sites downstream from Zagreb (HR1000003 Turopolje, HR1000004 Donja Posavina, HR2000415 Odransko polje, HR2000416 Lonjsko polje, HR2000420 Sunjsko polje). Sub-project No. 3011: Ensure the watercourse continuity for target fish species of SCI HR2001311 Sava nizvodno od Hrušćice and SCI HR2001506 Sava uzvodno od Zagreba. Design the technical solution in such a way as to avoid the habitat fragmentation and to enable upstream and downstream migrations of the fish species. To mitigate the cumulative effects of bank stabilization interventions along the Sava River, develop the Plan for revitalization of the riverbanks and riparian habitats along the Sava River. The Plan must cover the hydrotechnical aspects (identification of technical solutions for restoring the natural processes of erosion and deposition, ensuring at the same time the flood protection of settlements and important infrastructure), and ecological aspects (respecting the conservation objectives of the ecological network), and define the monitoring programme.
25	Flood protection project in the Krapina basin	HR2000583 Medvednica	-1	Sub-project No. 114, 116 Design planned detention basins and related facilities in such a way as to avoid the fragmentation of habitats for stone crayfish and Danube barbel, i.e., to allow for their upstream and downstream migrations. Design the dam of the detention basin without the barrier which would prevent the upstream migration of these species. The extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially forest and aquatic habitats. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, and riparian vegetation, especially the vegetation of hydrophilous tall herb fringe communities along the streams in the scope of the sub-project. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site SCI HR2000583 Medvednica. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
26	Flood protection project in the Samobor basins	HR2000586 Žumberak – Samoborsko gorje	-1	Sub-project No. 111, 3004, 3005: Design planned detention basins and accompanying facilities, and stream regulation in such a way as to avoid the fragmentation of habitats for stone crayfish and Danube barbel, i.e., to allow for their upstream and downstream migrations. Design the dam of the detention basin and stream
		HR2001506 Sava uzvodno od Zagreba	-1	

				regulation work without the barrier which would prevent the upstream migration of aquatic fauna. The extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially forest, grassland, riparian, and aquatic habitats. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, and riparian vegetation, especially the vegetation of hydrophilous tall herb fringe communities along the streams in the scope of the sub-project. Preserve woody vegetation in riparian zone and restore it if it has been damaged during the construction works. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site SCI HR2000586 Žumberak – Samoborsko gorje and SCI HR2001506 Sava uzvodno od Zagreba. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
27	Flood protection project in the Sjeverno Zagrebačko prisavljje basin	HR2000583 Medvednica (?)	0	Mitigation measures are not proposed for Project No. 27 on strategic impact assessment level.
28	Flood protection project in the Zelina and Lonja basins	HR2001415 Lonja	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 110 Plan the reservoir so that the continuity of the watercourse is not interrupted and upstream-downstream migrations, primarily fish, are allowed. Design fish passage if necessary. Provide a year-round favorable hydrological regime downstream from the reservoir, that is, ecologically acceptable flow.
29	Flood protection project in Česma and Glogovnica basins	HR1000009 Ribnjaci uz Česmu HR20011323 Česma – šume HR2000440 Ribnjaci Saščani i Blatnica HR2001243 Rijeka Česma HR2001208 Bilogora HR1000008 Bilogora i Kalničko gorje HR200120 Livade uz potok Injaticu	-1 -1 -1 -1 -1 -1 -2?	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out to reduce the disturbance of target species in during critical periods of their life cycles. Minimize the construction works area in ecological network and avoid the permanent loss of forest, grassland, aquatic and wetland habitats. Ensure favourable hydrological conditions and regime downstream and upstream from the location

				of the intervention and in the surrounding ecologically dependent area. Downstream from the reservoirs a favourable year-round ecologically acceptable flow must be ensured, as well as the favourable physical and chemical conditions in Česma River for the conservation of thick-shelled river mussel population and its host fish species. Sub-projects for construction of reservoirs within SPA HR100008 Bilogora i Kalničko gorje and/or SCI HR2001281 Bilogora: Plan detention basin instead of reservoir to avoid permanent loss of larger areas of favourable habitats for target species and significant areas of target habitat types within the ecological network. Sub-project No. 57 (Česma River regulation): Preserve the continuity of the flow and allow for the present aquatica fauna the upstream and downstream migrations. preserve the natural flooding dynamics and favourable hydrological conditions for target species and target habitat types in the ecological network sites (SPA) HR1000009 Ribnjaci uz Česmu and (SCI) HR2000440 Ribnjaci Siščani i Blatinica. The new embankments alignments must be planned on the appropriate distance from the riverbanks to ensure wide inundation area, while keeping the natural flooding dynamics of the alluvial forest and wetland habitats. While carrying out the regulation of watercourses, preserve the natural morphology and structure of the riverbed and banks. Design the banks of the watercourse with slight (gentle) slopes and from natural materials. Preserve riparian vegetation and restore it after construction if it has been damaged. Preserve the hydrological connection between the surface flow and the underground by ensuring the permeability of the riverbed. Carry out the regulation and streambank stabilization only exceptionally, on shorter sections, and on already anthropogenically modified riverbanks, or where floods directly threaten settlements or important infrastructure. Apply bioengineering technical solutions wherever it is possible. Sub-project No. 4057 (Kreševine reservoir): Because of potentially significant impact on SCI HR2001220 Livade uz potok Injaticu, the sub-project design must be significantly changed. The need for construction of reservoir must be reviewed. The priority must be given to the construction of detention basin instead of the reservoir to retain the water in the basin and to attenuate the stormwater runoff. The extent of the detention basin must be planned in such a way as to avoid the significant loss of target habitat type and favourable habitats for target butterfly species, i.e., to avoid the permanent changes of hydrological conditions for their conservation. If that is not possible even after the procedure prescribed by the law has been carried out, the sub-project should not be implemented.

30	Flood protection project in the Ilova and Pakra basins	HR2001216 Ilova	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out to reduce the disturbance of target species during the critical periods of their life cycles. Minimize the construction works area in ecological network to the least extent possible and avoid the permanent loss of forest, grassland, aquatic, and wetland habitats. Ensure the favourable hydrological conditions and hydrological regime upstream and downstream from the interventions, and in the surrounding ecologically dependent area. Sub-project No. 37 (Miletinac detention basin): Downstream from the detention basin a favourable year-round ecologically acceptable flow must be ensured for target species of SCI HR2001216 Ilova. Preserve the hydrological conditions required for conservation of target habitat type of SCI HR2001293 Livade oko Grubišnog polja. The dam of the detention basin must be planned without the barrier to enable upstream migrations of fish species. Sub-project No. 48 (Bijela River regulation): Maintain the flow continuity and enable the fish species upstream and downstream migrations. Preserve the natural morphology and structure of the riverbed and banks. Design the riverbanks with the slight (gentle) slopes and of natural materials. Preserve the riparian vegetation and restore it if it has been damaged by construction. Maintain the hydrological connection of the surface flow and the underground by keeping the permeability of the riverbed. Carry out the bank stabilization only exceptionally, on short sections, and on anthropogenically modified banks, or to ensure flood protection of settlements and important infrastructure. Apply bioengineering technical solutions wherever possible.
		HR2001293 Livade kod Grubišnog polja	-1	
		HR1000010 Poilovlje s ribnjacima	-1	
		HR2001330 Pakra i Bijela	-1	
31	Flood protection project in the Šumetlica and Crnac basins	NONE	0	Mitigation measures are not proposed for Project No. 31 on strategic impact assessment level.
32	Protection from the Sava River floods on the section between Nova Gradiška and Račinovci	HR2001311 Sava nizvodno od Hrušćice	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 68: Minimize the construction works area in ecological network to the least extent possible and avoid the permanent loss of alluvial forests, grasslands (hay meadows), aquatic habitats in the riverbed, and riparian habitats (especially the habitat type 3270
		HR2001288 Pričac – Lužani	-1	
		HR2001289 Davor – livade	-1	
		HR2001379 Vlakanc – Radinje	-1	
		HR2001326 Jelas polje s ribnjacima	-1	

		HR2000426 Dvorina	-1	Rivers with muddy banks with <i>Chenopodium rubri</i> pp and <i>Bidenton</i> pp vegetation.
		HR2000427 Gajna	-1	Bank stabilization by construction of revetments should be planned only exceptionally on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure.
		HR2001414 Spačvanski bazen	-1	The scope (length, height) of revetments must be minimized. Bank stabilization should be carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure, and where there is no other technical solution. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment.
		HR2001415 Spačva JZ	-1	The areas used for the construction material supply must be determined outside the riverbed and the floodplain (inundation area). Ensure favourable hydrological conditions and regime downstream from the intervention and in the ecologically dependent area.
		HR1000005 Jelas polje	-1	Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out, especially target fish species.
		HR1000006 Spačvanski bazen	-1	
33	Flood protection project in the Orłjava basin	HR1000040 Papuk (granično)	0	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works area in ecological network and avoid the permanent loss of natural habitats. Preserve as much as possible natural riverbanks, natural structure and morphology of the riverbed, and riparian vegetation. Preserve the watercourse continuity and enable the upstream migrations of fish and aquatic invertebrates. Ensure the favourable hydrological conditions and regime downstream from the intervention and in the surrounding ecologically dependent area. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out, especially target fish species. Stream regulation within the project unit should be designed in such a way as to ensure the permeability of the streambed and its' connection to the underground, with slight slope of the banks and with the use of natural materials. Minimize the scope of regulation and stabilization of the streambank sections and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure. Apply bioengineering technical solutions wherever possible. Sub-project No. 16
		HR2000580 Papuk (granično)	0	
		HR2001385 Orłjava	-1	
		HR2001286 Orłjavac	-2?	
		HR2001329 Potoci oko Papuka	-2?	

				Location of the dam and the extent of the sub-project must be planned outside of the ecological network, i.e., the technical solution must be significantly changed. If that is not possible even after the procedure prescribed by the law has been carried out, the planned sub-project cannot be implemented. Ensure the watercourse continuity for aquatic species, especially for target species of SCI HR2001329 Potoci oko Papuka (Danube barbel, stone crayfish), and fish species which are the hosts for thick-shelled river mussel. Downstream from the reservoir the favourable year-round ecologically acceptable flow must be ensured, as well as the favourable physical and chemical conditions for target species and fish species which are hosts for thick-shelled river mussel. Downstream from the reservoir the favourable hydrological regime must be ensured for hydrophilous and wetland habitats of target butterfly species of SCI HR2001286 Orljivac. Sub-project No. 4321 Design planned detention basins and related facilities in such a way as to avoid the fragmentation of habitats for fish species, i.e., to allow for their upstream and downstream migrations. Design the dam of the detention basin without the barrier which would prevent the upstream migration of these species. The extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Sub-project No. 4320 Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats, especially forest and aquatic habitats. Preserve as much as possible natural streambank, natural structure and morphology of the streambed, and riparian vegetation. If it is possible, regulation works should be planned without the barrier (weir), i.e., without the interruption of the flow continuity. Otherwise, design the appropriate technical solution to allow the upstream migrations of the fish. During construction and maintenance implement measures to prevent the introduction and spread of the invasive alien plant and animal species.
34	Flood protection project in Brodska posavina	HR2001328 Londža, Glogovica, Breznica	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 8: Design planned detention basins and related facilities in such a way as to avoid the fragmentation of habitats for aquatic fauna. Design the dam of the detention basin without the barrier which would prevent the upstream migration of aquatic animals, especially fish species.

				Ensure a favourable year-round hydrological regime, as well as sediment and deadwood transport downstream of the detention basin. Minimize the extent of construction works to avoid the permanent loss and changes of natural habitats. Where present, preserve natural streambanks, riparian and aquatic vegetation, and natural structure and morphology of the streambed. Construction works dynamics should be planned in accordance with the ecological requirements of target species especially of SCI HR2001328 Londža, Glogovica, Breznica, and fish species which are host species for thick-shelled river mussel.
35	Flood protection project in the Bid and Bosut basins	HR2001311 Sava nizvodno od Hrušćice	-1	For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 49: Location of the dam and the extent of the reservoir basin should be planned outside of SCI HR2001328 Londža, Glogovica, Breznica. If it is possible, and thick-shelled river mussel is distributed along the river section which will be inundated, similar ecological conditions important for the species survival must be established in the surrounding area. If other uses this area, the movement along the watercourse must be enabled for the species. ensure the flow continuity for aquatic species, especially for fish species which are hosts for thick-shelled river mussel. Downstream from the reservoir a favourable year-round ecologically acceptable flow must be ensured, as well as favourable physical and chemical conditions for thick-shelled river mussel and fish species which are host species for the mussel, as well as favourable hydrological regime for the habitats in the natural floodplain. Maintain the habitat continuity and enable the upstream and downstream migrations (especially for fish species that are hosts for thick-shelled river mussel). To avoid the potentially significant individual and cumulative impact, the technical solution must be significantly changed, or alternatives must be designed. If that is not possible even after the procedure prescribed by the law has been carried out, the planned sub-project cannot be implemented within the Multiannual Programmeme. For the sub-project No. 61 ensure technical measures on sub-project level to prevent injury and mortality of target fish species of SCI HR2001311 Sava nizvodno od Hrušćice at the pumping station inflow. Construction works area should be minimized to the least extent possible to avoid the permanent loss of natural habitats, especially forest habitats.
		HR2001328 Londža, Glogovica, Breznica	-2?	
36	Flood protection project of the Drava River from the	HR5000014 Gornji tok Drave	-1/+1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent
		HR1000014 Gornji tok Drave	-1/+1	

	Slovenian border to Pitomača	HR2001307 Dravske akumulacije	-1	the introduction and spread of invasive alien plant and animal species. Sub-project No. 279, 303, 1004, 1005, 1006, 264, 267: Reconstructions of the existing levees (dikes) should be planned and constructed using the same alignment as the existing levees, except where the change is necessary to ensure the flood protection. The new levees alignments must be planned in such a way as to ensure the protection of valuable target habitat types and aquatic and wetland habitats important for target species within the natural floodplain (inundation area) and to ensure the favourable hydrological regime and natural flooding dynamics. Minimize the construction works area in ecological network to the least extent possible and avoid the permanent loss of alluvial forests, grasslands (hay meadows), aquatic, and wetland habitats, especially: 91E0* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion, Alnion incanae, Salicion albae), 6510 Lowland hay meadows (<i>Alopecurus pratensis</i>, <i>Sanguisorba officinalis</i>), 3270 Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidenton</i> p.p. vegetation, 3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation, 91F0 Riparian mixed forests of <i>Quercus robur</i>, <i>Ulmus laevis</i> and <i>Ulmus minor</i>, <i>Fraxinus excelsior</i> or <i>Fraxinus angustifolia</i>, along the great rivers (Ulmenion minoris), 3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoeto-Nanojuncetea. Sub-project No. 254, 1104: By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Drava River.
		HR1000013 Dravske akumulacije	-1	
37	Flood protection project of the Drava River from Pitomača to the Danube estuary	HR1000015 Srednji tok Drave	-1	For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works area in ecological network to the least extent possible and avoid the permanent loss of alluvial forests, grasslands (hay meadows), aquatic, and wetland habitats. Reconstructions of the existing levees (dikes) should be planned and constructed using the same alignment as the existing levees, except where the change is necessary to ensure the flood protection. The new levees alignments must be planned in such a way as to ensure the protection of valuable target habitat types and habitats important for target species (alluvial forests, hydrophilous grasslands, aquatic, wetland habitats) within the natural floodplain (inundation area) and to ensure the
		HR5000015 Srednji tok Drave	-1	
		HR1000016 Podunavlje i donje Podravlje	-2?	
		HR2001308 Donji tok Drave	-2?	

				favourable hydrological regime and natural flooding dynamics. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest sections possible and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the important infrastructure. Apply bioengineering technical solutions wherever possible. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Drava River. Ensure favourable hydrological regime downstream and in ecologically dependent surrounding area. Sub-project No. 345 (regulation of the right riverbank of Drava River on location Nehaj): The technical solution must be significantly changed in such a way as to avoid the bank stabilization on locations favourable for nesting of the common kingfisher and the sand martin. if that is not possible even after the procedure prescribed by the law has been carried out, the planned sub-project cannot be implemented. If the objective of the sub-project is revitalization and the enhancement of the hydromorphological features of the river, technical solution must be designed in accordance with the conservation objectives of SPA HR1000016 Podunavlje i donje Podravlje and SCI HR2001308 Donji tok Drave. Sub-project No. 2109 (the construction of multipurpose hydrotechnical system Osijek): Due to the significant adverse impact of this sub-project on the conservation objectives and the integrity of the ecological network, if the sub-project is necessary for the achievement of the Multiannual Programme's objective of flood protection within the project unit No. 37, then other technical solution(s) must be designed with acceptable impacts on ecological network, and which would satisfy the requirements for the benefits of the multipurpose hydrotechnical system. if that is not possible, even after the procedure prescribed by the law has been carried out, the sub-project cannot be implemented.
38	Flood protection project of the Mura River	POVS HR2000364 Mura	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent
		POVS HR5000014 Gornji tok Drave	-1	

		POP HR1000014 Gornji tok Drave	-1	the introduction and spread of invasive alien plant and animal species. Sub-project No. 252, 1101, 1107: Reconstructions of the existing levees (dikes) should be planned and constructed using the same alignment as the existing levees, except where the change is necessary to ensure the flood protection. If the change of the levee alignment is necessary, it must be planned in such a way as to ensure the protection of valuable target habitat types and habitats important for target species (alluvial forests, hydrophilous grasslands, aquatic, and wetland habitats) within the natural floodplain (inundation area) and to ensure the favourable hydrological regime and natural flooding dynamics. Minimize the construction works in ecological network to the least extent possible and avoid the permanent loss of alluvial forests, grasslands (hay meadows), aquatic, and wetland habitats.
39	Flood protection project in the Bednja basin	HR2001408 Livade uz Bednju I	-2?	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 287: Review the need for construction of reservoir. If it is not necessary for flood protection, the sub-project should not be implemented. Design other technical solutions to achieve the objective of protection from adverse effects of water (the construction of detention basin, change in the location of the reservoir (outside of ecological network), or the significant reduction in the extent of the reservoir. If this is not possible even after the procedure prescribed by law has been carried out, the planned project cannot be implemented. Sub-project No. 289: Minimize the construction works in ecological network to the least extent possible and avoid the permanent loss of alluvial forests, grasslands (hay meadows), and aquatic habitats. Technical aspects of the detention basin and the accompanying facilities on the Očura stream must be planned in such a way as to avoid the permanent loss of favourable forest, grassland, aquatic, and wetland habitats for target species of SCI HR2001115 Strahinjčica. The location and the extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime downstream of the detention basin. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out.
		HR1000008 Bilogora i Kalničko gorje	-1	
		HR1000014 Gornji tok Drave	-1	
		HR5000015 Gornji tok Drave	-1	
		HR2001410 Livade uz Bednju III	-1	
		HR200115 Strahinjčica (?)	0	
40	Flood protection project in the Trnava basin	POVS HR2001304 Mačkovec – ribnjak	0	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent

		POVS HR2001307 Dravske akumulacije	-1	the introduction and spread of invasive alien plant and animal species. Sub-project No. 283: Plan the sub-project extent and the construction work area in such a way as to avoid the damage or permanent loss of amphibian hydrophytic habitats of the type 3130 Oligotrophic to mesotrophic standing waters with vegetation of the Isoeto-Nanojuncetea. Stream regulation works should not change the hydrological condition on the fishpond Mačkovec. Sub-project No. 1103: Minimize the construction works area in ecological network and avoid the permanent loss of alluvial forest habitats, grasslands (hay meadows), aquatic, and wetland habitats. The new levees alignments must be planned in such a way as to ensure the protection of valuable target habitat types and habitats important for target species (alluvial forests, wet grasslands, aquatic, and wetland habitats) within the natural floodplain (inundation area) and to ensure the favourable hydrological regime and natural flooding dynamics.
		POP HR1000013 Dravske akumulacije	-1	
41	Flood protection project in the Bistra basin	HR1000008 Bilogora i Kalničko gorje	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-projects No. 253, 268, 269, 273, 274, 304, 1105: Minimize the construction works area in ecological network and avoid the permanent loss of favourable habitats for target bird species, especially forest, grassland, aquatic and wetland habitats. Preserve hydrological conditions that support aquatic and wetland habitats within the ecological network in the extent of the planned detention basins, and in the extent of stream regulation. Preserve as much as possible natural banks, natural structure and morphology of the riverbed, and riparian vegetation. Riparian vegetation and damaged natural habitats should be restored by planting native (autochthonous) tree species adapted to riparian habitats. The location and the extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime downstream of the detention basin Construction works dynamics should be planned in accordance with the ecological requirements of target bird species of the ecological network site POP HR1000008 Bilogora i Kalničko gorje to avoid their disturbance in during nesting periods.
42	Flood protection project in the Županijski kanal basin	HR1000014 Gornji tok Drave	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Plan the dynamics and manner of performing construction works in accordance with the life cycles
		HR5000014 Gornji tok Drave	-1	
		HR1000008 Bilogora i Kalničko gorje	-1	

		HR2001281 Bilogora	-1	and ecological requirements of the target species to reduce disturbance of the target species (birds, fish, and amphibians) during significant periods of their life cycle.
		HR1000015 Srednji tok Drave	-1	Minimize the construction works area in ecological network to the least extent possible and avoid the permanent loss of alluvial forest habitats, grasslands (hay meadows), aquatic, and wetland habitats.
		HR5000015 Srednji tok Drave	-1	Maintain the hydrological connectivity of the surface flow and the underground by ensuring the permeability of the streambed.
		HR2001006 Županijski kanal (Gornje Bazje – Zidina)	-1	Preserve the flow continuity and enable the upstream and downstream migrations of target species if present in the watercourse in the scope of the project. Within the stream regulation sub-projects preserve as much as possible the natural morphology and structure of the riverbed and banks. Design the riverbanks with slight (gentle) slopes and of natural materials. Preserve riparian vegetation and restore it if it has been damaged during construction works. Streambed stabilization should be carried out exclusively, on short sections on already anthropogenically modified banks, and where floods directly threaten to human settlements and important structure. Use bioengineering technical solutions wherever possible. preserve favourable hydrological regime downstream and upstream from the intervention and in ecologically dependent area. To retain water in the basin and to attenuate the stormwater runoff, give priority to the construction of detention basins instead of reservoir, i.e., reservoirs. (sub-projects No. 2022, 2026, 2027)
43	Flood protection project in the Karašica and Vučica basins	HR1000011 Ribnjaci Grudnjak i Našice	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the construction works are planned. Minimize the construction works to the least extent possible to avoid the permanent loss of alluvial forests, grasslands (hay meadows), wetland, and aquatic habitats in the ecological network. Sub-project No. 316: Reconstructions of the existing levees (dikes) should be planned and constructed using the same alignment as the existing levees, except where the change is necessary to ensure the flood protection. The new levees alignments must be planned in such a way as to ensure the protection of valuable target habitat types and aquatic and wetland habitats important for target species (alluvial forests, hydrophilous grasslands, aquatic, and wetland habitats) within the natural floodplain (inundation area) and to ensure the favourable hydrological regime and natural flooding dynamics. Preserve the
		HR2001085 Ribnjak Grudnjak s okolnim šumskim kompleksom	-1	
		HR1000016 Podunavlje i donje Podravlje	-1	
		HR2001308 Donji tok Drave	-1	
		HR2000573 Petrijevci	-1	
		HR2001329 Potoci oko Papuka	-1	

				target habitat type and favorable hydrological conditions of SCI HR2000376 Petrijevci. To retain water in the basin and to attenuate the stormwater runoff, give priority to the construction of detention basins instead of reservoir, i.e., reservoirs. Sub-project should be designed without barriers if possible; if not, technical solution for enabling the upstream migrations of aquatic animals must be planned. Preserve as much as possible natural riverbanks and riparian vegetation. Sub-project No. 2020: Plan detention basin instead of reservoir. Ensure the flow continuity for aquatic species, especially for target species of the SCI HR2001329 Potoci oko Papuka (Danube barbel, stone crayfish), fish species that are host species for larva of thick-shelled river mussel. Ensure a favourable year-round hydrological regime downstream of the detention basin or reservoir, physical and chemical water conditions for the abovementioned species of SCI HR2001329 Potoci oko Papuka, as well as the sediment and deadwood transport.
44	Flood protection project in the Vuka basin	HR2000372 Dunav-Vukovar	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works area in ecological network and avoid the permanent loss of favourable habitats for target bird species, especially forest, grassland, wetland, and aquatic habitats. Potprojekti br. 360: Construction works dynamics should be planned in accordance with the ecological requirements of target fish species of SCI HR2000372 Dunav – Vukovar. Design technical solution in such a way as to allow upstream and downstream migrations of fish species along the regulated section of Vuka River. While carrying out the regulation and constructing the detention basins, preserve as much as possible natural riverbanks, natural structure and morphology of the riverbed, and riparian vegetation. Riparian vegetation and damaged natural habitats should be restored by planting native (autochthonous) tree species.
		HR2001354 Područje oko jezera Borovik	-1	
45	Flood protection project of the Danube River	HR1000016 Podunavlje i donje Podravlje	-2?	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the construction works to the least extent necessary and avoid the loss and degradation of natural habitats, especially forest, grassland, wetland, and aquatic habitats. Reconstructions of the existing levees (dikes) should be planned and constructed using the same alignment as the existing levees, except where the change is necessary to ensure the flood protection. The new levees alignments must be planned in such a way as to ensure the protection of valuable target habitat types and aquatic and wetland
		HR2001309 Dunav S od Kopačkog rita	-1	
		HR2000372 Dunav-Vukovar	-2?	
		HR2000394 Kopački rit	-1	

				habitats important for target species within the natural floodplain (inundation area) and to ensure the favourable hydrological regime and natural flooding dynamics. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Danube River. Ensure favourable hydrological regime downstream and in ecologically dependent surrounding area. Sub-project No. 331: Technical solution must be significantly changed to avoid the significant adverse individual and cumulative impact. The sub-project that covers the section D (rkm 1330+785 do rkm 1328+355) of the Danube River must be excluded from the implementation of the Multiannual Programme in the extent how is now planned. Other technical solution(s) must be designed to achieve the objective of flood protection along this section of Danube River and within this project unit. If that is not possible, even after the procedure prescribed by the law has been carried out, then the planned sub-project cannot be implemented. Sub-project No. 2043: Technical solution must be significantly changed to avoid the significant adverse impact on the common kingfisher and the sand martin. The sub-project must be excluded from the implementation of the Multiannual Programme in the extent how is now planned. Other technical solution(s) must be designed to achieve the objective of flood protection along this section of Danube River and within this project unit. If that is not possible, even after the procedure prescribed by the law has been carried out, then the planned sub-project cannot be implemented.
46	Flood protection project in the Baranja area	HR1000016 Podunavlje i donje Podravlje	-1/+1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Reconstructions of the hydrotechnical objects should be planned in the extent of the existing
		HR2001309 Dunav S od Kopačkog rita	-1	
		HR2001308 Donji tok Drave	-1	

		HR2000394 Kopački rit	-1	unless the change is necessary for protection against the adverse effects of water. Minimize the construction works to the least extent necessary and avoid the loss and degradation of natural habitats, especially forest, grassland (hay meadows), wetland, and aquatic habitats. Construction works dynamics should be planned in accordance with the ecological requirements of target species. Sub-project No. 340, 361, 357: Preserve target habitat types (6240* Sub-Pannonic steppic grasslands (Festucion valesiacae) and 6250* Pannonic loess steppic grasslands) within SCI HR2001309 Dunav S od Kopačkog rita. Sub-project No. 361: Preserve the favourable hydrological conditions and hydrological regime downstream from the sub-project's scope, and in ecologically dependent area. Preserve the flow continuity (allow the upstream migration of aquatic animals, especially fish species). Sub-project No. 327: Plan the appropriate technical design for the pumping station Bakanka to prevent fish injury and mortality. Sub-project No. 357: Plan the revitalization sub-project in accordance with the conservation objectives of SPA HR1000016 Podunavlje i donje Podravlje and SCI HR2001309 Dunav S od Kopačkog rita. By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Danube River.
47	Flood protection project in the Rječina basin	NONE	0	Mitigation measures are not proposed for Project No. 47 on strategic impact assessment level.
48	Flood protection project in the Sutla basin	POVS HR2001070 Sutla	-1	Sub-project No. 115: Preserve natural morphology and structure of the riverbed and riverbanks. Revetments and bank stabilization must be minimized to the least extent possible. Bank stabilization should be carried out exclusively along the already anthropogenically modified banks, and where flooding directly threatens to human settlements and important infrastructure. Use natural materials keeping the permeability of the riverbed and banks. Use bioengineering technical solutions wherever possible, on part of the regulated section or along the whole regulated section. Apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes. Preserve the flow continuity and allow upstream and downstream migrations of aquatic fauna. Minimize the construction works to the least extent necessary and avoid the loss and degradation of natural habitats, especially riparian and aquatic habitats (natural riverbanks and natural riverbed). Riparian vegetation should be preserved and

				restored with native (autochthonous) species if it has been damaged or removed during construction works. Preserve as much as possible of aquatic vegetation if where present. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site SCI HR2001070 Sutla (avoid spawning period of target fish species and host species for thick-shelled river mussel <i>Unio crassus</i>).
49	Flood protection project in the Plitvica basin	POVS HR2001307 Dravske akumulacije	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 260, 263 Reconstruction of the levees should be planned and carried out along the alignment of the existing levees unless their change is necessary for protection against the adverse effects of water. If the change of the alignment is necessary, the new alignments of the levees must be planned in such a way that valuable target habitat types and habitats important for the conservation of target species (flooded and alluvial forests, wet grasslands, aquatic, and wetland habitats) are kept within the inundation area bounded by the levee and that a favorable water regime and natural flood dynamics are preserved. Minimize the construction works to the least extent necessary and avoid the loss and degradation of natural habitats, especially forest, grassland (hay meadows), wetland, and aquatic habitats.
		POP HR1000013 Dravske akumulacije	-1	
		POVS HR5000014 Gornji tok Drave	-1	
		POP HR1000014 Gornji tok Drave	-1	
50	Flood protection project in the Glina basin	NEMA	0	Mitigation measures are not proposed for Project No. 50 on strategic impact assessment level.
51	Flood protection project in the Petrinjčica basin	HR2000459 Petrinjčica	-1	Sub-project No. 4050 Minimize the construction works to the least extent necessary and avoid the loss and degradation of natural habitats, especially forest and aquatic habitats. Technical design of the detention basin Petrinjčica and accompanying facilities must be planned in such a way as to avoid the habitat fragmentation for target fish species, i.e., allow upstream and downstream migrations of aquatic species, and minimize the permanent loss of favourable habitats for target species of SCI HR2000459 Petrinjčica and SCI HR2001356 Zrinska gora. The location of the dam and accompanying facilities should be planned in such a way as to avoid the permanent loss of priority habitat type 91E0* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>). The extent of the detention basin must be planned in the extent of the natural flooding. Ensure a favourable year-round hydrological regime, as well
		HR2001356 Zrinska gora	-1	

				as sediment and deadwood transport downstream of the detention basin. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
52	Flood protection project in the Danube basins downstream of Vukovar	HR2000372 Dunav – Vukovar	-1	All sub-projects within the project (project unit): For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Sub-project No. 325 During the works on reconstruction of drainage channel of the Opatovac reservoir, there must be no damage or permanent loss of the target habitat type 6240 Sub-Pannonic steppic grasslands (<i>Festucion valesiacae</i>). If it is necessary, consult with the expert (biologist – botanist) before the start of construction works. Within SCI HR2001501 Stepska staništa kod Opatovca construction works must be minimized exclusively to the channel and necessary construction zone. Carry out the works during low flow periods.
		HR2001501 Stepska staništa kod Opatovca	0	
		HR2001088 Mala Dubrava – Vučedol	0	
53	Flood protection project in the Kutinica basin	NONE	0	Mitigation measures are not proposed for Project No. 53 on strategic impact assessment level.
54	Flood protection project in the Lower Dobra basin	NONE	0	Mitigation measures are not proposed for Project No. 54 on strategic impact assessment level.
55	Flood protection project in the Pazinčica basin	HR2001017 Lipa (?)	0	Sub-project No. 146 The extent (scope) of the dam, related facilities and regulation works in the streambed and on the banks must be planned outside of the ecological network site HR2001017 Lipa. The location and the extent (scope) of the detention basin should be planned in the extent of natural flooding area. Ensure a favourable year-round hydrological regime downstream of the detention basin. Minimize the extent of construction works and avoid the permanent loss and changes of natural habitats, especially forest, grassland, and aquatic habitats, as much as it is possible. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
56	Flood protection project in the Boljunčica basin	HR2001215 Boljunsko polje	-1	Sub-project No. 367, 368 Minimize the construction works area in ecological network and avoid the permanent loss of target habitat types and favourable habitats for target species (streambed, banks, with natural morphology and structure, ponds and other stagnant water bodies, and forests, forest edges, riparian, and the habitats in the floodplain. Construction works dynamics should be planned in accordance with the ecological requirements of
		HR1000018 Učka i Čičarija	-1	

				target species of the ecological network site where the sub-project is carried out, especially target fish, amphibian and bird species (avoid nesting and spawning periods). For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. While designing the sub-project of stream regulation of Boljunčica (sub-project no. 367), preserve the flow continuity and allow upstream and downstream migrations of target species, preserve natural morphology, and structure of streambed and the banks, hydrological connectivity of the surface flow with the underground (ensure permeability of the streambed)), and preserve the riparian vegetation (restore it if it has been damaged). During the development of the Letaj reservoir reconstruction, keep the existing extent of the reservoir, and if possible, by adequate technical solution enable the upstream and downstream migration of aquatic fauna.
57	Flood protection project in the Lokvarka basin	HR5000019 Gorski kotar i sjeverna Lika	-2?	For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Reduce the scope of the Križ reservoir and maintain the continuity of the watercourse with technical solutions if, based on biological research, a potentially significant loss of target habitat types, favourable habitats for target animal species and habitat fragmentation for animal species (especially stone crayfish) is determined. Plan the reservoir in such a way that the continuity of the water flow is not interrupted, and the longitudinal migration of aquatic animals is allowed. Ensure a year-round favourable hydrological regime downstream of the reservoir, i.e., ecologically acceptable flow. Adjust the dynamics and method of carrying out the construction works to reduce the disturbance of target species, especially birds, amphibians, and bats. If the impact cannot be mitigated to an acceptable level with the above measures, review the need to build a reservoir to protect against the adverse effects of water and develop a variant or alternative solution (e.g., the possibility of designing a detention basin instead of a reservoir) that would achieve the flood protection objective.
		HR2001353 Lokve-Sunger-Fužine	-1	
		HR1000019 Gorski kotar i sjeverna Lika	-1	
58	Flood protection project in the Mrežnica basin	HR2000593 Mrežnica-Tounjčica	-1	Sub-project No. 4306: Bank stabilization by construction of revetments should be planned only exceptionally on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure. The scope (length, height) of revetments must be minimized and alternative solutions (instead of revetments) should be planned wherever possible. Use bioengineering solutions and natural materials, keeping the permeability of the riverbed and riverbanks, and preserve the favourable hydrological conditions for

				natural habitats in the floodplain. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. Minimize the extent of construction works and avoid as much as it is possible the permanent loss and changes of natural habitats, especially aquatic and riparian habitats. Preserve natural riparian vegetation and restore it with native species if it has been damaged or removed by construction works. Preserve the hydrophytic vegetation of target habitat type 3260 Water courses of plain to montane levels with the <i>Ranunculus fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation. Construction works dynamics should be planned in accordance with the ecological requirements of target species of the ecological network site where the sub-project is carried out. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.

Mitigation measures for planned land reclamation facilities

Drava and Danube basins

Mitigation measures for identified impacts – sector A

- Plan the technical aspects of hydrotechnical objects for water withdrawal and irrigation systems in the ecological network in such a way to avoid direct impacts of construction on target habitat types and habitats important for maintaining populations of target species.
- Preserve valuable natural habitats near agricultural areas.
- Implement measures during construction and maintenance for all proposed projects to prevent the introduction and spread of invasive alien plant and animal species.
- Plan the scope of projects to cumulatively provide a favorable water regime, i.e., ecologically acceptable flow, in the basin and downstream on the Drava River and in the old watercourse of the Drava River.
- Conduct water withdrawals in a manner that does not disrupt ecologically acceptable flow downstream of the withdrawal. All irrigation projects proposing to withdraw water from the same natural surface source (watercourses, lakes) should be developed (or planned) together so that there is no cumulative impact on ecologically acceptable flow of watercourses downstream or water levels in reservoirs on the Drava River. If developed sequentially, each new project must consider the previously implemented irrigation systems and their incorporation when calculating water availability.
- Review the availability of surface water for irrigation in accordance with the most recent hydrological data, conduct appropriate hydrological research and analysis and, if necessary, develop a study of the use of surface water from rivers for irrigation.
- By application of technical measures prevent the negative impact on fish and amphibians on the site of surface water withdrawal, i.e., reservoirs (Drava River, HPP Dubrava reservoir, Varaždinsko lake, Ormoško lake).
- Maintain the favorable hydrological regime and habitat conditions of aquatic, wetland, forest, and grassland habitats in the ecological network within the area of impact of planned irrigation systems.

Mitigation measures for identified impacts – sector B

- Plan the technical aspects of hydrotechnical objects for water withdrawal and irrigation systems in the ecological network in such a way to avoid direct impacts of construction on target habitat types and habitats important for maintaining populations of target species.
- Preserve valuable natural habitats near agricultural areas.
- Implement measures during construction and maintenance for all proposed projects to prevent the introduction and spread of invasive alien plant and animal species.
- By application of technical measures prevent the negative impact on fish and amphibians on the site of surface water withdrawal.

- Plan the scope of projects to cumulatively provide a favorable water regime, i.e., ecologically acceptable flow, in the basin and downstream along watercourses and floodplains of Drava, Karašica and Danube rivers. All irrigation projects proposing to withdraw water from the same natural surface source (watercourses, lakes) should be developed (or planned) together so that there is no cumulative impact on ecologically acceptable flow of downstream watercourses or water levels in reservoirs. If developed sequentially, each new project must consider the previously implemented irrigation systems and their incorporation when calculating water availability.
- Review the availability of surface water for irrigation in accordance with the most recent hydrological data, conduct appropriate hydrological research and analysis and, if necessary, develop a study of the use of surface water from Danube River for irrigation, and revise the study already available for Drava River.

Sava basins

Mitigation measures for identified impacts – sector C

- Plan the technical aspects of hydrotechnical objects for water withdrawal and irrigation systems in the ecological network in such a way to avoid direct impacts of construction on target habitat types and habitats important for maintaining populations of target species.
- Preserve valuable natural habitats near agricultural areas.
- Implement measures during construction and maintenance for all proposed projects to prevent the introduction and spread of invasive alien plant and animal species.
- By application of technical measures prevent the negative impact on fish and amphibians on the site of surface water withdrawal (Sava and Kupa rivers).
- Maintain the favorable hydrological regime and habitat conditions of aquatic, wetland, forest, and grassland habitats in the ecological network within the area of impact of planned irrigation systems.
- Plan the scope of projects to cumulatively provide a favorable water regime, i.e., ecologically acceptable flow, in the basin and downstream along watercourses and floodplains of Sava, and Kupa rivers, especially during dry season that coincide with the period of increased irrigation demand. All irrigation projects proposing to withdraw water from the same natural surface water body should be developed (or planned) together so that there is no cumulative impact on ecologically acceptable flow of downstream watercourses. If developed sequentially, each new project must consider the previously implemented irrigation systems and their incorporation when calculating water availability. For this purpose, it is proposed to conduct a study of the impact of water withdrawal of planned irrigation systems on the hydrological regime of Sava and Kupa rivers.

Mitigation measures for identified impacts – sector D

- Plan the technical aspects of hydrotechnical objects for water withdrawal and irrigation systems in the ecological network in such a way to avoid direct impacts of construction on target habitat types and habitats important for maintaining populations of target species.
- Preserve valuable natural habitats near agricultural areas.
- Implement measures during construction and maintenance for all proposed projects to prevent the introduction and spread of invasive alien plant and animal species.
- By application of technical measures prevent the negative impact on fish and amphibians on the site of surface water withdrawal (especially target species of SCI HR2001311 Sava nizvodno od Hrušćice).
- Downstream of the Londža reservoir (Project No 80, irrigation system Orjava-Londža), provide sufficient flow to ensure favorable hydrological conditions in the watercourse and in the floodplain for the target species thick shelled river mussel *Unio crassus* (SCI HR1001385 Orjava) and the target habitat type 6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) (SCI HR2001292 Livade kod Čaglina).
- Plan the scope of projects to cumulatively provide a favorable water regime, i.e., ecologically acceptable flow, in the project area and downstream along the Sava River and other watercourses within ecological network (Spačva basin), especially during dry periods that coincide with the period of increased irrigation demand. If irrigation projects are developed sequentially, each new project must consider the previously implemented irrigation systems and their incorporation when calculating water availability.
- Review the availability of surface water for irrigation in accordance with the most recent hydrological data. If necessary, conduct appropriate hydrological research and analysis. Develop a hydrological study of the availability of surface water from Sava River for all the existing and planned irrigation systems.

Northern Adriatic Basins

Mitigation measures for identified impacts - sector E

- Plan the technical aspects of hydrotechnical objects for water withdrawal and irrigation systems in the ecological network in such a way to avoid direct impacts of construction on target habitat types and habitats important for maintaining populations of target species.

- Preserve valuable natural habitats near agricultural areas.
- Implement measures during construction and maintenance for all proposed projects to prevent the introduction and spread of invasive alien plant and animal species.
- Especially within SPA HR1000033 Kvarnerski otoci and SCI HR2001357 Otok Krk, prevent the conversion and permanent occupation of natural grasslands (meadows, pastures), low bushes and maquis, forest edges and forest clearings as valuable habitats for target species of reptiles and birds.
- If micro-reservoirs are planned on natural watercourses, develop a technical solution for reservoir in such a way that favorable habitats for target species in the natural watercourses are preserved and that natural stream channels, water flow continuity and favorable hydrological conditions downstream are maintained (SCI HR5000019 Gorski Kotar i Sjeverna Lika).
- By application of technical measures prevent the negative impact on fish and amphibians on the site of surface water withdrawal (Raša, Mirna, and Boljunčica rivers, Letaj reservoir).
- Plan the scope of the project so that in the project impact area, in the watercourses (Mirna, Raša, Boljunčica, Ličanka and other local watercourses) and downstream from water withdrawal a favorable water regime, i.e., ecologically acceptable flow, is ensured, especially during dry periods that coincide with the period of increased irrigation demand.
- All irrigation projects planned for using water from the same surface water body (streams, lakes) should be developed (i.e., planned) together to avoid cumulative effects to ecologically acceptable flow of watercourses or water levels in lakes (reservoirs). If developed sequentially, each new project must consider previously implemented irrigation systems and their incorporation when calculating water availability.
- Review water use availability according to the most recent hydrological data. If necessary, conduct appropriate hydrologic and biological research and analysis.
- Scope of project No. 36 should be planned outside of the Natura 2000 ecological network site SCI HR2001486 Istra – Čepićko polje.
- When planning irrigation system projects No. 33, No. 38 and No. 44 ensure year-round ecologically acceptable flows downstream from Gradola water source.

10.5 Proposal of measures / guidelines for mitigating the impact on the environment

Measures for implementation through the Multiannual Programme

Construction of regulation and protection water facilities

PROJECT COMPONENT	MEASURE
WMD for the South Adriatic Basins	
1 Flash flood protection project of in the area of Dubrovačko primorje, the Pelješac peninsula and the islands of Korčula, Mljet and Lastovo	
Soil and agriculture	When planning and designing the projects, ensure that impact of construction on erosion is reduced to minimum.
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Water	During the preparatory work, the remains of mowed grass, wicker, shrubs and trees should be removed, but leave the stumps so that as little organic matter as possible remains in the area provided for sinking, and the possibility of erosion is reduced. All works must be carried out in such a way that the ecological and chemical state does not deteriorate, that is, with a minimal risk of any pollution. The protection of waters and water bodies is planned and carried out throughout the scope, and stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing the zones of sanitary protection of the spring and decisions on the zones of sanitary protection of the spring. When planning the intervention in the area, include the impacts of climate change when assessing the risk of adverse effects of water (floods). To the greatest extent possible preserve the functionality of the existing protection system against adverse effects of water and the existing hydrological regime. Ensure environmentally friendly flow downstream from the reservoir. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned in such a way as to meet the needs of the already built facilities upstream and downstream, so as not to jeopardise the existing hydrotechnical system on the watercourse.
Landscape	Changes to the terrain morphology should be as little as possible.

PROJECT COMPONENT	MEASURE
	Preserve developed vegetation and use natural materials, especially within protected areas (PP Lastovsko otočje and Significant Landscapes: Cetina Canyon, Dubrovačka River and Konavoski dvori).
Biodiversity	Carry out structural flood protection construction works within the least extent that is necessary, preserving suitable rare and endangered habitats (in accordance with regulations in the field of nature protection) for herpetofauna species. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and embankments in the least possible scope (extent) with the minimal required length and height. Minimize the construction work to the least possible extent and avoid the loss of natural habitats and favourable habitats for endangered and protected animal species. Preserve natural morphology and structure of riverbed and riverbanks. Preserve riparian vegetation and restore it if it has been damaged by construction works. Design sub-projects within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Minimize the scope of regulation and stabilization of the streambed of torrential and permanent streams and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Cultural heritage	For all intended interventions in the space, including temporary use of the site for the purpose of construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural property and confirmation of the project documentation of the intended intervention in the site in accordance with the special conditions or prior authorization for the planned works shall be obtained from the conservation department of the relevant ministry. If an archaeological site is encountered during the execution of earthworks (on the surface or under the ground surface, in the water or in the sea), the works shall be stopped and the conservation department of the relevant ministry shall be involved. When planning the stream management in the Rijeka Dubrovačka and Brsečina area, areas with protected cultural properties (summer residences) are to be avoided, as these works could affect their properties as cultural assets. When reconstructing the stream protection systems, avoid areas with individually protected cultural properties, which could affect the properties of cultural properties. During construction of water structures, provide for professional archaeological supervision (permanent or occasional) during the performance of all earthwork in the construction area. If necessary, stop the work, carry out protective archaeological surveys and conservation of finds in coordination with the conservation department of the relevant ministry.
2 Flood protection project in the Neretva river basin	
Soil and agriculture	Avoid P1 and P2 agricultural land during selection of locations from which soil material will be excavated for levee construction. While planning the projects ensure that the impact of construction on soil erosion is reduced to minimum.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials, especially within valuable cultivated areas.
Game and hunting	To the greatest extent, preserve the coastal vegetation. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.

PROJECT COMPONENT	MEASURE
Water	The protection of waters and water bodies plan and carry out throughout the scope, and stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing the zones of sanitary protection of the spring and decisions on the zones of sanitary protection of the spring. During project planning, include the impacts of climate change when assessing the risk of adverse effects of water (floods). To plan the collection of wastewater and stormwater from infrastructure facilities as a closed drainage system with wastewater treatment before discharge. Canal slopes should be carried out in such a way as to enable the drainage of groundwater from the hinterland of the building towards the watercourse (permeable geotextile, gravel layer). In order to reduce the impact on flow continuity and morphology of the surrounding terrain, regularly maintain the area behind the partition in terms of cleaning the deposited sediment during low waters. Decorating the watercourse trough is carried out in such a way as to allow groundwater to flow towards the surface watercourse using adequate materials to stabilize the trough. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned in such a way as to meet the needs of the already built facilities upstream and downstream, so as not to jeopardise the existing hydrotechnical system on the watercourse.
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Carry out the structural works for the reconstruction of irrigation hydrotechnical objects in such a way as to enable the migration of freshwater fish species. If it is not possible to remove the hydrotechnical object from the watercourse and carry out the restoration of the watercourse, the structural works of construction or reconstruction of transverse water structures should be carried in the least possible extent while preserving rare and endangered habitats (according to regulations in the field of nature protection) for rheophilic species. Implement flood protection measures while minimizing construction impacts by applying alternative restoration and/or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Minimize the construction works area and avoid the permanent loss of alluvial forests, grasslands (hay meadows), wetland and aquatic habitats. Reconstruction of levees should be planned and carried out along the alignment of the existing levees unless its change is necessary for protection against adverse effects of water. The new embankments alignments must be planned in such a way as to ensure the protection of valuable habitat types and aquatic and wetland habitats important for animal and plant species within the natural floodplain (inundation area) and to ensure the favourable hydrological regime and natural flooding dynamics. Ensure favourable hydrological regime downstream and in ecologically dependent surrounding area. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Neretva River.
Protected areas	Plan the organization of the construction site and the dynamics of the construction works in such a way as to minimize the damage the natural habitats and minimize the disturbance the species.

PROJECT COMPONENT	MEASURE
3 Flood protection project in the Vrgorsko polje basin	
Landscape	Create a landscape study for the lake improvement project. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Changes to the terrain morphology should be as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Water	The protection of waters and water bodies is planned and carried out throughout the scope, and stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing the zones of sanitary protection of the spring and decisions on the zones of sanitary protection of the spring. Include any impacts of climate change when planning the procedure To plan the collection of wastewater and stormwater from infrastructure facilities as a closed drainage system with wastewater treatment before discharge. Canal slopes should be carried out in such a way as to enable the drainage of groundwater from the hinterland of the banks towards the watercourse (permeable geotextile, gravel layer). Regulation of the riverbed should be carried out in such a way as to allow groundwater to flow towards the surface watercourse using adequate materials for the stabilization. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned in such a way as to meet the needs of the already built facilities upstream and downstream, so as not to jeopardise the existing hydrotechnical system on the watercourse.
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats. (according to regulations in the field of nature protection). Carry out the structural works for the reconstruction of irrigation hydrotechnical objects in such a way as to enable the migration of freshwater fish species (e.g. <i>Knipowitschia croatica</i> for Projects 2, 3). Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Minimize the extent of the construction works and avoid the permanent loss and permanent change of the morphology and structure of natural habitats and favourable habitats for present fauna, riparian habitats along the streams and channels, wetlands with emergent vegetation (reed, cattail), alluvial habitats in the floodplains of streams and rivers. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna.
4 Flood protection project in the Imotsko-Bekijsko polje basin	
Soil and agriculture	While planning the projects, ensure that the impact of construction on soil erosion is reduced to minimum.
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Water	During the preparatory work, the remains of cut grass, shrubs, bushes and trees should be removed, but the stumps should be left in order to leave as little organic matter as possible in the area intended for immersion, and to reduce the possibility of erosion. Perform all procedures in such a way that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of any pollution.

PROJECT COMPONENT	MEASURE
	Protection of waters and water bodies should be planned and carried out throughout the entire area, with stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the rulebook establishing sanitary protection zones of sources and decisions on sanitary protection zones of sources. When planning projects in the area and assessing the risk of adverse effects of water (flooding), include the effects of climate change. Stabilization of the banks and slopes of the protection and regulation facilities should be carried out in such a way as to enable the drainage of groundwater behind the bank towards the watercourse (permeable geotextile, gravel layer).
Biodiversity	Carry out structural flood protection construction works within the least extent that is necessary, preserving suitable rare and endangered habitats (in accordance with regulations in the field of nature protection) for herpetofauna species. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Sub-projects for the regulation of torrential streams (no. 208, 209, 6115) within this project unit should be planned in such a way as to ensure the permeability of the torrent bed and the connection of the surface flow with the underground, and the banks of the torrents should be designed with a gentle slope and with the use of natural materials so that smaller animals could get out of the streambed. Preserve as much as possible the natural streambank, the natural structure and morphology of the streambed, and the riparian vegetation. Preserve springs and their natural connection with surface flows. Plan the technical features and construction works for all planned sub-projects of regulation of torrential streams and channels in such a way as to minimize the permanent loss and changes to natural aquatic and riparian habitats due to construction works. Plan the construction works on torrents and channels during the dry period when the bed is dry and outside the spawning period of fish species in Vrljika to avoid their disturbance.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Mitigation of Climate changes	Limit works and use the existing and planned forest infrastructure in order to minimize the occupation of forest areas.
5 Protection from flash floods in the Makarska coastal region	
Soil and agriculture	When planning and designing the projects, ensure that the impact of construction on soil erosion is reduced to minimum.
Forest and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Water	During the carrying out of preparatory work, the remnants of mowed grass, wicker, shrubs and trees should be removed, but leave stumps so that as little organic matter as possible remains in the area provided for sinking, and the possibility of erosion is reduced.. Perform all procedures in such a way that the ecological and chemical condition does not deteriorate, i.e. with a minimal risk of contamination in any way. The protection of waters and water bodies is planned and carried out throughout the scope, and stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing the zones of sanitary protection of the spring and decisions on the zones of sanitary protection of the spring. During project planning, when assessing the risk of water damage (floods), include the impacts of climate change. To the greatest extent possible preserve the functionality of the existing water adverse protection system and the existing hydrological regime. Stabilize the banks and slopes of these facilities by allowing the drainage of groundwater from the hinterland of the bank towards the watercourse (permeable geotextile, gravel layer).
Biodiversity	Design sub-projects within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Preserve as much as possible the natural streambank, the natural structure and morphology of the streambed, and the riparian vegetation.

PROJECT COMPONENT	MEASURE
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials.
Cultural heritage	When planning the procedure in the premises, the conservation department of the relevant ministry should be consulted beforehand and further action should be determined according to the assessment of the situation.
Mitigation of climate changes	Limit works and use the existing and planned forest infrastructure in order to minimize the occupation of forest areas.
6 Protection from flash floods in the Middle Adriatic coastal region and the islands of Brač, Hvar, Vis, Šolta and Čiovo	
Soil and agriculture	When planning and designing the projects, ensure that the impact of construction on soil erosion is reduced to minimum.
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Water	During the carrying out of preparatory work, the remnants of mowed grass, wicker, shrubs and trees should be removed, but leave stumps so that as little organic matter as possible remains in the area provided for sinking, and the possibility of erosion is reduced. Perform all procedures in such a way that the ecological and chemical condition does not deteriorate, i.e. with a minimal risk of contamination in any way. The protection of waters and water bodies is planned and carried out throughout the scope, and stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing the zones of sanitary protection of the spring and decisions on the zones of sanitary protection of the spring. When planning the project in the area, include the impacts of climate change when assessing the risk of adverse effects of water (floods). To the greatest extent possible preserve the functionality of the existing water adverse protection system and the existing hydrological regime. Stabilize the banks and slopes in these buildings by allowing the drainage of groundwater from the hinterland of the bank towards the watercourse (permeable geotextile, gravel layer).
Biodiversity	Carry out structural flood protection construction works within the least extent that is necessary, preserving suitable rare and endangered habitats (in accordance with regulations in the field of nature protection) for herpetofauna species. If it is not possible to remove the hydrotechnical object from the watercourse and carry out the restoration of the watercourse, the structural works of construction or reconstruction of transverse water structures should be carried in the least possible extent while preserving rare and endangered habitats (according to regulations in the field of nature protection) for rheophilic species. Carry out the works in such a way as to enable the migration of freshwater fish species. Implement flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Dynamics and the manner of performing the construction works should be planned in such a way as to minimize the disturbance of animal species, especially fish, birds and amphibians, during important periods of their life cycles. Plan the construction works on torrents and channels during the dry period when the bed is dry ili during low water levels of permanent watercourses (Jadro, Žrnovnica). Design sub-projects within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Minimize the construction works area to the least possible extent and avoid the permanent loss of valuable habitats and favourable habitats for animal species, especially grasslands, garrigue, maquis, small water bodies (ponds), marine coastal habitats. Preserve as much as possible the natural streambank, the natural structure and morphology of the streambed, and the riparian vegetation. Stabilization of streambed during the regulation of torrents and permanent watercourses (Jadro, Žrnovnica) should be reduced to the smallest possible scope and carried out exclusively on already anthropogenically modified sections. Use bioengineering technical solutions wherever possible. On permanent watercourses

PROJECT COMPONENT	MEASURE
	(Jadro, Žrnovnica), preserve aquatic vegetation where it is present, riparian vegetation where it is present in a minimum zone of 2 m from the banks of the watercourse, and the composition of the substrate at the bottom (sand or gravel bottom). Preserve the continuity of the water course and allow the upstream migration of fish species.
Landscape	Create landscape studies for watercourse management projects. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials (especially within the Significant Landscape of Cetina Canyon).
Cultural heritage	For all intended projects, including temporary use of the site for the purpose of construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural property and confirmation of the project documentation of the intended project in the site in accordance with the special conditions or prior authorization for the planned works shall be obtained from the Conservation department of the relevant Ministry. If archaeological sites or finds are encountered during earthworks (on the surface or below the surface and in the riverbeds), the works shall be stopped and the competent conservation authority shall be informed about the findings. Prior conditions of the responsible conservation authority must be obtained for all projects within protected cultural-historical units. When constructing water structures, professional archaeological monitoring (permanent or occasional) shall be provided during the execution of all earthworks in the construction area. If necessary, discontinuation of work, implementation of protective measures, archaeological investigations and conservation of finds in consultation with the Conservation department of the relevant Ministry.
Mitigation of climate changes	Limit works and use the existing and planned forest infrastructure in order to minimize the occupation of forest areas.
7 Flood protection project in the Cetina river basin	
Soil and agriculture	During planning and designing the project location, exclude P1 and P2 agricultural land. If that is not possible, include the least possible area of P1 and P2 agricultural land. During planning and designing projects ensure that the impact of construction on soil erosion is reduced to minimum.
Water	During the carrying out of preparatory work, the remnants of mowed grass, wicker, shrubs and trees should be removed, but leave stumps so that as little organic matter as possible remains in the area provided for sinking, and the possibility of erosion is reduced. Perform all procedures in such a way that the ecological and chemical condition does not deteriorate, i.e. with a minimal risk of contamination in any way. The protection of waters and water bodies is planned and carried out throughout the scope, and stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing the zones of sanitary protection of the spring and decisions on the zones of sanitary protection of the spring. When planning the project in the area, include the impacts of climate change when assessing the risk of adverse effects of water (floods). To the greatest extent possible preserve the functionality of the existing water adverse protection system and the existing hydrological regime. In order to reduce the impact on flow continuity and morphology of the surrounding terrain, regularly maintain the area behind the partition in terms of cleaning the deposited sediment during low waters. Carry out the Regulation the watercourse in such a way as to allow groundwater to flow towards the surface watercourse using adequate materials to stabilize the trough. Stabilization of banks and slopes in these buildings should be carried out to enable the drainage of groundwater from the hinterland of the building towards the watercourse (permeable geotextile, gravel layer).. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned in such a way as to meet the needs of the already built facilities upstream and downstream, so as not to jeopardise the existing hydrotechnical system on the watercourse.
Biodiversity	Carry out structural flood protection construction works on torrential streams within the least extent that is necessary, preserving suitable rare and endangered habitats (in accordance with regulations in the field of nature protection) for herpetofauna species. If it is not possible to remove the hydrotechnical object from the watercourse and carry out the restoration of the watercourse, the structural works of construction or reconstruction of transverse water structures should be carried in the least possible extent while preserving rare and endangered habitats (according to

PROJECT COMPONENT	MEASURE
	regulations in the field of nature protection) for rheophilic species. Carry out the works in such a way as to enable the migration of freshwater fish species. Implement flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Direct the improvement of the existing pumping station infrastructure towards a more environmentally friendly form by applying alternative measures at the sub-project level. Design sub-projects within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Preserve as much as possible the natural streambanks, the natural structure and morphology of the streambed, and the riparian vegetation. Dynamics and the manner of performing the construction works should be planned in such a way as to minimize the disturbance of animal species, especially fish, birds European pond turtle, during important periods of their life cycles. Plan the construction works on torrents and other watercourses during the dry period when the streambed is dry during low water levels of permanent watercourses (Cetina, Kosinac). Minimize the construction works area to the least possible extent and avoid the permanent loss of valuable habitats and favourable habitats for animal species, especially grasslands, garrigue, maquis, small water bodies (ponds), marine coastal habitats. Stabilization of streambed during the regulation of torrents and permanent watercourses should be reduced to the smallest possible scope and carried out exclusively on already anthropogenically modified sections. Use bioengineering technical solutions wherever possible. On permanent watercourses preserve aquatic vegetation where it is present, riparian vegetation where it is present in a minimum zone of 2 m from the banks of the watercourse, and the composition of the substrate at the bottom (sand or gravel bottom). Preserve the continuity of the water course and allow the upstream migration of fish and invertebrate species.
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in a way to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Game and hunting	To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation
Landscape	Create landscape studies for watercourse management projects. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials (especially within the Significant Landscape of Cetina Canyon).
Cultural heritage	For works on protected cultural property, the prior opinion of the competent conservation department shall be obtained and a conservation study shall be prepared, based on which the impact of the intervention on cultural property and heritage shall be assessed. For all intended encroachments on the site, including temporary use of the site for construction of accompanying infrastructure, special conditions in the field of protection and preservation of cultural properties and confirmation of project documentation of the intended encroachment on the site in accordance with the special conditions or prior approval for the planned works shall be obtained from the Conservation department of the relevant Ministry. During all earthworks, if an archaeological site is found during the execution of earthworks (on or under the ground surface, in the water or in the sea), the works shall be stopped and the competent conservation authority shall be informed about the findings with the aim of securing and protecting the archaeological site and the finds.

PROJECT COMPONENT	MEASURE
	When building water structures, professional archaeological supervision (permanent or occasional) shall be provided during the execution of all earthworks in the construction area. If necessary, discontinue the work, conduct protective archaeological research and conservation of the findings in consultation with the Conservation department of the relevant Ministry.
Mitigation of climate changes	Limit works and use the existing and planned forest infrastructure in order to minimize the occupation of forest areas.
8 Flood protection	project in the Krka river basin
Soil and agriculture	During planning and designing projects ensure that the impact of construction on erosion is reduced to minimum.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials (especially within NP Krka and the Significant Landscape of Krka - upper stream).
Water	During the carrying out of preparatory work, the remnants of mowed grass, wicker, shrubs and trees should be removed, but leave stumps so that as little organic matter as possible remains in the area provided for sinking, and the possibility of erosion is reduced.. Perform all procedures in such a way that the ecological and chemical condition does not deteriorate, i.e. with a minimal risk of contamination in any way. The protection of waters and water bodies is planned and carried out throughout the scope, and stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing the zones of sanitary protection of the spring and decisions on the zones of sanitary protection of the spring. During the project planning phase, when assessing the risk of water damage (floods), include the impacts of climate change.
Biodiversity	Carry out structural flood protection construction works within the least extent that is necessary, preserving suitable rare and endangered habitats (in accordance with regulations in the field of nature protection) for herpetofauna species. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Carry out the structural works for the reconstruction of irrigation hydrotechnical objects in such a way as to enable the migration of freshwater fish species For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats.
Cultural heritage	When preparing project documentation for project situated directly adjacent to the protected cultural-historical unit, the opinion of the competent conservation authority shall be obtained. For all intended interventions in the space, including temporary use of the site for the purpose of construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural property and confirmation of the project documentation of the intended intervention in the site in accordance with the special conditions or prior approval for the planned works shall be obtained from the conservation department of the relevant ministry. For all earthworks, if an archaeological site or finds are encountered during the execution of earthworks (on the surface or below the surface of the ground, in the water or in the sea), the works shall be stopped and the conservation department of the relevant ministry shall be informed of the finds. When building water structures, professional archaeological supervision (permanent or occasional) shall be provided during the execution of all earthworks in the construction area. If necessary, the works shall be stopped and the archaeological protection surveys and conservation of the finds shall be carried out in consultation with the Conservation department of the relevant Ministry.
Mitigation of climate changes	Limit works and use the existing and planned forest infrastructure in order to minimize the occupation of forest areas.
9 Protection from flash floods	in the Šibenik coastal region and on the Šibenik islands
Soil and agriculture	During planning and designing projects ensure that the impact of construction on erosion is reduced to minimum.

PROJECT COMPONENT	MEASURE
Forest forestry and	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in a way to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Preserve functionality of existing protection systems against adverse effects of water and current hydrological regime.
Biodiversity	Carry out structural flood protection construction works within the least extent that is necessary, preserving suitable rare and endangered habitats (in accordance with regulations in the field of nature protection) for herpetofauna species. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials.
Mitigation of climate changes	Limit works and use the existing and planned forest infrastructure in order to minimize the occupation of forest areas.
10 Protection from	flash floods in the Zadar coastal region and on the Zadar islands
Soil and agriculture	During planning and designing projects ensure that the impact of construction on erosion is reduced to minimum.
Landscape	Create landscape studies for watercourse management projects. Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Changes to the terrain morphology should be as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially within PP Velebit).
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Preserve functionality of existing protection systems against adverse effects of water and current hydrological regime. Carry out the Regulation of riverbed as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for its' stabilisation. In order to reduce the impact on hydromorphology, apply the optimization of existing and new hydrotechnical structures (piers, revetments...). Stabilization of the banks and slopes of the facilities should be carried as to enable the drainage of groundwater from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer).

PROJECT COMPONENT	MEASURE
	Channel cuts should be made as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Carry out structural flood protection construction works within the least extent that is necessary, preserving suitable rare and endangered habitats (in accordance with regulations in the field of nature protection) for herpetofauna species. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites, especially detention basins. Plan construction works for bank stabilization and embankments in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Design sub-projects of regulation of torrential and other streams within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Preserve natural morphology and structure of riverbed and riverbanks, as well as riparian vegetation Minimize the scope of regulation and stabilization of the streambed of torrential and permanent streams and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna.
Cultural heritage	When planning the procedure in the premises, the conservation department of the relevant ministry should be consulted beforehand and further action should be determined according to the assessment of the situation.
11 Flood protection project in the Ravni kotari basins	
Soil and agriculture	During planning and designing the project location, exclude P1 and P2 agricultural land. If that is not possible, include the least possible area of P1 and P2 agricultural land. During planning and designing the project, avoid areas cultivated with permanent crops.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorate, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of the reservoir. Carry out the Regulation of riverbed as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for its' stabilisation. Channel slopes should be made as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and

PROJECT COMPONENT	MEASURE
	rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Carry out the structural works for the reconstruction of irrigation hydrotechnical objects in such a way as to enable the migration of freshwater fish species Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Plan the construction works in the least possible extent. Avoid permanent loss or damage of natural habitats, especially riparian vegetation, and grassland habitats. Preserve riparian vegetation, especially old and developed poplar trees along the banks of natural watercourses and artificial channels, as potential nesting sites for European roller. Plan the construction works on torrents during the dry period when the streambed is dry. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna and flora. Design sub-projects of regulation of torrential and other streams and channels within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Preserve as much as possible the natural streambank, the natural structure and morphology of the streambed, and the riparian vegetation. Minimize the scope of regulation and stabilization of the streambed of torrential and permanent streams and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure.
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Protected areas	Plan the organization of the construction site in such a way as to minimize the damage to natural habitats.
Biodiversity	While planning the locations and the extent of the reservoirs avoid rare and endangered habitat types (in accordance with the regulations in the field of nature protection).
Landscape	When developing solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Changes to the terrain morphology should be as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially within PP Vrana Lake).
Mitigation of climate changes	Plan and carry out activities in such a way as to avoid taking over forest areas.
12 Flood protection project in the basins of the Zrmanja river and the Lika plateau	
Water	Plan and carry out the water protections at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of the reservoir. Channel slopes should be made as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer).
Biodiversity	Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods.

PROJECT COMPONENT	MEASURE
	During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016).
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling. Protect the trees outside the working zone.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials (especially within PP Velebit).
WMD for North Adriatic Basin	
13 Flood protection project in the Lika and Gacka river basins	
Forests and forestry	Plan and implement operations in such a way to avoid the occupation of forest area, especially protective and special purpose forests. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.
Game and hunting	Plan and carry out works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Channel slopes should be made as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Avoid rare and endangered habitat types when planning the detention basins.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	Create a landscape study for the projects of the watercourse Regulation. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials (especially in the vicinity of PP Velebit).
Cultural and historical heritage	When preparing project documents for projects within a protected cultural-historical unit, the opinion of the responsible nature conservation authority must be obtained.
Mitigation of climate changes	Plan and carry out projects in such a way as to avoid occupying forest areas, especially those of special purpose.
14 Protection from flash floods in the Kvarner coastal region and on the islands of Krk, Cres, and Lošinj	

PROJECT COMPONENT	MEASURE
Soil and agriculture	During planning and designing the projects, ensure that impacts of construction on erosion is reduced on minimum.
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling. Protect the trees outside the working zone. When planning, use the existing and planned forest road infrastructure. Follow the forest fire protection measures.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of the reservoir. Carry out the Regulation of riverbed as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for its' stabilisation. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	In the case of finding a speleological object, all construction works around the object must be stopped until the central state administration body in charge of nature protection decides on further treatment of the object. Also, tunnel construction should be carried out during the day, when bats are not active, with a high level of caution, with minimal impact on the surrounding bedrock in accordance with nature protection regulations. While planning locations and the extent of detention basins, avoid rare and endangered habitat types. Structural works for regulation of watercourses must be planned in the minimal necessary extent (minimal length and height). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Minimize the impact of construction works by applying alternative restoration and/or enhancement works that must be consistent with the ecological requirements of the endangered and protected species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Landscape	Create landscape studies for watercourse management projects. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Changes to the terrain morphology should be as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Cultural heritage	If during the construction of water structures there is reasonable suspicion of the presence of or interaction with an archaeological site or other cultural heritage or if interaction with them is made, professional archaeological monitoring shall be provided during the performance of all earthwork in consultation with the appropriate historic preservation authority. Also, in case of encountering an archaeological site or findings,

PROJECT COMPONENT	MEASURE
	discontinue the works, and notify the conservation department of the competent ministry, which will continue to act in accordance with the legal powers.
15 Flood protection project in the Mirna river basin	
Forests and forestry	Plan and implement operations in such a way to avoid the occupation of forest area, especially protective and special purpose forests. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.
Game and hunting	Plan and carry out works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorate, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of the reservoir. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the partitions in terms of cleaning the precipitated sediment during low water. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Carry out the works in such a way as to enable the migration of freshwater fish species. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). To reduce the impact on biodiversity, if possible, construct several low weirs in cascade manner, instead of one high, to allow for upstream migrations of fish and invertebrates. While planning locations and the extent of detention basins, avoid rare and endangered habitat types. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials.
Cultural heritage	When planning the procedure in the site, the conservation department of the relevant ministry shall be consulted beforehand and further action shall be determined according to the assessment of the situation. In the case of all earthworks, including temporary use of the site for the purpose of constructing the accompanying infrastructure, the competent conservation authority shall be informed in advance and checked whether an archaeological field inspection is required. After the review and depending on the results, further measures for the protection of cultural assets will be determined. If there is reasonable suspicion of the presence of or interaction with an archaeological site or other remains of cultural property during the construction of water structures, expert archaeological supervision shall be provided during the performance of all earthwork in consultation with the appropriate historic preservation authority. Also, in case of encountering an archaeological site or findings, discontinue the works, and notify

PROJECT COMPONENT	MEASURE
	the appropriate authority – the conservation department of the relevant ministry, which will continue to act in accordance with the legal powers.
Mitigation of climate changes	Plan and carry out projects in such a way as to avoid occupying forest areas. Prevent excessive retention of water in retentions.
16 Flood protection project in the Raša river basin	
Soil and agriculture	During planning and designing the projects, ensure that impacts of construction on erosion is reduced on minimum.
Forests and forestry	Plan and implement operations in such a way to avoid the occupation of forest area, especially protective and special purpose forests. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. When working on torrents and watercourses, coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling and to protect the trees outside the working zone.
Game and hunting	Plan and carry our works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assesing the risk of adverse effects of water (flooding). Channel slopes should be constructed as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types. Avoid endangered and rare habitat types when planning infrastructure sites. Structural works for regulation of watercourses must be planned in the minimal necessary extent (minimal length and height). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.

PROJECT COMPONENT	MEASURE
	Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	Create landscape studies for watercourse management projects. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials (especially in and near the Significant Landscape of Pićan).
Cultural heritage	When planning the procedure on the site, the conservation department of the relevant ministry shall be consulted beforehand and the further actions shall be determined according to the assessment of the situation. For all intended interventions on the site, including the temporary use of the site for the construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural property and confirmation of the project documentation of the intended intervention on the site in accordance with the special conditions or prior approval for the planned works shall be obtained from the conservation department of the relevant ministry. When planning the laying of canals in Labin, it is necessary to avoid areas with individually protected cultural heritage that may affect monument properties. If there is a reasonable suspicion of the presence of archaeological remains during the construction of water structures, or if there are interactions with them, professional archaeological supervision shall be provided during the execution of all earthworks in coordination with the competent conservation department. If it is necessary to interrupt the work, archaeological protection research and the conservation of any findings shall be carried out in consultation with the conservation department of the relevant ministry.
Mitigation of climate changes	Plan and carry out projects in such a way as to avoid occupying forest areas. Prevent excessive retention of water in retentions.
17 Protection from flash floods in the Western Istria coastal region	
Forests and forestry	Plan and implement operations in such a way to avoid the occupation of forest area, especially protective and special purpose forests. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. When working on torrents and watercourses, coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling and to protect the trees outside the working zone.
Game and hunting	Plan and carry out works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be

PROJECT COMPONENT	MEASURE
	carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. Channel slopes should be constructed as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types.
Cultural heritage	When planning any intervention on the site, the Conservation department of the relevant ministry shall be consulted beforehand and the further procedure shall be determined according to the assessment of the situation. For all intended interventions on the site, including the temporary use of the site for the purpose of building the associated infrastructure, special conditions in the field of protection and preservation of cultural property shall be obtained from the Conservation department of the relevant Ministry.
Mitigation of climate changes	Plan and carry out projects in such a way as to avoid occupying forest areas. Prevent excessive retention of water in retentions.
47 Flood protection project in the Rječina river	
Forests and forestry	In case of retention basins constructions, ensure efficient drainage of water from the retention in order to prevent excessive water stagnation.
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
Mitigation of climate changes	Plan and carry out projects in such a way as to avoid occupying forest areas. Prevent excessive retention of water in retentions.
55 Flood protection project in the Pazinčica basin	
Forests and forestry	In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.

PROJECT COMPONENT	MEASURE
Landscape	Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials.
Game and hunting	Plan and carry out works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorate, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of the planned hydrotechnical structures, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
Mitigation of climate changes	Plan and carry out projects in such a way as to avoid occupying forest areas. Prevent excessive retention of water in retentions.
56 Flood protection project in the Boljunčica basin	
Soil and agriculture	During planning and designing the projects, ensure that impacts of construction on erosion is reduced on minimum.
Forests and forestry	Coordinate and monitor the dynamics of work execution and tree felling. Operations should be carried out in such a way as to prevent the landslides and tree felling and to protect the trees outside the working zone.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Changes to the terrain morphology should be as little as possible. Preserve developed vegetation and use natural materials.
Game and hunting	Plan and carry out works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorate, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs.

PROJECT COMPONENT	MEASURE
	In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Carry out the Regulation of riverbed as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for its' stabilisation.
Biodiversity	When planning reservoir locations, avoid endangered and rare habitat types, with an emphasis on NKS A.1.3. Unvegetated and sparsely vegetated riverbanks. Avoid endangered and rare habitat types when planning infrastructure sites. Structural works for regulation of watercourses must be planned in the minimal necessary extent (minimal length and height). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out construction works in such a way as not to prevent or interrupt the migration route for freshwater fish. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Mitigation of climate changes	Plan and carry out projects in such a way as to avoid occupying forest areas. Prevent excessive retention of water in retentions.
57 Flood protection project in the Lokvarka basin	
Forests and forestry	When planning the locations of the reservoir basins avoid occupying forest areas. Consider an alternative solution (construction of retention basin), which would achieve the goal of flood protection.
Game and hunting	Plan and carry out works in a way to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs. In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of the reservoir.
Biodiversity	When planning reservoir locations, avoid endangered and rare habitat types, with an emphasis on NKS A.1.3. Unvegetated and sparsely vegetated shores of the banks Ensure a year-round favorable hydrological regime downstream of the reservoir, i.e., ecologically acceptable flow. During construction and maintenance, implement measures to prevent the introduction and spread of invasive alien plant and animal species. Reduce the scope of the Križ reservoir and maintain the continuity of the watercourse with technical solutions if, based on biological research, a potentially significant loss of habitat types, favourable habitats for animal species and habitat fragmentation for animal species is determined. Plan the reservoir in such a way that the continuity of the water flow is not interrupted, and the longitudinal migration of aquatic animals is allowed. Ensure a year-round favourable hydrological regime downstream of the reservoir, i.e., ecologically acceptable flow. Adjust the dynamics and method of carrying out the construction works to reduce the disturbance of species, especially birds, amphibians, and bats.

PROJECT COMPONENT	MEASURE
	If the impact cannot be mitigated to an acceptable level with the above measures, review the need to build a reservoir to protect against the adverse effects of water and develop a variant or alternative solution (e.g., the possibility of designing a detention basin instead of a reservoir) that would achieve the flood protection objective.
Landscape	Create a landscape study for the construction of the reservoir. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Mitigation of climate changes	Consider an alternative solution of building a retention instead of an reservoir if this would also achieve the goal of flood protection.
WMD for the Middle and Lower Sava	
18 Flood protection in the Upper Kupa River Basin	
Landscape	Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs. In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Plan the collection of wastewater and rainwater from infrastructure facilities as a closed drainage system with wastewater treatment before discharge. During the construction and modernization of flood protection facilities, to the greatest extent possible, preserve the functionality of the existing protection system against the adverse effects of water and the existing hydrological regime. In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water.
Biodiversity	For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species.
Cultural heritage	When planning to proceed at the site, the conservation department of the relevant ministry shall be consulted beforehand and further action shall be determined in accordance with the assessment of the situation. For all intended interventions at the site, including the temporary use of the site for the construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural property and confirmation of the project documentation of the intended intervention at the site in accordance with the special conditions or prior approval for the planned work shall be obtained from the conservation department of the relevant ministry. For all intended interventions on the site, including temporary use of site for the purpose of construction of related infrastructure, special conditions in the field of protection and preservation of cultural property shall be obtained from the conservation department of the relevant ministry. If during the construction of water structures there is a reasonable suspicion of the presence of or interaction with archaeological remains, professional archaeological monitoring shall be provided during the execution of all earthworks in consultation with the relevant conservation departments. If necessary, stop work, conduct protective archaeological research, and conserve any finds found in consultation with the conservation department of the relevant ministry.
19 Flood protection project of the town of Ogulin	
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types. Structural works for regulation of watercourses must be planned in the minimal necessary extent (minimal length and height). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature

PROJECT COMPONENT	MEASURE
	protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Ensure enough water (sufficient flow) for watercourses downstream from the detention basin Ogulin in order to enable unhindered performance and development of the economic activity of fish farming on the nearby tributary.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assesing the risk of adverse effects of water (flooding). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. Carry out the Regulation of riverbed as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for its' stabilisation.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
20 Flood protection project in the Kupa river basin - Karlovac and Sisak area	
Soil and agriculture	During planning and designing the project location, exclude P1 and P2 agricultural land. If that is not possible, include the least possible area of P1 and P2 agricultural land. Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assesing the risk of adverse effects of water (flooding). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to reduce impact on flow continuity and morphology of wider area, regularly clean area behind barrier by cleaning sedimnets during low water. Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). Carry out the Regulation of riverbed as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for its' stabilisation.

PROJECT COMPONENT	MEASURE
	In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). While planning locations and the extent of detention basins, avoid rare and endangered habitat types. Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Construction works on linear hydrotechnical objects in the riverbed of the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). Stone revetments should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Reconstruction of the levees should be planned and carried out along the alignment of the existing levees unless their change is necessary for protection against the adverse effects of water. Plan the alignments of new levees in such a way that valuable habitats and habitats important for the conservation of animal species (flooded and alluvial forests, wet grasslands, aquatic, and wetland habitats) are kept within the inundation area bounded by the levee and that a favorable water regime and natural flood dynamics are preserved. Minimize the construction works area and avoid the permanent loss of alluvial forests, grasslands (hay meadows), wetland, riparian, and aquatic habitats. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. Ensure favorable hydrological conditions and water regime downstream of the catchment and in the surrounding ecologically dependent area..
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Cultural heritage	For all projects planned within or in the immediate vicinity of protected cultural and historical units, when drawing up the project documentation, request the opinion of the competent conservation department and prepare a conservation study that will prescribe appropriate protection measures. For all the intended interventions in the space, including the temporary use of the premises for the purpose of the construction of the accompanying infrastructure, obtain from the Conservation Department of the competent Ministry special conditions in the field of protection and preservation of cultural goods and confirmation of the project documentation of the intended intervention in the premises made in accordance with special conditions or prior approval for the planned works.

PROJECT COMPONENT	MEASURE
	If during the construction of water structures there is a reasonable suspicion for the existence of archaeological remains, or if interaction with them is made, in agreement with the competent conservation departments to provide professional archaeological supervision during the performance of all earthworks. If necessary, discontinue the works, carry out protective archaeological research and preservation of the found findings in agreement with the competent Conservation Department of the Ministry responsible for the protection of cultural goods.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially in and near the Significant Odransko polje landscape and near the Crna Mlaka Special Reserve).
21 Flood protection project in the Korana river basin	
Landscape	Create a landscape study for the reservoir. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of reservoir. Carry out the Regulation of river banks as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for riverbed stabilisation Channel slopes should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. For all planned sub-projects implement during construction and maintenance measures to prevent the introduction and spread of invasive alien plant and animal species. Minimize the extent of the construction works to avoid the permanent loss of natural habitats and habitats favorable for present fauna. Preserve as much as possible the natural streambanks, the natural structure and morphology of the streambed, and the riparian vegetation. Plan the dynamics of the construction works in accordance with the ecological requirements of the fish fauna of Korana River.
Cultural heritage	Before starting the works, ask for the opinion of the Conservation department of the competent Ministry and define further actions for the purpose of protecting the cultural and historical heritage.
22 Flood protection project in the Kupčina basin	
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection).

PROJECT COMPONENT	MEASURE
	Structural works for regulation of watercourses must be planned in the minimal necessary extent (minimal length and height). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Sub-projects for the regulation of torrential streams and other streams within this project unit should be planned in such a way as to ensure the permeability of the torrent bed and the connection of the surface flow with the underground, and the banks of the torrents should be designed with a slight (gentle) slope and with the use of natural materials so that smaller animals could get out of the streambed. Preserve as much as possible the natural streambank, the natural structure and morphology of the streambed, and the riparian vegetation. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Plan the collection of wastewater and rainwater from infrastructure facilities as a closed drainage system with wastewater treatment before discharge. Carry out the Regulation of riverbed as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for riverbed stabilisation Channel slopes should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Cultural heritage	For projects within the Protected Landscape Area Žumberak - Samoborsko gorje - Plešivica prigorje, ask the relevant nature conservation department for advice and: change the morphology of the terrain as little as possible. preserve the existing landscape pattern (monitor the existing parcelling) within valuable cultivated areas. to preserve the vegetation that has grown and to use natural materials.

PROJECT COMPONENT	MEASURE
23 Protection from Una River floods	
Soil and Agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Biodiversity	Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). Stone revetments should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Removal of riparian vegetation must be in the least extent possible. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016).
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Carry out the Regulation of river banks as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for riverbed stabilisation Channel slopes should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer).
Landscape	Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Cultural heritage	Before starting the works, ask for the opinion of the Conservation department of the competent Ministry and define further actions for the purpose of protecting the cultural and historical heritage.
24 Flood protection project in the Middle Sava river basin	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	Plan the routes of new embankments in such a way as to avoid encroachment on forest areas and to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods through technical measures. Reconstruction and rehabilitation of embankments, as far as possible, should be planned and carried out along the route of existing embankments. During the planning of interventions that are expected to have impact on the water regime, establish a water monitoring program and based on the results, plan the measures that will ensure a favorable water regime for forest communities dependent on it. Limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone.
Game and hunting	Plan and carry out works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, avoid the removal of vegetation and reduction of the hunting production area. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorate, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs

PROJECT COMPONENT	MEASURE
	In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water. Carry out the Regulation of river banks as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for riverbed stabilisation Channel slopes should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). Stone revetments should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Reconstruction of the levees should be planned and carried out along the alignment of the existing levees, unless their change is necessary for protection against the adverse effects of water. Plan the alignments of new levees in such a way that valuable habitats and habitats important for the conservation of animal species (flooded and alluvial forests, wet grasslands, aquatic, and wetland habitats) are kept within the inundation area bounded by the levee and that a favorable water regime and natural flood dynamics are preserved. Minimize the construction works area and avoid the permanent loss of alluvial forests, grasslands (hay meadows), wetland, riparian, and aquatic habitats. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna and flora. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially within PP Lonjsko polje and the Significant Landscape Sunjsko polje).

PROJECT COMPONENT	MEASURE
Mitigation of climate changes	To the greatest extent possible, use natural materials for the construction of embankments and revetments. When arranging the shore, enable the flow of underground water towards the surface watercourse by using adequate materials to stabilize the riverbed.
29 Flood protection project in the Česma and Glogovnica basins	
Soil and agriculture	During planning and designing project location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land. When planning and designing, consider the variant of building retention instead of reservoir on P1 and P2 lands. Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	As far as possible, interventions should be planned in such a way to avoid occupying valuable forest areas. Where possible, prefer the construction of retentions instead of reservoirs. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. Plan the routes of new embankments in such a way as to avoid encroachment on forest areas and to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods through technical measures. During the planning of projects that are expected to have impact on the water regime, establish a water monitoring program and based on the results, plan the measures that will ensure a favorable water regime for forest communities dependent on it. When carrying out construction works, use the existing or planned forest transport infrastructure, and limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone.
Game and hunting	Where possible and applicable, embankments should be planned as far from the riverbed as possible to protect alluvial and valuable forest areas that represent suitable habitats for the most valuable game species. Plan and carry out works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water. Channel slopes should be made in such a way as to enable groundwater drainage from the hinterland of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). Carry out the Regulation of river banks as to insure ground water flow from hinterland of the structure towards watercourse using adequate materials for riverbed stabilisation
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). Stone revetments should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature

PROJECT COMPONENT	MEASURE
	protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Dynamics and the manner of performing the construction works should be planned in accordance with the life cycles and ecological requirements of present fauna to minimize the disturbance during critical periods of their life cycles. Minimize the construction works to the least extent to avoid the permanent loss of forests, grasslands, wetland, and aquatic habitats. Ensure favorable hydrological conditions and water regime downstream of the catchment and in the surrounding ecologically dependent area. Ensure a year-round favorable hydrological regime downstream of the reservoirs of Česma River catchment, i.e. ecologically acceptable flow, as well as favorable physical and chemical conditions for the conservation of thick-shelled river mussel, its host fish species, and for the unhindered performance and development of the economic activity of fish farming on ponds Siščani, Blatnica and other.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially in the immediate vicinity of the Moslavačka gora Regional Park).
Mitigation of climate changes	Reduce the occupation of forest areas to the smallest possible extent, while still achieving the goals of flood protection. Where possible, prefer the construction of retentions instead of reservoir
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir.
30 Flood protection project in the Ilova and Pakra basins	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	During the embankments constructions avoid encroachment on forest areas and ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods through technical measures. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.
Game and hunting	Plan and carry our works in such a way as to preserve forest areas as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the breeding season of big game and nesting season.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assesing the risk of adverse effects of water (flooding). Channel slopes should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types. Carry out the structural works in torrential streams in the least possible extent and preserve rare and endangered habitat types.

PROJECT COMPONENT	MEASURE
	Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Ensure a year-round favorable hydrological regime downstream of the reservoir, i.e., ecologically acceptable flow. Dynamics and the manner of performing the construction works should be planned in accordance with the life cycles and ecological requirements of present fauna to minimize the disturbance during critical periods of their life cycles. Minimize the construction works to the least necessary extent and avoid the loss of forest, grassland, aquatic and wetland habitats. Ensure favorable hydrological conditions and water regime downstream of the catchment and in the surrounding ecologically dependent area.
Landscape	When developing solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Cultural heritage	When defining the location of the construction of stream protection and regulation buildings for of the City of Pakrac, avoid the area within the protected cultural and historical area of the City of Pakrac
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir. When planning the extraction of water from the reservoir, ensure water supplies for other purposes, primarily for human consumption.
31 Flood protection project in the Šumetlica and Crnac basins	
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016).
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding).

PROJECT COMPONENT	MEASURE
	Ensure environmentally acceptable flow downstream of reservoir In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water. Channel slopes should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer).
Game and hunting	Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir. When planning the extraction of water from the reservoir, ensure water supplies for other purposes, primarily for human consumption.
32 Protection from the Sava River floods on the section between Nova Gradiška and Račinovci	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Biodiversity	Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). Stone revetments should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Removal of the riparian vegetation must be avoided as much as possible. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016).
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Regulation of the banks of watercourses should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials to stabilize the bed. In order to reduce the impact on hydromorphology, apply the optimization of existing and new hydrotechnical structures (piers, revetments...).e.
Game and hunting	Restrict the movement of machinery and people to prevent disturbance of the peace. To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. Perform works outside the nesting period. To the greatest extent possible, avoid occupation and fragmentation of habitats.
Landscape	Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Cultural heritage	When planning the procedure in the premises, the conservation department of the relevant ministry should be consulted beforehand and further action should be determined according to the assessment of the situation.

PROJECT COMPONENT	MEASURE
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir. When planning the extraction of water from the reservoir, ensure water supplies for other purposes, primarily for human consumption.
33 Flood protection project in the Orjava basin	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	When planning the locations of the reservoir basins avoid occupying forest areas and consider an alternative solution (construction of retention basin). During the embankments constructions and watercourses regulations avoid encroachment on forest areas and ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods through technical measures.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Minimize the extent of the construction works in such a way as to avoid the loss of natural habitats. Preserve as much as possible the natural streambanks, the natural structure and morphology of the streambed, and the riparian vegetation. Ensure the continuity of the water flow and enable upstream migration for fish and aquatic invertebrates. Ensure favorable hydrological conditions and water regime downstream of the catchment and in the surrounding ecologically dependent area. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna, especially fish species. Design sub-projects within this project unit to ensure permeability of the riverbed and hydrological connection with the underground; design banks with a slight (gentle) slope and use natural materials to allow smaller animals to leave the riverbed. Minimize the scope of regulation and stabilization of the streambed of torrential and permanent streams and locate construction works on already anthropogenically modified stream sections, or where floods directly threaten settlements or important infrastructure.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Restrict the movement of machinery and people to prevent disturbance of the peace. Perform works outside the nesting period.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out construction work in a way that hydromorphological condition of water bodies does not deteriorate, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution.

PROJECT COMPONENT	MEASURE
	In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of reservoir. Channel slopes should be made in such a way as to enable groundwater drainage from the rear of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir. When planning the extraction of water from the reservoir, ensure water supplies for other purposes, primarily for human consumption.
34 Flood protection project in Brodska posavina	
Soil and agriculture	During planning and designing project location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land. When planning and designing, consider the variant of building retention instead of reservoir on P1 and P2 lands.
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types (in accordance with the regulations from the field of nature protection). Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016).
Soil and agriculture	When planning and designing, plan the project outside the area of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Channel slopes should be made in such a way as to enable groundwater drainage from the hinterland of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area that retention has its full function, which indirectly reduces the negative impact on hydromorphological elements.
Cultural heritage	When planning the procedure in the premises, the conservation department of the relevant ministry should be consulted beforehand and further action should be determined according to the assessment of the situation.
Forests and forestry	When planning the locations of the reservoir basins avoid occupying forest areas and consider an alternative solution (construction of retention basin). In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.

PROJECT COMPONENT	MEASURE
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Landscape	Create a landscape study for the construction of the reservoir. Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir. When planning the extraction of water from the reservoir, ensure water supplies for other purposes, primarily for human consumption.
35 Flood protection project in the Bid and Bosut basins	
Soil and agriculture	During planning and designing project location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Channel slopes should be made in such a way as to enable groundwater drainage from the hinterland of the hydrotechnical object (structure) towards the watercourse (permeable geotextile, gravel layer). Ensure environmentally acceptable flow downstream of reservoir. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Forests and forestry	Plan and carry out interventions in such a way as to protect forest areas as much as possible and avoid any unnecessary deforestation.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. When planning the reconstruction of the pumping station, plan the design as more environmentally friendly form by applying alternative measures at the sub-project level. Direct the construction of the pumping station towards a more environmentally friendly form by applying alternative measures at the project level. Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water).

PROJECT COMPONENT	MEASURE
	Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Cultural heritage	For all intended interventions in the space, including the temporary use of the site for the purpose of construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural property and confirmation of the project documentation of the intended intervention in the site in accordance with the special conditions or prior authorization for the planned works shall be obtained from the conservation department of the competent ministry. In the area of protected archaeological sites, an archaeological research is mandatory. If necessary, stop the works, carry out protective archaeological research and conservation of the findings in coordination with the conservation department of the relevant ministry.
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir. When planning the extraction of water from the reservoir, ensure water supplies for other purposes, primarily for human consumption.
50 Flood protection project in the Glina basin	
Forests and forestry	Avoid any unnecessary deforestation and limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assesing the risk of adverse effects of water (flooding). To largest possible extent preserve the functionality of existing protection system against the adverse effect of water and hydrological regime. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements..
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types (in accordance with the regulations from the field of nature protection). Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Landscape	Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.

PROJECT COMPONENT	MEASURE
Cultural heritage	Plan the retention outside the protected cultural and historical area of Topusko
51 Flood protection project in the Petrinjčica basin	
Forests and forestry	Avoid any unnecessary deforestation and limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.
Biodiversity	While planning locations and the extent of detention basins, avoid rare and endangered habitat types.
Water	During preparation works, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assesing the risk of adverse effects of water (flooding). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements..
Landscape	Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
53 Flood protection project in the Kutinica basin	
Forests and forestry	When planning the locations of the reservoir basins avoid occupying valuable forest areas. Consider an alternative solution (construction of retention basin), which would achieve the goal of flood protection. Ensure a favorable water regime downstream of the reservoir. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. Avoid any unnecessary deforestation and limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assesing the risk of adverse effects of water (flooding). Ensure environmentally acceptable flow downstream of the reservoir. In order to reduce the impact on hydromorphology, apply the optimization of existing and new hydrotechnical structures (piers, coastal fortifications...).
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.

PROJECT COMPONENT	MEASURE
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir. When planning the extraction of water from the reservoir, ensure water supplies for other purposes, primarily for human consumption.
54 Flood protection project in the lower Dobra river basin	
Biodiversity	Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016).
Water	Plan and carry out the water protection at whole project area with stricter criteria at the sanitary protection zone area (including potential zones) in accordance with ordinance that defines sanitary protection zones of springs and decisions on sanitary protection zones of water springs In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). Plan the collection of wastewater and rainwater from infrastructure facilities and parking lots as a closed drainage system with wastewater treatment before discharge into the public drainage system. During the construction and modernization of flood protection facilities, to the greatest extent possible, preserve the integrity of the existing protection system against the adverse effects of water and the existing hydrological regime. In the case of the need for landscaping of buildings, in order to reduce the impact on hydromorphology, apply the improvement of the granulometric composition of the bed for the purpose of its stabilization and maintenance of the hydrological regime. In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water. Channel slopes should be made in such a way as to enable groundwater drainage from the back of the building towards the watercourse (permeable geotextile, gravel layer).
58 Flood protection project in the Mrežnica basin	
Water	Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. Also, all construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution. In project planning phase, include impact of climate changes when assessing the risk of adverse effects of water (flooding). The watercourse banks should be constructed in such a way as to enable groundwater drainage from the back of the building towards the watercourse using adequate materials for riverbed stabilisation.
WMD for Upper Sava	
24 Flood protection project in the Middle Sava river basin	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	Plan the routes of new embankments in such a way as to avoid encroachment on forest areas and to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods through technical measures. Reconstruction and rehabilitation of embankments, as far as possible, should be planned and carried out along the route of existing embankments. During the planning of interventions that are expected to have impact on the water regime, establish a water monitoring program and based on the results, plan the measures that will ensure a favorable water regime for forest communities dependent on it. Limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone.

PROJECT COMPONENT	MEASURE
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Water	Carry out the projects in a way that hydromorphological condition of water bodies does not deteriorated, that is, the impact on hydromorphological condition should be minimal. All construction work should be carried out without causing deterioration of chemical and ecological state of waterbodies, with minimum risk of pollution, especially on locations within or near sanitary protection zones. In order to reduce the impact on hydromorphology, apply the optimization of existing and new hydrotechnical structures (piers, coastal fortifications...). In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. Channel cuts should be made in such a way as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of the planned hydrotechnical structures on the watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). Stone revetments should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Reconstruction of the levees should be planned and carried out along the alignment of the existing levees unless their change is necessary for protection against the adverse effects of water. Minimize the construction works area and avoid the permanent loss of alluvial forests, grasslands (hay meadows), wetland, riparian, and aquatic habitats. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna. Bank stabilization on Sava River and construction of revetments should be planned only exceptionally on the shortest possible sections and only where there are no other technical solution to ensure flood protection. The scope (length, height) of revetments must be minimized and alternative solutions (instead of revetments) should be planned wherever possible. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas.

PROJECT COMPONENT	MEASURE
	Preserve developed vegetation and use natural materials (especially within PP Lonjsko polje and Significant Landscapes Turopoljski lug and Sunjsko polje).
Cultural heritage	When planning the construction of the embankment, avoid the area of individually protected cultural property, as these works could affect their cultural properties. If the procedure needs to be located within a protected cultural property, ask for guidance from the relevant conservation department.
Mitigation of climate changes	Reduce the occupation of forest areas to the smallest possible extent.
25 Flood protection project in the Krapina basin	
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Water	During project planning, when assessing the risk of adverse effects of water (flooding), include the impacts of climate change. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Mitigation of climate changes	As far as possible, plan the locations of projects to avoid forest areas, especially special purpose forests.
26 Flood protection project in the Samobor basins	
Soil and agriculture	During planning and designing of the projects, ensure that the impact of the construction on soil erosion is minimized.
Water	When planning interventions in the area, when assessing the risk of harmful effects of water (flooding), include the effects of climate change. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Forests and forestry	As far as possible, locations of the interventions should be planned in such a way to avoid occupying valuable forest areas. By organizing the construction site, prevent the tree felling along the edge of the stream and by careful handling of machinery prevent/minimize damage of marginal vegetation and forest soil outside the working zone. Coordinate and monitor the dynamics of work execution and tree felling. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.
Cultural heritage	For projects within the Protected Landscape Area Žumberak - Samoborsko gorje - Plešivica prigorje, ask the relevant nature conservation department for advice and: change the morphology of the terrain as little as possible. preserve the existing landscape pattern (monitor the existing parcelling) within valuable cultivated areas. to preserve the vegetation that has grown and to use natural materials.
Mitigation of climate changes	As far as possible, plan the locations of projects to avoid forest areas, especially special purpose forests.
27 Flood protection project in the Sjeverno Zagrebačko Prisavlje basin	

PROJECT COMPONENT	MEASURE
Biodiversity	Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Water	Protection of waters and water bodies should be planned and carried out in the entire area, with stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing sanitary protection zones of water sources and decisions on sanitary protection zones of water sources. During project planning, when assessing the risk of adverse effects of water (flooding), include the impacts of climate change. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Landscape	Create a landscape study for the intervention of the watercourse Regulation. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials.
28 Flood protection project in the Zelina and Lonja basins	
Soil and agriculture	During planning and designing project location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land.
Biodiversity	When planning the locations and the scope of reservoirs and detention basin, avoid occupation of rare and endangered habitat types (in accordance with the regulations in the field of nature protection). Construction works for linear structures in the watercourse which are planned outside of the extent of the existing structures should be planned during low water flows, while avoiding nesting and spawning periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Minimize the impact of construction works by applying alternative restoration and/or improvement works that must be consistent with the ecological requirements of the species and habitats, following the expert guidelines on river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Ensure a year-round favorable hydrological regime downstream of the reservoir, i.e. ecologically acceptable flow.
Water	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for immersion, and to reduce the possibility of erosion.

PROJECT COMPONENT	MEASURE
	Perform all works in such a way that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of pollution. Protection of waters and water bodies should be planned and carried out in the entire area, with stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the rulebook establishing sanitary protection zones of water sources and decisions on sanitary protection zones of water sources. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. Ensure environmentally acceptable flow downstream of the reservoir Channel cuts should be made in such a way as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of the planned hydrotechnical structures on the watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Forests and forestry	When planning the locations of the reservoir basins avoid occupying forest areas. Consider an alternative solution (construction of retention basin), which would achieve the goal of flood protection. Ensure a favorable water regime downstream of the reservoir. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Landscape	When creating solutions for the Regulation of watercourses, take care to preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
48 Flood protection project in the Sutla basin	
Biodiversity	Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Water	Protection of waters and water bodies should be planned and carried out in the entire area, with stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the rulebook establishing sanitary protection zones of water sources and decisions on sanitary protection zones of water sources. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. To the greatest extent possible, preserve the functionality of the existing protection system against the adverse effects of water and the existing hydrological regime. In order to reduce the impact on hydromorphology, apply the optimization of existing and new hydrotechnical structures (piers, coastal fortifications...).
WMD for the Mura and Upper Drava	
36 Flood protection project of the Drava River from the Slovenian border to Pitomača	

PROJECT COMPONENT	MEASURE
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	As far as possible, interventions should be planned in such a way to avoid occupying forest areas, especially special purpose forests. When planning the embankments (re)constructions technical measures should be implemented to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Water	Perform all works in such a way that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of contamination in any way, especially in locations that are in sanitary protection zones. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. Channel cuts should be made in such a way as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). Carry out the Regulation of the watercourse bed as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Design levees (dikes) reconstruction at the sub-project level in such a way that the change or loss of natural riverbanks, riparian habitats and habitats in the floodplain is minimized, i.e., along previously anthropogenically modified riverbanks while avoiding endangered and rare habitat types (according to regulations in the field of nature protection). If the above is not possible, during the levee design, where possible, plan its position far enough from the watercourse to ensure natural flooding and thus prevent a negative impact on natural habitats in river's floodplain. To the greatest extent possible, avoid removing riparian vegetation and deepening the riverbed. Carry out construction works in the watercourse during low flows or dry streambed, avoiding important periods for reproduction of the present animal species dependent of the aquatic habitats. Plan reconstruction of the existing levees (dikes) in such a way as to enable future flooding of natural habitats in the floodplain unless that represents the flood protection risk for the settlements and important infrastructure. Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	Prepare landscape studies for revitalization of old backwaters. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible.

PROJECT COMPONENT	MEASURE
	Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially within the Mura - Drava Regional Park).
Mitigation of climate changes	To build embankments, use natural materials as much as possible. As far as possible, plan the locations of projects to avoid forest areas, especially special purpose forests.
38 Flood protection project of the Mura River	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	When planning the embankments (re)constructions technical measures should be implemented to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods.
Water	Perform all works in such a way that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of contamination in any way, especially in locations that are in sanitary protection zones. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. Channel cuts should be made in such a way as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Design levees (dikes) reconstruction at the sub-project level in such a way that the change or loss of natural riverbanks, riparian habitats and habitats in the floodplain is minimized, i.e., along previously anthropogenically modified riverbanks while avoiding endangered and rare habitat types (according to regulations in the field of nature protection). If the above is not possible, during the levee design, where possible, plan its position far enough from the watercourse to ensure natural flooding and thus prevent a negative impact on natural habitats in river's floodplain. To the greatest extent possible, avoid removing riparian vegetation and deepening the riverbed. Carry out construction works in the watercourse during low flows or dry streambed, avoiding important periods for reproduction of the present animal species dependent of the aquatic habitats. Plan reconstruction of the existing levees (dikes) in such a way as to enable future flooding of natural habitats in the floodplain unless that represents the flood protection risk for the settlements and important infrastructure.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials (especially within the Important Landscape of the Mura and the Mura - Drava Regional Park).
Mitigation of climate changes	To build embankments, use natural materials as much as possible.
39 Flood protection project in the Bednja basin	
Soil and agriculture	When planning and designing projects location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land. Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Water	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for immersion and to reduce the possibility of erosion. Perform all work that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of contamination in any way, especially in locations that are in sanitary protection zones. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. To the greatest extent possible, preserve the functionality of the existing protection system against the adverse effects of water and the existing hydrological regime. Ensure environmentally acceptable flow downstream of the reservoir. Carry out the Regulation of the watercourse bed as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the building towards the watercourse (permeable geotextile, gravel layer).

PROJECT COMPONENT	MEASURE
	In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Forests and forestry	As far as possible, interventions should be planned in such a way to avoid occupying forest areas Where possible, prefer the construction of retentions instead of reservoirs. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. When planning the embankments (re)constructions technical measures should be implemented to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods. When carrying out construction works, use the existing or planned forest transport infrastructure, and limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. Design levees (dikes) reconstruction at the sub-project level in such a way that the change or loss of natural riverbanks, riparian habitats and habitats in the floodplain is minimized, i.e., along previously anthropogenically modified riverbanks while avoiding endangered and rare habitat types (according to regulations in the field of nature protection). If the above is not possible, during the levee design, where possible, plan its position far enough from the watercourse to ensure natural flooding and thus prevent a negative impact on natural habitats in river's floodplain. To the greatest extent possible, avoid removing riparian vegetation and deepening the riverbed. Carry out construction works in the watercourse during low flows or dry streambed, avoiding important periods for reproduction of the present animal species dependent of the aquatic habitats. Plan reconstruction of the existing levees (dikes) in such a way as to enable future flooding of natural habitats in the floodplain unless that represents the flood protection risk for the settlements and important infrastructure. Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially within Trakošćan Forest Park).
Cultural heritage	In the case of all earthworks on the protected cultural property (Trakošćan Castle), including temporary use of the site for the purpose of construction of the associated infrastructure, inform the competent conservation

PROJECT COMPONENT	MEASURE
	department beforehand and, if necessary, carry out an archaeological field inspection. After the inspection and depending on the results, further measures for the protection of cultural assets shall be determined. If during the construction of water structures there is reasonable suspicion of archaeological remains or if contact is made with them, expert archaeological supervision is to be ensured during the execution of all earthworks in coordination with the conservation department of the responsible ministry. Also, if necessary, discontinue the works, carry out protective archaeological research and any findings are to be preserved in consultation with the conservation department of the responsible ministry.
Mitigation of climate changes	Regulation of the riverbed should be carried out to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the riverbed. If possible, instead of reservoir, build retention.
40 Flood protection project in the Trnava basin	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Landscape	Create landscape studies for watercourse management projects. Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Water	Perform all work so that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of contamination in any way, especially in locations that are in sanitary protection zones. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the building towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Design levees (dikes) reconstruction at the sub-project level in such a way that the change or loss of natural riverbanks, riparian habitats and habitats in the floodplain is minimized, i.e., along previously anthropogenically modified riverbanks while avoiding endangered and rare habitat types (according to regulations in the field of nature protection). If the above is not possible, during the levee design, where possible, plan its position far enough from the watercourse to ensure natural flooding and thus prevent a negative impact on natural habitats in river's floodplain. To the greatest extent possible, avoid removing riparian vegetation and deepening the riverbed. Avoid performing the works that cause removal of riparian vegetation and deepening of the streambed. Carry out construction works in the watercourse during low flows or dry streambed, avoiding important periods for reproduction of the present animal species dependent of the aquatic habitats. Plan reconstruction of the existing levees (dikes) in such a way as to enable future flooding of natural habitats in the floodplain unless that represents the flood protection risk for the settlements and important infrastructure.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Forests and forestry	As far as possible, interventions should be planned in such a way to avoid occupying forest areas. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. By organizing the construction site, prevent the tree felling along the edge of the stream and by careful handling of machinery prevent/minimize damage of marginal vegetation and forest soil outside the working zone. Coordinate and monitor the dynamics of work execution and tree felling
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.

PROJECT COMPONENT	MEASURE
Mitigation of climate changes	Regulation of the riverbed should be carried out to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the riverbed. As far as possible, plan the locations of projects in such a way as to avoid the occupation of forest areas..
41 Flood protection project in the Bistra basin	
Soil and agriculture	When planning and designing projects location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land.
Water	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for immersion and to reduce the possibility of erosion. Perform all work so that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of contamination in any way, especially in locations that are in sanitary protection zones. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. To the greatest extent possible, preserve the functionality of the existing protection system against the adverse effects of water and the existing hydrological regime. Ensure environmentally acceptable flow downstream of the reservoir. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. Carry out the Regulation of the watercourse bed as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Forests and forestry	As far as possible, interventions should be planned in such a way to avoid occupying valuable forest areas. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. By organizing the construction site, prevent the tree felling along the edge of the stream and by careful handling of machinery prevent/minimize damage of marginal vegetation and forest soil outside the working zone. Coordinate and monitor the dynamics of work execution and tree felling.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Biodiversity	For the construction of detention basins, plan the location of the intervention in natural flooding area of watercourses, while avoiding the damage and loss of endangered and rare habitat types (according to regulations in the field of nature protection). Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water).

PROJECT COMPONENT	MEASURE
	Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Mitigation of climate changes	Regulation of the riverbed should be carried out to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the riverbed. As far as possible, plan the locations of projects in such a way as to avoid the occupation of forest areas.
49 Flood protection project in the Plitvice basin	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	As far as possible, interventions should be planned in such a way to avoid occupying valuable forest areas. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. By organizing the construction site, prevent the tree felling along the edge of the stream and by careful handling of machinery prevent/minimize damage of marginal vegetation and forest soil outside the working zone. Coordinate and monitor the dynamics of work execution and tree felling.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Water	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for immersion and to reduce the possibility of erosion. Perform all work so that the ecological and chemical condition does not deteriorate, that is, with a minimal risk of contamination in any way, especially in locations that are in sanitary protection zones. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. To the greatest extent possible, preserve the functionality of the existing protection system against the adverse effects of water and the existing hydrological regime. Stabilization of the banks and slopes of the facilities should be carried out in such a way as to enable the drainage of groundwater from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. Channel cuts should be made in such a way as to enable groundwater drainage from the hinterland of the structure towards the watercourse (permeable geotextile, gravel layer). In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	Regulation of torrential streams should be planned in the least possible extent, i.e., on the shortest possible stream sections, while preserving the rare and endangered habitat types. For the construction of detention basins, plan the location of the intervention in natural flooding area of watercourses, while avoiding the damage and loss of endangered and rare habitat types (according to regulations in the field of nature protection). Design levees (dikes) reconstruction at the sub-project level in such a way that the change or loss of natural riverbanks, riparian habitats and habitats in the floodplain is minimized, i.e., along previously anthropogenically modified riverbanks while avoiding endangered and rare habitat types (according to regulations in the field of nature protection). If the above is not possible, during the levee design, where possible, plan its position far enough from the watercourse to ensure natural flooding and thus prevent a negative impact on natural habitats in river's floodplain. To the greatest extent possible, avoid removing riparian vegetation and deepening the riverbed.

PROJECT COMPONENT	MEASURE
	Carry out construction works in the watercourse during low flows or dry streambed, avoiding important periods for reproduction of the present animal species dependent of the aquatic habitats. Plan reconstruction of the existing levees (dikes) in such a way as to enable future flooding of natural habitats in the floodplain unless that represents the flood protection risk for the settlements and important infrastructure. Plan the organization of the construction site in such a way as to minimize the damage and loss of natural habitats. Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Carry out the works in such a way that the longitudinal migration route of freshwater fish species is enabled, and that the pollution of watercourse is avoided. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	Create landscape studies for watercourse management projects. Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially within the Mura - Drava Regional Park).
Mitigation of climate changes	Regulation of the riverbed should be carried out to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the riverbed. As far as possible, plan the locations of projects in such a way as to avoid the occupation of forest areas.
WMD for the Danube and lower Drava	
37 Flood protection project of the Drava River from Pitomača to the Danube estuary	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	For the construction of the Osijek multi-purpose hydrotechnical system, establish cooperation with the experts from the relevant forestry services in the field of forest ecology, forestry, and hydrology to assess the impact and risks that could arise from the implementation of the project and determine protection measures at the project level based on the opinion of experts. When planning the embankments (re)constructions technical measures should be implemented to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods. Before carrying out the construction works, clear mine-suspected areas.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Establish cooperation with hunting authorities and consider alternative interventions and their locations Preserve forest vegetation as much as possible. Restrict the movement of machinery and people to prevent disturbance of the peace. Perform works outside the nesting period. Perform works outside the mating period, especially for big game.
Vode	All works must be carried out in such a way that there is no deterioration of the ecological and chemical condition, that is, with a minimal risk of pollution in any way, especially in locations that are in sanitary protection zones or its peripheral areas.

PROJECT COMPONENT	MEASURE
	During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, the area behind the barrier should be regularly maintained in terms of cleaning the precipitated sediment during low water. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the building towards the watercourse (permeable geotextile, gravel layer). Regulation of the banks of watercourses should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials to stabilize the bed. In order to reduce the impact on hydromorphology, apply the optimization of existing and new hydrotechnical structures (piers, coastal fortifications...).
Biodiversity	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Minimize the extent of the construction works and avoid the permanent loss of alluvial forests, grassland (hay meadows), wetland, and aquatic habitats. Reconstruction of the levees should be planned and carried out along the alignment of the existing levees unless their change is necessary for protection against the adverse effects of water. Plan the alignments of new levees in such a way that valuable habitats and habitats important for the conservation of animal species (flooded and alluvial forests, wet grasslands, aquatic, and wetland habitats) are kept within the inundation area bounded by the levee and that a favorable water regime and natural flood dynamics are preserved. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Drava River. Ensure favorable hydrological conditions and water regime downstream of the catchment and in the surrounding ecologically dependent area, and for the unhindered performance and development of the economic activity of fish farming.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats.

PROJECT COMPONENT	MEASURE
	Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	Create landscape studies for watercourse management projects. Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials (especially within the Mura - Drava Regional Park).
Mitigation of climate changes	As far as possible, plan the locations of projects in such a way as to avoid the occupation of forest areas.
42 Flood protection project in the Županijski kanal basin	
Soil and agriculture	When planning and designing projects location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land.
Water	Protection of waters and water bodies should be planned and carried out in the entire area, with stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the rulebook establishing sanitary protection zones of water sources and decisions on sanitary protection zones of water sources. When planning interventions in the area, when assessing the risk of adverse effects of water (flooding), include the effects of climate change Ensure environmentally acceptable flow downstream of the reservoir. Regulation of the watercourse bed must be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the bed. • In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Dynamics and the manner of performing the construction works should be planned in such a way as to minimize the disturbance of animal species, especially fish, birds, and amphibians, during important periods of their life cycles.

PROJECT COMPONENT	MEASURE
	Minimize the extent of the construction works and avoid the permanent loss of alluvial forests, grasslands (hay meadows), wetland, and aquatic habitats. Maintain the continuity of the watercourse and enable the upstream-downstream migration of the animal species present within the scope of the individual sub-project. Preserve the natural morphology and structure of riverbed and riverbanks during watercourse regulation. Design the banks of watercourses with slight (gentle) slopes and from natural materials. Preserve riparian vegetation and restore it after construction if it is damaged. Preserve the hydrological connection of the surface flow and the underground in such a way as to ensure the permeability of the riverbed. Regulation and stabilization of the streambed should be carried out only exceptionally, on shorter sections, on anthropogenically altered sections of the stream, and in settlements to protect people and important infrastructure from flooding. Use bioengineering solutions wherever possible. Preserve favorable hydrological conditions and water regime downstream and upstream of the project and in the surrounding ecologically dependent area. To retain water in the in the basin and to attenuate the stormwater runoff, give priority to the construction of detention basins instead of reservoir, i.e., reservoirs (sub-projects 2022, 2023, 2026).
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Forests and forestry	As far as possible, interventions should be planned in such a way to avoid occupying forest areas.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Landscape	When creating solutions for the Regulation of watercourses, take care to preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially within the Mura - Drava Regional Park).
Mitigation of climate changes	As far as possible, plan the locations of projects in such a way as to avoid the occupation of forest areas.
43 Flood protection project in the Karašica and Vučica basins	
Soil and agriculture	When planning and designing projects location, exclude the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land.
Water	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Perform all work in such a way that there is no deterioration of the ecological and chemical condition, that is, with a minimal risk of pollution in any way, especially in the areas of the sanitary protection zones of the source. During project planning when assessing the risk of adverse effects of water (flooding), include the effects of climate change. Ensure environmentally acceptable flow downstream of the reservoir. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities must be dimensioned to meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured.

PROJECT COMPONENT	MEASURE
	Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Ensure a year-round favorable hydrological regime downstream of the reservoir, i.e., ecologically acceptable flow. Plan the dynamics of the construction works in accordance with the ecological requirements of the present fauna. Minimize the extent of the construction works and avoid the permanent loss of alluvial forests, grasslands (hay meadows), wetland, and aquatic habitats.
Forests and forestry	When planning the locations of the reservoir basins avoid occupying valuable forest areas and consider an alternative solution (construction of retention basin) where possible. In case of retention basins constructions, ensure efficient drainage of water from the retention to prevent excessive water stagnation. Coordinate and monitor the dynamics of work execution and tree felling.
Game and hunting	To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Perform works outside the nesting period. Restrict the movement of machinery and people to prevent disturbance of the peace.
Landscape	When creating solutions for the Regulation of watercourses, take care to preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Mitigation of climate changes	As far as possible, plan the locations of interventions in such a way as to avoid the occupation of forest areas.
Adaptation to climate changes	Ensure environmentally acceptable flow downstream of the reservoir.
44 Flood protection project in the Vuka basin	
Soil and agriculture	When planning and designing, take into account a possible project change - construction of retention instead of reservoir on P1 and P2 lands.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. The construction of weirs and other barriers should be carried out at the least possible extent while preserving suitable rare and endangered habitats for rheophilic species. Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and

PROJECT COMPONENT	MEASURE
	rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection). Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016).
Water	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Perform all operations in such a way that there is no deterioration of the ecological and chemical condition, that is, with a minimal risk of pollution in any way, especially in the areas of the sanitary protection zones of the source. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change Regulation of the banks of watercourses should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials to stabilize the bed. In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the precipitated sediment during low water. Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the building towards the watercourse (permeable geotextile, gravel layer). Ensure environmentally acceptable flow downstream of the reservoir. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to jeopardize the existing hydrotechnical system on the watercourse.
Landscape	When developing solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials.
Game and hunting	Restrict the movement of machinery and people to prevent disturbance of the peace.
Cultural heritage	For all intended interventions at the site, including the temporary use of the site for the purpose of construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural heritage shall be obtained from the conservation department of the competent ministry and further measures for the protection of cultural property shall be determined in accordance with the results. If there is a reasonable suspicion of the presence of or interaction with an archaeological site or other remains of cultural heritage during the construction of water structures, professional archaeological monitoring shall be provided during the execution of all earthworks in consultation with the relevant heritage department. If you come across an archaeological site or findings, discontinue the work and inform the competent authority - the conservation department of the relevant ministry, which will continue to act within its legal powers.
45 Flood protection project of the Danube River	
Soil and agriculture	Avoid the selection of soil material sites for the construction of protective embankments on P1 and P2 lands.
Forests and forestry	Plan interventions in such a way that, as far as possible, the occupation of alluvial forests is avoided. When planning the embankments (re)constructions technical measures should be implemented to ensure a favorable water regime and flooding dynamics for the forest communities dependent on floods.

PROJECT COMPONENT	MEASURE
	When carrying out construction works, use the existing or planned forest transport infrastructure, and limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone. Before carrying out the construction works, clear mine-suspected areas.
Game and hunting	Establish cooperation with hunting authorities and consider alternative interventions and their locations. To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Carry out works outside the mating season, especially of big game, and nesting season. Restrict the movement of machinery and people to prevent disturbance of the peace.
Water	All works must be carried out in such a way that there is no deterioration of the ecological and chemical condition, that is, with a minimal risk of pollution in any way, especially in locations that are in sanitary protection zones or its peripheral areas. When planning interventions in the area, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the building towards the watercourse (permeable geotextile, gravel layer). In order to reduce the impact on hydromorphology, apply the optimization of existing and new hydrotechnical structures (piers, coastal fortifications...).
Biodiversity	Construction works on the same watercourse should be carried out separately in time (without overlapping in two or more areas on the same watercourse), at low water level, avoiding spawning and nesting periods. Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). Stone revetments should be constructed roughly, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Avoid endangered and rare habitat types when planning infrastructure sites. Plan construction works for bank stabilization and levees (dikes) in the least possible scope (extent) with the minimal required length and height. Perform the works in such a way that the migration of freshwater fish species is not prevented or interrupted. Carry out flood protection measures while minimizing construction impacts by applying alternative restoration or enhancement measures that must be in accordance with the ecological needs of species and habitats, respecting the expert guidelines for river management (Stručne smjernice – Upravljanje rijekama, HAOP 2016). Reconstruction of the levees should be planned and carried out along the alignment of the existing levees, unless their change is necessary for protection against the adverse effects of water. Plan the alignments of new levees in such a way that valuable habitats and habitats important for the conservation of animal species (flooded and alluvial forests, wet grasslands, aquatic, and wetland habitats) are kept within the inundation area bounded by the levee and that a favorable water regime and natural flood dynamics are preserved. Bank stabilization and construction of revetments should be planned only exceptionally on the shortest possible sections and along already anthropogenically modified banks, where the bank stabilization is necessary to ensure flood protection of settlements and the infrastructure. The scope (length, height) of revetments must be minimized. Revetments are allowed to be constructed only where there is no other technical solution to ensure flood protection. When designing revetments apply landscape and other technical solutions to diversify habitats in the riverbed and banks slopes along revetment. By adequate technical design of revitalization sub-projects ensure minimal future hydrotechnical interventions within the scope of the revitalization (i.e., ensure long-term self-sustainability of the revitalized area), natural hydrological regime and natural flooding dynamics, as well as the enhancement of hydromorphological features of Danube River. Ensure favorable hydrological conditions and water regime downstream of the catchment and in the surrounding ecologically dependent area and for the unhindered performance and development of the economic activity of fish farming in the ponds in Bilje Municipality.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats.

PROJECT COMPONENT	MEASURE
	Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction, or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a Study that will connect the existing watercourses and stagnant water (blue system) into the green infrastructure network. Change the terrain morphology as little as possible. Preserve developed vegetation and use natural materials (especially in the area of PP Kopački rit).
Mitigation of climate changes	As far as possible, plan the locations of projects in such a way as to avoid the occupation of forest areas.
46 Flood protection project in the Baranja area	
Soil and agriculture	When planning and designing, plan projects location outside the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land. When planning and designing, take into account a possible project change - construction of retention instead of reservoir on P1 and P2 lands.
Game and hunting	Establish cooperation with hunting authorities and consider alternative interventions and their locations. To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Carry out works outside the mating season, especially of big game, and nesting season. Restrict the movement of machinery and people to prevent disturbance of the peace.
Vode	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out all work in such a way that there is no deterioration of the ecological and chemical condition, that is, with a minimal risk of pollution in any way, especially in areas. source sanitary protection zone. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. Ensure environmentally acceptable flow downstream of the reservoir. In order to reduce the impact on the continuity of the flow and the morphology of the surrounding terrain, regularly maintain the area behind the barrier in terms of cleaning the deposited sediment during low water. Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse. Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. In order to avoid the negative cumulative impact of the planned hydrotechnical structures on the watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. Ensure enough water in the watercourses from which water is taken for fish farming in order to enable the unhindered performance and development of the economic activity of fish farming. When planning the reconstruction of the pumping station, avoid endangered and rare habitat types (according to regulations in the field of nature protection) and limit the additional removal of riparian vegetation to the least extent possible. Direct the reconstruction towards a more environmentally friendly form by applying alternative measures at the project level. Structural works to stabilize the riverbanks and eroded surfaces along the riverbanks should be planned and carried out on previously anthropogenically modified sections, i.e., on sections where floods directly threaten settlements or important infrastructure in such a way as to minimize the impact on the natural riverbanks and rare and endangered riparian habitats of the floodplain (according to regulations in the field of nature protection).

PROJECT COMPONENT	MEASURE
	Regulation of watercourses, bank stabilization and construction of levees must be planned in the minimal necessary extent (minimal length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old, developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). Structural works on watercourses must be carried out in such a way as to enable migration of fish species and to avoid spawning and nesting periods. During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment. Reconstructions of the existing hydrotechnical objects should be planned and carried out within the scope of the existing ones, unless the change is necessary for the flood protection.
Protected areas	Organize the construction site in such a way as to minimize the damage to the natural habitats. Minimize the probability of the introduction and spread of invasive alien plant and animal species during intervention planning, construction or maintenance, using exclusively native species during recultivation and timely removal of invasive alien species individuals in the construction site, until the establishment of native vegetation.
Landscape	When creating solutions for the Regulation of watercourses, preserve the existing elements of green infrastructure (vegetation, linear green stretches, watercourses and stagnant water). Create a landscape study that will connect existing watercourses and stagnant waters (blue system) into the network of green infrastructure. Change the terrain morphology as little as possible. Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. Preserve developed vegetation and use natural materials (especially in the area of PP Kopački rit and RP Mura - Drava). Preserve developed vegetation and use natural materials.
Adaptation to climate changes	Ensure sufficient quantities of water downstream from the reservoirs, especially for fish farming, in order to enable the unhindered performance and development of economic activities.
52 Flood protection project in the Danube river basin downstream of Vukovar	
Soil and agriculture	When planning and designing, plan projects location outside the areas of P1 and P2 land. If this is not possible, cover the smallest possible area of P1 and P2 land. When planning and designing, take into account a possible project change - construction of retention instead of reservoir on P1 and P2 lands.
Forests and forestry	When carrying out construction works, use the existing or planned forest transport infrastructure, and limit the movement of vehicles and heavy machinery to prevent damage of forest soil and vegetation outside the working zone. When planning the locations of the reservoir basins avoid occupying valuable forest areas and consider an alternative solution (construction of retention basin) where possible.
Game and hunting	Establish cooperation with hunting authorities and consider alternative interventions and their locations. To the greatest extent, preserve the coastal vegetation and reduce the damage of surrounding vegetation, especially forests. To the greatest extent possible, avoid occupation and fragmentation of habitats. Carry out works outside the mating season, especially of big game, and nesting season. Restrict the movement of machinery and people to prevent disturbance of the peace.
Water	During the preparatory work, remove the remains of cut grass, shrubs, bushes and trees, but leave the stumps in order to leave as little organic matter as possible in the area intended for submersion and to reduce the possibility of erosion. Carry out all work in such a way that there is no deterioration of the ecological and chemical condition, that is, with a minimal risk of pollution in any way, especially in areas. source sanitary protection zone. During project planning, when assessing the risk of adverse effects of water (flooding), include the effects of climate change. • Ensure environmentally acceptable flow downstream of the reservoir. Channel cuts should be made in such a way as to enable groundwater drainage from the rear of the building towards the watercourse (permeable geotextile, gravel layer). Properly dimension the evacuation retention structures in order to enable the continuity of the watercourse and the hydrological regime in the watercourse during non-extreme hydrological conditions, which would reduce the impact on the hydromorphological elements of the watercourse.

PROJECT COMPONENT	MEASURE
	Regularly clean sediment from the retention area so that the retention has its full function, which indirectly reduces the negative impact on hydromorphological elements. Regulation of the watercourse bed should be carried out in such a way as to enable the flow of underground water towards the surface watercourse by using adequate materials for stabilizing the watercourse. In order to avoid the negative cumulative impact of planned hydrotechnical structures on a watercourse, the planned facilities should be dimensioned so that they meet the needs of already built facilities upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse.
Biodiversity	For the construction of the reservoir, plan the intervention in such a way as not to interrupt the continuity of the water flow (river integrity) and to preserve the ecologically acceptable flow downstream with the use of the technology that leads to the least water turbidity. When planning location, avoid endangered and rare habitat types (according to nature protection regulations) and limit the permanent loss of riparian vegetation to the smallest possible extent. Also, the continuity of the migration routes of freshwater fish should be ensured. While planning the location of detention basins, avoid rare and endangered habitat types (in accordance with regulations in the field of nature protection). Bank stabilization and construction of revetments should be planned in the least possible extent (minimal required length and height). If possible, use natural materials. If not, stabilise only the lowest part of the riverbank, and upper part should be left intact (natural). If the construction of stone revetment is necessary on some sections, it should be constructed in the rough, by leaving old developed trees, covering the riverbanks and revetment slopes with soil and humus for the development of natural vegetation). During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the construction equipment.
Cultural heritage	Prior to the commencement of work, the protective measures in the area of protected cultural property shall be determined in cooperation with the conservation department of the relevant ministry and, depending on the assessment of the situation, the further procedure shall be agreed upon. For all intended interventions in the space, including temporary use of the premises for the purpose of construction of the accompanying infrastructure, special conditions in the field of protection and preservation of cultural property and confirmation of the project documentation of the intended intervention in the premises in accordance with the special conditions or prior authorization for the planned works shall be obtained from the conservation department of the competent ministry.
Adaptation to climate changes	to Ensure ecologically acceptable flow downstream from the reservoir and use of water for other purposes, except irrigation.

Construction of land reclamation facilities

Theme	Measure
Forests and forestry	• Projects near forest edges should be carried out in such a way as not to damage the edge trees. • For water bodies from which water is taken, ensure the preservation of a favorable water regime for forest habitats dependent on it.
Game and hunting	• To the greatest extent possible, avoid occupation and fragmentation of habitats. • Perform works outside the nesting period. • Perform works outside the mating period, especially for big game • Restrict the movement of machinery outside the working zone.
Water	• Water intakes should be carried out in such a way that the ecologically acceptable flow downstream of the intakes is not disturbed, that is, the hydromorphological condition of the water bodies does not deteriorate. • When several irrigation systems are planned on the same watercourse or reservoir, they should be planned together in order to avoid cumulative impacts and disruption of the environmentally acceptable flow in watercourses, i.e. lowering the water level in reservoirs. • When planning new water extractions, all existing water intake should be taken into account in the calculation of water availability. • In periods of reduced water inflow, limit the use of irrigation systems, that is, the capture of water. • In order to avoid the negative cumulative impact of the planned hydrotechnical buildings, the planned facilities should be dimensioned so that they meet the needs of the already built facilities

Theme	Measure
	upstream and downstream, so as not to endanger the existing hydrotechnical system on the watercourse. Protection of waters and water bodies should be planned and carried out in the entire area, with stricter criteria in the area of sanitary protection zones (including potential ones) in accordance with the ordinance establishing sanitary protection zones of water sources and decisions on sanitary protection zones of water springs.
Biodiversity	- Plan structural works in such a way as to minimize the impact on natural state of present habitats and the riverbed. - During construction and maintenance, implement appropriate measures to prevent the introduction and spread of invasive alien plant and animal species (in accordance with regulations from the field of nature protection) with mandatory removal of plant and mud remains, removal of remaining living organisms, and drying of the equipment. - All water withdrawals must be developed at the catchment level in order to avoid cumulative impact to the ecologically acceptable flow in watercourses or on water level in the lakes. - Ensure a year-round favorable hydrological regime downstream of the reservoir, i.e. ecologically acceptable flow in the watercourses in order to enable the unhindered development of aquaculture in the existing fish farms.
Protected areas	During planning the expansion of the existing irrigation system and irrigation distribution network for irrigation system Gat-extension (Project No. 72) plan the organization of the construction site in such a way as to minimize the damage to the natural habitats in the Mura-Drava Regional Park.
Landscape	- Change the terrain morphology as little as possible. - Preserve the existing landscape pattern (follow the existing subdivision) within valuable cultivated areas. - Preserve developed vegetation and use natural materials Preserve developed vegetation and use natural materials (especially within protected areas such as <i>Regional Park Mura - Drava</i> and <i>Park Architecture Monument Zagreb - Park Maksimir</i>). - After construction, rehabilitate all areas affected by the construction works in such a way that they are brought to a state similar as it was before the start of construction.
Cultural heritage	- When planning how to proceed in the premises, the conservation department of the relevant ministry shall be consulted beforehand and further action shall be determined according to the assessment of the situation. - In case of projects in the immediate vicinity of archaeological protection zones (Orljava - Londža irrigation system next to Mihaljevačko polje - Beč archaeological zone), carry out a preliminary archaeological research of the site and ask for advice from the conservation department of the relevant ministry. - When building water structures, provide for professional archaeological supervision (permanent or occasional) during the execution of all earthworks in the construction area. If necessary, discontinue the work, carry out protective archaeological research and conservation of findings in consultation with the Conservation department of the relevant Ministry.
Population and human health	When planning new water extractions, ensure water supplies for other purposes, primarily for human consumption.
Adaptation to climate changes	- When planning new water extractions, all previously performed extractions should be taken into account in the calculation of water availability. - In periods of reduced water inflows, limit the use of irrigation systems, that is, provide water for human consumption as well. - For water bodies from which water is taken, ensure the preservation of a favorable water regime for forest habitats dependent on it.

10.6 Environmental Monitoring Program

At the territory of the Republic of Croatia, monitoring of a number of parameters of the state of the environment is carried out, the results of which are for the most part an integral part of the Environmental Protection Information System (ESPI), which is managed by the Institute for Environmental and Nature Protection of the Ministry of Economy and Sustainable Development, and the database used by other competent institutions. Furthermore, mechanisms for monitoring the state of the environment have been

established in the Republic of Croatia through environmental impact assessment procedures and through the issuance of water law acts for individual projects.

Water Monitoring

According to the Water Area Management Plan for the period 2016-2020, in order to achieve the goals of water protection and protection against the adverse effects of water, the following parameters are monitored:

- monitoring and evaluation of the state of water quality
- monitoring and evaluation of bathing water quality
- monitoring and evaluation of indicators of eutrophication in sensitive areas
- monitoring of nitrate concentration in areas subject to nitrate pollution of agricultural origin
- monitoring and determination of hydrological conditions (including monitoring, collection, control, processing, storage and publication of hydrological data, analysis of the hydrological regime, forecasting of extreme hydrological phenomena, floods and droughts), assessment of flood risks, monitoring of the state of watercourses and the state of regulation and protection water facilities.
- monitoring of underground water levels
- monitoring the quality of water used for irrigation

The state of water bodies is monitored by Hrvatske vode (Croatian Waters). According to the Law on Meteorological and Hydrological Activities in the Republic of Croatia (NN 66/2016), the State Hydrometeorological Institute of the Republic of Croatia conducts monitoring of the state of surface and underground waters within the framework of the national monitoring network.

The monitoring of the state of surface waters takes place according to the Rulebook on the state network of the meteorological and hydrological monitoring system (Official Gazette 142/21). Hydrological monitoring is carried out in cooperation with the Državni hidrometeorološki zavod (State Hydrometeorological Institute), Hrvatske vode, Hrvatska elektroprivreda (Croatian Electrical Company) and other interested legal bodies (national parks, nature parks, Ministry of the Sea, Transport and Infrastructure), according to the Rulebook on the relationship between the state network and other meteorological and hydrological networks (Official Gazette 142 /21) as well as according to the Decision on determining the position of meteorological, hydrological, meteorological-oceanographic and phenological stations of interest to the Republic of Croatia and the Decision on their work program (Official Gazette 143/21).

Groundwater level monitoring has been established on hundreds of piezometers in the valleys of the Drava and Sava rivers. A large number of piezometers were constructed for the purposes of designing and monitoring the operation of hydroelectric power plants planned and/or constructed on these rivers. The largest number is in the western part of the Drava and Sava basins. Organized monitoring has not been established in the Sava basin downstream from Sisak, except in the area of the Spačva basin ecosystem, which is not part of the national monitoring network carried out by the State Hydrometeorological Institute of the Republic of Croatia.

Verified data on the state of surface and underground waters are stored in the archive database of the State Hydrometeorological Institute, and reports are submitted on an annual basis according to the Ordinance on the Archive of Data, Products and Information (Official Gazette 142/21).

Forest ecosystems

Monitoring of the conditions of forest ecosystems at the national level has been carried out since 1987 within the framework of the International Cooperative Program on Assessment of Monitoring of Air Pollution Effects (ICP Forests). Since 2007, the Forest Ecosystem Damage Monitoring Program has been carried out according to the Ordinance on the method of data collection, the network of points, maintaining the register and the conditions for using data on the damage to forest ecosystems (Official gazette

129/06). Monitoring is carried out in cooperation with the Croatian Forestry Institute, the Faculty of Forestry and Croatian Forests, with the National Coordination Center at the Croatian Forestry Institute, and reports are submitted on an annual basis.

Due to the potential negative impact of the construction of certain interventions on the hydrological regime in the lowland forest stands dependent on the same, it is proposed to establish monitoring of water regime, health status and dynamics of the stand structure for the water management departments for the middle and lower Sava (project areas 20, 24, 29 and 35), Mura and upper Drava (project area 36) and Danube and lower Drava (project area 37). Monitoring should be established for projects that are assessed to lead to changes in the hydrological regime, in terms of the absence of floods in areas with regular floods, lowering of groundwater levels, excessive retention of water in stands etc. At the end of the monitoring, it is necessary to submit a report and, if needed, continue with further monitoring.

The Multiannual Programme plans to systematically monitor the indicators of the results of the Program's implementation and the achievement of goals, as well as the continuation of the implementation of individual projects. Monitoring of individual projects will be carried out at the level of WMDs. Data will be collected on the physical and operational progress of each individual project. Monitoring of the results of irrigation systems construction is carried out at the county level.

In the proposed program for monitoring the implementation of individual projects, it is necessary to include the monitoring of the implementation of environmental and ecological network protection measures proposed by the Strategic study.

For irrigation systems, carry out constant monitoring of affected amounts of water in order not to impair the ecologically acceptable flow in watercourses, that is, to prevent unacceptable lowering of groundwater level.

10.7 Brief overview of considered reasonable alternatives of the Multiannual Programme

Multiannual Programme for the Construction of Regulation, Protection and Land Reclamation Water Facilities for the Period until 2030 does not consider variant solutions. The strategic study analysed the development of the environment without the implementation of the Multiannual Programme, which includes 58 projects for the construction of regulation and protection facilities and 93 projects for the construction of land reclamation facilities. However, it should be kept in mind that not all planned projects will be realized in the upcoming period for which this Multiannual Programme is adopted. The mentioned projects will be implemented depending on the results of further elaboration, i.e. at the level of preparation of technical documentation of a higher level of detail (feasibility studies, conceptual or main projects).

Likewise, during the preparation of the Multiannual Programme itself and during the preparation of a strategic environmental assessment study of the Multiannual Programme, the developer revised the preliminary list of projects according to the established protection priorities and according to the results of the first environmental impact analyses with an emphasis on the areas of the ecological network. The final list of projects is the result of the iterative process of creating a multiannual programme and analysing possible environmental impacts.

10.8 Conclusion of the conducted assessment

The strategic study analysed the possible impacts of the planned projects of the Multiannual Programme.

The Multiannual Programme plans to build a series of **water protection projects** systematized into project units formed according to the relevant flood defence systems, spatial location and area of influence (area of a small basin, municipality or city, etc.). The strategic study analysed possible impacts on the environment at the level of project units, not at the level of individual projects. This approach ensures a better understanding of the wider effects, especially the cumulative effects of the program's impact on the

environment. At the same time, individual water structures were also considered according to the following types:

- linear buildings in the riverbed - revetments, channel
- linear structures in the flood area - embankment, canal, wall, bank stabilization
- regulation of floods, erosion and landslides
- partitions in the riverbed
- retention
- reservoirs
- water intakes
- regulation of watercourses and revitalization
- combined and unclassified buildings – hydrotechnical system, notification buildings, flood protection system (general)

Irrigation projects are reviewed individually and at the level of water management departments. Land reclamation facilities can be divided into two groups:

- water intakes (including the distribution network)
- irrigation systems (extension of existing systems)

An analysis of the characteristics and spatial arrangement of the projects determined that the greatest pressure is expected on the following components of the environment: biological diversity, forests and forestry, ecological network areas, protected nature areas, landscape and cultural heritage. Through the Strategic Environmental Assessment procedure, possible pressures on individual components of the environment were identified, and environmental protection measures were proposed in accordance with the aforementioned.

11 ANNEXES

11.1 Basic information

Tab. 11.1 Number and names of project groups for projects of protection against adverse effects of water

Project group	Name of the project group
1	Flash flood protection project of in the area of Dubrovačko primorje, the Pelješac peninsula and the islands of Korčula, Mljet and Lastovo
2	Flood protection project in the Neretva river basin
3	Flood protection project in the Vrgorsko polje basin
4	Flood protection project in the Imotsko-bekijsko polje basin
5	Protection from flash floods in the Makarska coastal region
6	Protection from flash floods in the Middle Adriatic coastal region and the islands of Brač, Hvar, Vis, Šolta and Čiovo
7	Flood protection project in the Cetina river basin
8	Flood protection project in the Krka river basin
9	Protection from flash floods in the Šibenik coastal region and on the Šibenik islands
10	Protection from flash floods in the Zadar coastal region and on the Zadar islands
11	Flood protection project in the Ravni Kotari basins
12	Flood protection project in the basins of the Zrmanja river and the Lika plateau
13	Flood protection project in the Lika and Gacka river basins
14	Protection from flash floods in the Kvarner coastal region and on the islands of Krk, Cres, and Lošinj
15	Flood protection project in the Mirna river basin
16	Flood protection project in the Raša river basin
17	Protection from flash floods in the Western Istria coastal region
18	Flood protection in the Upper Kupa River Basin
19	Flood protection project of the town of Ogulin
20	Flood protection project in the Kupa river basin – Karlovac and Sisak areas
21	Flood protection project in the Korana river basin
22	Flood protection in the Kupčina basin
23	Protection from Una River floods
24	Flood protection project in the Middle Sava River basin
25	Flood protection project in the Krapina basin
26	Flood protection project in the Samobor basins
27	Flood protection project in the Sjeverno Zagrebačko prisavlje basin
28	Flood protection project in the Zelina and Lonja basins
29	Flood protection project in Česma and Glogovnica basins
30	Flood protection project in the Ilova and Pakra basins
31	Flood protection project in the Šumetlica and Crnac basins
32	Protection from the Sava River floods on the section between Nova Gradiška and Račinovci
33	Flood protection project in the Orjava basin
34	Flood protection project in Brodska posavina
35	Flood protection project in the Biđ and Bosut basins
36	Flood protection project of the Drava River from the Slovenian border to Pitomača
37	37 Flood protection project of the Drava River from Pitomača to the Danube estuary
38	Flood protection project of the Mura River
39	Flood protection project in the Bednja basin
40	Flood protection project in the Trnava basin
41	Flood protection project in the Bistra basin
42	Flood protection project in Županijski kanal basin
43	Flood protection project in the Karašica and Vučica basins
44	Flood protection project in the Vuka basin
45	Flood protection project of the Danube River
46	Flood protection project in the Baranja area
47	Flood protection project in the Rječina river
48	Flood protection project in the Sutla basin

Project group	Name of the project group
49	Flood protection project in the Plitvica basin
50	Flood protection project in the Glina basin
51	Flood protection project in the Petrinjčica basin
52	Flood protection project in the Danube river basins downstream of Vukovar
53	Flood protection project in the Kutinica basin
54	Flood protection project in the Lower Dobra river basin
55	Flood protection in the Pazinčica basin
56	Flood protection project in the Boljunčica basin
57	Flood protection project in the Lokvarka basin
58	Flood protection project in the Mrežnica river basin

Tab. 11.2 Activities on irrigation projects in the period 2004 - 2020

IRRIGATION SYSTEMS (design & construction or design only)		ha	County
REPUBLIC OF CROATIA		152.449	
NATIONAL IRRIGATION PILOT PROJECTS (NPPNs)		8.455	
*SUB-SYSTEMS (PSs)			
1	NPPN Biđ - Bosutsko polje – Supply land reclamation canal for irrigation of Biđ - bosutsko polje	4.060	Vukovar – Srijem and Brod - Posavina
	NPPN Biđ - Bosutsko polje – Irrigation system from or around the supply land reclamation canal for irrigation of Biđ - bosutsko polje (DMKBBP)		
2	NPPN Opatovac	705	Vukovar – Srijem
3	NPPN Kaštela - Trogir - Seget	896	Split - Dalmatia
4	NPPN Donja Neretva (Lower Neretva) - PS Opuzen - stage I – Barrier on the Neretva River	1.887	Dubrovnik - Neretva
	NPPN Donja Neretva (Lower Neretva) - PS Opuzen – stage II - Phase 1 - 5 (incl. rehabilitation)		Dubrovnik - Neretva
	NPPN Donja Neretva (Lower Neretva) - PS Opuzen – stage II - PS Glog	312	Dubrovnik - Neretva
	NPPN Donja Neretva (Lower Neretva) - PS Koševo - Vrbovci	595	Dubrovnik - Neretva
PUBLIC IRRIGATION SYSTEMS		143.994	
1	IS Velika Ludina	453	Sisak - Moslavina
2	IS Koljak (incl. rehabilitation)	520	Koprivnica - Križevci
3	IS Vrbničko polje	160	Primorje – Gorski kotar
4	IS Bašćanska dolina	330	Primorje – Gorski kotar
5	IS Brusan	13	Primorje – Gorski kotar
6	IS Pavlomir	44	Primorje – Gorski kotar
7	IS Novljansko polje	350	Primorje – Gorski kotar
8	IS Mrkopalj - Sunđer	63	Primorje – Gorski kotar
9	IS Lič - Phase I	120	Primorje – Gorski kotar
	IS Lič - Phase II	325	Primorje – Gorski kotar
10	IS Malinska - Dubašnica	32	Primorje – Gorski kotar
11	IS Novaljsko polje	120	Lika - Senj
12	IS Kapinci - Vaška - Phase I (incl. construction of a bridge/sluice)	1.260	Virovitica - Podravina
	IS Kapinci - Vaška - Phase II	568	Virovitica - Podravina
13	IS Novi Gradac - Detkovac	750	Virovitica - Podravina
14	IS Đolta - Phase I	161	Virovitica - Podravina
	IS Đolta - Phase II	230	Virovitica - Podravina
15	IS Lukač - Phase I	447	Virovitica - Podravina
	IS Lukač - Phase II	1.321	Virovitica - Podravina
16	IS Kaptol - Phase I	106	Požega - Slavonia
	IS Kaptol - Phase II	104	Požega - Slavonia
17	IS Ramanovci - Bektež - Phase I	369	Požega - Slavonia
	IS Ramanovci - Bektež – Phases II - IV	488	Požega - Slavonia
18	IS Orjava - Londža - PS Orjava (incl. construction of part of Phase I reservoir Londža)	923	Požega - Slavonia
	IS Orjava - Londža - PS Londža	874	Požega - Slavonia
19	IS Venje - Hrnjevac	103	Požega - Slavonia
20	IS Pakrac - Lipik - Phase I	263	Požega - Slavonia
	IS Pakrac - Lipik Phases II -IV	312	Požega - Slavonia

IRRIGATION SYSTEMS (design & construction or design only)		ha	County
21	IS Orubica	326	Brod - Posavina
22	IS Bid	1.183	Brod - Posavina
23	IS Jelas polje (Jasinje) - PS Slobodnica	1.855	Brod - Posavina
	IS Jelas polje (Jasinje) - PS Oriovac	450	Brod - Posavina
	IS Jelas polje (Jasinje) - 8 PSs	5.899	Brod - Posavina
24	IS Bašćica - Phase I	350	Zadar
	IS Bašćica - Phase II	128	Zadar
25	IS Lišansko polje - Phase I	232	Zadar
	IS Lišansko polje - Phase II	168	Zadar
26	IS Donja Bašćica	108	Zadar
27	IS Vransko polje – Rehabilitation of IS Jankolovica	403	Zadar
	IS Vransko polje - Phase I - PS Malo Blato	434	Zadar
	IS Vransko polje - Phase I - PS Gorčine	982	Zadar
	IS Vransko polje - Phase II	1.304	Zadar
	IS Vransko polje - Phase III	1.105	Zadar
28	IS Škabrnja	296	Zadar
29	IS Kulinsko - Korlatsko polje	500	Zadar
30	IS Bokanjac - Rašinovac	470	Zadar
31	IS Kolan	330	Zadar
32	IS Povljana	300	Zadar
33	IS Zadarsko zaleđe	17.561	Zadar
34	IS Gat - Phase I	500	Osijek - Baranja
35	IS Gat - Phase II	589	Osijek - Baranja
36	IS Baranja (incl. areas Topolik and Mirkovac)	5.000	Osijek - Baranja
37	IS Puškaš (incl. rehabilitation)	916	Osijek - Baranja
38	IS Budimci - Krndija	565	Osijek - Baranja
39	IS Poljoprivredni institut Osijek (incl. rehabilitation)	212	Osijek - Baranja
40	IS Mala Šuma - Veliki Vrt	78	Osijek - Baranja
41	IS Dalj - Phase I	877	Osijek - Baranja
	IS Dalj - Phase II	2.570	Osijek - Baranja
42	IS Karašica I	40	Osijek - Baranja
43	IS Karašica - PS Kitišanci	1.198	Osijek - Baranja
	IS Karašica - PS Miholjac - Viljevo	682	Osijek - Baranja
	IS Karašica - PS Kapelna	1.216	Osijek - Baranja
	IS Karašica - PS Miholjački Poreč	490	Osijek - Baranja
44	IS Dravski rit - Phase I	1.690	Osijek - Baranja
	IS Dravski rit - Phase II	8.184	Osijek - Baranja
45	IS Marijanci	1.041	Osijek - Baranja
46	IS Baranjsko brdo	368	Osijek - Baranja
47	IS Koška - Lila	600	Osijek - Baranja
48	IS Donje Polje - Jadrtovac	297	Šibenik - Knin
49	IS Petrovo polje - Phase I	100	Šibenik - Knin
	IS Petrovo polje - Phase II	2.472	Šibenik - Knin
50	IS Gaj	10	Šibenik - Knin
51	IS Promina	100	Šibenik - Knin
52	IS PŠŠ Vinkovci	52	Vukovar – Srijem
53	IS Borinci (rehabilitation)	700	Vukovar – Srijem
54	IS Grabovo - Phase I (rehabilitation of reservoir and system)	535	Vukovar – Srijem
	IS Grabovo - Phase II	653	Vukovar – Srijem
55	IS Blata - Cerna	500	Vukovar – Srijem
56	IS Sopot	704	Vukovar – Srijem
57	IS Ervenica	738	Vukovar – Srijem
58	IS Lipovac	820	Vukovar – Srijem
59	IS Kajiševac - Phase I	320	Vukovar – Srijem
	IS Kajiševac - Phase II	181	Vukovar – Srijem
60	IS Penave	1.000	Vukovar – Srijem
61	IS Tovarnik	1.747	Vukovar – Srijem
62	IS Negoslavci	411	Vukovar – Srijem

IRRIGATION SYSTEMS (design & construction or design only)		ha	County
63	IS Đeletovci	179	Vukovar – Srijem
64	IS Sokolovac	182	Vukovar – Srijem
65	IS Pavlovac	171	Vukovar – Srijem
66	IS Berak	497	Vukovar – Srijem
67	IS Sinjsko polje (rehabilitation of canal)	530	Split - Dalmatia
	IS Sinjsko polje - Phase I - IS Trnovača	476	Split - Dalmatia
	IS Sinjsko polje - Phase II - 7 ISs	3.260	Split - Dalmatia
68	IS Imotsko – Bekijsko polje - I (incl. rehabilitation of canal)	1.332	Split - Dalmatia
	IS Imotsko - Bekijsko polje - Phase II	2.518	Split - Dalmatia
69	IS Bunina	108	Split - Dalmatia
70	IS Dol - Postira	150	Split - Dalmatia
71	IS Vukušići	8	Split - Dalmatia
72	IS Strmendolac	100	Split - Dalmatia
73	IS Vrgorsko polje	2.000	Split - Dalmatia
74	IS Rastok (rehabilitation of canal)	150	Split - Dalmatia
75	IS Katuni	100	Split - Dalmatia
76	IS Krban	50	Split - Dalmatia
77	IS Valtura (incl. rehabilitation)	440	Istria
78	SN Poreština - Phase I - IS Červar Porat -Bašarinka	490	Istria
	IS Poreština - Phase II	3.120	Istria
79	IS Bujština - Phase I - IS Petrovija – Phase I	513	Istria
	IS Bujština - Phase I - IS Petrovija - Phase II	700	Istria
	IS Bujština - Phase II	16.587	Istria
80	IS Labinština - Phase I - IS Čepić polje	366	Istria
	IS Labinština - Phase II	4.024	Istria
81	IS Rovinjšina	3.949	Istria
82	IS Pazinština	7.164	Istria
83	IS Bužeština	2.076	Istria
84	SN Župa Dubrovačka	312	Dubrovnik - Neretva
85	IS Lumbarda - Donje Blato	100	Dubrovnik - Neretva
86	IS Konavosko polje	1.500	Dubrovnik - Neretva
87	IS Desne	100	Dubrovnik - Neretva
88	IS Smokvica	175	Dubrovnik - Neretva
89	IS Vrbovica - Kruševo	70	Dubrovnik - Neretva
90	IS Čara	166	Dubrovnik - Neretva
91	IS Stonsko polje	500	Dubrovnik - Neretva
92	IS Bradat	91	Dubrovnik - Neretva
93	IS Kuna polje	50	Dubrovnik - Neretva
94	IS Raba - Stolovi - Komarna - Phase I	330	Dubrovnik - Neretva
	IS Raba -Stolovi - Komarna - Phase II	50	Dubrovnik - Neretva
95	IS Zažablje	40	Dubrovnik - Neretva
96	IS Lastovo	420	Dubrovnik - Neretva
97	IS Mljet - PS Babino polje	102	Dubrovnik - Neretva
	IS Mljet - PS Blatsko polje	32	Dubrovnik - Neretva
	IS Mljet - PS Propadi	16	Dubrovnik - Neretva
98	IS Međimurje	250	Međimurje
99	IS Belica - Phase I	337	Međimurje
	IS Belica - I Phase I	382	Međimurje
100	IS Prelog - Donji Kreljevec - PS Prelog	404	Međimurje
	IS Prelog - Donji Kreljevec - PS Donji Kraljevec	925	Međimurje
	IS Prelog - Donji Kreljevec - PS Goričan	404	Međimurje
101	IS Rugvica	621	Zagreb
102	IS Lupoglav	1.036	Zagreb
103	IS Lonjica	268	Zagreb
104	IS Dubrava	269	Zagreb
105	IS Pokušališta Agronomskog fakulteta	31	City of Zagreb
106	IS Kapelica - Kaniška Iva	424	Bjelovar - Bilogora

11.2 Projects of protection against adverse effects of water

Tab. 11.3 Identified projects of protection against adverse effects of water in the area of the Water Management Department for the Mura and Upper Drava

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
1	244	for the Mura and Upper Drava	36	Plitvica- Bednja	VC	Cestica	Reconstruction of the dike Virje Otok - Brezje (along the old bed of the HPP Formin, 3.7 km)	NASIP	26.000.000	1
2	252	for the Mura and Upper Drava	38	Trnava	MC	Goričan	Reconstruction of the retarding dikes along the Trnava (6.4 km)	NASIP	45.000.000	1
3	261	for the Mura and Upper Drava	36	Trnava	MC	Nedelišće	Reconstruction of the dike Gornji Hrašćan along the old bed of the HPP Varaždin (3.0 km)	NASIP	29.800.000	1
4	247	for the Mura and Upper Drava	36	Trnava	MC	Nedelišće	Reconstruction of the left bank dike Pušćine (3.5 km)	NASIP	25.000.000	1
5	262	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Mali i Veliki Bukovec	Reconstruction of the retarding dike on the left and right banks of the Bednja River from 0+000 to 5+610	NASIP	32.500.000	1
6	304	for the Mura and Upper Drava	41	Bistra	KKC	Rasinja	Regulation of the watercourse Gliboki in the settlement Rasinja (29+420-32+000)	KORITO	6.500.000	1
7	263	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Veliki Bukovec	Reconstruction of the retarding dike on the left and right Plitvica banks from 0+000 do 3+030	NASIP	37.500.000	1
8	1007	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Varaždin	Regulation of the Plitvica from Varaždin to Gojanec (5 km)	NASIP, KORITO	6.500.000	1
9	1019	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Varaždin, Trnovec Bartolovečki	Construction of the western boundary canal of the settlement Trnovec Bartolovečki (2.5 km)	KORITO	2.000.000	1
10	280	for the Mura and Upper Drava	41	Bistra	KKC	Novigrad Podravski	Regulation of the watercourse Komarnica from km 5+820 to 7+300	KORITO	1.600.000	1
11	1102	for the Mura and Upper Drava	40	Trnava	MC	Čakovec	Construction of a boundary canal of the settlement Pribislavec	KORITO	2.000.000	1
12	1016	for the Mura and Upper Drava	40	Trnava	MC	Čakovec, Vratišinec	Regulation of the Jalšovnica from Gornji Kraljevec to Novo Selo Rok (2.5 km)	KORITO	3.300.000	1
13	1013	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Novi Marof	Regulation of the Bednja along the easter bypass road of Novi Marof (4.5 km)	KORITO	6.500.000	1
14	1015	for the Mura and Upper Drava	49	Plitvica - Bednja	VC	Martijanec	Regulation of torrential streams in the area of the municipality Martijanec	KORITO	11.400.000	1
15	1020	for the Mura and Upper Drava	49	Plitvica - Bednja	VC	Maruševac	Construction of a lateral stormwater canal of the settlements Biljevec, Bikovec and Jurketinec (1.3 km)	KORITO	1.300.000	1
16	1022	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Mali Bukovec	Regulation of a stormwater canal of the settlements Novo Selo Podravsko and Županec (4.3 km)	KORITO	3.900.000	1
17	1024	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Varaždinske Toplice	Regulation of the watercourse Drenovec in the settlement Drenovec (2 km)	KORITO	3.500.000	1
18	1014	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Novi Marof	Regulation of the watercourse Makoišće in the settlements Moždenec and Grana (0.5 km)	KORITO	700.000	1
19	1025	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Varaždinske Toplice	Regulation of the watercourse Košćevac in Varaždinske Toplice (1.3 km)	KORITO	2.000.000	1
20	1021	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Maruševac	Construction a lateral stormwater canal of the settlement Greda (0.6 km)	KORITO	700.000	1
21	1026	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Novi Marof	Regulation of the watercourse Vapnara in Strmec Remetinečki	KORITO	700.000	1
22	240	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Bednja	Cleaning of Lake Trakošćan	JEZ_AKU	22.000.000	1

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
23	1018	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Veliki Bukovec	Regulation of Mlinski kanal in the business zone Veliki Bukovec (0.25 km)	KORITO	800.000	1
24	1001	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Ludbreg	Construction of a dike along the Bednja from Kapela Podravska to Ludbreg (11 km)	NASIP	32.500.000	2
25	258	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Novi Marof	Construction of the retention Korušćak	JEZ_AKU, BRANA	9.100.000	2
26	1002	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Varaždin	Construction of a relief canal of the Plitvica and the retention Jalkovec	KORITO, NASIP	16.500.000	2
27	260	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Trnovec-Bartolovečki	Reconstruction of the dike on the relief channel of the Plitvica River from 0+000 - 3+500	NASIP	9.100.000	2
28	1104	for the Mura and Upper Drava	36	Bistra	KKC	Gola	Revitalization of the side channel Ješkovo	KORITO	20.000.000	2
29	1008	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Varaždin, Knežinec, Jalžabet	Regulation of the Plitvica from Zbelava to Varaždin	NASIP, KORITO	4.300.000	2
30	1105	for the Mura and Upper Drava	41	Bistra	KKC	Koprivnica	Construction of the retention Žlebica on the Bistra Koprivnička	JEZ_RET	5.000.000	2
31	253	for the Mura and Upper Drava	41	Bistra	KKC	Koprivnica	Regulation of the watercourse Bistra Koprivnička from km 25+735 - 32+040	KORITO	6.500.000	2
32	305	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Lepoglava	Construction of the retention Kamenica I on the watercourse Kamenica	JEZ_RET	6.500.000	2
33	288	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Bednja	Construction of a retention on the watercourse Čret	JEZ_RET	5.200.000	2
34	1103	for the Mura and Upper Drava	40	Trnava	MC	Nedelišće	A retarding dike along the watercourse Zelena	NASIP	500.000	2
35	255	for the Mura and Upper Drava	40	Trnava	MC	Štrigova	Construction of the retention Vugrišinec	JEZ_RET	9.100.000	2
36	259	for the Mura and Upper Drava	36	Plitvica- Bednja	VC	Legrad, M.Bukovec, V.Bukovec	Construction of the dike Selnica - Dubovica (right bank dike along the old bed of the HPP Dubrava, 6.7 km)	NASIP	20.800.000	2
37	266	for the Mura and Upper Drava	36	Plitvica- Bednja	VC	Trnovec-Bartolovečki	Construction and reconstruction of the dike Šemovec (2.5 km)	NASIP	10.000.000	2
38	1011	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Martijanec, Sv.Đurđ	Regulation of the Plitvica from rkm 12+800 - 22+000 (7.2 km)	NASIP, KORITO	10.400.000	2
39	1012	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Gornji Knežinec	Regulation of the Mozdernjak in the settlement Varaždin Breg from rkm 2+800 - 4+500	KORITO	3.300.000	2
40	1106	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Vidovec	Construction of the retention Tužno	JEZ_RET	5.000.000	2
41	1101	for the Mura and Upper Drava	38	Trnava	MC	Donja Dubrava	Reconstruction of the Mura dike from km 0 – 6.1	NASIP	45.000.000	2
42	1010	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Veliki Bukovec	Regulation of the Plitvica in the settlement Dubovica (1.95 km)	NASIP, KORITO	4.000.000	2
43	284	for the Mura and Upper Drava	40	Trnava	MC	Čakovec, Pribislavec	Regulation of the Trnava Murska downstream of the WWTP of the town Čakovec	KORITO	3.900.000	2
44	287	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Bednja	Construction of a reservoir on the Bednja River near the settlement Bednja	JEZ_AKU	13.000.000	2
45	1107	for the Mura and Upper Drava	38	Trnava	MC	Podturen	Rehabilitation of the dike Podturen seepage	NASIP	4.500.000	2
46	1004	for the Mura and Upper Drava	36	Bistra	KKC	Molve, Gola, Drnje	Reconstruction of the dike Repaš - Botovo (18 km)	NASIP	100.000.000	2
47	1005	for the Mura and Upper Drava	36	Bistra	KKC	Ferdinandovac, Podravske Sesvete	Reconstruction of the dike Brodić - Zgruti	NASIP	45.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
48	250	for the Mura and Upper Drava	38	Trnava	MC	Legrad, Donja Dubrava	Reconstruction of retarding dikes along the Bistrec - Rakovnica (10.3 km)	NASIP	50.000.000	2
49	279	for the Mura and Upper Drava	36	Bistra	KKC	Novo Virje	Reconstruction of the dike Novo Virje - Crnac (7.2 km)	NASIP	45.000.000	2
50	283	for the Mura and Upper Drava	40	Trnava	MC	Šenkovec	Regulation of the watercourse Hrebec from the retention Šenkovec to its confluence	KORITO	3.900.000	2
51	282	for the Mura and Upper Drava	41	Bistra	KKC	Virje	Regulation of the watercourse Zdelja from km 5+400 – 10+500	KORITO	2.000.000	2
52	251	for the Mura and Upper Drava	38	Trnava	MC	Donja Dubrava	Reconstruction of retarding dikes along Kotoripski kanal (4.8 km)	NASIP	25.000.000	2
53	264	for the Mura and Upper Drava	36	Plitvica- Bednja	VC	Nedelišće	Construction of a dike between the bridges, left bank in Varaždin (0.2 km)	NASIP	1.100.000	2
54	268	for the Mura and Upper Drava	41	Bistra	KKC	Novigrad Podravski	Construction of the retention Javorovac on the stream Komarnica	JEZ_RET, BRANA	13.000.000	2
55	269	for the Mura and Upper Drava	41	Bistra	KKC	Virje	Construction of the retention Miholjanec on the stream Zdelja	JEZ_RET, BRANA	10.400.000	2
56	272	for the Mura and Upper Drava	41	Bistra	KKC	Virje	Construction of the retention Anski on the stream Anski	JEZ_RET, BRANA	7.800.000	2
57	273	for the Mura and Upper Drava	41	Bistra	KKC	Kloštar Podravski	Construction of the retention Kozarevac on the stream Kozarevac	JEZ_RET, BRANA	3.900.000	2
58	274	for the Mura and Upper Drava	41	Bistra	KKC	Đurđevac	Construction of the retention Prugovac on the stream Suha Katalena	JEZ_RET, BRANA	6.500.000	2
59	289	for the Mura and Upper Drava	39	Plitvica- Bednja	KZC	Jesenje	Construction of a retention on the watercourse Očura	JEZ_RET	5.200.000	2
60	301	for the Mura and Upper Drava	49	Plitvica- Bednja	VC	Maruševac	Construction of the retention Grabušnica on the Plitvica River	JEZ_RET	6.500.000	2
61	294	for the Mura and Upper Drava	39	Plitvica- Bednja	KZC, VC	Jesenje, Bednja	Construction of the retention Šaša I (flood defence) on the stream Šaša	JEZ_RET	5.200.000	2
62	1023	for the Mura and Upper Drava	39	Plitvica- Bednja	VC	Veliki Bukovec	Construction of a sotrmwater canal of the settlement Kapela Podravska (0.6 km)	KORITO	700.000	2
63	1006	for the Mura and Upper Drava	36	Bistra	KKC	Drnje	Construction of the right Drava dike in the area of the settlement Drnje	NASIP	15.000.000	2
64	267	for the Mura and Upper Drava	36	Plitvica- Bednja	VC	Matrijanec	Reconstruction of the dike Zamlaka - Hrženica (0+000 - 6+500)	NASIP	26.000.000	2
65	303	for the Mura and Upper Drava	36	Bistra	KKC	Legrad	Construction of the right bank dike Botovo - Libanovec	NASIP	15.600.000	2
66	254	for the Mura and Upper Drava	36	Bistra	KKC	Gola	Revitalization of the Čambina (old Drava side channel)	JEZ_AKU, BRANA	2.000.000	2

Tab. 11.4 Identified projects of protection against adverse effects of water in the area of the Water Management Department for the Danube and Lower Drava

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
1	2105	for the Danube and Lower Drava	37	Baranja	OBC	Osijek	Regulation of the Drava River in Osijek – construction ongoing, completion in 2024	OBALA, REG.GRAĐEVINA,	120.000.000	I

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
2	2103	for the Danube and Lower Drava	44	Vuka	VSC	Vukovar	Regulation of the Vuka River in Vukovar from 0+000 to 3+640	OB_REG.GRAĐ_PRAG, NAS_IZMULJENJE_UST	25.125.000	1
3	331	for the Danube and Lower Drava	45	Vuka	VSC	Vukovar	Danube River – stabilization of its right bank from Vukovar to Vučedol (rkm 1328-1333)	STAB_OB	230.700.000	1
4	2010	for the Danube and Lower Drava	42	Županijski kanal	VPC	Slatina	Regulation of the streams Čadavica and Slanac (box culverts)	KANAL, OBALA, STEPENICA	1.945.000	1
5	339	for the Danube and Lower Drava	45	Vuka	VSC	Vukovar	Danube River – improvement of its right bank in Sotin, downstream of Vukovar - MSTI (the former agency conducts public procurement for works in 2020 – funding from the OPCC fund)	OB_PERA	46.000.000	1
6	2005	for the Danube and Lower Drava	46	Baranja	OBC	Popovac	Reconstruction of water facilities Gaj	USTAVA, KANAL	1.660.000	1
7	334	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Podgorač	Breznica – construction of a multipurpose reservoir (irrigation, recreation, fisheries, technological uses) near Našice	JEZ_AKU	33.000.000	1
8	2201	for the Danube and Lower Drava	37	Karašica - Vučica	OBC	Darda	Revitalization / restoration of the Drava side channel Halaševo	REVITALIZACIJA KORITA	15.550.000	1
9	349	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Našice	Lapovac 1 – construction of a multipurpose reservoir near Našice	JEZ_AKU	25.000.000	2
10	323	for the Danube and Lower Drava	44	Vuka	VSC	Vukovar	Construction of the multipurpose reservoir Dola (flood defence for settlements upstream of Vukovar, recreation, fisheries)	JEZ_AKU	17.500.000	2
11	2006	for the Danube and Lower Drava	37	Vuka	OBC	Petrijevci	Construction of a flood protection dike for the settlement Karašica	NASIP, USTAVA	7.000.000	2
12	2203	for the Danube and Lower Drava	37	Karašica - Vučica	OBC	OBC	Dike Sveti Đurađ - Viljevo	NASIP	8.130.000	2
13	2106	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Donja Motičina	Reservoir Gornja Motičina	JEZ_AKU, BRANA	18.750.000	2
14	2109	for the Danube and Lower Drava	37	Baranja	OBC	Osijek	Construction of the multipurpose hydrotechnical system Osijek – in designing stage	OB_AKU, BR_NAS REV_CS, UST_SIFON	2.609.000.000	2
15	342	for the Danube and Lower Drava	42	Županijski kanal	VPC	Suhopolje	Dabrovica – construction of a reservoir – dam on the stream Dabrovica – multipurpose economic facility (flood defence, irrigation, recreation) near Suhopolje	JEZ_AKU, BRANA	13.992.000	2
16	316	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Valpovo /Belišće /Petrijevci / Marijanci / Koška	Regulation of the Vučica River, basin improvement	NAS_OB_PRAG, PAR_GRAĐ_UST_MOST	109.570.000	2
17	2004	for the Danube and Lower Drava	45	Baranja	OBC	Draž	Reconstruction of the Danube dikes Gomboš and Batina	NASIP	16.000.000	2
18	350	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Našice / Donja Motičina	Seona - construction of a multipurpose reservoir (flood defence, recreation, irrigation, etc.) near Donja Motičina	JEZ_AKU	20.386.000	2
19	2021	for the Danube and Lower Drava	42	Županijski kanal	VPC	Virovitica	Regulation of the water regime in the Odenica basin for flood defence and other uses in the town Virovitica area	SLIV	24.500.000	2
20	335	for the Danube and Lower Drava	52	Vuka	VSC	Ilok	Drljan - construction of a reservoir in Ilok (Drlijanski potok), flood defence, irrigation, recreation	JEZ_AKU	15.000.000	2
21	336	for the Danube and Lower Drava	52	Vuka	VSC	Ilok	Drljan 1 - construction of a reservoir in Ilok (flood defence, irrigation, recreation)	JEZ_AKU	15.000.000	2
22	354	for the Danube and Lower Drava	43	Baranja	OBC	Feričanci / Donja Motičina / Đurđovac	Marjanac - construction of a reservoir (flood defence, irrigation, recreation) for protection of Orahovica from mountain flash floods	JEZ_AKU	26.000.000	2
23	2029	for the Danube and Lower Drava	46	Baranja	OBC	Bilje	Sub-centre for flood defence in the Danube region	KANAL, USTAVA, CS	12.000.000	2
24	2007	for the Danube and Lower Drava	43	Karašica - Vučica	VPC	Slatina	Reservoir / retention Stublovac	RETENCIJA	6.500.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_ Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
25	2020	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Voćin / Slatina	Reservoir / retention Sašika	AKUMULACIJA, KANAL	18.750.000	2
26	2108	for the Danube and Lower Drava	44	Vuka	OBC	Drenje	Reconstruction of the bottom outlet gate of the dam Borovik	OBALA, ISPUST	20.000.000	2
27	2023	for the Danube and Lower Drava	42	Županijski kanal	VPC	VPC	Rehabilitation of water facilities in the watercourse Županijski kanal	KANAL, USTAVA, OBALA	5.000.000	2
28	2026	for the Danube and Lower Drava	42	Županijski kanal	VPC	VPC	Regulation of the water regime in the watercourse Županijski kanal for flood protection and multipurpose use	KANAL, USTAVA, OBALA	22.000.000	2
29	319	for the Danube and Lower Drava	44	Vuka	OBC	Osijek	Kanal Petruš – basin regulation, canal, sluice, pumping station	KANAL, USTAVA, CS	38.167.000	2
30	337	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Našice	Darna - construction of a multipurpose reservoir (flood defence, irrigation, recreation) near Našice	JEZ_AKU	6.495.000	2
31	2028	for the Danube and Lower Drava	42	Županijski kanal	VPC	VPC	Regulation of the water regime in the watercourse Brana for flood defence and multipurpose use	KANAL, USTAVA, OBALA	15.000.000	2
32	340	for the Danube and Lower Drava	46	Baranja	OBC	Kneževi Vinogradi	Baranjska planina – construction of a multipurpose reservoir (flood defence, irrigation, recreation), Kneževi Vinogradi, Zmajevac	JEZ_AKU	5.987.000	2
33	341	for the Danube and Lower Drava	52	Vuka	VSC	Tompojevci	Lovas and Tompojevci - regulation of the water regime and use of rits	SLIV	40.127.000	2
34	2024	for the Danube and Lower Drava	42	Županijski kanal	VPC	VPC	Improvement of water facilities in the watercourse Lendava	KANAL, USTAVA, OBALA	1.000.000	2
35	2027	for the Danube and Lower Drava	42	Županijski kanal	VPC	VPC	Regulation of the water regime in the watercourse Lendava for flood defence and multipurpose use	KANAL, USTAVA, OBALA	50.000.000	2
36	325	for the Danube and Lower Drava	52	Vuka	VSC	Lovas	Opatovac – reconstruction of the outlet channel of the reservoir	KANAL	2.838.000	2
37	327	for the Danube and Lower Drava	46	Baranja	OBC	Petlovac	PS Bakanka - reconstruction, protection of the settlements Darda and Bilje	CS	2.413.000	2
38	356	for the Danube and Lower Drava	44	Vuka	OBC	Osijek, Čepin, Bizovac, Podgorač	Poganovačko - Kravički kanal, basin regulation	SLIV, DIKE, USTAVA, CS	20.000.000	2
39	360	for the Danube and Lower Drava	44	Vuka	OBC	OBC	Regulation of the water regime in the Vuka by the construction of sluices	SLIV	15.592.000	2
40	361	for the Danube and Lower Drava	46	Baranja	OBC	OBC	Regulation of the water regime of the Karašica in Baranja by the construction of sluices	USTAVA_JEZ	6.617.000	2
41	343	for the Danube and Lower Drava	43	Karašica - Vučica	VPC	Čačinci	Krajna – construction of a reservoir (flood defence, irrigation, recreation), Čačinci	JEZ_AKU	20.352.000	2
42	345	for the Danube and Lower Drava	37	Karašica - Vučica / Baranja	OBC	Petrijevci, Jagodnjak	Drava – rehabilitation and maintenance of the right bank (km 38-Nehaj), revitalisation	STAB_OB	7.500.000	2
43	2017	for the Danube and Lower Drava	46	Baranja	OBC	Kneževi Vinogradi	Reservoirs Divlja dolina	AKUMULACIJA, KANAL	1.500.000	2
44	2018	for the Danube and Lower Drava	46	Baranja	OBC	Kneževi Vinogradi	Improvement of the retention area of the torrential stream Zmajevac	RETENCIJA, KANAL	2.100.000	2
45	348	for the Danube and Lower Drava	42	Županijski kanal	VPC	VPC	Regulation of the water regime in the Čadavica - sluices, sills, reconstruction of existing retentions	RET, AKU, MOST, PRAG, KANAL	30.000.000	2
46	357	for the Danube and Lower Drava	46	Baranja	OBC	Draž	Revitalisation of Topoljski Dunavac, municipality Draž	KNL_JEZ	21.649.000	2
47	2022	for the Danube and Lower Drava	42	Županijski kanal	VPC	Virovitica	Regulation of the water regime in the Brežnica Orešaka basin for flood defence and multipurpose use	SLIV	50.000.000	2
48	2008	for the Danube and Lower Drava	43	Karašica - Vučica	OBC	Đurđenovac	Improvement of the flood protection system of the settlements Bokšić Lug and Bokšić	RETENCIJA, DIKE, USTAVA, KANAL	20.000.000	2
49	2011	for the Danube and Lower Drava	37	Baranja	OBC	Osijek	Reconstruction and extension of the dike and revetment - Zoo vrt	DIKE, OBALA	14.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_ Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
50	2036	for the Danube and Lower Drava	45	Dunav	OBC	Draž	Regulation of the Danube in Dalj from rkm 1352+500-1355+000 (protection against adverse effects of water, defence against ice, revitalisation)	OBALA, REG. GRAD., REVITAL.	250.000.000	2
51	2037	for the Danube and Lower Drava	45	Dunav	OBC	Erdut	Improvement of the Danube right bank in Aljmaš from rkm 1379+800 - 1380+400 (protection against adverse effects of water)	OBLALA	25.000.000	2
52	2040	for the Danube and Lower Drava	45	Dunav	VSC	Ilok	Improvement of the Danube bank in Šarengrad rkm 1306+500 - 1307+000 - continued construction of the revetment in the upstream part (protection against adverse effects of water)	OBALA,	30.000.000	2
53	2034	for the Danube and Lower Drava	37	Drava i Dunav	OBC/VSC/VPC	OBC/VSC/VPC	Reconstruction of defensive dikes in the defended area B.34 - the Lower Drava and Danube	NA DIKE SIP	500.000.000	2
54	2016	for the Danube and Lower Drava	52	Vuka	VSC	Ilok	Retetion Mala Kanjiža	RETENCIJA, KANAL	7.500.000	2
55	2015	for the Danube and Lower Drava	44	Vuka	OBC	Drenje	Execution of a new Vuka riverbed in the area of the cadastral municipality Bučje	KANAL, OBALA, USTAVA	24.500.000	2
56	344	for the Danube and Lower Drava	42	Županijski kanal	VPC	Suhopolje	Dabroviča – construction of a relief channel	KANAL	5.181.000	2
57	359	for the Danube and Lower Drava	44	Vuka	VSC	Tordinci	Revitalisation of Antinski prokop	USTAVA, KANAL, JEZ	8.583.000	2
58	2033	for the Danube and Lower Drava	37	Baranja	OBC	Darda	Rehabilitation of a waste disposal site on the left Drava bank near the corridor VC - rkm 32	OBALA,	5.500.000	2
59	2043	for the Danube and Lower Drava	45	Dunav	OBC	Erdut	Improvement of the right Drava bank downstream of the settlement Aljmaš rkm 1375+000 - 1378+000 (Staklara)	OBALA,	120.000.000	2
60	314	for the Danube and Lower Drava	37	Županijski kanal	VPC	VPC	Dike Terezino polje - Vrbovka, dike Noskovci - Sopje and retarding dike along the Županijski kanal, dike reconstruction	DIKE	38.978.000	2
61	315	for the Danube and Lower Drava	37	Karašica - Vučica	OBC	OBC	Dike Zabara - Hobod, dike Donji Mihojaci - Sveti Đurađ and dike Beliše - Nard, dike reconstruction	DIKE	9.701.000	2
62	2038	for the Danube and Lower Drava	45	Baranja	OBC	Draž	Construction of the connecting defensive dike Zmajevac - Goboš (Batina)	DIKE	45.000.000	2
63	2041	for the Danube and Lower Drava	37	Drava	OBC	Beliše	Construction of a revetment on the right Drava bank from rkm 66+000 - settlement Gat	OBALA	25.000.000	2
64	2042	for the Danube and Lower Drava	37	Drava	OBC	Beliše	Construction of a revetment on the right Drava bank in Bistrinci from rkm 57+000 - 58+000	OBALA	25.000.000	2
65	2014	for the Danube and Lower Drava	44	Vuka	OBC	Punitovci	Construction of a flood defence system for the settlement Punitovci	KANAL, OBALA, USTAVA	5.000.000	2
66	2039	for the Danube and Lower Drava	45	Dunav	OBC	Ilok	Construction of a defensive dike along the Danube in Ilok	DIKE	45.000.000	2
67	2019	for the Danube and Lower Drava	46	Baranja	OBC	Bilje	Sluice Stara Drava in Bilje	USTAVA, KANAL	1.500.000	2
68	2035	for the Danube and Lower Drava	45	Dunav	OBC	Draž	Improvement and protection of Zeleni otok in the Danube – rehabilitation of the parallel facility in the Danube from rkm 1423+250 to 1424+200 and revitalisation of a Danube side channel from rkm 1421+500 to 1423+370	REGULACIJA GRAĐEVINA, REVITALIZACIJA	20.000.000	2
69	2032	for the Danube and Lower Drava	45	Baranja	OBC	Draž	Retarding dike along the Karašica in Batina – confluence with the Danube	DIKE, OBALA, KANAL	12.000.000	2
70	2013	for the Danube and Lower Drava	37	Vuka	OBC	Osijek	The sluice Stara Drava in Josipovac with a plateau for a mobile pump	KANAL, OBALA, USTAVA	6.000.000	2
71	332	for the Danube and Lower Drava	45	Baranja	OBC	Draž	Batina - construction of a revetment, the Karašica confluence with the Danube	OB_UTV	3.000.000	2
72	2030	for the Danube and Lower Drava	52	Vuka	VSC	Vukovar	Water management improvement and revitalisation of reservoir area of rit Grabovo near the Ovcara Memorial	AKUMULACIJA, KANAL	5.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
73	351	for the Danube and Lower Drava	37	Baranja	OBC	Petlovac	Boroš Drava – ecological revitalisation of the Boroš Drava area, sluice	USTAVA	538.000	2
74	352	for the Danube and Lower Drava	37	Baranja	OBC	Petlovac	Boroš jezero – a bridge - ecological revitalisation of the Boroš Drava	MOST	3.184.000	2
75	353	for the Danube and Lower Drava	37	Baranja	OBC	Petlovac	Boroš Drava - ecological revitalisation of the Boroš Drava area, mud removal	JEZ	4.186.000	2
76	2107	for the Danube and Lower Drava	37	Baranja	OBC	Osijek	Revitalisation / restoration of Biljski rit (Stara Drava) – continuation of the INTERREG IPA project "Wetland / Restore"	RIVERBED REVITALISATION	50.000.000	2
77	2031	for the Danube and Lower Drava	37	Baranja	OBC	Osijek	Improvement and revitalisation of Otok ljubavi in Osijeku, left Drava bank rkm 22	OBALA	7.500.000	2
78	2202	for the Danube and Lower Drava	45	Karašica - Vučica	OBC	Kneževi Vinogradi, Draž	Restoration of the old Danube course - Zmajevački Dunavac - continuation of the INTERREG IPA project "Wetland / Restore"	RIVERBED REVITALISATION	62.500.000	2
79	355	for the Danube and Lower Drava	45	Baranja	OBC	Bilje	Kopački rit – water regime regulation – revitalisation of habitats	SLIV	33.045.000	2

Tab. 11.5 Identified projects of protection against adverse effects of water in the area of the Water Management Department for the Upper Sava

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
1	3020	for the Upper Sava	28	Zelina - Lonja	ZC	Brckovljani	Construction of the syphon Kosač in the connecting canal	SIFON	3.100.000	1
2	121	for the Upper Sava	28	Zelina - Lonja	ZC	Vrbovec	Construction of the retention Vir on the watercourse Zlenin in the town of Vrbovec area	JEZ_RET	8.700.000	1
3	3012	for the Upper Sava	20	Zagrebačko prisavlje	ZC	Zagreb	Construction of a transversal dike from the relief canal Odra to the Sava dike – extension of the flood defence system of the City of Zagreb	DIKE	45.300.000	1
4	129	for the Upper Sava	26	Zagrebačko prisavlje	ZC	Sveta Nedjelja	Stream Goštiraj - Sveta Nedjelja	RIVERBED	20.800.000	1
5	3001	for the Upper Sava	27	Zagrebačko prisavlje	City of ZG	Zagreb	Regulation of the stream Čnomerec	RIVERBED	15.105.000	1
6	3021	for the Upper Sava	28	Zelina - Lonja	ZC	Vrbovec	Construction of the syphon Poljanski Lug	SIFON	6.785.000	1
7	111	for the Upper Sava	26	Zagrebačko prisavlje	ZC	Samobor	Construction of the retention Lipovečka Gradna – a fill barrier and a retention for flood defence of the Samobor area	JEZ_RET, BARRIER	23.000.000	1
8	120	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Rugvica	Sava (left bank) – reconstruction of the left-bank dike Hrušč žica - Dubrovčak	DIKE	25.000.000	1
9	122	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Orle	Sava (right bank) – reconstruction of the dike between the settlements Drnek - Suša, including the construction of four revetments	DIKE, OB_UT	165.000.000	1
10	126	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Velika Gorica	Sava - construction of a sill in the Sava riverbed at Novaki Šćitarjevski	PRAG	17.500.000	1
11	3003	for the Upper Sava	28	Zelina - Lonja	ZC	Dugo Selo	Regulacija and improvement of the canal Puhovec - PS Dugo Selo	RIVERBED, CS	7.965.000	1
12	119	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Zaprešić	Construction of the left Sava dike in the Zaprešić area (from the Sutla River to the Krapina River)	DIKE	50.540.000	1
13	3004	for the Upper Sava	26	Zagrebačko prisavlje	ZC	Samobor	Construction of a retention in the stream Bregana basin	JEZ_RET, BARRIER	31.000.000	1

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
14	124	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Samobor	Rakovica – reconstruction of the right retarding dike	DIKE	15.856.000	1
15	3006	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Zagreb	Reconstruction of the left Sava bank on the stretch Jadranski most - Jarun (L=3000 m) from 704+000 to 707+000	DIKE	30.000.000	1
16	3007	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Zagreb	Reconstruction of the right Sava bank on the stretch weir Jankomir - Jarun (L=1400 m) from 707+700 to 709+100	DIKE	10.000.000	1
17	3008	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Zagreb	Reconstruction of the right Sava bank on the stretch Most slobode - Jadranski most (L=1400 m) from 700+500 to 701+900	DIKE	10.000.000	1
18	114	for the Upper Sava	25	Krapina - Sutla	KZC	Donja Stubica	Construction of the retention Reka with pertaining facilities on the watercourse Reka in Donja Stubica area for flood protection of the downstream area and Stubičke Toplice	JEZ_RET	10.000.000	1
19	115	for the Upper Sava	48	Krapina - Sutla	KZC	Hum na Sutli	Regulation of the Sutla riverbed in a 900 m long section near Hum na Sutli, with the removal of the old bridge and the construction of a new one for flood protection of the settlement centre	RIVERBED	7.010.000	1
20	105	for the Upper Sava	24	Zagrebačko prisavlje	City of ZG	Zagreb	Sava – sills in the Sava riverbed, section Ivanja Reka - Jarun (6 sills)	PRAG	135.000.000	1
21	3022	for the Upper Sava	28	Zelina - Lonja	ZC	Vrbovec	Lonja River, Negovec 9+750-10+170	KORITO	6.440.000	2
22	3023	for the Upper Sava	28	Zelina - Lonja	ZC	Sveti Ivan Zelina / Rakovec	Lonja River, Mlaka 12+079-12+504	KORITO	4.880.000	2
23	3010	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Zagreb	Reconstruction of the weir Jankomir - extension of the flood defence system of the City of Zagreb	PRELJEV	18.000.000	2
24	3011	for the Upper Sava	24	Zagrebačko prisavlje	ZC	Zagreb	Construction of a sill in the Sava River downstream of the weir Jankomir - extension of the flood defence system of the City of Zagreb	PRAG	20.000.000	2
25	3005	for the Upper Sava	26	Zagrebačko prisavlje	ZC	Samobor	Regulation of the watercourse Lipovecka Gradna from 0+000 to 9+000	KORITO	6.000.000	2
26	116	for the Upper Sava	25	Krapina - Sutla	KZC	Donja Stubica	Construction of the retention Slani Potok – flood protection of Donja Stubica and Stubičke Toplice downstream areas	JEZ_RET	17.520.000	2
27	110	for the Upper Sava	28	Zelina - Lonja	VC	Visoko	Construction of the reservoir Presečno with pertaining facilities on the Presečno tributary of the Lonja River, reconstruction of the county and local roads, flood defence, improvement of small watercourses	JEZ_AKU	34.370.000	2

Tab. 11.6 Identified projects of protection against adverse effects of water in the area of the Water Management Department for the Middle and Lower Sava

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
1	4200	for the Middle and Lower Sava	32	Bid - Bosut, Brodska posavina, Šumetlica-Crnac	VSC-BPC	Drenovci, Gunja-Davor, Vrbje	Modernisation of the left Sava dikes from Račinovci to Nova Gradiška	DIKE	370.000.000	1
2	60	for the Middle and Lower Sava	24	Lonja-Trebež	SMC	Popovača	Reconstruction of the protection system of the settlements Donja Jelenska and Zapolic from flooding of the Sava and stream Vlahinička by phased construction	KORITO, DIKE	21.506.000	1
3	4005	for the Middle and Lower Sava	54	Lonja-Trebež	SMC	Kutina	Reconstruction of the Sava dike in Dubrovčak Lijevi in the length of about 2.5 km	DIKE	12.625.000	1

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
4	78	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Nova Rača, Veliki Grdevac	Construction of sills in the Česma, Severinska and Lipova riverbeds for stabilisation of the riverbeds and regulation of low-water level regimes	KORITO, BARRIER	2.422.000	1
5	9	for the Middle and Lower Sava	19	Kupa	KC	Ogulin	Construction of the retention Ogulin, a dam with pertaining facilities on the watercourse Ogulinska Dobra in the area of the settlement Turkovići near Ogulin for flood defence of Ogulin	JEZ_RET	54.779.050	1
6	40	for the Middle and Lower Sava	33	Brodsko posavina	BPC	Orlovac	Regulation of the Orlava with the construction of dikes and a protective wall on its left bank in the Ciglenik and Bečica area, km 8+717 - 9+400	DIKE, OB_UT, KORITO	4.010.000	1
7	58	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Construction of the left Kupa dike upstream of the railway bridge in Karlovac to Brodarac from km 137+450 to km 144+300, a continuation of the construction of the left Kupa dike from km 4+689,41 to km 6+772,50 in Phase III of the construction	DIKE	11.710.000	1
8	61	for the Middle and Lower Sava	35	Bid - Bosut	VSC	Račinovci	Construction of the PS Teča on the Sava near Račinovci	CS	18.675.000	1
9	4011	for the Middle and Lower Sava	20	Kupa	KC	Karlovac, Barilović	Construction of a dike along the right Mrežnica bank and along the left and right Korana banks for the protection of the settlements Logorište, Mala Švarča and Turanjski Poloj	DIKE, ZID	40.000.000	1
10	4104	for the Middle and Lower Sava	50	Banovina	SMC	Topusko, Velika Vranovina	Protection of the settlements Topusko and Velika Vranovina on the left and right Glin banks	DIKE, ZID, OBALOUTVRDA	6.000.000	1
11	4018	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Reconstruction of a stone wall on the right Kupa bank in Obala V. Mažuranića St. In Karlovac	KAMENI ZID, OBALOUTVRDA	13.500.000	1
12	80	for the Middle and Lower Sava	24	Banovina	SMC	Sunja	Works performance on the "Reconstruction of a barrier in the Sunja riverbed in Četvrtkovac"	BARRIER	8.100.000	1
13	4028	for the Middle and Lower Sava	30	Ilova - Pakra	PSC	Toplica	Regulation of the stream Toplica in Daruvar with dike construction	KORITO, DIKE	10.812.500	1
14	4035	for the Middle and Lower Sava	24	Subocka - Strug	SMC	Sava	Rehabilitation of the right Sava bank in Uštica from km 0+350 to km 1+250	DIKE	2.626.830	1
15	4022	for the Middle and Lower Sava	22	Kupa	ZGC	Klinača Sela	Construction of a box culvert on the stream Kupinec	BOX CULVERT	500.000	1
16	28	for the Middle and Lower Sava	53	Lonja-Trebež	SMC	Kutina	Construction of the reservoir Polojac, a dam with pertaining facilities on the watercourse Polojac, left tributary of the Kutinica, for flood defence, improvement of small watercourses downstream, and irrigation	JEZ_AKU	14.643.000	1
17	4008	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Reconstruction of the drainage facilities of the left Kupa backshore from the settlement Selce to Rečica	KANAL, CS	200.000.000	1
18	4010	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Construction of dikes along the Korana left and right banks and the Mrežnica left bank, and the regulation of the stream Sajevac for protection of the settlements Mostanje and Turanjski Lug	DIKE, ZID	40.000.000	1
19	27	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Construction of the left Kupa dike, revetment and protective wall from the settlement Selce to Rečica on the Kupa section from rkm 123+552-rkm 135+415 in five construction phases for flood protection of the settlements Selce, Gradac, Mekušje and Husje	DIKE, ZID, STAB_OB	34.387.000	1

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
20	4007	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Construction of the right Kupa dike from Brodarci to the brewery in the length of 5.7 km	DIKE, ZID, CS	25.000.000	1
21	67	for the Middle and Lower Sava	20	Banovina	SMC	Sisak - Staro Pračno	Reconstruction of the left Kupa dike in the section Pračno - Stara Drenčina (Phase 2 from km 2+400 to km 10+825)	DIKE	42.000.000	1
22	4102	for the Middle and Lower Sava	24	Banovina	SMC	Martinska Ves	Construction of a revetment on the left Sava bank in Luka Lijevo	OBALOUTVRDA	4.000.000	1
23	96	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Construction of a revetment on the left Sava bank in Galdovo	OB_UT	13.533.000	1
24	69	for the Middle and Lower Sava	22	Kupa	KC	Draganić	Regulation of the stream Črnac in Draganić from rkm 0+000 to rkm 2+900	KORITO	3.477.000	1
25	8	for the Middle and Lower Sava	34	Brodsko-posavska	BPC	Slavonski Brod	Retention Glogovica	JEZ_RET	35.727.250	1
26	6	for the Middle and Lower Sava	24	Banovina	SMC	Martinska Ves	Construction and reconstruction of the dike and protective wall on the right Sava bank upstream of Sisak, from km 32+400-km 34+705.42, in the Sava section Željezno Desno - Dubrovčak Desni, rkm 643+500-rkm 645+800	DIKE	7.534.000	1
27	4004	for the Middle and Lower Sava	54	Kupa	KAC	Karlovac	Stabilisation of the left Dobra bank in Grdun – of common interest with HEP	KORITO, KANAL	2.400.000	1
28	72	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Reconstruction of the bridge above the outlet canal of the weir Palanijek and access ramps of the road Hrastelnica - Palanijek	KORITO, MOST	2.567.000	1
29	4013	for the Middle and Lower Sava	20	Kupa	KC, ZGC	Karlovac, Draganić, Pisarovina	Reconstruction of the dike on the canal Kupa-Kupa	DIKE	25.000.000	1
30	17	for the Middle and Lower Sava	31	Šumetlica-Crnac	BPC	Rešetari	Construction of the reservoir Rešetarica, a dam with pertaining facilities on the watercourse Rešetarica for purposes of flood defence, improvement of small watercourses downstream and irrigation	JEZ_AKU, BRANA	23.530.000	1
31	23	for the Middle and Lower Sava	53	Lonja-Trebež	SMC	Kutina	Regulation of the watercourse Kutinica from rkm 10+374 to rkm 13+511 in the area of the town Kutina	KORITO	2.140.000	1
32	25	for the Middle and Lower Sava	31	Šumetlica-Crnac	BPC	Cernik	Construction of a weir facility in the riverbed of the watercourse Šumetlica, a bridge across the connecting canal Šumetlica - Rešetarica on the road Cernik - Šumetlica and finalisation of the excavation of the connecting canal in the length of about 150 m for the purpose of transporting a part of the Šumetlica water to the Rešetarica	KORITO, PRELJEV, MOST	4.985.000	1
33	66	for the Middle and Lower Sava	31	Šumetlica-Crnac	BPC	Rešetari	Regulation of the watercourse Rešetarica in Rešetari by the construction of a new cutoff from km 12+870 to km 13+505	KORITO	2.000.000	1
34	79	for the Middle and Lower Sava	31	Šumetlica-Crnac	BPC	Cernik	Regulation of the watercourse Rešetarica in the section from km 2+749,40 to km 2+800,90 with the construction of a bridge in km 2+749,00 on the road Bačin Dol - Cernik	KANAL, MOST	2.000.000	1
35	73	for the Middle and Lower Sava	24	Lonja-Trebež	SMC	Kutina	Construction of the right Ilova dike in the section of about 4200 m length from the Kutinica confluence upstream to the motorway	DIKE	4.700.000	1

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36	4055	for the Middle and Lower Sava	41	Česma - Glogovnica	BBC	Kapela	Regulation of the watercourse Jabučeta from 0+000 to 1+700 in the settlement Jabučeta	OBALOUTVRDA, KANAL	600.000	1
37	4030	for the Middle and Lower Sava	24	Subocka - Strug	SMC	Sava	Reconstruction of the left Sava dike in the section Košutarica - Jasenovac from km 24.4 to 35.6 (11.2 km)	DIKE	20.000.000	1
38	4037	for the Middle and Lower Sava	20	Banovina	SMC	Sisak	Odransko polje – construction of a dike about 6.8 km long, boundary canal and pumping station for the protection of the settlements Greda - Sela - Stupno from flooding of the retention Odransko polje	DIKE, KANAL, CS	34.660.000	1
39	4039	for the Middle and Lower Sava	20	Banovina	SMC	Sisak	Reconstruction and construction of the right Odra dike, Odra Sisačka - Žabno – Stupno, in the length of about 7.2 km	DIKE, ZID,	34.655.000	1
40	4036	for the Middle and Lower Sava	20	Banovina	SMC	Martinska Ves	Odransko polje – construction of the eastern dike of the retention Odransko polje Tišina Kaptolska - Suša in the length of about 14.5 km	DIKE, KANAL	67.700.000	1
41	4038	for the Middle and Lower Sava	20	Banovina	SMC	Lekenik	Odransko polje - reconstruction and construction of a dike for the protection of the settlement Lekenik, left and right dike in the total length of about 10.8 km	DIKE, ZID	29.876.000	1
42	4029	for the Middle and Lower Sava	24	Subocka - Strug	SMC	Sava	Reconstruction of the left Sava dike in Mlaka from km 0 to km 12,100	DIKE	20.000.000	1
43	4045	for the Middle and Lower Sava	20	Banovina	SMC	Petrinja	Construction of protection and regulation water facilities on the right Kupa bank Nova Drenčina - Moščenica in the length of about 3.0 km, a boundary channel and a pumping station	DIKE, KANAL, CS	38.000.000	1
44	64	for the Middle and Lower Sava	34	Brodsko posavina	BPC	Slavonski Brod	Construction of a sluice and pumping station on the stream Glogova and reconstruction of the pertaining section of the Sava defensive dike in the zone of Luka Brod (Port)	CS, USTAVA, DIKE	7.170.000	1
45	16	for the Middle and Lower Sava	33	Orjava-Londža	PSC	Požega	Construction of the reservoir Kamensko, a dam with pertaining facilities on the watercourse Brzaja, a left tributary of the Orjava, for flood defence, improvement of small watercourses downstream, irrigation and water supply	JEZ_AKU, BRANA	20.410.000	1
46	4023	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Reconstruction of the stone wall and right Kupa bank in Gaza in Karlovac	KAMENI ZID, OBALOUTVRDA	2.000.000	1
47	4042	for the Middle and Lower Sava	20	Banovina	SMC	Lekenik, Petrinja	Construction of protection and regulation water facilities on the left Kupa bank, settlements Stari Brod - Letovanić - Žažina - Mala Gorica, in the length of about 11.0 km	DIKE, ZID, OBALOUTVRDA	120.000.000	1
48	4105	for the Middle and Lower Sava	32	Bid - Bosut	VSC	Štitar	Rehabilitation of a rockfall on the Sava left bank by the construction of a revetment from rkm 275+770 to rkm 276+277 in the village Štitar, Phase II	OBALOUTVRDA	31.250.000	1
49	4019	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Protection of the settlements from Šišljavić to Lijeva Pokupska from flooding of the Kupa River	DIKE	50.000.000	1
50	4047	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Rehabilitation of the Sava left bank by the construction of a revetment Sanacija in rkm 577 in Kratečko in the length of about 400 m	OBALOUTVRDA	8.000.000	1
51	4304	for the Middle and Lower Sava	21	Kupa	KC	Vojnić	Flood protection of the settlement Vojnić (regulation of the Radonja and Vojišnica through Vojnić)	DIKE	20.000.000	1

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52	57	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Stefanje	Regulation of the Česma riverbed and construction of dikes on its both banks from rkm 38+850 to rkm 46+591, section Siščani - Narta	KORITO, NASIP	6.154.155	1
53	4103	for the Middle and Lower Sava	24	Banovina	SMC	Lipovljani	Protection of the settlement Kraljeva Velika	NASIP	4.000.000	1
54	47	for the Middle and Lower Sava	22	Kupa	KC	Jastrebarsko-Draganić	Construction of the connecting canal Stojnica - Kupčina and regulation of the Stojnica from the sluice to the distribution facility on the Kupčina in Franetići	KORITO, KANAL	28.378.000	1
55	4053	for the Middle and Lower Sava	29	Česma - Glogovnica	KKC	Križevci	Rehabilitation by geodetic works on the left and right banks - the revetment Glogovnica in Križevci from 26+200 to 26+280	OBALOUTVRDA	1.200.000	1
56	71	for the Middle and Lower Sava	34	Brodsko posavina	BPC	Brodski Stupnik	Construction of the reservoir Razliv, a dam with pertaining facilities on the watercourse Razliv near Sl. Brod for flood protection and irrigation	JEZ_AKU	5.000.000	1
57	4301	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Drainage of the canal 1.1 basin in Novi centar in Karlovac	KANAL	500.000	1
58	4316	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Regulation of the canal Mostanje in Karlovac	KORITO	1.500.000	1
59	4315	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Regulation of the stream Švarča in Karlovac	KORITO	3.000.000	1
60	48	for the Middle and Lower Sava	30	Ilova - Pakra	BBC	Sirač	Regulation of the watercourse Bijela with the construction of a relief canal for floodwater and regulation of the existing riverbed from km 25+474 to km 28+411 in Sirač for the purpose of flood protection	KORITO, KANAL	9.737.000	1
61	51	for the Middle and Lower Sava	22	Kupa	KC	Jastrebarsko	Construction of a chute in the riverbed of the watercourse Kupčina at the railway bridge and the regulation of the Kupčina from km 0+530 to km 0+805 for the purpose of the riverbed regulation	CHUTE	1.436.000	1
62	4041	for the Middle and Lower Sava	20	Banovina	SMC	Lekenik	Construction of protection and regulation water facilities on the left Kupa bank in the settlement Brkiševina about 2.0 km long	NASIP, ZID, OBALOUTVRDA	11.600.000	1
63	4032	for the Middle and Lower Sava	30	Ilova - Pakra	PSC	Pakra	Protection of the town Pakrac from flash floods	RET_ KANAL	5.000.000	1
64	4033	for the Middle and Lower Sava	30	Ilova - Pakra	PSC	Pakra	Protection of the right bank in the town Pakrac from flash floods	KANAL	4.600.000	1
65	4054	for the Middle and Lower Sava	29	Česma - Glogovnica	KKC	Križevci	Rehabilitation by performing geodetic works on the left and right bank – revetment Glogovnica in Majurec in 31+600	OBALOUTVRDA	1.200.000	1
66	4303	for the Middle and Lower Sava	21	Kupa	KC	Karlovac	Flood protection of a part of the settlement Turanjski Goljaci in Karlovac	NASIP	2.000.000	1
67	4031	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Ivanska	Construction of the reservoir Samarica	AKUMULACIJA	45.000.000	1

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
68	4307	for the Middle and Lower Sava	54	Kupa	KC	Ozalj	Protection of a part of the settlement Priselci from the Dobra floods	NASIP	1.500.000	1
69	39	for the Middle and Lower Sava	23	Banovina	SMC	Hrvatska Kostajnica	Protection of Hrvatska Kostajnica from the Una floods	OB_UT, NASIP, ZID	18.400.000	1
70	10	for the Middle and Lower Sava	24	Subocka - Strug	SMC	Jasenovac	Rehabilitation of the left Sava bank by the construction of a revetment in the section from rkm 498+961 to rkm 499+761 in the settlement Mlaka for the purpose of the bank stabilisation	OB_UT, STAB_OB	14.402.000	1
71	38	for the Middle and Lower Sava	20	Banovina	SMC	Lekenik	Construction of the retention Burdelj, a dam with pertaining facilities on the watercourse Burdeljski potok in the area of the settlement Peščenica in the SMC for the purpose of flood defence	JEZ_RET	5.042.000	1
72	4048	for the Middle and Lower Sava	50	Banovina	SMC	Topusko	Construction of the retention Kalanjevac, a dam with pertaining facilities on the stream Kalanjevac in the area of the settlement Topusko for the purpose of flood defence	BRANA, CESTA	3.500.000	1
73	20	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Construction of the cutoff Korana-Kupa with inlet and outlet sluices	NASIP, PROKOP, USTAVA, KANAL	40.000.000	1
74	37	for the Middle and Lower Sava	30	Ilova - Pakra	BBC	Đulovac	Construction of the retention Miletinac, a dam with pertaining facilities on the Ilova River near the settlement Mali Miletinac for purposes of flood defence, improvement of small watercourses downstream and irrigation	JEZ_RET	41.723.000	1
75	4016	for the Middle and Lower Sava	19	Kupa	KC	Ogulin	Regulation of the stream Ratković in Ogulin	KORITO	500.000	1
76	4017	for the Middle and Lower Sava	22	Kupa	ZGC	Jastrebarsko	Regulation of the stream Brebrovac in Čegljje	KORITO	500.000	1
77	4034	for the Middle and Lower Sava	23	Subocka - Strug	SMC	Una	Rehabilitation of the left Una dike – a wall from km 5+109,50 to km 5+965	NASIP	3.000.000	1
78	70	for the Middle and Lower Sava	24	Banovina	SMC	Martinska Ves	Reconstruction of the right Sava dike in the section from km 22+700 to km 24+370 between the settlements Martinska Ves (Desna) and Ljubljana	NASIP, ZID, CESTA	7.534.000	1
79	95	for the Middle and Lower Sava	20	Kupa	ZGC	Jastrebarsko	Reconstruction of the canal Znanovit - Brebernica	KANAL	1.000.000	1
80	86	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Reconstruction of the left Sava dike downstream of the sluice Trebež to the bridge on the watercourse Trebež from km 58+324 - 59+700	NASIP	3.500.000	1
81	14	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Construction of the node Brodarci with pertaining dikes on the Kupa and Dobra in two construction stages for the purpose of the water regime regulation in the Karlovac area	BRANA, PRELJEV, NASIP	33.670.000	1
82	4025	for the Middle and Lower Sava	35	Biđ - Bosut	VSC	Vinkovci	Regulation and stabilisation of the Bosut banks in Vinkovci	KORITO, STAZE	10.000.000	1
83	4012	for the Middle and Lower Sava	20	Kupa	ZGC	Jastrebarsko	Reconstruction of a dike around the Crna Mlaka fish ponds in the retention Kupčina	NASIP	10.000.000	1

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
84	18	for the Middle and Lower Sava	20	Kupa	ZZ	Pisarovina	Construction of the eastern dike of the retention Kupčina	NASIP	7.000.000	1
85	19	for the Middle and Lower Sava	20	Kupa	ZC	Pisarovina	Construction of sluices for water distribution in the stretch from the canal Kupa - Kupa to the retention Kupčina	USTAVA, KANAL	30.000.000	1
86	41	for the Middle and Lower Sava	24	Banovina	SMC	Sisak-Martinska Ves	Reconstruction of the right Sava dike through the settlements Sisak - Bok Palanječki - Strelečko - Tišina Desna from km 5+370 to km 13+581	NASIP	10.202.000	1
87	82	for the Middle and Lower Sava	35	Bid - Bosut	VSC	Stari Jankovci	Regulation of the watercourse Boris – confluence of the watercourse Boris (in km 9+250) into the Bosut River (in km 55+035)	KORITO, KANAL	6.950.000	1
88	68	for the Middle and Lower Sava	32	Bid - Bosut	VSC	Županja	Rehabilitation of the left Sava bank in Županja from rkm 270+500 to rkm 271+311 by the construction of a revetment	OB_UT	13.498.000	1
89	4021	for the Middle and Lower Sava	18	Kupa	KC	Bosiljevo	Reconstruction of the waterfall on the Kupa River in Pribanjci	BARRIER IN THE RIVERBED	4.000.000	1
90	4020	for the Middle and Lower Sava	18	Kupa	KC	Kamanje	Reconstruction the waterfall on the Kupa River in Orjakovo	BARRIER IN THE RIVERBED	2.000.000	1
91	4311	for the Middle and Lower Sava	24	Banovina	SMC	Sunja	Reconstruction of the right Sava dike from km 0+000 to 10+050, from the settlement Selište sunjsko to Gradusa – Phase II	NASIP	10.000.000	2
92	4024	for the Middle and Lower Sava	22	Kupa	ZGC	Žumberak	Construction of a retention and a reservoir in the Kupčina basin	BRANE, JEZERA	10.000.000	2
93	4201	for the Middle and Lower Sava	30	Ilova - Pakra	PSC	Pakrac	Regulation of the Pakra River from km 45+982 to km 47+750 in the cadastral municipality Kusonje in the area of the town Pakrac	KORITO	11.250.000	2
94	4009	for the Middle and Lower Sava	21	Kupa	KC	Barilović, Krnjak, Slunj	Construction of the reservoir Lučica on the Korana River	AKUMULACIJA S PRATEĆIM OBJEKTIMA	100.000.000	2
95	35	for the Middle and Lower Sava	24	Subocka - Strug	SMC	Jasenovac	Rehabilitation of the left Sava bank near the settlements Jasenovac and Drenov Bok by the construction of a revetment for the purpose of the riverbank stabilisation	OB_UT, STAB_OB	10.000.000	2
96	52	for the Middle and Lower Sava	30	Lonja-Trebež	SMC	Kutina (Međurić) -Garešnica (V. Vukovje)	Construction of the left Ilova dike in the area of the settlements Međurić and Veliko Vukovje near Kutina	NASIP	3.000.000	2
97	42	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Reconstruction of the left Korana dike between the wooden bridge and the pontoon bridge in Karlovac	NASIP	2.099.000	2
98	4320	for the Middle and Lower Sava	33	Orjava-Londža	PSC	Požega	Protection of the town Požega against flash floods from Mt. Požeška gora	JEZ_RET, JEZ_AKU, BRANA, KANAL	100.000.000	2
99	4056	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Grubišno Polje/Veliki Grđevac	Construction of the reservoir Grbavac	AKUMULACIJA S PRATEĆIM OBJEKTIMA	41.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
100	4057	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Grubišno Polje	Construction of the reservoir Kreševine	AKUMULACIJA S PRATEĆIM OBJEKTIMA	15.000.000	2
101	4058	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Veliki Grđevac	Construction of the reservoir Topolovica	AKUMULACIJA S PRATEĆIM OBJEKTIMA	12.500.000	2
102	4059	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Nova Rača, Šandrovac	Construction of the reservoir Bedenička	AKUMULACIJA S PRATEĆIM OBJEKTIMA	20.000.000	2
103	4060	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Šandrovac	Construction of the reservoir Ravneš	AKUMULACIJA S PRATEĆIM OBJEKTIMA	58.000.000	2
104	4061	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Šandrovac	Construction of the reservoir Lazarevac	AKUMULACIJA S PRATEĆIM OBJEKTIMA	55.000.000	2
105	4062	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Severen	Construction of the reservoir Severin	AKUMULACIJA S PRATEĆIM OBJEKTIMA	56.000.000	2
106	4063	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Bjelovar	Construction of the reservoir Ciglena	AKUMULACIJA S PRATEĆIM OBJEKTIMA	77.000.000	2
107	4064	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Bjelovar	Construction of the reservoir Tomaška	AKUMULACIJA S PRATEĆIM OBJEKTIMA	36.000.000	2
108	4066	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Kapela	Construction of the reservoir Starčevljani	AKUMULACIJA S PRATEĆIM OBJEKTIMA	50.000.000	2
109	4067	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Rovišće	Construction of the reservoir Rovišće	AKUMULACIJA S PRATEĆIM OBJEKTIMA	40.000.000	2
110	4068	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Veliki Grđevac, Velika Trnovitica	Construction of the reservoir Mala Trnovitica	AKUMULACIJA S PRATEĆIM OBJEKTIMA	32.000.000	2
111	4069	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Velika Trnovitica	Construction of the reservoir Velika Trnovitica	AKUMULACIJA S PRATEĆIM OBJEKTIMA	24.000.000	2
112	4070	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Velika Trnovitica, Berek	Construction of the reservoir Krnjača	AKUMULACIJA S PRATEĆIM OBJEKTIMA	46.000.000	2
113	4071	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Berek	Construction of the reservoir Ruškovac	AKUMULACIJA S PRATEĆIM OBJEKTIMA	33.000.000	2
114	4072	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Berek, Ivanska	Construction of the reservoir Šimljana	AKUMULACIJA S PRATEĆIM OBJEKTIMA	68.000.000	2
115	4073	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Berek	Construction of the reservoir Krivaja	AKUMULACIJA S PRATEĆIM OBJEKTIMA	33.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
116	4074	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Ivanska, Stefanje	Construction of the reservoir Križić	AKUMULACIJA S PRATEČIM OBJEKTIMA	25.000.000	2
117	4075	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Štefanje	Construction of the reservoir Laminac	AKUMULACIJA S PRATEČIM OBJEKTIMA	15.000.000	2
118	4076	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Čazma	Construction of the reservoir Martinac	AKUMULACIJA S PRATEČIM OBJEKTIMA	15.000.000	2
119	4077	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Čazma	Construction of the reservoir Miklouš I	AKUMULACIJA S PRATEČIM OBJEKTIMA	40.000.000	2
120	4049	for the Middle and Lower Sava	50	Banovina	SMC	Topusko	Construction of the retention Vranovina, a dam with pertaining facilities on the Glina River in the area of the municipality Topusko for the purpose of flood defence	BRANA, CESTA	30.000.000	2
121	4050	for the Middle and Lower Sava	51	Banovina	SMC	Petrinja	Construction of the retention Petrinjčica, a dam with pertaining facilities on the watercourse Petrinjčica in the area of the town Petrinja for the purpose of flood defence	BRANA, CESTA	20.000.000	2
122	4040	for the Middle and Lower Sava	20	Banovina	SMC	Sisak - Martinska Ves	Reconstruction and construction of the left dike of the Odra River Sisak - Tišina Kaptolska from 2+990 to 4+250	NASIP	10.128.000	2
123	31	for the Middle and Lower Sava	29	Česma - Glogovnica	BBC	Veliko Trojstvo	Construction of the reservoir Martinac Trojstveni, a dam with pertaining facilities on the watercourse Dobrovita, a right Bjelovarska tributary, for the purpose of flood defence, improvement of small watercourses downstream and irrigation	JEZ_AKU	6.117.000	2
124	55	for the Middle and Lower Sava	33	Orlava-Londža	PSC	Požega	Regulation of the Orlava River in the section Kuzmica - Vidovci from km 30+188-33+983 downstream of Požega	KORITO	6.980.000	2
125	4321	for the Middle and Lower Sava	33	Orlava-Londža	PSC	Požega	Retention Kaptolka	JEZ_RET	40.000.000	2
126	92	for the Middle and Lower Sava	29	Česma - Glogovnica	KKC	Čazma	Reconstruction of dikes on the streams Črnc and Glogovnica on the stretch south of the railroad Vrbovec - Križevci	NASIP	2.000.000	2
127	88	for the Middle and Lower Sava	29	Česma - Glogovnica	ZC	Dubrava	Construction of the left and right dikes of the lateral canal Koritna from rkm 2+020-rkm 3+000 in the area of the small basin Česma - Glogovnica	NASIP	3.000.000	2
128	4305	for the Middle and Lower Sava	21	Kupa	KC	Barilović	Protection of the settlement Belajske Poljice from the Korana floods	NASIP	500.000	2
129	75	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Reconstruction of the left Sava dike through the settlement Preloščica from km 89+800-94+015	NASIP	6.023.000	2
130	76	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Reconstruction of the left Sava dike through the settlement Gušće from km 78+725 -81+000 and from 82+000-83+200	NASIP	7.193.000	2
131	4313	for the Middle and Lower Sava	24	Banovina	SMC	Sunja	Reconstruction and construction of the right Sunja dike and retarding dikes of the stream Krivaj	NASIP, ZID, OBALOUTVRDA	4.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
132	4312	for the Middle and Lower Sava	20	Banovina	SMC	Petrinja	Reconstruction of the retarding dikes of the Petrinjčica River	NASIP, ZID, OBALOUTVRDA	4.000.000	2
133	4317	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Regulation of the stream Mala Utinja in Donji Sjeničak in the area of the town Karlovac	KORITO	3.000.000	2
134	7	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Improvement of the left Kupa bank in Karlovac on the location Drežnik by the construction of a revetment from km 137+470 to km 138+200, in the total length of 730 m, for the purpose of bank stabilisation	NASIP	7.790.000	2
135	49	for the Middle and Lower Sava	35	Biđ - Bosut	OBC	Đakovo	Construction of the reservoir Breznica, a dam with pertaining facilities on the watercourse Breznica in the basin of the Western Lateral Canal in Biđ polje for purposes of flood defence, improvement of small watercourses downstream and irrigation	JEZ_AKU	42.300.000	2
136	50	for the Middle and Lower Sava	35	Biđ - Bosut	OBC	Drenje	Construction of the reservoir Preslatinci, a dam with pertaining facilities on the watercourse Kaznica, a tributary of the Western Lateral Canal, in Biđ polje for purposes of flood defence, improvement of small watercourses downstream and irrigation	JEZ_AKU	17.360.000	2
137	4310	for the Middle and Lower Sava	33	Ortjava-Londža	PSC	Kutjevo	Improvement of the access road along the regulated riverbed of the torrential stream Kutjevačka Rika through Kutjevo	OBALOUTVRDA, STAZA, ZID	1.500.000	2
138	4314	for the Middle and Lower Sava	20	Kupa	KC	Karlovac	Protection of the settlements on the right Kupa bank downstream of Kamnesko	NASIP	10.000.000	2
139	84	for the Middle and Lower Sava	24	Banovina	SMC	Martinska Ves	Reconstruction of the right Sava dike through the settlement Ljubljana from km 18+000 to 19+200	NASIP	2.142.000	2
140	85	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Reconstruction of the left Sava dike through the settlement Lonja from km 63+214 - 63+512	NASIP	1.341.000	2
141	4043	for the Middle and Lower Sava	20	Banovina	SMC	Petrinja, Sisak	Construction of protection and regulation water facilities on the left Kupa bank – settlements Brest Pokupski - Vurot - Stara Drenčina, length about 2.5 km	NASIP, ZID, OBALOUTVRDA	15.000.000	2
142	4051	za srednju i donju Savu	20	Banovina	SMC	Lekenik	Construction of a revetment on the Kupa bank in Stari Brod from 48+550 - 48+700	OBALOUTVRDA	4.400.000	2
143	4306	for the Middle and Lower Sava	58	Kupa	KC	Duga Resa	Rehabilitation of the left Mrežnica bank in Zvečaj	OBALOUTVRDA	1.000.000	2
144	4302	for the Middle and Lower Sava	22	Kupa	ZGC	Jastrebarsko	Regulation of the stream Reka in Vranov Dol	KANAL	300.000	2
145	4309	for the Middle and Lower Sava	21	Kupa	KC	Slunj	Rehabilitation of a retaining wall on the left Korana bank in Rastoke in Slunj	OBALOUTVRDA	3.000.000	2
146	4046	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Construction of the PS Preloščica	CS, KANAL	15.000.000	2
147	4052	for the Middle and Lower Sava	20	Banovina	SMC	Lekenik	Rehabilitation of the left Kupa bank in Stari Farkašić from rkm 49+100 to 49+700 by the construction of a revetment	OBALOUTVRDA, CESTA	23.125.000	2
148	4308	for the Middle and Lower Sava	20	Kupa	ZGC	Pisarovina	Stabilisation of the left Kupa bank in Jaminička Kiselica upstream of the bridge	OBALOUTVRDA	10.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
149	87	for the Middle and Lower Sava	24	Banovina	SMC	Sunja	Revitalisation of the old Sava riverbed in Crkveno and Ivanjski Bok, Čigoć and Mužilovčica	KORITO	5.000.000	2
150	46	for the Middle and Lower Sava	35	Bid - Bosut	VSC	Cerna, Vrpolje	Regulation of the watercourse Bid in the section from km 6+000 to km 26+295	KORITO	16.385.000	2
151	90	for the Middle and Lower Sava	24	Banovina	SMC	Sisak	Performance of rehabilitation works on the left Sava bank in Bok Palanječki by the construction of a revetment in rkm 609+500 in the length of 400 m	OB_UT	7.288.000	2
152	43	for the Middle and Lower Sava	24	Banovina	SMC	Sisak - Martinska Ves	Reconstruction of the left Sava dike through the settlements Palanjek - Setuš from km 110+800 - 117+600	NASIP	8.922.000	2
153	89	for the Middle and Lower Sava	29	Lonja - Trebež	ZC	Kloštar Ivanić	Construction of dikes of the connecting canal Zelina - Lonja - Glogovnica from rkm 10+500 to rkm 11+000 near the settlement Stara Marča in the Kloštar Ivanić area	NASIP	1.000.000	2

Tab. 11.7 Identified projects of protection against adverse effects of water in the area of the Water Management Department for the North Adriatic Basins

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
1	143	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Cres	Cres – construction of the retention C3	BRANA_RET	3.500.000	1
2	145	for the North Adriatic Basins	57	Gorski Kotar	PGC	Lokve, Delnice	Construction of the reservoir Križ potok	BARRIER	22.000.000	2
3	138	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Vinodolska Općina, Crikvenica	Dubračina – regulation of a part of the watercourse	KANAL	10.500.000	2
4	142	for the North Adriatic Basins	15	Mirna - Dragonja	IC	Buzet	Benčići - construction of a retention	BRANA_RET	75.000.000	2
5	148	for the North Adriatic Basins	15	Mirna - Dragonja	IC	Buzet	Draga (Čirtež) - construction of a retention	BRANA_RET	17.000.000	2
6	5007	for the North Adriatic Basins	15	Mirna - Dragonja	IC	Buzet	Pengari - construction of a retention	BRANA_RET	15.000.000	2
7	139	for the North Adriatic Basins	17	Mirna - Dragonja	IC	Umag, Buje	Ljubljanijska - construction of a retention	BRANA_RET	16.000.000	2
8	146	for the North Adriatic Basins	55	Mirna - Dragonja	IC	Cerovlje	Lipa - construction of a retention	BRANA_RET	5.500.000	2
9	5013	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Baška	Gorica – construction of a canal	KANAL	1.000.000	2
10	140	za slivove sjevernog Jadrana	16	Raša - Bojunićica	IC	Raša	Raša – reconstruction of the boundary canal No. 2	KANAL	8.000.000	2
11	141	for the North Adriatic Basins	47	Kvarnersko primorje i otoci	PGC	Čavle	Grobnik - construction of a retention	BRANA_RET	28.000.000	2
12	133	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Baška	Bašćanska Ričina – regulation of a torrential stream	KANAL	5.000.000	2

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
13	137	for the North Adriatic Basins	13	Lika	LSC	Gospić	Brušanka - construction of a retention	BRANA_RET	18.500.000	2
14	149	for the North Adriatic Basins	16	Raša - Boljunčica	IC	Piće	Karbuna – watercourse regulation	KANAL	3.500.000	2
15	150	for the North Adriatic Basins	16	Raša - Boljunčica	IC	Piće	Tupaljski potok - construction of a retention	BRANA_RET	13.000.000	2
16	151	for the North Adriatic Basins	16	Raša - Boljunčica	IC	Piće	Sepčići – a retention (rehabilitation)	BRANA_RET	2.500.000	2
17	153	for the North Adriatic Basins	16	Raša - Boljunčica	IC	Piće	Petrovica - construction of a retention	BRANA_RET	6.000.000	2
18	154	for the North Adriatic Basins	13	Lika	LSC	Gospić	Tisovac - construction of a retention	BRANA_RET	93.000.000	2
19	367	for the North Adriatic Basins	56	Raša - Boljunčica	IC	Kršan	Boljunčica - regulation	KANAL	15.500.000	2
20	144	for the North Adriatic Basins	13	Lika	LSC	Otočac	Gacka – regulation of the relief canal of the Gacka River	KANAL	7.500.000	2
21	5020	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Rab	Torrential streams of Rab Island – regulation works	KANAL	3.500.000	2
22	363	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Baška	Baška - a retention	BRANA_RET	4.000.000	2
23	368	for the North Adriatic Basins	56	Raša - Boljunčica	IC	Kršan	Letaj - rehabilitation of the reservoir	BRANA_AKU	20.000.000	2
24	155	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Vinodolska Općina	Slani Potok – regulation of the basin	BARRIER, KANAL	26.000.000	2
25	5015	for the North Adriatic Basins	16	Raša - Boljunčica	IC	Labin	Vilete –construction of a canal	KANAL	1.000.000	2
26	5004	for the North Adriatic Basins	16	Raša - Boljunčica	IC	Labin	Krapanjske bujice - regulation (Kapelica I, Kapelica II, Kapelica III)	KANAL	2.200.000	2
27	5002	for the North Adriatic Basins	17	Raša - Boljunčica	IC	Fažana	Valbandon - construction of a canal	KANAL	18.000.000	2
28	156	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Vrbnik	Lug - Kozica – construction of a water transfer tunnel	HTEH_TUN	11.500.000	2
29	5012	for the North Adriatic Basins	14	Kvarnersko primorje i otoci	PGC	Dobrinj	Dobrinjski potok - construction of a canal	KANAL	3.000.000	2
30	157	for the North Adriatic Basins	15	Mirna - Dragonja	IC	Buzet	Račice – construction of a barrier	BARRIER	5.000.000	2
31	158	for the North Adriatic Basins	15	Mirna - Dragonja	IC	Buzet	Draguč - Podmerišće - construction of a barrier	BARRIER	19.000.000	2
32	5006	for the North Adriatic Basins	15	Mirna - Dragonja	IC	Pazin	Jukani – a retention (rehabilitation)	BARRIER	3.500.000	2
33	5025	for the North Adriatic Basins	15	Mirna - Dragonja	IC	Motovun	Restoration of the Mirna River	REVITALIZACIJA KORITA	12.550.000	2

Tab. 11.8 Identified projects of protection against adverse effects of water in the area of the Water Management Department for the South Adriatic Basins

No.	Project ID	Water Management Department	Project unit	Area of a small basin	County	Municipality_Town	Name of the project	Hydromorphological type	Investment value (incl. VAT) in HRK	Priority
1	164	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Opuzen	Stabilisation of the Mala Neretva banks with backshore protection	STAB_OB	90.000.000	1
2	161	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Metković	Flood defense of the town Metković, the right Neretva bank – a dike in the municipality Čapljina (BiH)	NASIP, KANAL, CS, USTAVA	28.000.000	1
3	370	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Zadar	Regulation of the torrential stream Ričina in Zadar	KORITO	16.000.000	1
4	6120	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Orebić	Regulation of the riverbed of the torrential stream Trstenik – estuary	KANAL	1.000.000	1
5	6111	za slivove južnog Jadrana	6	Srednje dalmatinsko primorje i otoci	SDC	Postira	Regulation of the torrential stream Dol in Postire	KORITO	2.000.000	1
6	6049	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Brač	Regulation of the torrential stream Dol	KORITO	3.800.000	1
7	170	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Ploče	Stabilisation of the right Neretva bank in Komin	STAB_OB	25.000.000	1
8	190	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Kula Norinska	Construction of a flood defense dike for a part of the settlement Krvavac in the municipality Kula Norinska	STAB_OB, KORITO, NASIP	1.250.000	1
9	172	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Dubrovnik	Regulation Rijeka Dubrovačka torrents	KORITO	15.000.000	1
10	205	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Vis	Regulation of the torrential stream Samogor	KORITO	3.003.000	1
11	6046	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Dragočevo (above former Getro)	KORITO	3.200.000	1
12	6042	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the eastern tributary of the torrential stream Dragočevo in K. Sućurac, Phases I and II	KORITO	3.000.000	1
13	6014	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Starigrad Paklenica	Regulation of the watercourse Mala Paklenica	KORITO	5.625.000	1
14	6040	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Trogir	Regulation of the right tributary of the torrential stream Balancana in Trogir – Phase I	KORITO	500.000	1
15	6041	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Trogir	Regulation of the torrential stream Betanija in Trogir upstream of km 0+660	KORITO	1.500.000	1
16	6052	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the eastern tributary of the torrential stream Smoljevac	KORITO	1.300.000	1
17	6053	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the western tributary of the torrential stream Stražbenica	KORITO	2.300.000	1
18	6003	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Benkovac	Reconstruction of the left bank wall of the watercourse Karišnica	OB_UT, STAB_OB	2.125.000	1
19	6044	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Muč	Regulation of the torrential stream Mučka Jaruga in Muć (upstream of the road Dmiš - Split)	KORITO	780.000	1
20	6045	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Ričevica upstream of the express road	KORITO	1.200.000	1
21	6048	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Žrnovnica	Regulation of the torrential stream Korešnica along the street Ulica put Vrila	KORITO	1.700.000	1
22	6050	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Podstrana	Regulation of the torrential stream Grijevac	KORITO	540.000	1
23	6001	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Poličnik / Benkovac	Reconstruction of the dam Vlačina and pertaining facilities	JEZ_AKU, BRANA	2.400.000	1

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24	193	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Opuzen	Construction of a syphon under the Mala Neretva	PROP_CIJE	5.700.000	1
25	226	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Metković	Construction of dikes for the sub-system Mislina - Kuti	NASIP, KANAL	5.000.000	1
26	187	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Orebić	Regulation of the torrential stream Puka	KORITO	1.500.000	1
27	6081	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Trpanj	Regulation of the torrential stream Duba Pelješka	KORITO	5.000.000	1
28	209	for the South Adriatic Basins	4	Vrlička	SDC	Šumet	Regulation of the torrential stream Vrilo	KORITO	2.200.000	1
29	208	for the South Adriatic Basins	4	Vrlička	SDC	Šumet	Regulation of the torrential stream Lasića Vrilo	KORITO	2.200.000	1
30	6117	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Metković	Collecting canal Glibuša	KORITO,KANAL,PROPUST	1.000.000	1
31	6039	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Planica and its left tributary	KORITO	5.200.000	1
32	6054	za slivove južnog Jadrana	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Smokvica in Kaštel Kambelovac	KORITO	2.850.000	1
33	372	for the South Adriatic Basins	11	Krka - Šibensko primorje	ŠKC	Pirovac	Construction of a sluice (sill) in the canal Prosika	USTAVA, KORITO	12.000.000	1
34	189	for the South Adriatic Basins	6	Cetina	SDC	Dugi Rat	Regulation of the left tributary of the torrential stream Soline	KORITO	800.000	1
35	6020	for the South Adriatic Basins	6	Cetina	SDC	Gata	Regulation of the torrential stream Gata, section from km 0+815 upstream	KORITO	1.200.000	1
36	178	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Orebić	Regulation of the torrential stream Blatina	KORITO	2.000.000	1
37	6072	for the South Adriatic Basins	5	Matica	SDC	Makarska	Regulation of the torrential stream Puharića potok in Makarska	KORITO	6.000.000	1
38	239	for the South Adriatic Basins	8	Krka - Šibensko primorje	ŠKC	Knin	Protection of the Krka River near the petrol station in Knin	NASIP	3.500.000	1
39	6024	for the South Adriatic Basins	7	Cetina	SDC	Sinj	Regulation of the torrential stream Župičev potok	KORITO	1.500.000	1
40	6027	for the South Adriatic Basins	6	Cetina	SDC	Jesenice	Regulation of the torrential stream Suhi potok	KORITO	3.250.000	1
41	223	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Nin	Stabilisation of the Miljašić Jaruga banks (0+000 - 0+500)	OB_UTV	11.000.000	1
42	215	for the South Adriatic Basins	4	Vrlička	SDC	Imotsko polje	Construction of five culverts at canal mouths into Imotsko polje	PROPUSTI	1.000.000	1
43	6055	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the Town of Kaštela torrents	KORITO	4.000.000	1
44	6116	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Lastovo	Reconstruction of the outlet canal Vino polje - Ubli	KORITO,KANAL,PROPUST	5.000.000	1
45	191	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Župa Dubrovačka	Regulation of Župa dubrovačka torrents	KORITO	33.000.000	1
46	6057	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Solin	Regulation of theTown of Solin torrents	KORITO	2.000.000	1
47	169	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Metković	Stabilisation of the Neretva River banks to improve the flood defense system	STAB_OB	150.000.000	1
48	6078	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Metković	Water improvement of the Upper Old Neretva course, banks improvement	STAB_OB_UST_PROPUST	15.000.000	1

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49	168	for the South Adriatic Basins	7	Cetina	SDC	Hrvace	Regulation of the Cetina River in Hrvatačko polje	STAB_OB, KORITO	10.000.000	1
50	6002	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Zadar	Construction of a retention in the upper part of the Ričina basin	JEZ_RET, BRANA	46.000.000	1
51	165	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Benkovac	Rehabilitation of critical sections of the water transfer tunner Tinj	HTEH_TUN	1.500.000 kn	1
52	6006	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Poličnik	Regulation of the watercourse Glavičine	KORITO	800.000	1
53	6043	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Ričevica mouth in Kaštel Novi (0+000 - 0+140)	KORITO	400.000	1
54	6118	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Ploče	Lake Birina, Crna Rijeka, section Rogotin - Ploče – sediment cleaning - regulaiton	KORITO,PROPUST	4.000.000	1
55	185	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Lumbarda	Reconstruction of the main outlet canal of the karst field Donje Blato - Lumbarda	KORITO	1.000.000	1
56	6056	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Podstrana	Regulation of the Municipality of Podstrana torrents	KORITO	2.000.000	1
57	6058	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Split	Regulation of the City of Split torrents	KORITO	1.000.000	1
58	6059	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Muč	Regulation of the Municipality of Muć torrents	KORITO	1.000.000	1
59	6066	for the South Adriatic Basins	5	Matica	SDC	Makarska	Regulation of the City of Makarska area torrents	KORITO	20.000.000	1
60	6060	for the South Adriatic Basins	3	Matica	SDC-DNC	Vrgprac_Pojezerje_Ploče	Flood protection in the basins of the karst fields Rastok and Vrgorsko polje	HTEH_TUN, BARRIER	135.000.000	1
61	6079	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Slivno	Reconstruction of the torrential stream Klek	KORITO	2.000.000	1
62	6101	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Sukošan	Regulation of Sukošanski potok	KORITO	27.000.000	1
63	6074	for the South Adriatic Basins	5	Matica	SDC	Brela	Regulation of the torrential stream Stomarica in Brela	KORITO	3.400.000	1
64	6114	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Rusinje potok – middle course	KORITO	800.000	1
65	6025	for the South Adriatic Basins	7	Cetina	SDC	Sinj	Regulation of the torrential stream Miletin	KORITO	2.000.000	1
66	6064	for the South Adriatic Basins	5	Matica	SDC	Brela	Regulation of the Municipality of Brela torrents	KORITO	5.000.000	1
67	6065	for the South Adriatic Basins	5	Matica	SDC	Baška Voda	Regulation of the Municipality of Baška Voda torrents	KORITO	11.000.000	1
68	6067	for the South Adriatic Basins	5	Matica	SDC	Tučepi	Regulation of the Municipality of Tučepi torrents	KORITO	7.000.000	1
69	6068	for the South Adriatic Basins	5	Matica	SDC	Podgora	Regulation of the Municipality of Podgora torrents	KORITO	12.000.000	1
70	6069	for the South Adriatic Basins	5	Matica	SDC	Gradac	Regulation of the Municipality of Gradac torrents	KORITO	10.000.000	1
71	188	for the South Adriatic Basins	7	Cetina	SDC	Otok (Sinjski)	Regulation of the torrential stream Drežnica	KORITO	9.000.000	1
72	6080	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Slivno	Regulation of the torrential stream Duba	KORITO	1.500.000	1
73	6115	for the South Adriatic Basins	4	Vrlička	SDC	Proložac	Regulation of the torrential stream Čekuk in Proložac	KANAL	6.000.000	1

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74	180	for the South Adriatic Basins	5	Matica	SDC	Baška Voda	Regulation of the torrential stream Zbanjica	KORITO	1.410.000	1
75	182	for the South Adriatic Basins	5	Matica	SDC	Baška Voda	Regulation of the torrential stream Krvavica	KORITO	1.350.000	1
76	192	for the South Adriatic Basins	5	Matica	SDC	Gradac	Regulation of the torrential stream Mlatinjska bujica	KORITO	1.130.000	1
77	183	for the South Adriatic Basins	6	Cetina	SDC	Tugare	Regulation of the torrential stream Veliki potok	KORITO	3.850.000	1
78	6112	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Sutivan	Regulation of the lower course of the torrential stream Sutivan	KORITO	4.000.000	1
79	218	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Gajina - Podgaj	KORITO	3.000.000	1
80	162	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Solin	Regulation of the Jadro River in Solin	KORITO	6.000.000	1
81	6062	for the South Adriatic Basins	3	Matica	SDC	Vrgorac	Rehabilitation and reconstruction of combined amelioration facilities in the karst field Rastok	KANAL	6.000.000	1
82	6004	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Benkovac / Polača	Reconstruction of the drainage system Kličevica - Nadin - Polača - Vrana – the sea and the main drainage canal of Nadinsko blato	KANAL	900.000	1
83	6113	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Hvar	Regulation of the torrential stream Hvar	KORITO	2.000.000	1
84	228	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Kaštela	Regulation of the torrential stream Kiseljeva	KORITO	1.500.000	1
85	371	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Trogir	Regulation of the City of Trogir torrential streams	KORITO	2.000.000	1
86	210	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Žrnovnica	Regulation of the lower and middle course of the Žrnovnica River	OB_UT	5.000.000	1
87	6021	for the South Adriatic Basins	6	Cetina	SDC	Jesenice	Regulation of the torrential stream Ravna njiva potok – detailed design development	KORITO	2.000.000	1
88	6022	for the South Adriatic Basins	7	Cetina	SDC	Sinj	Regulation of the torrential stream Pavjak, section from km 2+081 upstream	KORITO	3.000.000	1
89	6031	for the South Adriatic Basins	6	Cetina	SDC	Omiš	Regulation of the torrential stream Kovačića potok	KORITO	1.500.000	1
90	6026	for the South Adriatic Basins	7	Cetina	SDC	Sinj	Regulation of the torrential stream Stuparića potok	KORITO	1.500.000	1
91	6030	for the South Adriatic Basins	6	Cetina	SDC	Dugi Rat	Regulation of the II right tributary of the torrential stream Dugi Rat, section from km 0+088 to km 0+170	KORITO	800.000	1
92	6038	for the South Adriatic Basins	6	Cetina	SDC	Sumpetar	Regulation of the torrential stream Vrilo	KORITO	2.000.000	1
93	6047	for the South Adriatic Basins	6	Srednje dalmatinsko primorje i otoci	SDC	Solin	Regulation of the right tributary of the torrential stream Rupotinska bujica in Solin (along the house Gizdić)	KORITO	900.000	1
94	6061	for the South Adriatic Basins	3	Matica	DNC	Ploče	Regulation of Bačina Lakes	JEZERO	20.000.000	1
95	222	for the South Adriatic Basins	12	Zrmanja - Zadarsko primorje	ŠKC	Ervenik	Stabilisation of the Zrmanja banks (Ervenik, Mokro Polje, Palanka-Kusci, Čankovac, Gradina and downstream of the bridge Čukovi (64+000 - 64+100))	STAB_OB	2.760.000	1
96	6009	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Starigrad Paklenica	Regulation of the torrential stream Krušćica duboka	KORITO	600.000	1
97	163	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Metković	Stabilisation of the left Neretva River bank upstream of the bridge in Metković	STAB_OB	12.000.000	1
98	184	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Ploče	Flood protection of the settlement Komin	NASIP, OBOR_ODV, CS,	3.000.000	1

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99	6105	for the South Adriatic Basins	7	Cetina	SDC	Vrlika	Regulation of the downstream section of the torrential stream Vrlička jaruga	KORITO	2.500.000	1
100	6106	for the South Adriatic Basins	6	Cetina	SDC	Dugi Rat	Regulation of the torrential stream Žilica potok	KORITO	700.000	1
101	224	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Posedarje	Stabilisation of the watercourse Bašćica banks (0+000 - 0+900)	OB_UTV	4.170.000	1
102	236	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Pašman	Regulation of the torrential stream Potok Barotul	KORITO	1.000.000	1
103	6007	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Novigrad	Regulation of the stream Grubića draga	KORITO	2.650.000	1
104	6008	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Posedarje	Regulation of the stream Oblog	KORITO	750.000	1
105	6103	za slivove južnog Jadrana	11	Zrmanja - Zadarsko primorje	ZC	Novigrad	Regulation of Novigradska jaruga	KORITO	1.250.000	1
106	6036	for the South Adriatic Basins	7	Cetina	SDC	Otok	Regulation of the stream Ovrja	KORITO	2.000.000	1
107	6023	for the South Adriatic Basins	6	Cetina	SDC	Pisak	Regulation of the torrential stream Kutleša potok	KORITO	400.000	1
108	6035	for the South Adriatic Basins	7	Cetina	SDC	Han	Regulation of the downstream section of the stream Kosinac in the length of about 170 m, from the confluence into the Cetina River to the bridge on the road Han - Otok	KORITO	1.500.000	1
109	6032	for the South Adriatic Basins	7	Cetina	SDC	Hrvace	Construction of a culvert over the riverbed of the torrential stream Banovića potok in km 1+200	MOST	300.000	1
110	6200	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Opuzen, Ploče	Protection from salinisation of soils, surface waters and ground water in the Neretva river valley	PREGRA_CS_AKUM	525.000.000	2
111	6123	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Kula Norinska	Reconstruction of the self-regulating sluice at the confluence of the Norin River	USTAVA	15.000.000	2
112	6077	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Opuzen, Ploče	Reconstruction of the coastal dike "Diga"	NASIP	15.000.000	2
113	6082	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Konavle	Regulation of the Konavle area torrents	KORITO	35.000.000	2
114	6005	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Nin	Construction of a retention on Miljašić jaruga upstream of the City of Nin	JEZ_RET, BRANA	78.000.000	2
115	6119	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Stanković, Orebić	Reconstruction of the riverbed of the torrential stream Dubravica - Stanković	KORITO,PROPUST	2.000.000	2
116	6088	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Ston	Regulation of the Ston area torrents	KORITO	12.000.000	2
117	6083	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Dubrovnik	Regulation of the Zaton area torrents	KORITO	5.000.000	2
118	6091	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Ston	Regulation of the Žuljane area torrents	KORITO	1.000.000	2
119	6084	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Dubrovnik	Regulation of the Orašac area torrents	KORITO	4.000.000	2
120	6086	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Dubrovačko Primorje	Regulation of the Slano area torrents	KORITO	10.000.000	2
121	6017	for the South Adriatic Basins	8	Krka - Šibensko primorje	ŠKC	Skradin	Regulation of the torrential stream Rivina jaruga	KORITO, OBALE	4.000.000	2
122	6087	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Dubrovačko Primorje	Regulation of the Primorje area torrents	KORITO	5.000.000	2

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123	6089	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Ston	Regulation of the Ponikve area torrents	KORITO	2.000.000	2
124	6090	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Ston	Regulation of the Putniković area torrents	KORITO	2.000.000	2
125	6092	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Janjina	Regulation of the Janjina area torrents	KORITO	1.000.000	2
126	6015	for the South Adriatic Basins	9	Krka - Šibensko primorje	ŠKC	Tribunj	Regulation of the torrential stream Sovlje	KORITO	1.500.000	2
127	6108	for the South Adriatic Basins	6	Cetina	SDC	Omiš	Rehabilitation of the covered cunette of the torrential stream Mala luka	KORITO	1.000.000	2
128	6011	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Benkovac / Stankovci	Rekonstrukcija of the canal Donje Bare in Prović	KANAL	5.700.000	2
129	167	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Zažablje	Regulation of the Mislina River and Lake Kuti, water improvement	KANAL	15.000.000	2
130	6063	for the South Adriatic Basins	3	Matica	SDC-DNC	Vrgprac_Pojezerje_Ploče	Amelioration canals of Vrgorsko polje (construction of the new canals and reconstruction and rehabilitation of the existing ones)	KANAL	10.000.000	2
131	6016	for the South Adriatic Basins	8	Krka - Šibensko primorje	ŠKC	Skradin	Regulation of the torrential stream Rupska foša	KORITO	1.000.000	2
132	6102	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Zadar	Reconstruction of the water transfer tunnel Bokanjac	HTEH_TUN	1.000.000	2
133	6104	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Pristeg, Stankovci	Reconstruction of the connecting canal Pristeg - Stankovci	KORITO	1.100.000	2
134	6012	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Stankovci	Regulation of the canal Banjevci	KANAL	1.200.000	2
135	6124	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Metković	Reconstruction of a separating dike Hum	NASIP	2.000.000	2
136	6107	for the South Adriatic Basins	6	Cetina	SDC	Jesenice	Regulation of the downstream section of the torrential stream Jaruga	KORITO	300.000	2
137	6010	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Lišane Ostrovičke	Regulation of the streams Prestene and Polje in Lišane Ostrovičke	KORITO	1.935.000	2
138	173	for the South Adriatic Basins	2	Neretva - Korčula	DNC	Ploče	Improvement of the coast and promenade along the Crna Rijeka in Rogotin	STAB_OB, KORITO	3.000.000	2
139	225	for the South Adriatic Basins	12	Zrmanja - Zadarsko primorje	ZC	Gračac	Stabilisation of the watercourse Otuča banks (1+120 - 1+265)	OB_UTV	2.580.000	2
140	234	for the South Adriatic Basins	10	Zrmanja - Zadarsko primorje	ZC	Pašman	The stream Subica, Pašman, cunette from 0+000 - 0+540	KORITO	1.500.000	2
141	6085	for the South Adriatic Basins	1	Dubrovačko primorje	DNC	Dubrovnik	Regulation of the Brsečine area torrents	KORITO	3.000.000	2
142	6121	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Orebić	Regulation of the bed of the torrential stream MaliTrstenik	KORITO,PROPUST	1.500.000	2
143	6110	for the South Adriatic Basins	7	Cetina	SDC	Blato na Cetini	Rehabilitation of the eroded left bank of the Cetina River in Blato na Cetini	OB_UT	500.000	2
144	6122	for the South Adriatic Basins	1	Neretva - Korčula	DNC	Lastovo	Regulation of the riverbed of the torrential stream Skrivena Luka	KORITO,PROPUST	1.000.000	2
145	6109	for the South Adriatic Basins	7	Cetina	SDC	Trilj	Rehabilitation of the water tank Bunarina in Velić	JEZ_LOKVA	350.000	2
146	202	for the South Adriatic Basins	11	Zrmanja - Zadarsko primorje	ZC	Benkovac	Construction of the multipurpose reservoir Kotao	JEZ_AKU	25.000.000	2

Tab. 11.9 Overview of the status of evaluated projects of protection against adverse effects of water grouped according to project groups

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
6120	for the South Adriatic Basins	1	Regulation of the riverbed of the torrential stream Trstenik – estuary	1	1.000.000	c	a	c	a,b,h,i	a,b,c,d,e	b
172	for the South Adriatic Basins	1	Regulation of Rijeka Dubrovačka torrents	1	15.000.000	c	a	a	a,b,c,h	c,i,j	a
187	for the South Adriatic Basins	1	Regulation of the torrential stream Puka	1	1.500.000	c	a	c	b,i	a,b,d,e,f	b
6081	for the South Adriatic Basins	1	Regulation of the torrential stream Duba Pelješka	1	5.000.000	c	a	c	a,b,h,i	a,d	b
178	for the South Adriatic Basins	1	Regulation of the torrential stream Blatina	1	2.000.000	c	a	c	b,i	d	b
6116	for the South Adriatic Basins	1	Reconstruction of the outlet canal VINO polje - Ubli	1	5.000.000	c	a,f,i	c	a,b,c,d,h,i	j	a
191	for the South Adriatic Basins	1	Regulation of Župa dubrovačka torrents	1	33.000.000	c	a	a	a,b,c,h	h,i	a
185	for the South Adriatic Basins	1	Reconstruction of the main outlet canal of the karst field Donje Blato - Lumbarda	1	1.000.000	c	f,g	c	a,c,d	h,i	b
6079	for the South Adriatic Basins	1	Reconstruction of the torrential stream Klek	1	2.000.000	c	a	c	a,b,h,i	j	a
6080	for the South Adriatic Basins	1	Regulation of the torrential stream Duba	1	1.500.000	c	a	c	a,b,i	j	b
6082	for the South Adriatic Basins	1	Regulation of the Konavle area torrents	2	35.000.000	c	a	a	a,b,c	i,h,f	a
6119	for the South Adriatic Basins	1	Reconstruction of the riverbed of the torrential stream Dubravica - Stanković	2	2.000.000	c	a,i	c	a,b,c,d,i	j	b
6088	for the South Adriatic Basins	1	Regulation of the Ston area torrents	2	12.000.000	c	a	b	a,b,c,h	j,h	a
6083	for the South Adriatic Basins	1	Regulation of the Zaton area torrents	2	5.000.000	c	a	b	a,b,h	i	a
6091	for the South Adriatic Basins	1	Regulation of the Žuljane area torrents	2	1.000.000	c	a	b	b,c,h	j,h	a
6084	for the South Adriatic Basins	1	Regulation of the Orašac area torrents	2	4.000.000	c	a	b	a,b,h	j	a
6086	for the South Adriatic Basins	1	Regulation of the Slano area torrents	2	10.000.000	c	a	b	a,b,h	j	a
6087	for the South Adriatic Basins	1	Regulation of the Primorje area torrents	2	5.000.000	c	a	b	b,c,h	j	a
6089	for the South Adriatic Basins	1	Regulation of the Ponikve area torrents	2	2.000.000	c	a	b	b,c,h	j	a
6090	for the South Adriatic Basins	1	Regulation of the Putniković area torrents	2	2.000.000	c	a	b	b,c,h	j	a
6092	for the South Adriatic Basins	1	Regulation of the Janjina area torrents	2	1.000.000	c	a	b	b,c,h	j	a
6085	for the South Adriatic Basins	1	Regulation of the Brsečine area torrents	2	3.000.000	c	a	b	b,h	j	a
6121	for the South Adriatic Basins	1	Regulation of the bed of the torrential stream Mali Trstenik	2	1.500.000	c	a	c	i	h	a
6122	for the South Adriatic Basins	1	Regulation of the bed of the torrential stream Skrivena Luka	2	1.000.000	c	a	c	i	j	b
PROJECT GROUP 1 - Total:					151.500.000						
164	for the South Adriatic Basins	2	Stabilisation of the Mala Neretva banks with backshore protection	1	90.000.000	c	a,d,h,i	a	a,b,c,d,i	a,b,c,d,e	b
161	for the South Adriatic Basins	2	Flood defence of the town Metković, the right Neretva bank – a dike in the municipality Čapljina (BiH)	1	28.000.000	a	a	a	a,b,c,d	a,b,c,d,e	b
170	for the South Adriatic Basins	2	Stabilisation of the right Neretva bank in Komin	1	25.000.000	c	a,h,i	b	b,i	a,b,c,d,e	b
190	for the South Adriatic Basins	2	Construction of a dike for flood defence of a part of the settlement Krvavac in the municipality Kula Norinska	1	1.250.000	c	a	b	a,i	a,b,c,d,e,f	b
193	for the South Adriatic Basins	2	Construction of a syphon under the Mala Neretva	1	5.700.000	c	c,f,g	c	c,d	a,b,d,e,f	b
226	for the South Adriatic Basins	2	Construction of dikes for the sub-system Mislina - Kuti	1	5.000.000	c	a,f	c	a,c,d,i	a,b,d	b
6117	for the South Adriatic Basins	2	Collecting canal Glibuša	1	1.000.000	c	a,i	b	a,b,i	d,f	b
169	for the South Adriatic Basins	2	Stabilisation of the Neretva banks to improve the flood defence system	1	150.000.000	a	a,d,f	a	b,c,d,e	i	a
6078	for the South Adriatic Basins	2	Water improvement of the Upper Old Neretva course, banks improvement	1	15.000.000	c	a,c,h,i	b	a,b,e,i	j	a
6118	for the South Adriatic Basins	2	Lake Birina, Crna Rijeka, section Rogotin - Ploče – sediment cleanup - -regulation	1	4.000.000	b	a,c,f,h,i	c	a,b,i	j	a
163	for the South Adriatic Basins	2	Stabilisation of the left Neretva bank upstream of the bridge in Metković	1	12.000.000	b	a	b	b	j	b
184	for the South Adriatic Basins	2	Flood protection of the settlement Komin	1	3.000.000	c	a	c	a,i	j	b
6123	for the South Adriatic Basins	2	Reconstruction of the self-regulating sluice at the confluence of the Norin River	2	15.000.000	a	a	a	a,b,c,d,e,g,i	j	b
6077	for the South Adriatic Basins	2	Reconstruction of the coastal dike "Diga"	2	15.000.000	b	a,c,f,h,i	a	a,b,c,d,i	h	a
6200	for the South Adriatic Basins	2	Protection from salinisation of soils, surface waters and ground water in the Neretva valley	2	525.000.000	a	c,d,f,g	c	c,d,e	d,f,g,h	a

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
167	for the South Adriatic Basins	2	Regulation of the Mislina River and Lake Kuti, water improvement	2	15.000.000	a	c	c	a,e	j	a
6124	for the South Adriatic Basins	2	Reconstruction of a separating dike Hum	2	2.000.000	c	a,f	c	c,d	j	b
173	for the South Adriatic Basins	2	Improvement of the coast and promenade along the Crna Rijeka in Rogotin	2	3.000.000	c	a,h	c	b,i	j	a
PROJECT GROUP 2 - Total:					914.950.000						
6060	for the South Adriatic Basins	3	Flood protection in the basins of the karst fields Rastok and Vrgorsko polje	1	135.000.000	a	a,f,i	a	c,d	i	b
6062	for the South Adriatic Basins	3	Rehabilitation and reconstruction of combined amelioration facilities in the karst field Rastok	1	6.000.000	c	f,g	b	c,d	j	a
6061	for the South Adriatic Basins	3	Regulation of Bačina Lakes	1	20.000.000	c	c,h,i	b	e,i	j	b
6063	for the South Adriatic Basins	3	Amelioration canals of Vrgorsko polje (construction of new canals and reconstruction and rehabilitation of existing canals)	2	10.000.000	c	f,g	b	c,d	j	a
PROJECT GROUP 3 - Total:					171.000.000						
209	for the South Adriatic Basins	4	Regulation of the torrential stream Vrilo	1	2.200.000	c	a,c	c	d,i	a,d,f,h,j	a
208	for the South Adriatic Basins	4	Regulation of the torrential stream Lasića Vrilo	1	2.200.000	c	a,c,f	c	d	a,d,f,h,j	a
215	for the South Adriatic Basins	4	Construction of five culverts at canal mouths into Imotsko polje	1	1.000.000	c	h,i	b	a,i	f,h	a
6115	for the South Adriatic Basins	4	Regulation of the torrential stream Čečuk in Proložac	1	6.000.000	c	a,c	c	b,e	j	b
PROJECT GROUP 4 - Total:					11.400.000						
6072	for the South Adriatic Basins	5	Regulation of the torrential stream Puharića potok in Makarska	1	6.000.000	c	a,i	b	a,b	d,f,h	b
6074	for the South Adriatic Basins	5	Regulation of the torrential stream Stomarica in Brela	1	3.400.000	c	a,i	b	a,b	h	a
6066	for the South Adriatic Basins	5	Regulation of the City of Makarska area torrents	1	20.000.000	c	a,i	a	a,b	j	a
6064	for the South Adriatic Basins	5	Regulation of the Municipality of Brela torrents	1	5.000.000	c	a,i	b	a,b	j	a
6065	for the South Adriatic Basins	5	Regulation of the Municipality of Baška Voda torrents	1	11.000.000	c	a,i	b	a,b	j	a
6067	for the South Adriatic Basins	5	Regulation of the Municipality of Tučepi torrents	1	7.000.000	c	a,i	b	a,b	j	a
6068	for the South Adriatic Basins	5	Regulation of the Municipality of Podgora torrents	1	12.000.000	c	a,i	b	a,b	j	a
6069	for the South Adriatic Basins	5	Regulation of the Municipality of Podgora torrents	1	10.000.000	c	a,i	b	a,b	j	a
180	for the South Adriatic Basins	5	Regulation of the torrential stream Žbanjica	1	1.410.000	c	a,i	c	a,b	j	a
182	for the South Adriatic Basins	5	Regulation of the torrential stream Krvavica	1	1.350.000	c	a,i	c	a,b	j	a
192	for the South Adriatic Basins	5	Regulation of the torrential stream Mlatinska bujica	1	1.130.000	c	a,i	c	a,b	j	a
PROJECT GROUP 5 - Total:					78.290.000						
6111	for the South Adriatic Basins	6	Regulation of the torrential stream Dol in Postire	1	2.000.000	c	a,i	a	a,c,e,i	c,d,e,f,h	b
6049	for the South Adriatic Basins	6	Regulation of the torrential stream Dol	1	3.800.000	c	a,i	a	a,c,e,i	c,d,e,f,h	b
205	for the South Adriatic Basins	6	Regulation of the torrential stream Samogor	1	3.003.000	c	a	a	b,h	a,c,d,f,h	a
6046	for the South Adriatic Basins	6	Regulation of the torrential stream Dragočevo (above former Getro)	1	3.200.000	c	a	a	a,b,i	c,d	b
6042	for the South Adriatic Basins	6	Regulation of the eastern tributary of the torrential stream Dragočevo in K. Sućurac, Phases I and II	1	3.000.000	c	a	a	b,i	c,d,f,h	a
6040	for the South Adriatic Basins	6	Regulation of the right tributary of the torrential stream Balancana in Trogir – Phase I	1	500.000	c	a	a	b,i	c,d,f,h	b
6041	for the South Adriatic Basins	6	Regulation of the torrential stream Betanija in Trogir upstream of km 0+660	1	1.500.000	c	a	a	b,i	c,d,f,h	b
6052	for the South Adriatic Basins	6	Regulation of the eastern tributary of the torrential stream Smoljevac	1	1.300.000	c	a	a	b,i	c,d,f,h	b
6053	for the South Adriatic Basins	6	Regulation of the western tributary of the torrential stream Stražbenica	1	2.300.000	c	a	a	b,i	c,d,f,h	b
6044	for the South Adriatic Basins	6	Regulation of the torrential stream Mučka Jaruga in Muć (upstream of the road Drniš - Split)	1	780.000	c	a	a	b,i	c,d	b
6045	for the South Adriatic Basins	6	Regulation of the torrential stream Ričevica upstream of the express road	1	1.200.000	c	a	a	a,i	c,d	b
6048	for the South Adriatic Basins	6	Regulation of the torrential stream Korešnica along the street Ulica put Vrila	1	1.700.000	c	a	c	b,i	c,d	b
6050	for the South Adriatic Basins	6	Regulation of the torrential stream Grljevac	1	540.000	c	a	b	i	c,d	b
6039	for the South Adriatic Basins	6	Regulation of the torrential stream Planiča and its left tributary	1	5.200.000	c	a	a	b,i	d,f,h	b
6054	for the South Adriatic Basins	6	Regulation of the torrential stream Smokvica in Kaštel Kambelovac	1	2.850.000	c	a	a	b,i	d,f,h	b
6020	for the South Adriatic Basins	6	Regulation of the torrential stream Gata, section from km 0+815 upstream	1	1.200.000	c	a	b	b,c	d	b

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
189	for the South Adriatic Basins	6	Regulation of the left tributary of the torrential stream Soline	1	800.000	c	a	b	b,i	d	b
6055	for the South Adriatic Basins	6	Regulation of the Town of Kaštela torrents	1	4.000.000	c	a	a	a,b,c,e,h,i	j	a
6057	for the South Adriatic Basins	6	Regulation of the Town of Solin torrents	1	2.000.000	c	a	a	a,b,e,h,i	j	a
6043	for the South Adriatic Basins	6	Regulation of the torrential stream Ričevica mouth in Kaštel Novi (0+000 - 0+140)	1	400.000	c	a	a	a,e,h,i	j	b
6056	for the South Adriatic Basins	6	Regulation of the Municipality of Podstrana torrents	1	2.000.000	c	a	a	a,b,i	j	a
6058	for the South Adriatic Basins	6	Regulation of the City of Split torrents	1	1.000.000	c	a	a	a,b,i	j	a
6059	for the South Adriatic Basins	6	Regulation of the Municipality of Muć torrents	1	1.000.000	c	a	a	a,b,i	j	a
6114	for the South Adriatic Basins	6	Regulation of the torrential stream Rusinje potok – middle course	1	800.000	c	a	b	a,b,i	j	b
6027	for the South Adriatic Basins	6	Regulation of the torrential stream Suhi potok	1	3.250.000	c	a	b	b,i	f,h	b
183	for the South Adriatic Basins	6	Regulation of the torrential stream Veliki potok	1	3.850.000	c	a	b	b,c	j	b
6112	for the South Adriatic Basins	6	Regulation of the lower course of the torrential stream Sutivan	1	4.000.000	c	a	a	b,i	h	a
218	for the South Adriatic Basins	6	Regulation of the torrential stream Gajina - Podgaj	1	3.000.000	c	a	a	b,i	i	a
162	for the South Adriatic Basins	6	Regulation of the Jadro River in Solin	1	6.000.000	b	a,h	a	e,h	j	a
6113	for the South Adriatic Basins	6	Regulation of the torrential stream Hvar	1	2.000.000	c	a	a	b,i	j	a
228	for the South Adriatic Basins	6	Regulation of the torrential stream Kiseljevica	1	1.500.000	c	a	a	b,i	j	a
371	za slivove južnog Jadrana	6	Uređenje bujica grada Trogira	1	2.000.000	c	a	a	b,i	j	a
210	for the South Adriatic Basins	6	Regulation of the lower and middle course of the Žrnovnica River	1	5.000.000	b	a,h	a	e,i	j	a
6021	for the South Adriatic Basins	6	Regulation of the torrential stream Ravna njiva potok – detailed design development	1	2.000.000	c	a	b	b,i	h	b
6031	for the South Adriatic Basins	6	Regulation of the torrential stream Kovačića potok	1	1.500.000	c	a	b	b,i	h	b
6030	for the South Adriatic Basins	6	Regulation of the II right tributary of the torrential stream Dugi Rat, section from km 0+088 to km 0+170	1	800.000	c	a	b	b,i	j	b
6038	for the South Adriatic Basins	6	Regulation of the torrential stream Vrilo	1	2.000.000	c	a	b	b,i	j	b
6047	for the South Adriatic Basins	6	Regulation of the right tributary of the torrential stream Rupotinska bujica in Solin (along the house Gizdić)	1	900.000	c	a	c	b,i	h	b
6106	for the South Adriatic Basins	6	Regulation of the torrential stream Žilića potok	1	700.000	c	a	c	b,i	j	b
6023	for the South Adriatic Basins	6	Regulation of the torrential stream Kutleša potok	1	400.000	c	a	c	i	j	b
6108	for the South Adriatic Basins	6	Rehabilitation of the covered cunette of the torrential stream Mala luka	2	1.000.000	c	a	b	a,b	j	b
6107	for the South Adriatic Basins	6	Regulation of the downstream section of the torrential stream Jaruga	2	300.000	c	a	c	b	d	b
PROJECT GROUP 6 - Total:					86.273.000						
168	for the South Adriatic Basins	7	Regulation of the Cetina River in Hrvatačko polje	1	10.000.000	c	a,h	a	a,b,c	j	a
6025	for the South Adriatic Basins	7	Regulation of the torrential stream Miletin	1	2.000.000	c	a	b	a,b,i	j	b
188	for the South Adriatic Basins	7	Regulation of the torrential stream Drežnica	1	9.000.000	c	a	b	a,b	j	a
6024	for the South Adriatic Basins	7	Regulation of the torrential stream Župičev potok	1	1.500.000	c	a	b	b,i	f,h	b
6022	for the South Adriatic Basins	7	Regulation of the torrential stream Pavjak, section from km 2+081 upstream	1	3.000.000	c	a	b	b,i	h	b
6026	for the South Adriatic Basins	7	Regulation of the torrential stream Stuparića potok	1	1.500.000	c	a	b	b,i	j	b
6105	for the South Adriatic Basins	7	Regulation of the downstream section of the torrential stream Vrljička jaruga	1	2.500.000	c	a	c	b,i	j	b
6036	for the South Adriatic Basins	7	Regulation of the stream Ovrļa	1	2.000.000	c	a	c	c	j	b
6035	for the South Adriatic Basins	7	Regulation of the downstream section of the stream Kosinac in the length of about 170 m, from the confluence into the Cetina River to the bridge on the road Han - Otok	1	1.500.000	c	a	c	i	j	b
6032	for the South Adriatic Basins	7	Construction of a culvert over the riverbed of the torrential stream Banovića potok in km 1+200	1	300.000	c	i	c	i	j	b
6110	for the South Adriatic Basins	7	Rehabilitation of the eroded left bank of the Cetina River in Blato na Cetini	2	500.000	c	a,h	c	i	j	b
6109	for the South Adriatic Basins	7	Rehabilitation of the water tank Bunarina in Velić	2	350.000	c	i	c	h	j	b
PROJECT GROUP 7 - Total:					34.150.000						
239	for the South Adriatic Basins	8	Protection of the Krka River near the petrol station in Knin	1	3.500.000	c	a	a	a,b	f,h	b
6017	for the South Adriatic Basins	8	Regulation of the torrential stream Rivina jaruga	2	4.000.000	c	a,h	c	b,c	h,g	a

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
6016	for the South Adriatic Basins	8	Regulation of the torrential stream Rupska foša	2	1.000.000	c	a	c	b,c	j	b
PROJECT GROUP 8 - Total:					8.500.000						
6015	for the South Adriatic Basins	9	Regulation of the torrential stream Sovlje	2	1.500.000	c	a	c	b,c	f,h	b
PROJECT GROUP 9 - Total:					1.500.000						
370	for the South Adriatic Basins	10	Regulation of the torrential stream Ričina in Zadar	1	16.000.000	c	a	a	a,b,g	a,b,c,d,e,f	a
6014	for the South Adriatic Basins	10	Regulation of the watercourse Mala Paklenica	1	5.625.000	c	a	c	b	a,b,c,d	b
6002	for the South Adriatic Basins	10	Construction of a retention in the upper part of the Ričina basin	1	46.000.000	c	a	a	a,b,g	i	b
6101	for the South Adriatic Basins	10	Regulation of Sukošanski potok	1	27.000.000	c	a	b	a,b	i,j	a
223	for the South Adriatic Basins	10	Stabilisation of the Miljašić Jaruga banks (0+000 - 0+500)	1	11.000.000	c	a	b	b	f,h,j	a
6009	for the South Adriatic Basins	10	Regulation of the torrential stream Krušćica duboka	1	600.000	c	a	c	b	h,j	b
236	for the South Adriatic Basins	10	Regulation of the torrential stream Potok Barotul	1	1.000.000	c	a	c	b	h	b
6005	for the South Adriatic Basins	10	Construction of a retention on Miljašić jaruga upstream of the City of Nin	2	78.000.000	c	a	a	a,b,c,h	i	b
234	for the South Adriatic Basins	10	The stream Subica, Pašman, cunette from 0+000 - 0+540	2	1.500.000	c	a	c	d	i	b
PROJECT GROUP 10 - Total:					186.725.000						
6003	for the South Adriatic Basins	11	Reconstruction of the left bank wall of the watercourse Karišnica	1	2.125.000	c	a	c	h	a,b,c,d	b
6001	for the South Adriatic Basins	11	Reconstruction of the dam Vlačina and pertaining facilities	1	2.400.000	c	a,g,h	b	a,b,c,d	a,b,d,j	b
372	for the South Adriatic Basins	11	Construction of a sluice (sill) in the canal Prosika	1	12.000.000	c	c	c	i	a,d,f,h	b
165	for the South Adriatic Basins	11	Rehabilitation of critical sections of the water transfer tunner Tinj	1	1.500.000	c	a,f	c	b,c,d	i,j	b
6006	for the South Adriatic Basins	11	Regulation of the watercourse Glavičine	1	800.000	c	a	b	a,b,c	j	b
6004	for the South Adriatic Basins	11	Reconstruction of the drainage system Kličevica - Nadin - Polača - Vrana – the sea and the main drainage canal of Nadinsko blato	1	900.000	c	a,f	c	c,d	j	a
224	for the South Adriatic Basins	11	Stabilisation of the watercourse Bašćica banks (0+000 - 0+900)	1	4.170.000	c	a	c	b	h	b
6007	for the South Adriatic Basins	11	Regulation of the stream Grubića draga	1	2.650.000	c	a	c	b	j	a
6008	for the South Adriatic Basins	11	Regulation of the stream Oblog	1	750.000	c	a	c	b	j	b
6103	for the South Adriatic Basins	11	Regulation of Novigradska jaruga	1	1.250.000	c	a	c	b	j	b
6011	for the South Adriatic Basins	11	Rekonstrukcija of the canal Donje Bare in Prović	2	5.700.000	c	a,f	c	c,d	h,j	b
6102	for the South Adriatic Basins	11	Reconstruction of the water transfer tunnel Bokanjac	2	1.000.000	c	a,f	c	c,d	j	b
6104	for the South Adriatic Basins	11	Reconstruction of the connecting canal Pristeg - Stankovci	2	1.100.000	c	a,f	c	c,d	j	b
6012	for the South Adriatic Basins	11	Regulation of the canal Banjevci	2	1.200.000	c	a,f	c	c,d	j	a
6010	for the South Adriatic Basins	11	Regulation of the streams Prestene and Polje in Lišane Ostrovičke	2	1.935.000	c	a	c	b	h,j	b
202	for the South Adriatic Basins	11	Construction of the multipurpose reservoir Kotao	2	25.000.000	c	g	c	i	j	b
PROJECT GROUP 11 - Total:					64.480.000						
222	for the South Adriatic Basins	12	Stabilisation of the Zrmanja banks (Ervenik, Makro Polje, Palanka-Kusci, Čankovac, Gradina and downstream of the bridge Čukovi (64+000 - 64+100)	1	2.760.000	c	a	c	b	h,j	a
225	for the South Adriatic Basins	12	Stabilisation of the watercourse Otuča banks (1+120 - 1+265)	2	2.580.000	c	a	c	b	i	b
PROJECT GROUP 12 - Total:					5.340.000						
137	for the North Adriatic Basins	13	Brušanka - construction of a retention	2	18.500.000	b	a	b	a,b	i	b
154	for the North Adriatic Basins	13	Tisovac - construction of a retention	2	93.000.000	c	a	b	a,b	h	b
144	for the North Adriatic Basins	13	Gacka – regulation of the relief canal of the Gacka River	2	7.500.000	c	a	b	a,h	f, h	b
PROJECT GROUP 13 - Total:					119.000.000						
143	for the North Adriatic Basins	14	Cres – construction of the retention C3	1	3.500.000	c	a	b	a,b	j	b
138	for the North Adriatic Basins	14	Dubračina – regulation of a part of the watercourse	2	10.500.000	c	a	a	a,b,g	h	a
5013	for the North Adriatic Basins	14	Gorica – construction of a canal	2	1.000.000	n	a	b	a,b	h,f	b

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						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
133	for the North Adriatic Basins	14	Bašćanska Ričina – regulation of a torrential stream	2	5.000.000	c	a	b	a,b	h	a
5020	for the North Adriatic Basins	14	Torrential streams of Rab Island – regulation works	2	3.500.000	c	a	a	a,b	j	a
363	for the North Adriatic Basins	14	Baška - a retention	2	4.000.000	c	a	b	a,b	j	a
155	for the North Adriatic Basins	14	Slani Potok – regulation of the basin	2	26.000.000	c	i	b	a,b	i	a
156	for the North Adriatic Basins	14	Lug - Kozica – construction of a water transfer tunnel	2	11.500.000	c	f	b	d	h,f	a
5012	for the North Adriatic Basins	14	Dobrinjski potok - construction of a canal	2	3.000.000	c	a	b	b	h	b
PROJECT GROUP 14 - Total:					68.000.000						
142	for the North Adriatic Basins	15	Benčići - construction of a retention	2	75.000.000	c	a	a	a b g	h	a
148	for the North Adriatic Basins	15	Draga (Čiritež) - construction of a retention	2	17.000.000	c	a	a	a,b,g	i	a
5007	for the North Adriatic Basins	15	Pengari - construction of a retention	2	15.000.000	c	a	a	a b,g	i	a
157	for the North Adriatic Basins	15	Račice – construction of a barrier	2	5.000.000	b	a,c	a	i	i	a
158	for the North Adriatic Basins	15	Draguč - Podmerišće - construction of a barrier	2	19.000.000	b	a,c	a	i	i	a
5006	for the North Adriatic Basins	15	Jukani – a retention (rehabilitation)	2	3.500.000	b	a,c	a	i	i	a
5025	for the North Adriatic Basins	15	Restoration of the Mirna River	2	12.550.000	c	a,c,h,i	c	e	j	a
PROJECT GROUP 15 - Total:					147.050.000						
140	for the North Adriatic Basins	16	Raša – reconstruction of the boundary canal No. 2	2	8.000.000	b	a,b	a	b	h,f	a
149	for the North Adriatic Basins	16	Karbuna – watercourse regulation	2	3.500.000	c	a	b	a,b	i	a
150	for the North Adriatic Basins	16	Tupaljski potok - construction of a retention	2	13.000.000	c	a	b	a,b	h	a
151	for the North Adriatic Basins	16	Sepčići – a retention (rehabilitation)	2	2.500.000	c	a	b	a,b	h	a
153	for the North Adriatic Basins	16	Pedrovica - construction of a retention	2	6.000.000	c	a	b	a,b	h	a
5015	for the North Adriatic Basins	16	Vilete –construction of a canal	2	1.000.000	c	a	c	a b	h	b
5004	for the North Adriatic Basins	16	Krapanjske bujice - regulation (Kapelica I, Kapelica II, Kapelica III)	2	2.200.000	c	a	b	b	h,f	a
PROJECT GROUP 16 - Total:					36.200.000						
139	for the North Adriatic Basins	17	Ljubljanijska - construction of a retention	2	16.000.000	c	a	a	a,b,h	h	b
5002	for the North Adriatic Basins	17	Valbandon - construction of a canal	2	18.000.000	c	a	b	b	h,f	b
PROJECT GROUP 17 - Total:					34.000.000						
4021	for the Middle and Lower Sava	18	Reconstruction of the waterfall on the Kupa River in Pribanjci	1	4.000.000	a	i	c	i	j	b
4020	for the Middle and Lower Sava	18	Reconstruction the waterfall on the Kupa River in Orjakovo	1	2.000.000	c	i	c	i	j	b
PROJECT GROUP 18 - Total:					6.000.000						
9	for the Middle and Lower Sava	19	Construction of the retention Ogulin, a dam with pertaining facilities on the watercourse Ogulinska Dobra in the area of the settlement Turkovići near Ogulin for flood defence of Ogulin	1	54.779.050	a	a,b,h,i	a	a,b,h,i	a,b,c,d,e,f,g,h,i,j	a
4016	for the Middle and Lower Sava	19	Regulation of the stream Ratković in Ogulin	1	500.000	c	a	b	a	h	b
PROJECT GROUP 19 - Total:					55.279.050						
58	for the Middle and Lower Sava	20	Construction of the left Kupa dike upstream of the railway bridge in Karlovac to Brodarac from km 137+450 to km 144+300, a continuation of the construction of the left Kupa dike from km 4+689,41 to km 6+772,50 in stage III of the construction	1	11.710.000	c	a	a	a,b,c,i	a,b,c,d,e,f,h,i	b
4011	for the Middle and Lower Sava	20	Construction of a dike along the right Mrežnica bank and along the left and right Korana banks for the protection of the settlements Logorište, Mala Svarča and Turanjski Poloj	1	40.000.000	c	a	a	a,b,i	a,b,c,d,e,f,h	a
4018	for the Middle and Lower Sava	20	Reconstruction of a stone wall on the right Kupa bank in Obala V. Mažuranića St. in Karlovac	1	13.500.000	c	a,h	a	a,b,h,i	d,c,b,a	b

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3012	for the Upper Sava	20	Construction of a transversal dike from the relief canal Odra to the Sava dike – extension of the flood defence system of the City of Zagreba	1	45.300.000	b	a	a	a,b	a,b,c	b
4008	for the Middle and Lower Sava	20	Reconstruction of the drainage facilities of the left Kupa backshore from the settlement Selce to Rečica	1	200.000.000	c	a	a	a,b,c,d,h,i	d,e,h	a
4010	for the Middle and Lower Sava	20	Construction of dikes along the Korana left and right banks and the Mrežnica left bank, and the regulation of the stream Sajevac for protection of the settlements Mostanje and Turanjski Lug	1	40.000.000	b	a	a	a,b	a,b,d,e,f,h	a
27	for the Middle and Lower Sava	20	Construction of the left Kupa dike, revetment and protective wall from the settlement Selce to Rečica on the Kupa section from rkm 123+552-rkm 135+415 in five construction phases for flood protection of the settlements Selce, Gradac, Mekušje and Husje	1	34.387.000	c	a	a	a,b,c,i	h,f,d,a	b
4007	for the Middle and Lower Sava	20	Construction of the right Kupa dike from Brodarci to the brewery in the length of 5.7 km	1	25.000.000	c	a	a	a,b,h,i	a,d,e,h	a
67	for the Middle and Lower Sava	20	Reconstruction of the left Kupa dike in the section Staro Pračno - Stara Drenčina (Phase 2 from km 2+400 to km 10+825) in the total length of 8.4 km (Measure 9/1-stage 2)	1	42.000.000	c	a	a	a,b	b,d,e,f,g,h,j	a
4013	for the Middle and Lower Sava	20	Reconstruction of the dike on the canal Kupa-Kupa	1	25.000.000	b	a	a	a,b,c,d,e,g,h	h	a
4037	for the Middle and Lower Sava	20	Odransko polje – construction of a dike about 6.8 km long, boundary canal and pumping station for the protection of the settlements Greda - Sela - Stupno from flooding of the retention Odransko polje	1	34.660.000	b	a,f	a	a,b,c,i	g,i,j	a
4039	for the Middle and Lower Sava	20	Reconstruction and construction of the right Odra dike, Odra Sisačka - Žabno – Stupno, in the length of about 7.2 km	1	34.655.000	c	a,f	a	a,b,c,i	g,i,j	a
4036	for the Middle and Lower Sava	20	Odransko polje – construction of the eastern dike of the retention Odransko polje Tišina Kaptolska - Suša in the length of about 14.5 km	1	67.700.000	b	a	a	a,b,c,i	g,i,j	a
4038	for the Middle and Lower Sava	20	Odransko polje - reconstruction and construction of a dike for the protection of the settlement Lekenik, left and right dike in the total length of about 10.8 km	1	29.876.000	c	a	a	a,b,c,i	g,i,j	a
4045	for the Middle and Lower Sava	20	Construction of protection and regulation water facilities on the right Kupa bank Nova Drenčina - Moščenica in the length of about 3.0 km, a boundary channel and a pumping station	1	38.000.000	c	a	a	a,b,g,i	g,i,j	a
4023	for the Middle and Lower Sava	20	Reconstruction of the stone wall and right Kupa bank in Gaza in Karlovac	1	2.000.000	c	a	a	a,b,e,h,i	j	b
4042	for the Middle and Lower Sava	20	Construction of protection and regulation water facilities on the left Kupa bank, settlements Stari Brod - Letovanić - Žažina - Mala Gorica, in the length of about 11.0 km	1	120.000.000	c	a	b	a,b,g,i	g,i,j	a
4019	for the Middle and Lower Sava	20	Protection of the settlements from Šišljavić to Lijeva Pokupska from flooding of the Kupa River	1	50.000.000	b	a	a	a,b,c,i	i	a
4301	for the Middle and Lower Sava	20	Drainage of the canal 1.1 basin in Novi centar in Karlovac	1	500.000	c	a	a	a,b,i	i	b
4316	for the Middle and Lower Sava	20	Regulation of the canal Mostanje in Karlovac	1	1.500.000	c	a	b	a,b,i	h	b
4315	for the Middle and Lower Sava	20	Regulation of the stream Švarča in Karlovac	1	3.000.000	c	a	b	a,b,i	h	b
4041	for the Middle and Lower Sava	20	Construction of protection and regulation water facilities on the left Kupa bank in the settlement Brkiševina about 2.0 km long	1	11.600.000	c	a	b	b,i	g,i,j	a
38	for the Middle and Lower Sava	20	Construction of the retention Burdelj, a dam with pertaining facilities on the watercourse Burdeljski potok in the area of the settlement Peščenica in the SMC for the purpose of flood defence	1	5.042.000	c	a	a	a	h	b
20	for the Middle and Lower Sava	20	Construction of the cutoff Korana - Kupa with inlet and outlet sluices	1	40.000.000	c	a	a	g,i	h	b
95	for the Middle and Lower Sava	20	Reconstruction of the canal Znanovit - Brebernica	1	1.000.000	c	a	b	c	h	b

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14	for the Middle and Lower Sava	20	Construction of the node Brodarci with pertaining dikes on the Kupa and Dobra in two construction stages for the purpose of the water regime regulation in the Karlovac area	1	33.670.000	c	a	c	c	h	a
4012	for the Middle and Lower Sava	20	Reconstruction of a dike around the Crna Mlaka fish ponds in the retention Kupčina	1	10.000.000	c	a	c	e	h	b
18	for the Middle and Lower Sava	20	Construction of the eastern dike of the retention Kupčina	1	7.000.000	c	a	a	i	h	b
19	for the Middle and Lower Sava	20	Construction of sluices for water distribution in the stretch from the canal Kupa - Kupa to the retention Kupčina	1	30.000.000	c	a	a	i	h	b
42	for the Middle and Lower Sava	20	Reconstruction of the left Korana dike between the wooden bridge and the pontoon bridge in Karlovac	2	2.099.000	c	a	a	a,b,e,h,i	d	a
4040	for the Middle and Lower Sava	20	Reconstruction and construction of the left dike of the Odra River Sisak - Tišina Kaptolska from 2+990 to 4+250	2	10.128.000	c	a	b	a, b, c, i	g,i,j	b
4312	for the Middle and Lower Sava	20	Reconstruction of the retarding dikes of the Petrinjčica River	2	4.000.000	c	a	a	a, b, h, i		a
4317	for the Middle and Lower Sava	20	Regulation of the stream Mala Utinja in Donji Sjeniĉak in the area of the town Karlovac	2	3.000.000	c	a	c	a,b,c	j	a
7	for the Middle and Lower Sava	20	Improvement of the left Kupa bank in Karlovac on the location Drežnik by the construction of a revetment from km 137+470 to km 138+200, in the total lenght of 730 m, for the purpose of bank stabilisation	2	7.790.000	c	a	a	a,b,i	j	a
4314	for the Middle and Lower Sava	20	Protection of the settlements on the right Kupa bank downstream of Kamnesko	2	10.000.000	c	a	c	a,b,c		a
4043	for the Middle and Lower Sava	20	Construction of protection and regulation water facilities on the left Kupa bank – settlements Brest Pokupski - Vurot - Stara Drenčina, length about 2.5 km	2	15.000.000	c	a	b	b,i	g,i,j	a
4051	for the Middle and Lower Sava	20	Construction of a revetment on the Kupa bank in Stari Brod from 48+550 - 48+700	2	4.400.000	c	a	c	b	d,f,h	b
4052	for the Middle and Lower Sava	20	Rehabilitation of the left Kupa bank in Stari Farkašić from rkm 49+100 to 49+700 by the construction of a revetment	2	23.125.000	c	i	c	b	g h,i,j	a
4308	for the Middle and Lower Sava	20	Stabilisation of the left Kupa bank in Jaminička Kiselica upstream of the bridge	2	10.000.000	c	a	c	a,b		b
PROJECT GROUP 20 - Total:					1.086.642.000						
4304	for the Middle and Lower Sava	21	Flood protection of the settlement Vojnić (regulation of the Radonja and Vojišnica through Vojnić)	1	20.000.000	c	a	b	a,b,f,g,i		a
4303	for the Middle and Lower Sava	21	Flood protection of a part of the settlement Turanjski Goljaci in Karlovac	1	2.000.000	c	a	c	a,b	i	b
4009	for the Middle and Lower Sava	21	Construction of the reservoir Lučica on the Korana River	2	100.000.000	b	a	a	a,b,c,d,g,h		a
4305	for the Middle and Lower Sava	21	Protection of the settlement Belajske Poljice from the Korana floods	2	500.000	c	a	c	a,b,f,g,i	j	b
4309	for the Middle and Lower Sava	21	Rehabilitation of a retaining wall on the left Korana bank in Rastoke in Slunj	2	3.000.000	c	i	c	a,b,h		b
PROJECT GROUP 21 - Total:					125.500.000						
4022	for the Middle and Lower Sava	22	Construction of a box culvert on the stream Kupinec	1	500.000	c	i	c	b	c,d	b
69	for the Middle and Lower Sava	22	Regulation of the stream Črnac in Draganić from rkm 0+000 to rkm 2+900	1	3.477.000	c	a	a	a,b,c	d,f,h	b

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						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Posibility of phased construction
47	for the Middle and Lower Sava	22	Construction of the connecting canal Stojnica - Kupčina and regulation of the Stojnica from the sluice to the distribution facility on the Kupčina in Franešići	1	28.378.000	c	a	a	a,b,c		b
51	for the Middle and Lower Sava	22	Construction of a chute in the riverbed of the watercourse Kupčina at the railway bridge and the regulation of the Kupčina from km 0+530 to km 0+805 for the purpose of the riverbed regulation	1	1.436.000	c	a	c	b,c	f,h	b
4017	for the Middle and Lower Sava	22	Regulation of the stream Brebrovac in Čegle	1	500.000	c	a	b	a	h	b
4024	for the Middle and Lower Sava	22	Construction of a retention and a reservoir in the Kupčina basin	2	10.000.000	b	a,i	a	a,b,c,d,e,h		a
4302	for the Middle and Lower Sava	22	Regulation of the stream Reka in Vranov Dol	2	300.000	c	a	c	a,b	j	b
PROJECT GROUP 22 - Total:					44.591.000						
39	for the Middle and Lower Sava	23	Protection of Hrvatska Kostajnica from the Una floods	1	18.400.000	c	a	b	a	f,h	b
4034	for the Middle and Lower Sava	23	Rehabilitation of the left Una dike – a wall from km 5+109,50 to km 5+965	1	3.000.000	c	a	b	e	f	b
PROJECT GROUP 23 - Total:					21.400.000						
60	for the Middle and Lower Sava	24	Reconstruction of the protection system of the settlements Donja Jelenska and Zapolic from flooding of the Sava and stream Vlahinička by phased construction	1	21.506.000	c	a	b	a,b,c,d,e,h	a,b,c,d,e,f,h	a
80	for the Middle and Lower Sava	24	Works performance on the "Reconstruction of a dam in the Sunja riverbed in Četrtkovac"	1	8.100.000	c	a	b	h	a,b,c,d,f,g	b
4035	for the Middle and Lower Sava	24	Rehabilitation of the right Sava bank in Uštica from km 0+350 to km 1+250	1	2.626.830	c	a	b	e	a,c	b
4102	for the Middle and Lower Sava	24	Construction of a revetment on the left Sava bank in Luka Lijeva	1	4.000.000	a	a	a	a,b,c	d,f,h	b
96	for the Middle and Lower Sava	24	Construction of a revetment on the left Sava bank in Galdovo	1	13.533.000	a	a	a	a,b,c	d,f,h	b
120	for the Upper Sava	24	Sava (left bank) – reconstruction of the left-bank dike Hrušćica - Dubrovčak	1	25.000.000	a	a	b	a,b	a,b,d	b
122	for the Upper Sava	24	Sava (right bank) – reconstruction of the dike between the settlements Drnek - Suša, including the construction of four revetments	1	165.000.000	a	a	b	a,b	a,b,d	b
126	for the Upper Sava	24	Sava - construction of a sill in the Sava riverbed at Novaki Šćitarjevski	1	17.500.000	b	a	b	a,b	a,b,d	b
6	for the Middle and Lower Sava	24	Construction and reconstruction of the dike and protective wall on the right Sava bank upstream of Sisak, from km 32+400-km 34+705,42, in the Sava section Željezno Desno - Dubrovčak Desni, rkm 643+500-rkm 645+800	1	7.534.000	c	a	a	a	a,d	b
72	for the Middle and Lower Sava	24	Reconstruction of the bridge above the outlet canal of the weir Palanek and access ramps of the road Hrastelnica - Palanek	1	2.567.000	b	a,i			d,e,f,g,h,j	b
73	for the Middle and Lower Sava	24	Construction of the right Ilova dike in the section of about 4200 m length from the Kutinica confluence upstream to the motorway	1	4.700.000	b	a	a	a,b,c,d,e,f	j	a
4030	for the Middle and Lower Sava	24	Reconstruction of the left Sava dike in the section Košutarica - Jasenovac from km 24.4 to 35.6 (11.2 km)	1	20.000.000	a	a	b	a,b,c,d	f,g,h	b
119	for the Upper Sava	24	Construction of the left Sava dike in the Zaprešić area (from the Sutla River to the Krapina River)	1	50.540.000	a	a,h	a	a,b,h,i	i	a
4029	for the Middle and Lower Sava	24	Reconstruction of the left Sava dike in Mlaka from km 0 to km 12,100	1	20.000.000	a	a	c	a,b,c,d	g,h	b
4047	for the Middle and Lower Sava	24	Rehabilitation of the Sava left bank by the construction of a revetment in rkm 577 in Kratečko in the length of about 400 m	1	8.000.000	c	a	b	a, b, c	h,i,j	b
124	for the Upper Sava	24	Rakovica – reconstruction of the right retarding dike	1	15.856.000	b	a	a	a,b	h,f	a

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
4103	for the Middle and Lower Sava	24	Protection of the settlement Kraljeva Velika	1	4.000.000	c	a	b	a,b,c	i	b
3006	for the Upper Sava	24	Reconstruction of the left Sava bank on the stretch Jadranski most - Jarun (L=3000 m) from 704+000 to 707+000	1	30.000.000	b	a	a	a,b	i	b
3007	for the Upper Sava	24	Reconstruction of the right Sava bank on the stretch weir Jankomir - Jarun (L=1400 m) from 707+700 to 709+100	1	10.000.000	b	a	a	a,b	i	b
3008	for the Upper Sava	24	Reconstruction of the right Sava bank on the stretch Most slobode - Jadranski most (L=1400 m) from 700+500 to 701+900	1	10.000.000	b	a	a	a,b	i	b
105	for the Upper Sava	24	Sava – sills in the Sava riverbed, section Ivanja Reka - Jarun (6 sills)	1	135.000.000	b	a	a	e	h,g	a
10	for the Middle and Lower Sava	24	Rehabilitation of the left Sava bank by the construction of a revetment in the section from rkm 498+961 to rkm 499+761 in the settlement Mlaka for the purpose of bank stabilisation	1	14.402.000	a	a	a	a	h	b
70	for the Middle and Lower Sava	24	Reconstruction of the right Sava dike in the section from km 22+700 to km 24+370 between the settlements Martinska Ves (Desna) and Ljubljana	1	7.534.000	c	a	b	a,b,e	j,g,f	a
86	for the Middle and Lower Sava	24	Reconstruction of the left Sava dike downstream of the sluice Trebež to the bridge on the watercourse Trebež from km 58+324 - 59+700	1	3.500.000	c	a	c	b,i		a
41	for the Middle and Lower Sava	24	Reconstruction of the right Sava dike through the settlements Sisak - Bok Palanječki - Strelečko - Tišina Desna from km 5+370 to km 13+581	1	10.202.000	c	a	c	b		a
4311	for the Middle and Lower Sava	24	Reconstruction of the right Sava dike from km 0+000 to 10+050, from the settlement Selište sunjsko to Gradusa – Phase II	2	10.000.000	c	a	a	a,b,c,i	c,d,e,f,g,h	a
35	for the Middle and Lower Sava	24	Rehabilitation of the left Sava bank near the settlements Jasenovac and Drenov Bok by the construction of a revetment for the purpose of the riverbank stabilisation	2	10.000.000	c	a	a	a,b,c,e,h,i	j	a
75	for the Middle and Lower Sava	24	Reconstruction of the left Sava dike through the settlement Preloščica from km 89+800-94+015	2	6.023.000	c	a	a	a,b,c		a
76	for the Middle and Lower Sava	24	Reconstruction of the left Sava dike through the settlement Gušće from km 78+725 -81+000 and from 82+000-83+200	2	7.193.000	c	a	a	a,b,c		a
4313	for the Middle and Lower Sava	24	Reconstruction and construction of the right Sunja dike and retarding dikes of the stream Krivaj	2	4.000.000	c	a	b	a,b,c,i		a
84	for the Middle and Lower Sava	24	Reconstruction of the right Sava dike through the settlement Ljubljana from km 18+000 to 19+200	2	2.142.000	c	a	b	a,b,i		b
85	for the Middle and Lower Sava	24	Reconstruction of the left Sava dike through the settlement Lonja from km 63+214 - 63+512	2	1.341.000	c	a	b	a,b,i		b
4046	for the Middle and Lower Sava	24	Construction of the PS Preloščica	2	15.000.000	c	a, f	b	c	f,h	b
3010	for the Upper Sava	24	Reconstruction of the weir Jankomir - extension of the flood defence system of the City of Zagreb	2	18.000.000	a	a	a	a,b	i	b
3011	for the Upper Sava	24	Construction of a sill in the Sava River downstream of the weir Jankomir - extension of the flood defence system of the City of Zagreb	2	20.000.000	a	a	a	a,b		b
87	for the Middle and Lower Sava	24	Revitalisation of the old Sava riverbed in Crkveno and Ivanjski Bok, Čigoč and Mužilovčica	2	5.000.000	c	a b,c,g,h		e,i		a
90	for the Middle and Lower Sava	24	Performance of rehabilitation works on the left Sava bank in Bok Palanječki by the construction of a revetment in rkm 609+500 in the length of 400 m	2	7.288.000	c	i		b,d,i		b
43	for the Middle and Lower Sava	24	Reconstruction of the left Sava dike through the settlements Palanjek - Setuš from km 110+800 - 117+600	2	8.922.000	b	a	b	c		a
PROJECT GROUP 24 - Total:					726.009.830						
114	for the Upper Sava	25	Construction of the retention Reka with pertaining facilities on the watercourse Reka in Donja Stubica area for flood protection of the downstream area and Stubičke Toplice	1	10.000.000	c	a	b	a,b	i	b
116	for the Upper Sava	25	Construction of the retention Slani Potok – flood protection of Donja Stubica and Stubičke Toplice downstream areas	2	17.520.000	c	a	b	a,b		b
PROJECT GROUP 25 - Total					27.520.000						

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						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
129	for the Upper Sava	26	Stream Goštiraj - Sveta Nedjelja	1	20.800.000	b	a	a	a,b	a,b,c	b
111	for the Upper Sava	26	Construction of the retention Lipovečka Gradna – a fill barrier and a retention for flood protection of the Samobor area	1	23.000.000	b	a	a	a,b	a,b,c	b
3004	for the Upper Sava	26	Construction of a retention in the stream Bregana basin	1	31.000.000	b	a	a	a,b,e	i	b
3005	for the Upper Sava	26	Regulation of the watercourse Lipovečka Gradna from 0+000 to 9+000	2	6.000.000	c	a	b	a, b	i	a
PROJECT GROUP 26 - Total:					80.800.000						
3001	for the Upper Sava	27	Regulation of the stream Čnomerec	1	15.105.000	c	a	b	a,b	a,b,c	b
PROJECT GROUP 27 - Total:					15.105.000						
3020	for the Upper Sava	28	Construction of the syphon Kosač in the connecting canal	1	3.100.000	c	a	b	a,b,f,g	a,b,c,d	b
121	for the Upper Sava	28	Construction of the retention Vir on the watercourse Zlenin in the town of Vrbovec area	1	8.700.000	b	a	a	a,i	a,b,c,d,e,f,g,j	a
3021	for the Upper Sava	28	Construction of the syphon Poljanski Lug	1	6.785.000	c	a	c	a,b	c,d	b
3003	for the Upper Sava	28	Regulacija and improvement of the canal Puhovec - PS Dugo Selo	1	7.965.000	b	a	a	a,i	a,b,d,e	b
3022	for the Upper Sava	28	Lonja River, Negovec 9+750-10+170	2	6.440.000	c	a	b	a,b,c	c,d	b
3023	for the Upper Sava	28	Lonja River, Miaka 12+079-12+504	2	4.880.000	c	a	b	a,b,f	d	b
110	for the Upper Sava	28	Construction of the reservoir Presečno with pertaining facilities on the Presečno tributary of the Lonja River, reconstruction of the county and local roads, flood defence, improvement of small watercourses	2	34.370.000	b	a	a	a,i		a
PROJECT GROUP 28 - Total:					72.240.000						
78	for the Middle and Lower Sava	29	Construction of sills in the Česma, Severinska and Lipova riverbeds for stabilisation of the riverbeds and regulation of low-water level regimes	1	2.422.000	c	a,c	a	a,c,d,e	a,b,c,d,h	b
57	for the Middle and Lower Sava	29	Regulation of the Česma riverbed and construction of dikes on its both banks from rkm 38+850 to rkm 46+591, section Siščani - Narta	1	6.154.155	c	a	a	a,b,d	j	a
4053	for the Middle and Lower Sava	29	Rehabilitation by geodetic works on the left and right banks - the revetment Glogovnica in Križevci from 26+200 to 26+280	1	1.200.000	c	a	a	a,b,i	i	b
4054	for the Middle and Lower Sava	29	Rehabilitation by performing geodetic works on the left and right bank – revetment Glogovnica in Majurec in 31+600	1	1.200.000	c	a	c	a,b,i	j	b
4031	for the Middle and Lower Sava	29	Construction of the reservoir Samarica	1	45.000.000	c	a,i	a	a,i	i	b
4056	for the Middle and Lower Sava	29	Construction of the reservoir Grbavac	2	41.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4057	for the Middle and Lower Sava	29	Construction of the reservoir Kreševine	2	15.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4058	for the Middle and Lower Sava	29	Construction of the reservoir Topolovica	2	12.500.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4059	for the Middle and Lower Sava	29	Construction of the reservoir Bedenička	2	20.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4060	for the Middle and Lower Sava	29	Construction of the reservoir Ravneš	2	58.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4061	for the Middle and Lower Sava	29	Construction of the reservoir Lazarevac	2	55.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4062	for the Middle and Lower Sava	29	Construction of the reservoir Severin	2	56.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4063	for the Middle and Lower Sava	29	Construction of the reservoir Ciglena	2	77.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4064	for the Middle and Lower Sava	29	Construction of the reservoir Tomaška	2	36.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b

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4066	for the Middle and Lower Sava	29	Construction of the reservoir Starčevljani	2	50.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4067	for the Middle and Lower Sava	29	Construction of the reservoir Rovišće	2	40.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4068	for the Middle and Lower Sava	29	Construction of the reservoir Mala Trnovitica	2	32.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4069	for the Middle and Lower Sava	29	Construction of the reservoir Velika Trnovitica	2	24.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4070	for the Middle and Lower Sava	29	Construction of the reservoir Krnjača	2	46.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4071	for the Middle and Lower Sava	29	Construction of the reservoir Ruškovac	2	33.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4072	for the Middle and Lower Sava	29	Construction of the reservoir Šimljana	2	68.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4073	for the Middle and Lower Sava	29	Construction of the reservoir Krivaja	2	33.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4074	for the Middle and Lower Sava	29	Construction of the reservoir Križić	2	25.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4075	for the Middle and Lower Sava	29	Construction of the reservoir Laminac	2	15.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4076	for the Middle and Lower Sava	29	Construction of the reservoir Martinac	2	15.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
4077	for the Middle and Lower Sava	29	Construction of the reservoir Miklouš I	2	40.000.000	c	a,c,g,h,i	a	a,b,d,i	j	b
31	for the Middle and Lower Sava	29	Construction of the reservoir Martinac Trojstveni, a dam with pertaining facilities on the watercourse Dobrovita, a right Bjelovarska tributary, for the purpose of flood defence, improvement of small watercourses downstream and irrigation	2	6.117.000	c	a,c,g,h,i	a	a,b,d	j	b
92	for the Middle and Lower Sava	29	Reconstruction of dikes on the streams Čmec and Glogovnica on the stretch south of the railroad Vrbovec - Križevci	2	2.000.000	c	a	a	a,b,d	j	a
88	for the Middle and Lower Sava	29	Construction of the left and right dikes of the lateral canal Koritna from rkm 2+020-rkm 3+000 in the area of the small basin Česma - Glogovnica	2	3.000.000	c	a	a	a,b,d	j	a
89	for the Middle and Lower Sava	29	Construction of dikes of the connecting canal Zelina - Lonja - Glogovnica from rkm 10+500 to rkm 11+000 near the settlement Stara Marča in the Kloštar Ivanić area	2	1.000.000	c	a	c	a		b
PROJECT GROUP 29 - Total:					859.593.155						
4028	for the Middle and Lower Sava	30	Regulation of the stream Toplica in Daruvar with dike construction	1	10.812.500	c	a	a	i	a,c,d,f	b
48	for the Middle and Lower Sava	30	Regulation of the watercourse Bijela with the construction of a relief canal for floodwater and regulation of the existing riverbed from km 25+474 to km 28+411 in Sirač for the purpose of flood defence	1	9.737.000	c	a	b	a,b	h	a
4032	for the Middle and Lower Sava	30	Protection of the town Pakrac from flash floods	1	5.000.000	c	a	a	a	a	a
4033	for the Middle and Lower Sava	30	Protection of the right bank in the town Pakrac from flash floods	1	4.600.000	c	a	a	a	a	a
37	for the Middle and Lower Sava	30	Construction of the retention Miletinac, a dam with pertaining facilities on the Illova River near the settlement Mali Miletinac for purposes of flood defence, improvement of small watercourses downstream and irrigation	1	41.723.000	c	c	a	c	i	b
4201	for the Middle and Lower Sava	30	Regulation of the Pakra River from km 45+982 to km 47+750 in the cadastral municipality Kusunje in the area of the town Pakrac	2	11.250.000	c	a	a	a,b	a,b,c,d	b

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52	for the Middle and Lower Sava	30	Construction of the left Illova dike in the area of the settlements Međurić and Veliko Vukovje near Kutina	2	3.000.000	b	a	b	a,b,c,d,h,i	i	b
PROJECT GROUP 30 - Total:					86.122.500						
17	for the Middle and Lower Sava	31	Construction of the reservoir Rešetarica, a dam with pertaining facilities on the watercourse Rešetarica for purposes of flood defence, improvement of small watercourses downstream and irrigation	1	23.530.000	c	a,g,h	a	a,b,c,d,g	g,h,i,j	a
25	for the Middle and Lower Sava	31	Construction of a weir facility in the riverbed of the watercourse Šumetlica, a bridge across the connecting canal Šumetlica - Rešetarica on the road Černik - Šumetlica and finalisation of the excavation of the connecting canal in the length of about 150 m for the purpose of transporting a part of the Šumetlica water to the Rešetarica	1	4.985.000	c	a,g,h	a	a,b,c,d,g	g,i,j	a
66	for the Middle and Lower Sava	31	Regulation of the watercourse Rešetarica in Rešetari by the construction of a new cutoff from km 12+870 to km 13+505	1	2.000.000	c	a,g,h	a	a,b,c,d,g	g,i,j	a
79	for the Middle and Lower Sava	31	Regulation of the watercourse Rešetarica in the section from km 2+749,40 to km 2+800,90 with the construction of a bridge in km 2+749,00 on the road Bačin Dol - Černik	1	2.000.000	c	a,g,h	a	a,b,c,d,g	g,i,j	a
PROJECT GROUP 31 - Total:					32.515.000						
4200	for the Middle and Lower Sava	32	Modernisation of the left Sava dikes from Račinovci to Nova Gradiška	I	370.000.000	b	a,i	a	a,b,c,e,h,i	a,b,c,d,e,f,g,h,i,j	a
4105	for the Middle and Lower Sava	32	Rehabilitation of a rockfall on the Sava left bank by the construction of a revetment from rkm 275+770 to rkm 276+277 in the village Sitar, Phase II	1	31.250.000	a	a	a	a,b,d	f,g,h	b
68	for the Middle and Lower Sava	32	Rehabilitation of the left Sava bank in Županja from rkm 270+500 to rkm 271+311 by the construction of a revetment	1	13.498.000	c	a	a			b
PROJECT GROUP 32 - Total:					414.748.000						
40	for the Middle and Lower Sava	33	Regulation of the Orjava with the construction of dikes and a protective wall on its left bank in the Ciglenik and Bečica area, km 8+717 - 9+400	1	4.010.000	c	a	a	a,b,c	a,b,c,d,e,f,g,h	b
16	for the Middle and Lower Sava	33	Construction of the reservoir Kamensko, a dam with pertaining facilities on the watercourse Brzaja, a left tributary of the Orjava, for flood defence, improvement of small watercourses downstream, irrigation and water supply	1	20.410.000	c	a,b,e,g,h,i	a	a,b,c,i	j	b
4320	for the Middle and Lower Sava	33	Protection of the town Požega against flash floods from Mt. Požeška gora	2	100.000.000	c	a,b,g,h,i	a	a,b,c,i	i,j	a
4321	for the Middle and Lower Sava	33	Retention Kaptolka	2	40.000.000	c	a,b,g,h,i	c	a,b,c,i	i,j	b
55	for the Middle and Lower Sava	33	Regulation of the Orjava River in the section Kuzmica - Vidovci from km 30+188-33+983 downstream of Požega	2	6.980.000	c	a,c,i	a	a,b,i	d	a
4310	for the Middle and Lower Sava	33	Improvement of the access road along the regulated riverbed of the torrential stream Kutjevačka Rika through Kutjevo	2	1.500.000 kn	c	c,h,i	b	a,b,i	i	a
PROJECT GROUP 33 - Total:					172.900.000						
8	for the Middle and Lower Sava	34	Retention Glogovica	1	35.727.250	c	a	a	b	a,b,d-h	b
64	for the Middle and Lower Sava	34	Construction of a sluice and pumping station on the stream Glogova and reconstruction of the pertaining section of the Sava defensive dike in the zone of Luka Brod (Port)	1	7.170.000	c	a	a	a,b	e,f,h,i,j	b
71	for the Middle and Lower Sava	34	Construction of the reservoir Razliv, a dam with pertaining facilities on the watercourse Razliv near Sl. Brod for flood defence and irrigation	1	5.000.000	c	a	b	a,b,c	-	b
PROJECT GROUP 34 - Total:					47.897.250						
61	for the Middle and Lower Sava	35	Construction of the PS Teča on the Sava near Račinovci	1	18.675.000	c	a,f	a	a,b,c,d	a,b,c,d	b
4025	for the Middle and Lower Sava	35	Regulation and stabilisation of the Bosut banks in Vinkovci	1	10.000.000	c	a, h	a	i	h	b

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82	for the Middle and Lower Sava	35	Regulation of the watercourse Boris – confluence of the watercourse Boris (in km 9+250) into the Bosut River (in km 55+035)	1	6.950.000	c	g	c	c		a
49	for the Middle and Lower Sava	35	Construction of the reservoir Breznica, a dam with pertaining facilities on the watercourse Breznica in the basin of the Western Lateral Canal in Bid polje for purposes of flood defence, improvement of small watercourses downstream and irrigation	2	42.300.000	c	a,g,h	a	b,c	h	b
50	for the Middle and Lower Sava	35	Construction of the reservoir Preslatinci, a dam with pertaining facilities on the watercourse Kaznica, a tributary of the Western Lateral Canal, in Bid polje for purposes of flood defence, improvement of small watercourses downstream and irrigation	2	17.360.000	c	a,g,h	a	b,c	h	b
46	for the Middle and Lower Sava	35	Regulation of the watercourse Bid in the section from km 6+000 to km 26+295	2	16.385.000	b	a,c,f	a		d	a
PROJECT GROUP 35 - Total:					111.670.000						
244	For the Mura and Upper Drava basins	36	Reconstruction of the dike Virje Otok - Brezje (along the old bed of the HPP Formin, 3.7 km)	1	26.000.000	a	a	a	a,b,c,f,h	a,b,c	b
261	For the Mura and Upper Drava basins	36	Reconstruction of the dike Gornji Hrašćan along the old bed of the HPP Varaždin (3.0 km)	1	29.800.000	b	a	a	a,b,c	d,e,f	b
247	For the Mura and Upper Drava basins	36	Reconstruction of the left bank dike Puščine (3.5 km)	1	25.000.000	b	a	a	a,b,c	d	b
1104	For the Mura and Upper Drava basins	36	Revitalization of the side channel Ješkovo	2	20.000.000	b	a,c,h	b	a,b,c,e	j	b
259	For the Mura and Upper Drava basins	36	Construction of the dike Selnica - Dubovica (right bank dike along the old bed of the HPP Dubrava, 6.7 km)	2	20.800.000	b	a	a	a,b,c	h	a
266	For the Mura and Upper Drava basins	36	Construction and reconstruction of the dike Šemovec (2.5 km)	2	10.000.000	c	a	a	a,b,c	i	b
1004	For the Mura and Upper Drava basins	36	Reconstruction of the dike Repaš - Botovo (18 km)	2	100.000.000	a	a	a	a,b,c		a
1005	For the Mura and Upper Drava basins	36	Reconstruction of the dike Brodić - Zgruti	2	45.000.000	a	a	a	a,b,c		b
279	For the Mura and Upper Drava basins	36	Reconstruction of the dike Novo Virje - Crnec (7.2 km)	2	45.000.000	a	a	a	a,b,c		b
264	For the Mura and Upper Drava basins	36	Construction of a dike between the bridges, left bank in Varaždin (0.2 km)	2	1.100.000	b	a	a	a,b,c		b
1006	For the Mura and Upper Drava basins	36	Construction of the right Drava dike in the area of the settlement Drnje	2	15.000.000	b	a	b	a,b,c		b
267	For the Mura and Upper Drava basins	36	Reconstruction of the dike Zamlaka - Hrženica (0+000 - 6+500)	2	26.000.000	c	a	b	a,b,c		b
303	For the Mura and Upper Drava basins	36	Construction of the right bank dike Botovo - Libanovec	2	15.600.000	c	a	b	a,b,c		b
254	For the Mura and Upper Drava basins	36	Revitalization of the Čambina (old Drava side channel)	2	2.000.000	a	f,g,h	c	a,c,e		a
PROJECT GROUP 36 - Total:					381.300.000						
2105	For the Danube and Lower Drava	37	Regulation of the Drava River in Osijek – construction ongoing, completion in 2024	I	120.000.000	a	a,d,f,h,i	a	a,b,c,d,e,f,g,h,i	a,b,c,d,e,f,h,i,j	a
2201	For the Danube and Lower Drava	37	Revitalization / restoration of the Drava side channel Halaševo	1	15.550.000	c	a,c,f,h,i	c	e,i	j	a
2006	For the Danube and Lower Drava	37	Construction of a flood protection dike for the settlement Karašica	2	7.000.000	a	a,h,i	a	a,b,c,d,e,h,i	a,b,c,d,e,f,h,i,j	a

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
2203	For the Danube and Lower Drava	37	Dike Sveti Đurađ - Viljevo	2	8.130.000	a	a,h,i	a	a,b,c,d,e,h,i	a,b,c,d,e,f,h,i,j	a
2109	For the Danube and Lower Drava	37	Construction of the multipurpose hydrotechnical system Osijek – in designing stage	2	2.609.000.000	a	a,b,c,d,e,f,g,h,i	a	a,b,c,d,e,f,g,h,i	i,j	b
345	For the Danube and Lower Drava	37	Drava – rehabilitation and maintenance of the right bank (km 38-Nehaj), revitalisation	2	7.500.000	a	a,c,d,h,i	a	a,b,c,d,e,i	h,i,j	a
2011	For the Danube and Lower Drava	37	Reconstruction and extension of the dike and revetment - Zoo vrt	2	14.000.000	a	a,h,i	b	a,b,d,e,h,i	e,f,h,i,j	a
2034	For the Danube and Lower Drava	37	Reconstruction of defensive dikes in the defended area B.34 - the Lower Drava and Danube	2	500.000.000	a	a,i	a	a,b,c,d,e,g,h,i	j	b
2033	For the Danube and Lower Drava	37	Rehabilitation of a waste disposal site on the left Drava bank near the corridor VC - rkm 32	2	5.500.000	a	a,d,i	a	a,b,c,d,e,h,i	j	a
314	For the Danube and Lower Drava	37	Dike Terezino polje - Vrbovka, dike Noskovci - Sopje and retarding dike along the Županijski kanal, dike reconstruction	2	38.978.000	a	a,h,i	a	a,b,c,d,e,h,i	j	a
315	For the Danube and Lower Drava	37	Dike Zabara - Hobod, dike Donji Miholjac - Sveti Đurađ and dike Belišće - Nard, dike reconstruction	2	9.701.000	a	a,h,i	a	a,b,c,d,e,h,i	j	a
2041	For the Danube and Lower Drava	37	Construction of a revetment on the right Drava bank from rkm 66+000 - settlement Gat	2	25.000.000	a	a,d,i	a	a,b,c,d,e,i	j	b
2042	For the Danube and Lower Drava	37	Construction of a revetment on the right Drava bank in Bistrinci from rkm 57+000 - 58+000	2	25.000.000	a	a,d,i	a	a,b,c,d,e,i	j	b
2013	For the Danube and Lower Drava	37	The sluice Stara Drava in Josipovac with a plateau for a mobile pump	2	6.000.000	c	a,i	a	a,b,c,d,i	h,i,j	a
351	For the Danube and Lower Drava	37	Boroš Drava – ecological revitalisation of the Boroš Drava area, sluice	2	538.000	a	a,c,i	c	a,b,e,i	h,i,j	b
352	For the Danube and Lower Drava	37	Boroš jezero – a bridge - ecological revitalisation of the Boroš Drava	2	3.184.000	a	a,c,i	c	a,b,e,i	h,i,j	b
353	For the Danube and Lower Drava	37	Boroš Drava - ecological revitalisation of the Boroš Drava area, mud removal	2	4.186.000	a	a,c,i	c	a,b,e,i	h,i,j	b
2107	For the Danube and Lower Drava	37	Revitalisation / restoration of Biljski rit (Stara Drava) – continuation of the INTERREG IPA project "Wetland / Restore"	2	50.000.000	c	a,c,f,h,i	a	e,i	j	a
2031	For the Danube and Lower Drava	37	Improvement and revitalisation of Otok Ijubavi in Osijeku, left Drava bank rkm 22	2	7.500.000	c	achi	c	ei	ij	b
PROJECT GROUP 37 - Total:					3.456.767.000						
252	For the Mura and Upper Drava basins	38	Reconstruction of the retarding dikes along the Trnava (6.4 km)	1	45.000.000	b	a	a	a,b,c	a,b,c	a
1101	For the Mura and Upper Drava basins	38	Reconstruction of the Mura dike from km 0 – 6.1	2	45.000.000	a	a	a	a,b,c	j	b
1107	For the Mura and Upper Drava basins	38	Rehabilitation of the dike Podturen seepage	2	4.500.000	a	a	b	a,b,c	i	b
250	For the Mura and Upper Drava basins	38	Reconstruction of retarding dikes along the Bistrec - Rakovnica (10.3 km)	2	50.000.000	b	a	a	a,b,c		a
251	For the Mura and Upper Drava basins	38	Reconstruction of retarding dikes along Kotoripski kanal (4.8 km)	2	25.000.000	b	a	a	a,b,c		b
PROJECT GROUP 38 - Total:					169.500.000						

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
262	For the Mura and Upper Drava basins	39	Reconstruction of the retarding dike on the left and right banks of the Bednja River from 0+000 to 5+610	1	32.500.000	c	a	b	a,b,c,d,h,i	g,h	a
1013	For the Mura and Upper Drava basins	39	Regulation of the Bednja along the easter bypass road of Novi Marof (4.5 km)	1	6.500.000	b	a	b	a,b,c,i	h	b
1022	For the Mura and Upper Drava basins	39	Regulation of a stormwater canal of the settlements Novo Selo Podravsko and Županec (4.3 km)	1	3.900.000	c	a	b	a,b,c	f	b
1024	For the Mura and Upper Drava basins	39	Regulation of the watercourse Drenovec in the settlement Drenovec (2 km)	1	3.500.000	c	a	b	a,b,c	f	b
1014	For the Mura and Upper Drava basins	39	Regulation of the watercourse Makoišće in the settlements Moždenec and Grana (0.5 km)	1	700.000	c	a	c	a,b,c,i	f	b
1025	For the Mura and Upper Drava basins	39	Regulation of the watercourse Košćevec in Varaždinske Toplice (1.3 km)	1	2.000.000 k	c	a	b	a,b,c	h	b
1026	For the Mura and Upper Drava basins	39	Regulation of the watercourse Vapnara in Strmec Remetinečki	1	700.000	c	a	c	a,b,c	f	b
240	For the Mura and Upper Drava basins	39	Cleaning of Lake Trakošćan	1	22.000.000	c	a,c,h	b	e,h	a,h	b
1018	For the Mura and Upper Drava basins	39	Regulation of Mlinski kanal in the business zone Veliki Bukovec (0.25 km)	1	800.000	c	a	c	a,b,c		b
1001	For the Mura and Upper Drava basins	39	Construction of a dike along the Bednja from Kapela Podravska to Ludbreg (11 km)	2	32.500.000	b	a	b	a,b,c,d,h,i	g,i	a
258	For the Mura and Upper Drava basins	39	Construction of the retention Korušćak	2	9.100.000	b	a	b	a,b,c,d,i	g,h	b
305	For the Mura and Upper Drava basins	39	Construction of the retention Kamenica I on the watercourse Kamenica	2	6.500.000	b	a	c	a,b,c,i	g,h	b
288	For the Mura and Upper Drava basins	39	Construction of a retention on the watercourse Čret	2	5.200.000	b	a	c	a,b,c,i	g,h	b
287	For the Mura and Upper Drava basins	39	Construction of a reservoir on the Bednja River near the settlement Bednja	2	13.000.000	b	a	c	a,b,c,i	i,j	b
289	For the Mura and Upper Drava basins	39	Construction of a retention on the watercourse Očura	2	5.200.000	b	a	c	a,b,c,i	i	b
294	For the Mura and Upper Drava basins	39	Construction of the retention Šaša I (flood defence) on the stream Šaša	2	5.200.000	c	a	c	a,b,c,i	i	b
1023	For the Mura and Upper Drava basins	39	Construction of a sotrmwater canal of the settlement Kapela Podravska (0.6 km)	2	700.000	c	a	c	a,b,c	f	b
PROJECT GROUP 39 - Total:					150.000.000						
1102	For the Mura and Upper Drava basins	40	Construction of a boundary canal of the settlement Pribislavec	1	2.000.000	b	a	a	a,b,c	h	a
1016	For the Mura and Upper Drava basins	40	Regulation of the Jalšovnica from Gornji Kraljevec to Novo Selo Rok (2.5 km)	1	3.300.000	b	a	a	a,b,c	h	a
1103	For the Mura and Upper Drava basins	40	A retarding dike along the watercourse Zelena	2	500.000 k	b	a	a	a,b,c	h	a
255	For the Mura and Upper Drava basins	40	Construction of the retention Vugrišinec	2	9.100.000	b	a	a	a,b,c	i	a
284	For the Mura and Upper Drava basins	40	Regulation of the Trnava Murska downstream of the WWTP of the town Čakovec	2	3.900.000	c	a	a	a,b,c	j	a

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283	For the Mura and Upper Drava basins	40	Regulation of the watercourse Hrebec from the retention Šenkovec to its confluence	2	3.900.000	c	a	b	a,b,c	h	a
PROJECT GROUP 40 - Total:					22.700.000						
4055	For the Middle and Lower Sava basins	41	Regulation of the watercourse Jabučeta from 0+000 to 1+700 in the settlement Jabučeta	1	600.000	c	a	b	a,b,c,d,e	f,h,j	b
304	For the Mura and Upper Drava basins	41	Regulation of the watercourse Gliboki in the settlement Rasinja (29+420-32+000)	1	6.500.000	c	a	a	a,b,c,d	e,i,j	a
280	For the Mura and Upper Drava basins	41	Regulation of the watercourse Komarnica from km 5+820 to 7+300	1	1.600.000	c	a	a	a,b,c	i,j	a
1105	For the Mura and Upper Drava basins	41	Construction of the retention Žlebica on the Bistra Koprivnička	2	5.000.000	b	a	a	a,b,c,d	j	b
253	For the Mura and Upper Drava basins	41	Regulation of the watercourse Bistra Koprivnička from km 25+735 - 32+040	2	6.500.000	b	a	a	a,b,c	e,i	a
282	For the Mura and Upper Drava basins	41	Regulation of the watercourse Zdelja from km 5+400 – 10+500	2	2.000.000	c	a	a	a,b,c		a
268	For the Mura and Upper Drava basins	41	Construction of the retention Javorovac on the stream Komarnica	2	13.000.000	c	a	a	a,b,c		b
269	For the Mura and Upper Drava basins	41	Construction of the retention Mihaljanec on the stream Zdelja	2	10.400.000	c	a	a	a,b,c		b
272	For the Mura and Upper Drava basins	41	Construction of the retention Anski on the stream Anski	2	7.800.000	c	a	a	a,b,c		b
273	For the Mura and Upper Drava basins	41	Construction of the retention Kozarevac on the stream Kozarevac	2	3.900.000	c	a	a	a,b,c		b
274	For the Mura and Upper Drava basins	41	Construction of the retention Prugovac on the stream Suha Katalena	2	6.500.000	c	a	a	a,b,c		b
PROJECT GROUP 41 - Total:					63.800.000						
2010	For the Danube and Lower Drava	42	Regulation of the streams Čadavica and Slanac (box culverts)	1	1.945.000	a	a,c,i	a	a,b,c,d,e,i	a,b,c,d,e,f,h,i,j	a
342	For the Danube and Lower Drava	42	Dabrovnica – construction of a reservoir – dam on the stream Dabrovnica – multipurpose economic facility (flood defence, irrigation, recreation) near Suhopolje	2	13.992.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	e,f,g,h,i,j	a
2021	For the Danube and Lower Drava	42	Regulation of the water regime in the Odenica basin for flood defence and other uses in the town Virovitica area	2	24.500.000	a	a,c,g,h,i	a	a,b,c,d,e,g,h,i	i,j	a
2023	For the Danube and Lower Drava	42	Improvement of water facilities in the watercourse Županijski kanal	2	5.000.000	a	a,c,g,h,i	a	a,b,c,d,e,g,h,i	i,j	b
2026	For the Danube and Lower Drava	42	Regulation of the water regime in the watercourse Županijski kanal for flood defence and multipurpose use	2	22.000.000	a	a,c,g,h,i	a	a,b,c,d,e,g,h,i	i,j	b
2028	For the Danube and Lower Drava	42	Regulation of the water regime in the watercourse Brana for flood defence and multipurpose use	2	15.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	h,i,j	b
2024	For the Danube and Lower Drava	42	Improvement of water facilities in the watercourse Lendava	2	1.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	i,j	a
2027	For the Danube and Lower Drava	42	Regulation of the water regime in the watercourse Lendava for flood defence and multipurpose use	2	50.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	i,j	a
348	For the Danube and Lower Drava	42	Regulation of the water regime in the Čadavica - sluices, sills, reconstruction of existing retentions	2	30.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	j	b

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						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
2022	For the Danube and Lower Drava	42	Regulation of the water regime in the Brežnica Orešaka basin for flood defence and multipurpose use	2	50.000.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	h,i,j	b
344	For the Danube and Lower Drava	42	Dabrova – construction of a relief channel	2	5.181.000	a	a,c,f,i	a	a,b,c,d,e,i	i,j	a
PROJECT GROUP 42 - Total:					218.618.000						
334	For the Danube and Lower Drava	43	Brežnica – construction of a multipurpose reservoir (irrigation, recreation, fisheries, technological uses) near Našice	1	33.000.000	a	a,c,f,g,h,i	a	b,c,d,e,i	d,e,f,g,h,i,j	a
349	For the Danube and Lower Drava	43	Lapovac 1 – construction of a multipurpose reservoir near Našice	2	25.000.000	a	a,c,f,g,h,i	a	a,b,c,d,e,f,g,h,i	a,b,c,d,e,f,g,h,i	a
2106	For the Danube and Lower Drava	43	Reservoir Gornja Motičina	2	18.750.000	a	a,c,f,g,h,i	a	a,b,c,d,e,f,g,h,i	f,h,i,j	a
316	For the Danube and Lower Drava	43	Regulation of the Vučica River, basin improvement	2	109.570.000	a	a,c,f,g,h,i	a	a,b,c,d,e,f,g,h,i	h,i,j	a
350	For the Danube and Lower Drava	43	Seona - construction of a multipurpose reservoir (flood defence, recreation, irrigation, etc.) near Donja Motičina	2	20.386.000	a	a,c,f,g,h,i	a	a,b,c,d,e,f,g,h,i	i,j	a
354	For the Danube and Lower Drava	43	Marjanac - construction of a reservoir (flood defence, irrigation, recreation) for protection of Orahovica from mountain flash floods	2	26.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	e,f,h,i,j	a
2007	For the Danube and Lower Drava	43	Reservoir / retention Stublovac	2	6.500.000	a	a,c,g,h,i	b	a,b,c,d,e,i	d,e,f,h,i,j	b
2020	For the Danube and Lower Drava	43	Reservoir / retention Šašika	2	18.750.000	a	a,c,f,g,h,i	a	a,b,c,d,e,f,h,i	i,j	a
337	For the Danube and Lower Drava	43	Darna - construction of a multipurpose reservoir (flood defence, irrigation, recreation) near Našice	2	6.495.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	h,i,j	a
343	For the Danube and Lower Drava	43	Krajna – construction of a reservoir (flood defence, irrigation, recreation), Čačinci	2	20.352.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	i,j	a
2008	For the Danube and Lower Drava	43	Improvement of the flood protection system of the settlements Bokšić Lug and Bokšić	2	20.000.000	a	a	b	a,b,c,e,i	d,e,f,h,i,j	b
PROJECT GROUP 43 - Total:					304.803.000						
2103	For the Danube and Lower Drava	44	Regulation of the Vuka River in Vukovar from 0+000 to 3+640	1	25.125.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	a,b,c,d,e,f,h,i,j	a
323	For the Danube and Lower Drava	44	Construction of the multipurpose reservoir Dola (flood protection for settlements upstream of Vukovar, recreation, fisheries)	2	17.500.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	a,b,d,e,f,h,i,j	a
2108	For the Danube and Lower Drava	44	Reconstruction of the bottom outlet gate of the dam Borovik	2	20.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	f,h,i,j	b
319	For the Danube and Lower Drava	44	Kanal Petruš – basin regulation, canal, sluice, pumping station	2	38.167.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	h,i,j	a
356	For the Danube and Lower Drava	44	Poganovačko - Kravički kanal, basin regulation	2	20.000.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	i,j	b
360	For the Danube and Lower Drava	44	Regulation of the water regime in the Vuka by the construction of sluices	2	15.592.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	i,j	b
2015	For the Danube and Lower Drava	44	Execution of a new Vuka riverbed in the area of the cadastral municipality Buče	2	24.500.000	a	a,c,g,h,i	a	a,b,c,d,e,i	i,j	a
359	For the Danube and Lower Drava	44	Revitalisation of Antinski prokop	2	8.583.000	c	a,c,h,i	a	a,b,c,d,e,h,i	j	b

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						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
2014	For the Danube and Lower Drava	44	Construction of a flood protection system for the settlement Punitovci	2	5.000.000	c	a,f	a	a,b,c,d,h,i	h,i,j	a
PROJECT GROUP 44 - Total:					174.467.000						
331	For the Danube and Lower Drava	45	Danube River – stabilization of its right bank from Vukovar to Vučedol (rkm 1328-1333)	1	230.700.000	a	a,b,d,h,i	a	a,b,c,d,e,h,i	a,b,c,d,e,f,g,h,i,j	a
339	For the Danube and Lower Drava	45	Danube River – improvement of its right bank in Sotin, downstream of Vukovar - MSTI (the former agency conducts public procurement for works in 2020 – funding from the OPCC fund)	1	46.000.000	a	a,d,h,i	a	a,b,c,d,e,h,i	a,b,c,d,f,h,i,j	a
2004	For the Danube and Lower Drava	45	Reconstruction of the Danube dikes Gomboš and Batina	2	16.000.000	a	a,h,i	a	a,b,c,d,e,h,i	d,e,f,h,i,j	b
2036	For the Danube and Lower Drava	45	Regulation of the Danube in Dalj from rkm 1352+500-1355+000 (protection against adverse effects of water, defence against ice, revitalisation)	2	250.000.000	a	a,c,d,h,i	a	a,b,c,d,e,h,i	j	b
2037	For the Danube and Lower Drava	45	Improvement of the Danube right bank in Aljmaš from rkm 1379+800 - 1380+400 (protection against adverse effects of water)	2	25.000.000	a	a,d,h,i	a	a,b,c,d,e,h,i	i,j	b
2040	For the Danube and Lower Drava	45	Improvement of the Danube bank in Šarengrad rkm 1306+500 - 1307+000 - continued construction of the revetment in the upstream part (protection against adverse effects of water)	2	30.000.000	a	a,d,h,i	a	a,b,c,d,e,h,i	i,j	b
2043	For the Danube and Lower Drava	45	Improvement of the right Danube bank downstream of the settlement Aljmaš rkm 1375+000 - 1378+000 (Staklara)	2	120.000.000	a	a,d,i	a	a,b,c,d,e,i	i,j	b
2038	For the Danube and Lower Drava	45	Construction of the connecting defensive dike Zmajevac - Goboš (Batina)	2	45.000.000	a	a,h,i	a	a,b,c,d,e,h,i	h,i,j	a
2039	For the Danube and Lower Drava	45	Construction of a defensive dike along the Danube in Ilok	2	45.000.000	a	a,h,i	a	a,b,c,d,e	h,i,j	a
2035	For the Danube and Lower Drava	45	Improvement and protection of Zeleni otok in the Danube – rehabilitation of the parallel facility in the Danube from rkm 1423+250 to 1424+200 and revitalisation of a Danube side channel from rkm 1421+500 to 1423+370	2	20.000.000	a	a,c,d,h,i	a	a,b,e,i	i,j	b
2032	For the Danube and Lower Drava	45	Retarding dike along the Karašica in Batina – confluence with the Danube	2	12.000.000	a	a,c,h,i	a	a,b,e,h,i	j	a
332	For the Danube and Lower Drava	45	Batina - construction of a revetment, the Karašica confluence with the Danube	2	3.000.000	a	a,d,h,i	a	a,b,e,h,i	j	b
2202	For the Danube and Lower Drava	45	Restoration of the old Danube course - Zmajevački Dunavac - continuation of the INTERREG IPA project "Wetland / Restore"	2	62.500.000	c	a,c,f,h,i	c	e,i	j	a
355	For the Danube and Lower Drava	45	Kopački rit – water regime regulation – revitalisation of habitats	2	33.045.000	a	a,c,i	c	e,i	j	b
PROJECT GROUP 45 - Total:					938.245.000						
2005	For the Danube and Lower Drava	46	Reconstruction of water facilities Gaj	1	1.660.000	c	a,c,f,i	a	a,b,c,d,e,i	a,b,c,d,f,h,j	a
2029	For the Danube and Lower Drava	46	Sub-centre for flood defence in the Danube region	2	12.000.000	a	a,h,i	a	a,b,e,h,i	a,b,c,d,e,f,h,i,j	b
340	For the Danube and Lower Drava	46	Baranjska planina – construction of a multipurpose reservoir (flood defence, irrigation, recreation), Kneževi Vinogradi, Zmajevac	2	5.987.000	c	a,c,f,g,h,i	a	a,b,c,d,e,h,i	h,i,j	a
327	For the Danube and Lower Drava	46	PS Bakanka - reconstruction, protection of the settlements Darda and Bilje	2	2.413.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	i,j	a
361	For the Danube and Lower Drava	46	Regulation of the water regime of the Karašica in Baranja by the construction of sluices	2	6.617.000	a	acfgi	a	a,b,c,d,e,h,i	i,j	b
2017	For the Danube and Lower Drava	46	Reservoirs Divlja dolina	2	1.500.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	h,i,j	a

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
2018	For the Danube and Lower Drava	46	Improvement of the retention area of the torrential stream Zmajevac	2	2.100.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	h,i,j	a
357	For the Danube and Lower Drava	46	Revitalisation of Topoljski Dunavac, municipality Draž	2	21.649.000	a	a,c,f,g,h,i	a	a,b,c,d,e,h,i	j	b
2019	For the Danube and Lower Drava	46	Sluice Stara Drava in Bilje	2	1.500.000	a	a,c,f,g,h,i	a	a,b,e,h,i	h,i,j	a
PROJECT GROUP 46 - Total:					55.426.000						
141	For North Adriatic Basins	47	Grobnik - construction of a retention	2	28.000.000	c	a	b	a,b	i	a
PROJECT GROUP 47 - Total:					28.000.000						
115	For the Upper Sava	48	Regulation of the Sutla riverbed in a 900 m long section near Hum na Sutli, with the removal of the old bridge and the construction of a new one for flood protection of the settlement centre	1	7.010.000	c	a	b	a,b		b
PROJECT GROUP 48 - Total:					7.010.000						
263	For the Mura and Upper Drava basins	49	Reconstruction of the retarding dike on the left and right Plitvica banks from 0+000 do 3+030	1	37.500.000	c	a	b	a,b,c,d,h,i	i	a
1007	For the Mura and Upper Drava basins	49	Regulation of the Plitvica from Varaždin to Gojanec (5 km)	1	6.500.000	c	a	b	a,b,c,d,h,i	h	b
1019	For the Mura and Upper Drava basins	49	Construction of the western boundary canal of the settlement Trnovec Bartolovečki (2.5 km)	1	2.000.000	c	a	b	a,b,d,e,i	h	b
1015	For the Mura and Upper Drava basins	49	Regulation of torrential streams in the area of the municipality Martijanec	1	11.400.000	c	a	b	a,b,c,i	h	b
1020	For the Mura and Upper Drava basins	49	Construction of a lateral stormwater canal of the settlements Biljevec, Bikovec and Jurketinec (1.3 km)	1	1.300.000	c	a	b	a,b,c	f	b
1021	For the Mura and Upper Drava basins	49	Construction a lateral stormwater canal of the settlement Greda (0.6 km)	1	700.000	c	a	c	a,b,c	f	b
1002	For the Mura and Upper Drava basins	49	Construction of a relief canal of the Plitvica and the retention Jalkovec	2	16.500.000	c	a	b	a,b,c,d,h,i	i	b
260	For the Mura and Upper Drava basins	49	Reconstruction of the dike on the relief channel of the Plitvica River from 0+000 - 3+500	2	9.100.000	b	a	a	a,b,c,d,i	i	b
1008	For the Mura and Upper Drava basins	49	Regulation of the Plitvica from Zbelava to Varaždin	2	4.300.000	c	a	b	a,b,c,d,h,i		b
1011	For the Mura and Upper Drava basins	49	Regulation of the Plitvica from rkm 12+800 - 22+000 (7.2 km)	2	10.400.000	b	a	b	a,b,c,i	i	a
1012	For the Mura and Upper Drava basins	49	Regulation of the Mozdernjak in the settlement Varaždin Breg from rkm 2+800 - 4+500	2	3.300.000	b	a	b	a,b,c,i	i	b
1106	For the Mura and Upper Drava basins	49	Construction of the retention Tužno	2	5.000.000	b	a	b	a,b,c,i	i	b
1010	For the Mura and Upper Drava basins	49	Regulation of the Plitvica in the settlement Dubovica (1.95 km)	2	4.000.000	c	a	b	a,b,c,i	i	b
301	For the Mura and Upper Drava basins	49	Construction of the retention Grabušnica on the Plitvica River	2	6.500.000	b	a	c	a,b,c,i	i	b
PROJECT GROUP 49 - Total:					118.500.000						
4104	for the Middle and Lower Sava	50	Protection of the settlements Topusko and Velika Vranovina on the left and right Glina banks	1	6.000.000	c	a	b	a,b,h,i	a,c,d,e,f,g,h	b
4048	for the Middle and Lower Sava	50	Construction of the retention Kalanjevac, a dam with pertaining facilities on the stream Kalanjevac in the area of the settlement Topusko for the purpose of flood defence	1	3.500.000	c	a	a	a	h	b

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
4049	for the Middle and Lower Sava	50	Construction of the retention Vranovina, a dam with pertaining facilities on the Glina River in the area of the municipality Topusko for the purpose of flood defence	2	30.000.000	b	a	a	a,b,c,h,i	i	b
PROJECT GROUP 50 - Total:					39.500.000						
4050	for the Middle and Lower Sava	51	Construction of the retention Petrinjčica, a dam with pertaining facilities on the watercourse Petrinjčica in the area of the town Petrinja for the purpose of flood defence	2	20.000.000	b	a	a	a,b,c,h,i	i	b
PROJECT GROUP 51 - Total:					20.000.000						
335	For the Danube and Lower Drava	52	Drijan - construction of a reservoir in Ilok (Drljanski potok), flood defence, irrigation, recreation	2	15.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	e,f,h,i,j	a
336	For the Danube and Lower Drava	52	Drijan 1 - construction of a reservoir in Ilok (flood defence, irrigation, recreation)	2	15.000.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	e,f,h,i,j	a
341	For the Danube and Lower Drava	52	Lovas and Tompojevci - regulation of the water regime and use of rits	2	40.127.000	b	a,c,g,h,i	a	a,b,c,d,e,h,i	h,i,j	b
325	For the Danube and Lower Drava	52	Opatovac – reconstruction of the outlet channel of the reservoir	2	2.838.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	i,j	a
2016	For the Danube and Lower Drava	52	Retetion Mala Kanjiža	2	7.500.000	a	a,c,g,h,i	a	a,b,c,d,e,h,i	j	a
2030	For the Danube and Lower Drava	52	Water management improvement and revitalisation of reservoir area of rit Grabovo near the Ovčara Memorial	2	5.000.000	c	a,c,h,i	a	a,b,e,h,i	j	b
PROJECT GROUP 52 - Total:					85.465.000						
28	for the Middle and Lower Sava	53	Construction of the reservoir Polojac, a dam with pertaining facilities on the watercourse Polojac, left tributary of the Kutinica, for flood defence, improvement of small watercourses downstream, and irrigation	1	14.643.000	c	a,b,c,f,g,h	a	a,c,d,e,i	a,b,d,e,f,g,h	b
23	for the Middle and Lower Sava	53	Regulation of the watercourse Kutinica from rkm 10+374tdo rkm 13+511 in the area of the town Kutina	1	2.140.000	c	a,c	a	a,b,c,d,e	f,h	b
PROJECT GROUP 53 - Total:					16.783.000						
4005	for the Middle and Lower Sava	54	Reconstruction of the Sava dike in Dubrovčak Lijevi in the length of about 2.5 km	1	12.625.000	b	a	a	a,b,c,d,e	a,b,c,d,e,f,h	b
4004	for the Middle and Lower Sava	54	Stabilisation of the left Dobra bank in Grdun – of common interest with HEP	1	2.400.000	c	a	c	b	d,f,h	b
4307	for the Middle and Lower Sava	54	Protection of a part of the settlement Priselci from the Dobra floods	1	1.500.000	c	a	c	a,b	j	b
PROJECT GROUP 54 - Total:					16.525.000						
146	For the North Adriatic Basins	55	Lipa - construction of a retention	2	5.500.000	c	a	b	a,b,g	h	b
PROJECT GROUP 55 - Total:					5.500.000						
367	For the North Adriatic Basins	56	Boljunčica - regulation	2	15.500.000	c	a,f	b	b,c	h	a
368	For the North Adriatic Basins	56	Letaj - rehabilitation of the reservoir	2	20.000.000	c	a,e	b	b,c	j	b
PROJECT GROUP 56 - Total:					35.500.000						
145	For the North Adriatic Basins	57	Construction of the reservoir Križ potok	2	22.000.000	b	a,b	a	b	b,c,d	a
PROJECT GROUP 57 - Total:					22.000.000						
4306	for the Middle and Lower Sava	58	Rehabilitation of the left Mrežnica bank in Zvečaj	2	1.000.000	c	a	c	a,b,i	j	b
PROJECT GROUP 58 - Total:					1.000.000						
GRAND TOTAL:					12.436.299.785						

 Existing construction permit

Project ID	Water Management Department	Project group	Name of the project	Priority	Investment value (HRK)	Characteristics of the project - evaluation					
						Importance	Purpose	Population protection	Protection of assets and other values	Available designs and permits	Possibility of phased construction
			Existing detailed design without construction permit								

11.3 Irrigation projects

Tab. 11.10 Identified irrigation projects

County	Area proposed in county irrigation plans	Surface proposed in county irrigation plans (ha)	Cost estimate proposed in county irrigation plans (HRK)	No.	Project ID	Area proposed by the Unit for Implementation of the National Program for Irrigation and Management of Agricultural Land and Water Resources (NAPNAV)	Surface (ha)	Investment value of the project (HRK)
Bjelovar - Bilogora	Bedenička (reservoir)	800	12.000.000					
Bjelovar - Bilogora	Blagorodovac (reservoir)	800	12.000.000					
Bjelovar - Bilogora	Česma-Čazma (Česma)	600	9.000.000					
Bjelovar - Bilogora	Kapelica-Kaniška Iva (reservoir)	300	4.500.000	1	1	Kapelica - Kaniška Iva	424	114.000.000
Bjelovar - Bilogora	Križic (reservoir)	800	12.000.000					
Bjelovar - Bilogora	Martinac Trojstveni (reservoir)	500	7.500.000					
Bjelovar - Bilogora	Miletinac/Končanica (reservoir)	1.300	19.500.000					
Bjelovar - Bilogora	ground water	1.000	15.000.000					
Bjelovar - Bilogora	Tomašica (reservoir)	1.400	21.000.000					
Brod - Posavina	Bebrina	1.800	9.100.000					
Brod - Posavina	Orubica	400	21.100.000	2	3	Orubica	326	30.000.000
Brod - Posavina	Mountain area along the Šumetlica and Rešetarica	100	1.100.000					
Brod - Posavina	Draževac	330	9.790.000					
Brod - Posavina				3	7	Bid	1.183	47.000.000
Brod - Posavina	Open watercourses and canals (construction of 20 sluices)		16.000.000					
Brod - Posavina	Podcrkavlje	350	17.000.000					
Brod - Posavina	Area of Brodski Stupnik	200	21.400.000					
Brod - Posavina	Area along the lateral canal Adžamovka-Orljava	2.000	58.000.000					
Brod - Posavina	Area of Jelas polje	200	13.100.000					
Brod - Posavina	Ground water (construction of 30 wells)		9.000.000					
Brod - Posavina	Rešetarica	400	29.600.000					
Brod - Posavina	Sloboština	100	1.400.000					
Brod - Posavina	Stara Gradiška	400	5.500.000					
Brod - Posavina	Trnava-Šumetlica	720	25.760.000					
Brod - Posavina	Voćnjak Dolci (orchard)	210	5.700.000					
Brod - Posavina	Bid - Bosut polje in the area of the County	10.000	77.500.000	4	2	Bid - Bosutsko polje in the BPC	2.030	138.000.000
Dubrovnik - Neretva	Blato	3.326						
Dubrovnik - Neretva	Dubrovačko primorje (Dubrovnik coastal region)	1.769						
Dubrovnik - Neretva	Dubrovnik	1.420						
Dubrovnik - Neretva	Janjina	517						
Dubrovnik - Neretva	Opuzen			5	22	NPPN Donja Neretva-PS Glog (NPPN - national irrigation pilot project, PS – sub-system)	312	22.830.000
Dubrovnik - Neretva	Vela Luka	1.871		6	13	Vela Luka (Bradat, Potočarje and Vrbovica-Kruševo)	170	54.000.000
Dubrovnik - Neretva	Metković	1.093		7	19	NPPN Donja Neretva-PS Koševo Vrbovci (NPPN - national irrigation pilot project, PS – sub-system)	595	62.000.000
Dubrovnik - Neretva	Lastovo	261						
Dubrovnik - Neretva	Župa Dubrovačka	663		8	25	Župa Dubrovačka	312	15.000.000
Dubrovnik - Neretva	Mljet	396						
Dubrovnik - Neretva	Lumbarda	587		9	11	Lumbarda - Donje blato	100	27.000.000
Dubrovnik - Neretva	Konavle	3.336		10	14	Konavosko polje	1.500	317.587.500
Dubrovnik - Neretva	Smokvica	505		11	12	Smokvica	175	63.000.000
Dubrovnik - Neretva	Korčula	2.164		12	9	Čara	166	47.000.000
Dubrovnik - Neretva	Kula Norinska	258						
Dubrovnik - Neretva	Ploče	1.576						
Dubrovnik - Neretva	Ston	1.482		13	24	Stonsko polje	500	47.221.250

County	Area proposed in county irrigation plans	Surface proposed in county irrigation plans (ha)	Cost estimate proposed in county irrigation plans (HRK)	No.	Project ID	Area proposed by the Unit for Implementation of the National Program for Irrigation and Management of Agricultural Land and Water Resources (NAPNAV)	Surface (ha)	Investment value of the project (HRK)
Dubrovnik - Neretva	Pojezerje	253						
Dubrovnik - Neretva	Slivno	707						
Dubrovnik - Neretva	Trpanj	312						
Dubrovnik - Neretva	Orebić	1.992						
Dubrovnik - Neretva	Zažablje	535						
City of Zagreb	Agronomski fakultet (priority P1)	30						
City of Zagreb	Hrvatski Leskovac (priority P1)	436						
City of Zagreb	Obrež (priority P3)	125						
City of Zagreb	Sava-Sesvete (priority N1)	668						
City of Zagreb	Sava-Sesvete (priority P3)	98						
Istria	Červar Porat-Bašarinka - Pilot Project	605		14	32	Červar Porat-Bašarinka	490	104.000.000
Istria	Labinština-1 Phase 1-4			15	37	Boljunčica	2.500	60.000.000
Istria				16	38	Tar-Vabriga	660	100.000.000
Istria				17	39	Vodnjan	378	60.000.000
Istria				18	40	Donja Raša	360	60.000.000
Istria				19	41	Brtonigla	1.000	114.000.000
Istria				20	43	Butoniga	400	60.000.000
Istria				21	44	Mugeba-Funtana-Vrsar	638	100.000.000
Istria	Poreština	660						
Istria	Buiština-1 Phase 1	1.250		22	33	Petrovija Phase 1	513	101.000.000
Istria	Pazinština-1 Phase 2	339						
Istria	Proština - Pilot project	378						
Istria	Puljština-1 Phase 1	358						
Istria	Puljština-1 Phase 2	1.128						
Istria	Rovinjština-1 Phase 1	393						
Istria	Labinština-1 Phase 1-4	2.580		23	36	Čepić polje	366	60.000.000
Istria	Trumina - Pilot project	300						
Istria	Buzeština-1 Phase 1	254		24	42	Buzeština	400	70.000.000
Karlovac	Dobra-Statve Donje (watercourse)	500	7.500.000					
Karlovac	Dobra-Turkovići (watercourse)	200	3.000.000					
Karlovac	Dretulja (Plaško area) (ground water)	150	2.250.000					
Karlovac	Korana River after the Mrežnica confluence (watercourse)	400	6.000.000					
Karlovac	Korana-Velemerić (watercourse)	400	6.000.000					
Karlovac	Korana-Veljun (watercourse)	100	1.500.000					
Karlovac	Kupa-Brodarci I (watercourse)	300	4.500.000					
Karlovac	Kupa-Brodarci II (watercourse)	1.000	15.000.000					
Karlovac	Kupa-Jamnička Kiselica (watercourse)	300	4.500.000					
Karlovac	Kupa-Kamanje (watercourse)	900	13.500.000					
Karlovac	Kupa-Ladešić (watercourse)	600	9.000.000					
Karlovac	Kupa-Rečica II (watercourse)	1.100	16.500.000					
Karlovac	Mrežnica-Mrzlo Polje (watercourse)	200	3.000.000					
Karlovac	Radonja-Tušilović (reservoir)	500	7.500.000					
Karlovac	Radonja-Tušilović (watercourse)	300	4.500.000					
Karlovac	Turkovići (ground water)	350	5.250.000					
Karlovac	Vitunjčica-Turkovići (reservoir)	500	7.500.000					
Koprivnica - Križevci	Donji Kolarec (reservoir)	400	8.400.000					
Koprivnica - Križevci	Drnje (Drava)	350	5.250.000					
Koprivnica - Križevci	Đelekovec (Drava)	500	7.500.000					
Koprivnica - Križevci	Hlebine (Drava)	350	5.250.000					
Koprivnica - Križevci	Legrad (Drava)	500	7.500.000					

County	Area proposed in county irrigation plans	Surface proposed in county irrigation plans (ha)	Cost estimate proposed in county irrigation plans (HRK)	No.	Project ID	Area proposed by the Unit for Implementation of the National Program for Irrigation and Management of Agricultural Land and Water Resources (NAPNAV)	Surface (ha)	Investment value of the project (HRK)
Koprivnica - Križevci	Miholjevac (reservoir)	900	18.900.000					
Koprivnica - Križevci	Novi Glog (reservoir)	150	3.150.000					
Koprivnica - Križevci	Ground water	1.400	21.000.000					
Koprivnica - Križevci	Prugovac (reservoir)	600	12.600.000					
Koprivnica - Križevci	Veliki Pažut (Drava)	300	4.500.000					
Koprivnica - Križevci	Vojakovac (reservoir)	500	10.500.000					
Koprivnica - Križevci	Vratno (reservoir)	450	9.450.000					
Koprivnica - Križevci	Koljak (reservoir)	500	10.500.000	25	51	Koljak	520	101.000.000
Lika - Senj	Balatin	46	3.011.422					
Lika - Senj	Bobići	144	8.341.737					
Lika - Senj	Hrvatsko polje-Kompolje	732	16.006.797					
Lika - Senj	Karamanuša	1.668	77.310.261					
Lika - Senj	Lipovo polje	1.270	35.031.370					
Lika - Senj	Lovinac	1.268	51.216.433					
Lika - Senj	Novaljsko polje	158	6.711.380					
Lika - Senj	Ornice	183	9.694.680					
Lika - Senj	Ostrvica	232	9.065.395					
Lika - Senj	Pazarišno polje	557	17.008.575					
Međimurje	ČAK 1, A 1, Čakovec	251	12.500.000					
Međimurje	ČAK 1, A 1, Gornji Pustakovec	246	12.500.000					
Međimurje	ČAK 1, A 1, Ivanovec	623	12.500.000					
Međimurje	ČAK 1, A 1, Pribislavec	25	12.500.000					
Međimurje	ČAK 1, A 1, Savska Ves	251	12.500.000					
Međimurje	ČAK 1, A 1, Strahoninec	654	12.500.000					
Međimurje	ČAK 1, A 1, Štefanec	105	12.500.000					
Međimurje	ČAK 1, A 2	5.205	185.000.000					
Međimurje	ČAK 1, A 1, Gornji Vidovec	71	12.500.000					
Međimurje				26	57	Belica	719	58.000.000
Međimurje				27	53	Prelog Donji Kraljevec - PS Prelog (PS – sub-system)	404	44.000.000
Međimurje				28	54	Prelog Donji Kraljevec - PS Donji Kraljevec (PS – sub-system)	925	50.875.000
Međimurje				29	55	Prelog Donji Kraljevec - PS Goričan (PS – sub-system)	404	50.875.000
Osijek - Baranja	Crvene njive	2.400	7.400.000					
Osijek - Baranja	Use of existing interventions on the Drava River	160	1.200.000					
Osijek - Baranja	Area of Bokšić Lug	1.100	13.000.000					
Osijek - Baranja	Area of Beliše - Gat			30	63	Gat Phase 2	589	30.000.000
Osijek - Baranja	Area of Erdut	950	21.000.000					
Osijek - Baranja	Area of Koška - Jelisavac	1.150	16.500.000					
Osijek - Baranja	Area along the Karašica (option I)	14.500	21.500.000					
Osijek - Baranja	Area along the lateral canal Kneževi Vinogradi	3.500	48.100.000					
Osijek - Baranja	Area along the planned reservoirs	5.700	3.500.000					
Osijek - Baranja	Area along the Poganovačko-Krav. canal and the Vuka basin	22.700	42.550.000					
Osijek - Baranja	Area along Šećeranski kanal	15.400	18.900.000					
Osijek - Baranja	Area along the Vučica	4.400	600.000					
Osijek - Baranja	Ground water (construction of 30 wells)		45.000.000					
Osijek - Baranja	Puškaš			31	79	Puškaš	916	17.000.000
Osijek - Baranja	Budimci - Krndija	1.750	17.500.000	32	61	Budimci - Krndija	565	26.000.000
Osijek - Baranja				33	75	Poljoprivredni institut Osijek	212	13.000.000

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Osijek - Baranja				34	74	Mala šuma Veliki vrt	78	9.000.000
Osijek - Baranja	Area of Dalj	650	8.500.000	35	64	Dalj Phase 1	877	79.000.000
Osijek - Baranja				36	66	Karašica Phase 1 (pumpin station Krnjak, sluices on the Karašica and IS Kapelna)	1.216	129.000.000
Osijek - Baranja				37	67	Karašica Phase 2 Miholjac - Viljevo	682	54.000.000
Osijek - Baranja				38	68	Karašica Phase 3 Miholjački Poreč	490	35.000.000
Osijek - Baranja				39	69	Dravski rit	1.690	154.000.000
Osijek - Baranja				40	76	Marijanci	1.041	33.000.000
Požega - Slavonia	Badljevačko polje, cadastral municipality Pakrac - o. g.	650	13.450.000					
Požega - Slavonia	Donje polje, cadastral municipality Pakrac - o.g.	220	5.300.000					
Požega - Slavonia	Kaptol - Vinogradarstvo - Musil	20	1.350.000					
Požega - Slavonia	Ovčare - Kutjevo d.d.	200	7.000.000					
Požega - Slavonia	Pleternica - Hrvatski duhani d.d.	300	8.800.000					
Požega - Slavonia	Sloboština - Eko imanje Mavrović	160	5.780.000					
Požega - Slavonia	Treštanovci - Grbić d.o.o.	150	3.750.000					
Požega - Slavonia	Dolina Londže and Orljave - Kutjevo d.d.	2.500	37.500.000	41	80	Orjava - Londža	1.797	90.000.000
Primorje – Gorski kotar	Lič polje	480	32.160.000	42	94	Lič	445	15.000.000
Primorje – Gorski kotar	Vrbničko polje	200	13.400.000	43	100	Vrbničko polje	160	11.922.500
Primorje – Gorski kotar	Bašćansko polje	418	28.006.000	44	92	Bašćanska dolina	330	29.250.000
Primorje – Gorski kotar	Polje Brusan	13	4.300.000	45	93	Brusan	13	2.761.250
Primorje – Gorski kotar	Novljansko polje - Vinodolska dolina	400	26.800.000	46	99	Pavlomir	44	4.750.000
Primorje – Gorski kotar	Fields on Rab Island	295	15.000.000					
Primorje – Gorski kotar	Field near Njivice Lake	62	7.300.000					
Primorje – Gorski kotar	Unijsko polje	250	16.750.000					
Primorje – Gorski kotar	Field near Mrkopalj	63	6.400.000	47	98	Mrkopalj - Sunger	63	8.362.500
Primorje – Gorski kotar				48	101	Kimpi	100	6.000.000
Primorje – Gorski kotar				59	102	Dunat	200	11.000.000
Primorje – Gorski kotar				50	103	Malinska Dubašnica	32	2.000.000
Sisak - Moslavina	Čaire (reservoir)	1.000	19.000.000					
Sisak - Moslavina	Krivajac (reservoir)	300	5.700.000					
Sisak - Moslavina	Martinska Ves (Sava)	1.750	26.250.000					
Sisak - Moslavina	Ground water	1.200	18.000.000					
Sisak - Moslavina	Topolovec/Šašna Greda (Sava)	1.350	20.250.000					
Sisak - Moslavina	Vlahinička (reservoir)	700	13.300.000					
Sisak - Moslavina	Ludina (reservoir)	500	9.500.000	51	104	Velika Ludina	453	85.000.000
Split - Dalmatia	Bisko - Dicmo (Cetina)	300						
Split - Dalmatia	Hrvace (Cetina, springs)	300						
Split - Dalmatia	Kaštela (Jadro partially, reservoir, rainwater, wells)	780						
Split - Dalmatia	Marina (rainwater, wells, galleries, backshore of the spring Pantane)	500						
Split - Dalmatia	Milna (rainwater, dew, water accumulated from water supply)	250						
Split - Dalmatia	Nerežišće (rainwater, dew, water accumulated from water supply)	350						
Split - Dalmatia	Podstrana - Dugi Rat (Cetina estuary)	300						
Split - Dalmatia	Postira (rainwater, springs, intake, reservoir)	350						
Split - Dalmatia	Seget i Trogir (water supply systems, reservoir, backshore of the spring Pantane)	100						
Split - Dalmatia	Sinjsko polje (Cetina)			52	110	Sinjsko polje -Trnovača	476	32.000.000
Split - Dalmatia	Imotsko polje (Vrlička, Ričica, ground water)			53	114	Imotsko - bekjsko polje	500	25.000.000

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Split - Dalmatia	Supetar (rainwater, dew, water accumulated from water supply)	300						
Split - Dalmatia	Sutivan (rainwater, dew, water accumulated from water supply)	250						
Split - Dalmatia	Vrgorac (Trebižat, Matica)	800						
Split - Dalmatia	Vrlika (local springs, watercourses, rainwater)	200						
Split - Dalmatia				54	106	Bunina	108	19.000.000
Šibenik - Knin	Bilice, Danilo, Kraljice	708						
Šibenik - Knin	Biovičino selo, Ivoševci	32						
Šibenik - Knin	Bogatići	147						
Šibenik - Knin	Bratiškovci, Plaštovo, Dubravice	6						
Šibenik - Knin	Bribir, Piromatovci	827						
Šibenik - Knin	Čista, Gačelezi	198						
Šibenik - Knin	Dazlina	501						
Šibenik - Knin	Dobrijević, Butišnica	108						
Šibenik - Knin	Dubrave, Vodice	987						
Šibenik - Knin	Đevrske, Varivode	452						
Šibenik - Knin	Erakovici	260						
Šibenik - Knin	Erveničko polje	32						
Šibenik - Knin	Kijevo, Civiljane	1.859						
Šibenik - Knin	Kistanje, Modro selo	210						
Šibenik - Knin	Kninsko polje, Vrpole	283						
Šibenik - Knin	Konjevrate	56						
Šibenik - Knin	Kosovo polje	2.360						
Šibenik - Knin	Miljevci	81						
Šibenik - Knin	Modrava	259						
Šibenik - Knin	Mokro polje, Očestovo	43						
Šibenik - Knin	Murter	217						
Šibenik - Knin	Okalj	708						
Šibenik - Knin	Pađene	154						
Šibenik - Knin	Donje polje, Mandalina	66		55	123	Donje polje - Jadrtovac	297	80.000.000
Šibenik - Knin	Plavno	118						
Šibenik - Knin	Pristeg, Stankovci	164						
Šibenik - Knin	Prokljan	12						
Šibenik - Knin	Rogoznica	35						
Šibenik - Knin	Skradinsko polje	89						
Šibenik - Knin	Strmica Golubić	81						
Šibenik - Knin	Vučina, Smokovci	1						
Šibenik - Knin	Vujasinovići	29						
Šibenik - Knin	Zaton	45						
Šibenik - Knin	Petrovo polje	2.752		56	124	Petrovo polje Phase 1	100	6.000.000
Varaždin	Ludbreg	3522	134.300.000	57	127	Ludbreg	200	11.000.000
Varaždin	Varaždin zapad (west)	2775	109.600.000	58	128	Varaždin zapad (west)	200	11.000.000
Varaždin	Varaždin istok (east)	5029	198.600.000	59	129	Varaždin istok (east)	200	11.000.000
Virovitica - Podravina	Kapinci - Vaška	428		60	131	Kapinci - Vaška Phase 2	568	37.000.000
Virovitica - Podravina				61	137	Novi Gradac - Detkovac	750	43.000.000
Virovitica - Podravina				62	136	Čadavica Phase 1	500	27.000.000
Virovitica - Podravina	Đolta			63	135	Đolta Phase 2	230	13.000.000
Virovitica - Podravina				64	132	Lukač Phase 1	447	44.000.000
Virovitica - Podravina				65	133	Lukač Phase 2	500	48.000.000

County	Area proposed in county irrigation plans	Surface proposed in county irrigation plans (ha)	Cost estimate proposed in county irrigation plans (HRK)	No.	Project ID	Area proposed by the Unit for Implementation of the National Program for Irrigation and Management of Agricultural Land and Water Resources (NAPNAV)	Surface (ha)	Investment value of the project (HRK)
Virovitica - Podravina				66	184	Čačinci - Crnac	1600	50.000.000
Virovitica - Podravina				67	185	Zdenci	2400	60.000.000
Vukovar - Srijem	Bid – Bosut basin (for conditions of constructed multipurpose canal Dunav - Sava)	57.303						
Vukovar - Srijem	Vuka river basin (for conditions of not constructed multiple purpose reservoir of the HPP Osijek and not constructed Canal Osijek)	35.920						
Vukovar - Srijem				68	144	Grabovo Phase 2	653	72.000.000
Vukovar - Srijem				69	146	Brana Lipovac Phase 2	0	5.000.000
Vukovar - Srijem				70	147	Weir Bazjaš	0	1.000.000
Vukovar - Srijem				71	148	Dam Trbušanci	0	8.000.000
Vukovar - Srijem				72	149	Sluice on the supply land reclamation canal of Bid-bosutsko polje (DMK BBP)	0	1.000.000
Vukovar - Srijem				73	138	Blata - Cerna	500	32.000.000
Vukovar - Srijem				74	152	Sopot	704	26.000.000
Vukovar - Srijem				75	139	Ervenica	738	64.000.000
Vukovar - Srijem				76	150	Lipovac	820	68.000.000
Vukovar - Srijem				77	151	Penave	1.000	21.250.000
Vukovar - Srijem				78	145	Tovarnik	1.747	155.000.000
Vukovar - Srijem				79	162	Čeretinci - Markušica	200	10.000.000
Vukovar - Srijem				80	161	Bid - Bosutsko polje VSC	2.027	138.000.000
Zadar				81	176	Lišansko polje Phase 1	232	25.100.000
Zadar	Kožlovačko-Morpolačko polje	862	25.760.000					
Zadar	Krupa (Kupa River)	40	16.000.000					
Zadar	Kulsko-Korlatsko polje (reservoir Biljanje-Kotao)	620	9.790.000					
Zadar	Baštica (reservoir Grabovac)	70	9.100.000	82	166	Donja Bašćica	108	9.000.000
Zadar	Ljubač (spring Greb)	20	58.000.000					
Zadar	Muškovci (Zrmanja River)	55	17.000.000					
Zadar	Oko (spring Oko)	30	21.100.000					
Zadar	Vransko polje			83	171	Vransko polje Phase 1 PS Malo Blato (PS-sub-system)	434	125.000.000
Zadar	Vransko polje			84	172	Vransko polje Phase 1 PS Gorčine (PS-sub-system)	982	188.000.000
Zadar	Škabrnja (reservoir, wells)	70	29.600.000	85	169	Škabrnja	296	57.000.000
Zadar	Zaton (springs Vrulj, Dražnik)	22	5.500.000					
Zadar	Žegarsko polje (Zrmanja River)	270	21.400.000					
Zadar	Bokanjac-Poličnik (reservoir Miljašić jaruga)	520	5.700.000	86	167	Bokanjac - Rašinovac	470	62.000.000
Zadar				87	175	Kolan	330	32.397.125
Zadar				88	178	Povljana	300	28.473.000
Zagreb	Krapina	242						
Zagreb	Pokuplje	461						
Zagreb	Rugvica-Oborovo-Topolje	5.355		89	180	Rugvica	621	61.000.000
Zagreb	Samobor	1.614						
Zagreb	Velika Gorica	1.128						
Zagreb	Zaprešić	153						
Zagreb				90	182	Lupoglav	1.036	160.000.000
Zagreb				91	181	Lonjica	268	24.000.000
Zagreb				92	183	Dubrava	269	83.000.000
Zagreb				93	186	Pisarovina	1.200	54.000.000

Tab. 11.11 Proposal of irrigation projects implementation

No.	Project ID	County	Area included in the NAPNAV	Project description	Surface (ha)	Investment value of the project (HRK)	2021	2022	2023	2024	2025	Investments 2021 - 2025	Investments 2026 - 2030
1	1	Bjelovar - Bilogora	Kapelica - Kaniška lva	Water intake from the reservoir on the watercourse Bršjanica (planned within the project), supply pipeline and pumping station, pressure distribution network to land plots	424	114.000.000							114.000.000
2	3	Brod - Posavina	Orubica	Investment transfer (works started during the previous Multiannual Programme) – water intake from the Sava River, supply pipeline, low pressure pumping station, connecting pipeline, high pressure pumping station, pressure distribution network to land plots	326	4.000.000	4.000.000					4.000.000	
3	7	Brod - Posavina	Biđ	Prefeasibility study in development since 2020	1.183	47.000.000							47.000.000
4	9	Dubrovnik - Neretva	Čara	Water intake from public water supply and ground water	166	47.000.000				10.000.000	20.000.000	30.000.000	17.000.000
5	11	Dubrovnik - Neretva	Lumbarda - Donje Blato	Water intake from public water supply and ground water	100	27.000.000				9.000.000	10.000.000	19.000.000	8.000.000
6	12	Dubrovnik - Neretva	Smokvica	Water intake from public water supply and ground water	175	63.000.000							63.000.000
7	13	Dubrovnik - Neretva	Vela Luka	Includes the systems Bradat, Vrbovica - Kruševo and Potoracije. Water intake from public water supply and ground water.	170	54.000.000							54.000.000
8	19	Dubrovnik - Neretva	NPPN Donja Neretva – Sub-system Koševo - Vrbovci	Water intake from the main irrigation canal until the construction of the barrier on the Neretva River, after this – supply gravity pipeline, pumping station and pressure distribution network to land plots.	595	62.000.000			20.000.000	30.000.000	12.000.000	62.000.000	
9	32	Istria	Červar Porat - Bašarinka	Investment transfer (works started during the previous Multiannual Programme) – water intake from public water supply that abstracts water from the Mirna River, reservoir, pumping station, pressure distribution network to land plots.	490	36.000.000	25.000.000	11.000.000				36.000.000	
10	33	Istria	Petrovija Phase 1	Water intake from public water supply that abstracts water from the Mirna River, reservoir, pumping station, pressure distribution network to land plots.	513	101.000.000			15.000.000	45.000.000	30.000.000	90.000.000	11.000.000
11	36	Istria	Čepić polje	Water intake from the planned reservoir, pumping station, pressure distribution network.	366	60.000.000							60.000.000
12	41	Istria	Brtonigla	Water intake from the reservoir, from water supply in winter, IS Brtonigla	1.000	114.000.000							114.000.000
13	51	Koprivnica - Križevci	Koljak	Water intake for the future reservoir Sirova Katalena (planned within the project), pumping station, pressure distribution network to land plots.	520	101.000.000							101.000.000
14	53	Međimurje	Prelog - Donji Kraljevec – Sub-system Prelog	Water intake from existing reservoir of the HPP Dubrava, supply pipeline, pumping station, pressure distribution network to land plots.	404	44.000.000			10.000.000	20.000.000	14.000.000	44.000.000	
15	57	Međimurje	Belica	Divided into 2 phases of development – Phase 1 - 337 ha, Phase 2 - 382 ha. Water intake from ground water (5 wells connected with connecting pipeline and control station), pressure distribution network to land plots.	719	58.000.000			29.000.000	29.000.000		58.000.000	
16	61	Osijek - Baranja	Budimci - Krndija	Water intake from the Vuka River (there are two reservoirs upstream of the intake - Borovik 6 million m3 and Koritrjak 6 million m3), pumping stations, pressure distribution network to land plots.	565	26.000.000	13.000.000	13.000.000				26.000.000	

No.	Project ID	County	Area included in the NAPNAV	Project description	Surface (ha)	Investment value of the project (HRK)	2021	2022	2023	2024	2025	Investments 2021 - 2025	Investments 2026 - 2030
17	64	Osijek - Baranja	Dalj Phase 1	Water intake from the Danube, pumping stations, pressure distribution network in the floodplain area, pumping stations, settling tanks outside floodplain area, pressure distribution network.	877	79.000.000			20.000.000	31.000.000	28.000.000	79.000.000	
18	66	Osijek - Baranja	Karašica – Sub-system Kapelna	Revitalisation of the Karašica River (pumping station Krnjak, sluices on the Karašica) and IS Karašica – Sub-system Kapelna (water intake from the Karašica River, pumping station, pressure distribution network to land plots).	1.216	129.000.000			43.000.000	43.000.000	43.000.000	129.000.000	
19	67	Osijek - Baranja	Karašica – Sub-system Miholjac-Viljevo	Water intake from the Karašica River, pumping station, pressure distribution network to land plots.	682	54.000.000			18.000.000	18.000.000	18.000.000	54.000.000	
20	68	Osijek - Baranja	Karašica - Subsystem Miholjački Poreč	Water intake from the Karašica River, pumping stations, pressure distribution network.	490	35.000.000			10.000.000	15.000.000	10.000.000	35.000.000	
21	69	Osijek - Baranja	Dravski rit	Water intake from the Drava River, pumping station, combined distribution system (open canals and pressure distribution network)	1.690	154.000.000							154.000.000
22	74	Osijek - Baranja	Mala šuma - Veliki vrt	Water intake from the Vuka River, pumping station, pressure distribution network.	78	9.000.000	4.000.000	5.000.000				9.000.000	
23	75	Osijek - Baranja	Poljoprivredni institut Osijek	Intake from three underground wells, pumping station, pressure distribution network.	212	13.000.000	6.000.000	7.000.000				13.000.000	
24	76	Osijek - Baranja	Marijanci	Intake from ground water.	1.041	33.000.000							33.000.000
25	79	Osijek - Baranja	Puškaš	Water intake from the lake Topoljski Dunavac and future PS Draž, open canal network; ground water (30 ha)	916	17.000.000	7.000.000	10.000.000				17.000.000	
26	63	Osijek - Baranja	Gat Phase 2	Extension of existing irrigation system Gat (water intake from the Drava)	589	30.000.000			25.000.000	5.000.000		30.000.000	
27	80	Požega - Slavonia	Orljava - Londža	Divided into 2 sub-systems - Sub-system Orijava (923 ha) and Sub-system Londža (874 ha). Water from existing reservoir Londža is released in the controlled manner into the Londža riverbed towards existing lateral canal for land along the Londža (sluices and mobile pumps on plateaus for one part, and supply pipeline, pumping station and pressure distribution network for the other part) and into the planned concrete canal for the land along the Orljava (sluices and syphons, mobile pumps on plateaus and pressure distribution network).	1.797	90.000.000							90.000.000
28	94	Primorje – Gorski kotar	Lič	Water intake from the spillway of the HPP Ličanka, pressure distribution network.	445	15.000.000							15.000.000
29	101	Primorje – Gorski kotar	Kimpi	Water intake from the reservoir and from water supply in winter.	100	6.000.000							6.000.000
30	102	Primorje – Gorski kotar	Dunat	Water intake from water supply and reservoir.	200	11.000.000							11.000.000
31	103	Primorje – Gorski kotar	Malinska-Dubašnica	Water intake from the reservoir and from water supply in winter.	32	2.000.000			2.000.000			2.000.000	
32	104	Sisak - Moslavina	Velika Ludina	Water intake from the reservoir on the watercourse (planned within the project), pumping station, pressure distribution network to land plots with an intermediate PS.	453	85.000.000			25.000.000	35.000.000	25.000.000	85.000.000	
33	106	Split - Dalmatia	Bunina	Pumping stations, pressure distribution network.	108	19.000.000			9.000.000	10.000.000		19.000.000	
34	110	Split - Dalmatia	Sinjsko polje - Trnovača	Intake from the Cetina River, pumping stations, pressure distribution network.	476	32.000.000							32.000.000
35	123	Šibenik - Knin	Donje polje - Jadrtovac	Water intake from the future reservoir.	297	80.000.000	40.000.000	40.000.000				80.000.000	
36	124	Šibenik - Knin	Petrovo polje Phase 1	Intake from ground water.	100	6.000.000							6.000.000
37	128	Varaždin	Varaždin	Intake from the Drava, from existing reservoirs.	200	11.000.000							11.000.000

No.	Project ID	County	Area included in the NAPNAV	Project description	Surface (ha)	Investment value of the project (HRK)	2021	2022	2023	2024	2025	Investments 2021 - 2025	Investments 2026 - 2030
38	131	Virovitica - Podravina	Kapinci - Vaška Phase 2	Extension of the irrigation IS Kapinci Vaška (300 l/sec.) , pressure distribution network.	568	37.000.000	18.000.000 kn	19.000.000 kn				37.000.000	
39	132	Virovitica - Podravina	Lukač Phase 1	Water intake from the Drava (max.1000 l/sec.), pumping stations, pressure distribution network, IS Lukač	447	44.000.000			22.000.000 kn	22.000.000 kn		44.000.000 kn	
40	135	Virovitica - Podravina	Đolta Phase 2	Intake from ground water.	230	13.000.000			10.000.000 kn	3.000.000 kn		13.000.000 kn	
41	136	Virovitica - Podravina	Čadavica Phase 1	Water intake from the Drava, IS Čadavica	500	27.000.000							27.000.000
42	137	Virovitica - Podravina	Novi Gradac - Detkovac	Works transfer (works started during the previous Multiannual Programme) – water intake from the Drava (max. 600l/sec), pumping stations, pressure distribution network.	750	4.000.000	4.000.000					4.000.000	
43	139	Vukovar - Srijem	Ervenica	Water intake from the Bosut River, pumping stations, pressure distribution network.	738	64.000.000	32.000.000	32.000.000				64.000.000	
44	144	Vukovar - Srijem	Grabovo Phase 2	Intake from existing reservoir Grabovo, which will be supplemented with additional water quantities from the Danube over the planned pumping station Sokolovac and supply pipeline, pumping stations, pressure distribution network.	653	72.000.000				10.000.000	30.000.000	40.000.000	32.000.000
45	145	Vukovar - Srijem	Tovarnik	Intake from the planned reservoir Berak through planned reconstruction of the canal Boris, pumping station, pressure distribution network.	1.747	155.000.000				25.000.000	50.000.000	75.000.000	80.000.000
46	146	Vukovar - Srijem	Dam Lipovac Phase 2	Elevation of existing dam Lipovac.	0	5.000.000	5.000.000					5.000.000	
47	150	Vukovar - Srijem	Lipovac	Water intake from the watercourse Spačva.	820	68.000.000	34.000.000	34.000.000				68.000.000	
48	147	Vukovar - Srijem	Weir Bazjaš	Elevation of existing weir.	0	1.000.000	1.000.000					1.000.000	
49	149	Vukovar - Srijem	Sluice on the supply land reclamation canal of Bid – bosutsko polje (DMKBBP)	Construction of a sluice at the end of the supply land reclamation canal for irrigation of Bid – bosutsko polje (DMKBBP)	0	1.000.000	1.000.000					1.000.000	
50	148	Vukovar - Srijem	Dam Trbušanci	Construction of a control and regulation node on the site of existing war dam.	0	8.000.000	8.000.000					8.000.000	
51	162	Vukovar - Srijem	Čeretinci - Markušica	Intake from ground water, IS Čeretinci - Markušica	200	10.000.000							10.000.000
52	172	Zadar	Vransko polje Phase 1 – Sub-system Gorčine	Intake from surface waters in the basin	982	188.000.000				47.000.000	47.000.000	94.000.000	94.000.000
53	171	Zadar	Vransko polje Phase 1 – Sub-system Malo Blato	Intake from surface waters in the basin	434	125.000.000				31.000.000	31.000.000	62.000.000	63.000.000
54	166	Zadar	Donja Bašćica	Intake from existing reservoir (rehabilitation necessary), pumping station, pressure distribution network.	108	9.000.000	4.000.000	5.000.000				9.000.000	
55	181	Zagreb	Lonjica	Intake from the Lonja River – PS Negovec	268	24.000.000							24.000.000
56	182	Zagreb	Lupoglav	Intake from the Sava River near Rugvica	1.036	160.000.000					40.000.000	40.000.000	120.000.000
57	180	Zagreb	Rugvica	Intake from the Sava River near Rugvica	621	61.000.000					15.000.000	15.000.000	46.000.000
58	183	Zagreb	Dubrava	Intake from the watercourse Cerina (fill dam, option 2)	269	83.000.000							83.000.000

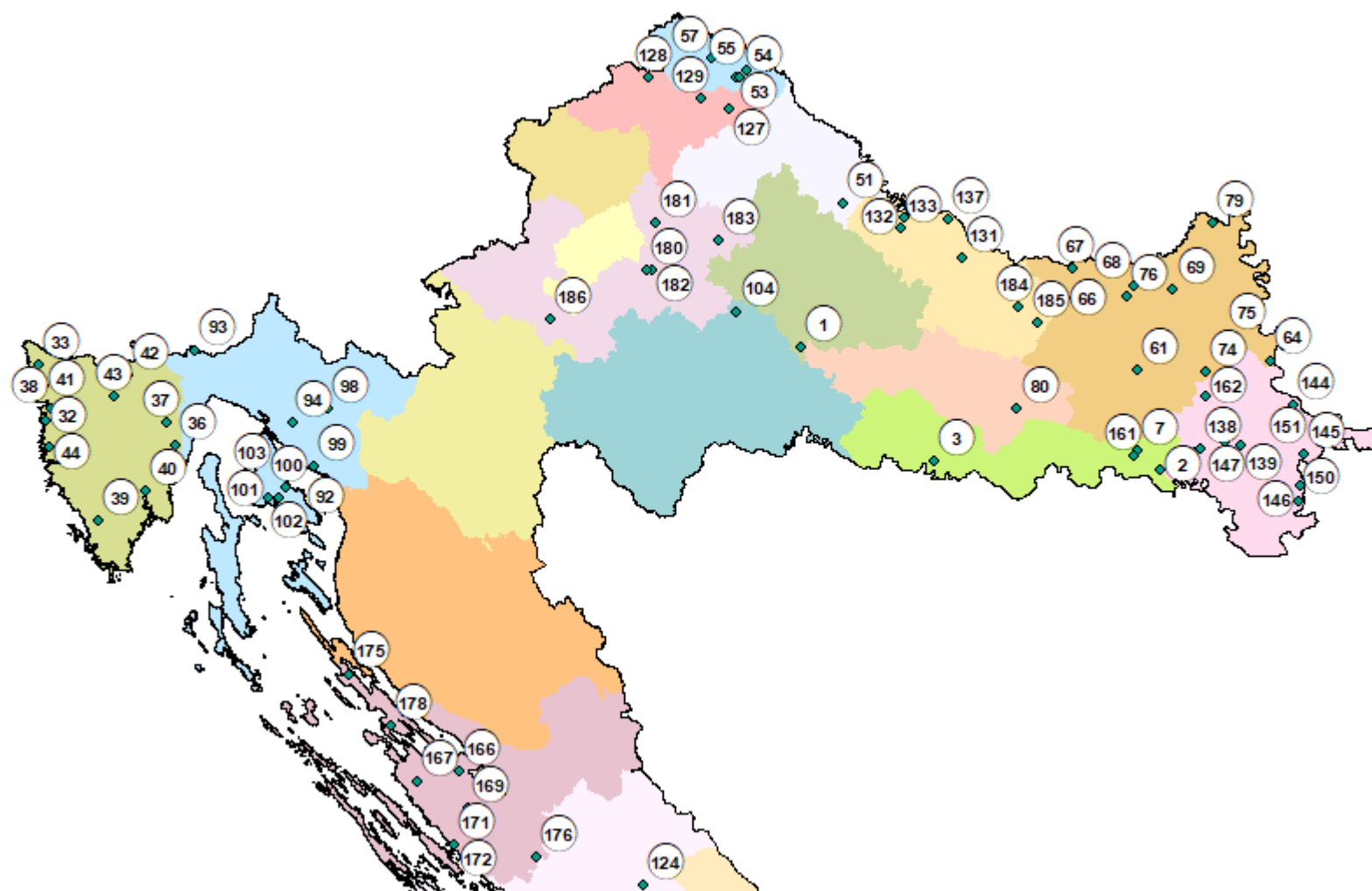


Fig. 11.1 Spatial distribution of irrigation projects, northern part of Croatia (project IDs marked on the map)

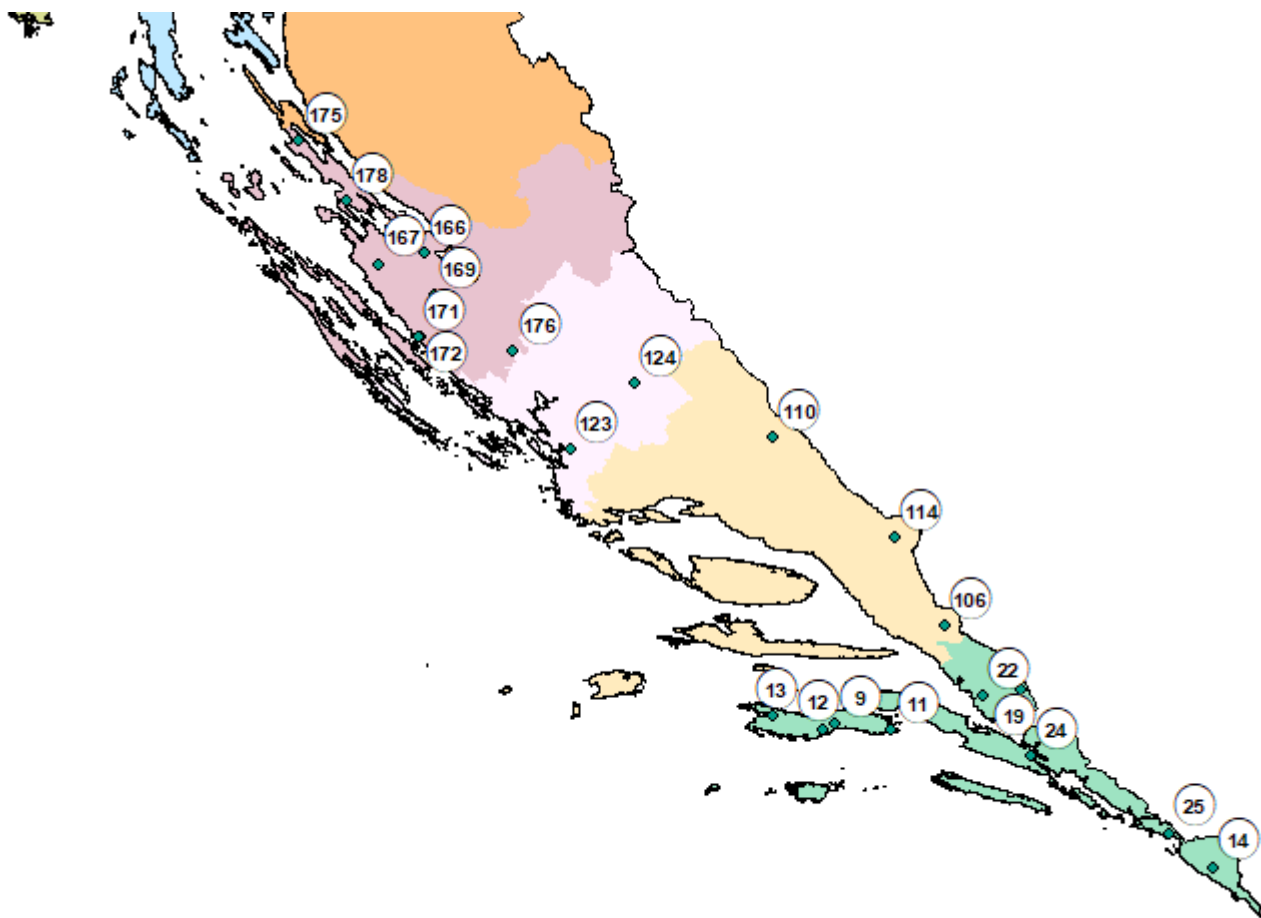


Fig. 11.2 Spatial distribution of irrigation projects, southern part of Croatia (project IDs marked on the map)

