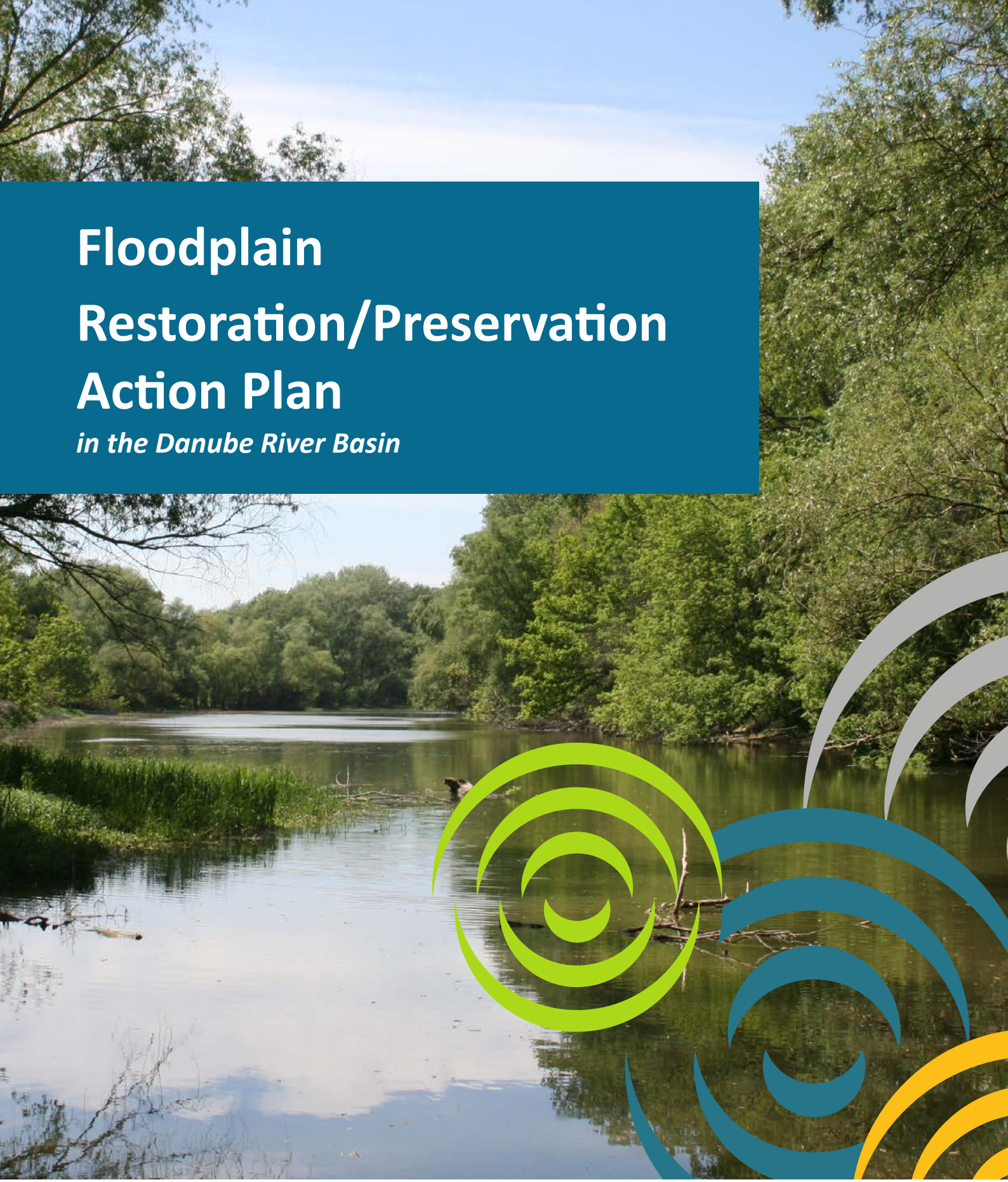

Floodplain Restoration/Preservation Action Plan

in the Danube River Basin

Interreg

EUROPEAN UNION

Danube Transnational Programme

Danube Floodplain

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General

During the last decades, Europe suffered major catastrophic floods along the Danube. Therefore, the Flood Directive asks for adequate and coordinated measures to reduce flood risk without conflicting WFD objectives.

The Danube Declaration[1], adopted at the ICPDR Ministerial Meeting at the 9th of February 2016, emphasized that in line with the relevant regulations of the EU Floods Directive and the EU Water Framework Directive, the Danube Flood Risk Management Plan (DFRMP) and the Danube River Basin Management Plan (DRBMP) should be developed in parallel with the process of exploiting synergies in particular with regard to information exchange, the efficiency of measures and the active involvement of all interested parties. Therefore, in the implementation phase of both plans, further strive for common actions, e.g., by seeking options for the conservation and restoration of the natural functions of wetlands and floodplains are necessary. This was in fact the milestone of Danube Floodplain Project proposal, further developed in frame of Danube Transnational Program[2], with the aim to reduce the flood risk through floodplain restoration along the Danube and other rivers in the basin while at the same time contributing to the integration of the EU Floods Directive, EU Water Framework Directive and EU nature protection legislation as well as biodiversity and climate policies.

Among other key outputs[3], (e.g., *Danube Floodplain Manual, Danube Floodplain Guidance*), necessary actions, deadlines, responsibilities at the basin-wide and national levels to develop and realize concrete floodplain restoration projects have been taken into account into the *Danube River Basin Floodplain Restoration Roadmap (DRB Floodplain Restoration Roadmap)*. DRB Floodplain Restoration Roadmap is an output-oriented description of the overall restoration and process which gives details about future floodplain restoration and preservation actions on Danube basin, as well as national level.

The target groups of the proposed DRB Floodplain Restoration Roadmap are mainly decision makers and planners, but is also addressed to NGO engaged in nature conservation, to local communities. It is very important to highlight that the effective implementation depends on availability of one or more funding sources to cover the capital costs of conducting the physical interventions and most probably would be strongly influenced by the willingness of the landowner(s) to cooperate. The DRB Roadmap is a direct input to the 2021 update of DFRMP and DRBMP and contribution to the national plans.

[1] https://www.icpdr.org/flowpaper/app/#page=1
[2] http://www.interreg-danube.eu/
[3] http://www.interreg-danube.eu/approved-projects/danube-floodplain

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Structure of the DRB Floodplain Restoration Roadmap

The DRB Floodplain Restoration Roadmap has been designed in order to plot different necessary milestones, actions, respective timelines and responsibilities.

There are two parts which define the DRB Floodplain Restoration Roadmap: an *action plan for Danube Floodplain project pilots' areas* and an *action plan for active and potential floodplains assessed* in the *Danube Floodplain project.*

Having in view the terms of the Danube Floodplain Project, five pilots' areas (see section *Action plan* for Danube Floodplain project pilot areas) have been defined by PPs as important for floodplains restoration along the Danube or selected tributaries. All five pilots have been subject of common structured feasibility studies, reason for what the pilots related action plan defines different future actions in a more detailed way. It provides a more accurate picture in terms of restoration and preservation scenarios, concrete measures, effects, timelines for implementation and responsible authorities in relation with each pilot area.

Instead, in this stage, the action plan related to the active and potential floodplains assessed in the project does not define future actions at the same level of detail like to the pilots related one. This is mostly due to the need of in-depth identification and assessment of restoration scenarios (e.g., hydrodynamic modelling, CBA, etc.), which were compiled only on the five pilots The action plan related to the active and potential floodplains proposes an action-orientated logical framework for a future detailed floodplain restoration and preservation planning. This framework could be used to describe, manage and administrate further detailed activities.

Action plan for Danube Floodplain project pilot areas

Background

Five pre-selected pilot areas (Begečka Jama in Serbia; Bistret in Romania, Krka in Slovenia, Middle Tisza in Hungary, and Morava in Slovakia and Czech Republic) have been considered in order to assess and improve efficiency and profitability of preservation and restoration projects for flood risk mitigation and for improving the ecosystem services at the Danube and its major tributaries. The purpose of restoration follows different motivations, e.g., flood risk management, reconnecting old oxbows and reactivating the floodplain, enhancing the ecological conditions to improve habitats for plant and fish species, or promoting sustainable development and ecotourism

In order to analyze the floodplain restoration scenarios for each pilot areas, two-dimensional (2D) hydrodynamic models have been used (*Figure 1 - The pilot areas where the 2D modeling was applied in the frame of the Danube Floodplain project*). The restoration measures are very

different according to particularities of each pilot area and the results discussion should consider the models' limitations (e.g., uncertainty), as well as the potential effects of tributary rivers.
The five pre-selected pilot areas show important differences in terms of size (from 10 km^2 in the Begečka Jama area to 177 km^2 at the Romanian Danube in Bistret), geographical characteristics, land use, restoration measures. Further, the purpose of restoration follows different motivations, e.g., flood risk management, reconnecting old oxbows and reactivating the floodplain, enhancing the ecological conditions to improve habitats for plant and fish species, or promoting sustainable development and ecotourism

Using two-dimensional hydrodynamic models has been considered as an appropriate way to analyze the impacts of possible restoration scenarios on the flood hazard and the corresponding risk.

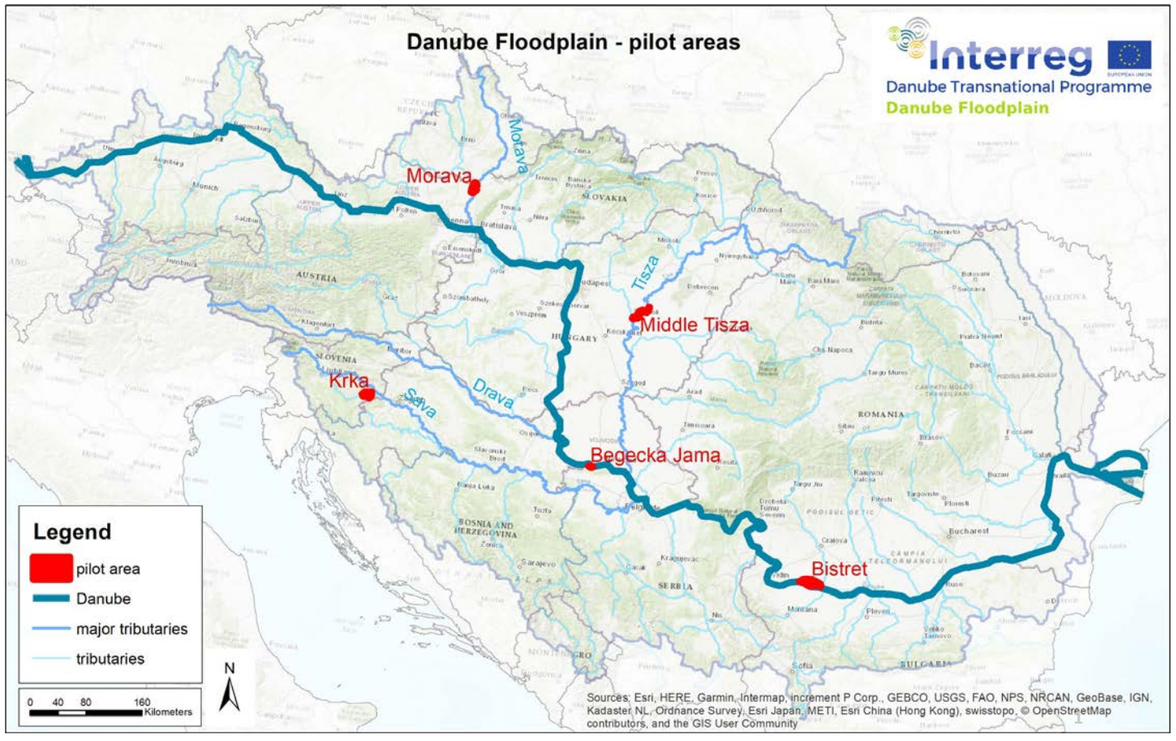

Figure 1 - The pilot areas where the 2D modeling were applied in the frame of the Danube Floodplain project

Each pilot area was the subject of feasibility studies in order to assess all restoration project's relevant factors- technical, economical, legal. The feasibility study describes and summarize the current situation and problems, methodologies for setting up scenarios, different aspects of the feasibility, indicators or monitoring criteria and investment costs.

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The feasibility studies also bring together the results of all technical activities, used for assessing the scenarios in the pilot areas in terms of hydrology and hydrodynamics of the pilot areas (Deliverable 4.1.1[4]), stakeholder engagement (Deliverable 4.2.1[5]), biodiversity (Deliverable 4.2.3[6]), ecosystem services and its modeling (Deliverables 4.2.2[7] and 4.3.2[8]), and profitability (Deliverable 4.3.1[9]).

In order to assess the changes of the effects of floodplain restoration to flood events, it was agreed by Danube Floodplain consortium to consider at least three hydrological scenarios, i.e., a current state scenario and two restoration scenarios (realistic restoration scenario and optimistic restoration scenario). Key stakeholders (local and national) involvement played an important role in the process of defining the restoration scenarios. Considering the realistic scenario, it is clear that this offers a higher degree of practicability compared to the optimistic one, reduced limitations or constraints, pragmatic and acceptable technical solutions. Of course, the results of approaching both realistic and optimistic scenarios show differences in terms of benefits.

For example, in case of *Begečka Jama pilot area*, the realistic scenario is more profitable, also reflecting the stakeholders' demands and the compatibility with the measures of the Begečka Jama Nature Park Protection Study. For this scenario, institutional analyses were elaborated and a potential way to proceed forward was considered.

The realistic scenario in case of *Bistret pilot area* meets the maximum score as a result of analyzing the impact of the project from a technical, socio-economic, environmental/sustainability and remaining risks. It will contribute to sustainable development of the area and ecological tourism.

In case of *Kostanjevica na Krki* (Krka) pilot area measures in the riverbed and for the activation of floodplains do not bring significant improvements to the hydraulic/hydrological parameters. In this case, the optimistic scenario offers a benefit which considers, among others, also protective measures within Kostanjevica itself (where the greatest effects occur, especially in terms flood risk reduction).

[4] Deliverable D 4.1.1 - Report on the technical realization scenarios taken into consideration for modelling, the implementation in a 2D model and assessment of the impact as input for D 4.4.1 and part of output 4.1.
[5] Deliverable D 4.2.1 - Report about the stakeholder analysis, their interests and their benefits from the floodplains in the pilot areas resulting from the workshops
[6] Deliverable D 4.2.3 - Report on the assessment of biodiversity in the pilot areas
[7] Deliverable D 4.2.2 - Report, database and maps of ecosystem services analysis of the pilot areas including a list, description, assessment, and ranking concerning the demands and supplies
[8] Deliverable D 4.3.2. Method documentation describing the implementation of ESS and biodiversity to traditional CBA as input for D 4.3.4 and therefore of output 5.1.
[9] Deliverable D 4.3.1 - Report on assessment results of the CBA applied to the pre-selected pilot areas including ESS, stakeholders and biodiversity as input for 4.4.1 and therefore part of the feasibility studies in output 4.1.

In case of the *Middle Tisza pilot area*, a decrease of the flood hazard with the two restoration scenarios can only be considered as a local effect. Therefore, flood protection purposes of restoration are partly met: conveyance capacity and floodplain area were increased and show a significant effect in flood volume storage. For the measures' effective implementation, the realistic scenario was chosen, since it already has integrative benefits, which can be further developed with optimistic scenario in the future.

In the case of the *Morava River pilot area*, scenarios were analyzed maintaining the current high efficiency in managing the culmination of catastrophic floods, but at the same time significantly improving the system's performance during annual periodic floods and lower floods with multi-year recurrence. In particular, the optimistic scenario significantly improves floodplain dynamics and returns more than 22 km of the Morava River to its original length and important morphological processes. Living conditions for fish will be substantially improved, including the restoration of favourable conditions for their natural reproduction. Restoration of connection of the river's communication and floodplain will make the whole area better adapted to the impacts of climate change. The river will better supply the extensive floodplain forest with water. By setting a target condition, it is possible to progress towards the stated objective by means of smaller achievable sub-steps

The measures related to each scenario selected in the pilot areas are presented in the *Table 1 - Action plan for Danube Floodplain project pilot areas.*

It can be concluded that differences considering the selection of suitable restoration scenarios

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do not lead to similar approaches in terms of future actions. Moreover, time and budget represent a difficulty, giving a strict limit of the restoration scenarios, because it can happen that the scenarios show no considerable effect on the highlighted problem.

Therefore, considering all the above, the *Action plan for Danube Floodplain project pilot areas* is based on the main results[10] of flood prevention measures tested in pilot areas. It tends towards mainly to realistic scenarios (Bistret, Begečka Jama, Middle Tisza) as the more feasible ones. In case of *Kostanjevica na Krki* (Krka) and *Morava* pilots' areas, the optimistic scenario has been chosen, as the benefits of realistic scenarios are very low. For sure this is a first step, which it will be further completed with complementary measures (most probably part of optimistic scenarios) through a more appropriate assessment in terms of technical, social and financial feasibility.

The *Table 1* presents the roadmap in relation with pilots' areas, subjects of Danube Floodplain project. It comprises mainly the key results of the pilots related feasibility studies focusing on restoration and preservation measures considered in frame of realistic scenario, socio-economic and environmental effects, costs estimation, responsible authorities and an estimation of implementation timeline. The proposed action plan is meant to be subject of national approaches, considering the Flood Risk Management Plans and River Basin Management Plans but also could be considered subject of updating process of DFRMP and DRBMP. A short description of the pilot's area is also included.

[10] Danube Floodplain Output 4.1: Food Prevention measures tested in pilot areas

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Pilot area	River	Pilot area size (ha)	Brief description of Pilot area	Measures	Effects of measures	Cost estimation mil. €	Responsible authority	Estimated time for implementation
Bistret	Danube	17,698	The pilot area is located on the left embanked bank of Danube between km 726.and km 708 The purpose of embanking the meadow lands was to capitalize for agriculture the high fertility potential of the lands periodically subject to flooding, fertility ensured by the alluvial material brought by the waters, good permeability of the soils and a good water supply of the crops from the phreatic supply. The low geodetic position of these lands ensures facilities for eliminating excess water and applying irrigation at low costs, the pumping heights being of the order of a few meters. On the other hand, the protection of the floodplain's localities from the overflowing waters of the Danube is ensured. The forest-steppe is with xerophytic grasses, clumps of brumarium oak. On small areas of crops live small rodents (hares, field mice, partridges) small predators (ferret, weasel) and large predators (fox) spread in different areas. The anthropogenic works, mostly related to flood protection, changing of land use in the Danube floodplain, such as dikes, drainage and irrigation, have completely changed its appearance and considerably reduced the areas occupied by water, so that only the Danube River and a few lakes have remained as a fishing environment. Among the most common fish species we mention: carp, catfish, salmon, pike, crucian Protected area - Braniște–Bistreț oak (200 ha) grove forest, is part of the pilot area. Also, Lake Bistreț has been designated a special avifauna protection area (ROSPA0010) and is part of the Natura 2000 network.	Scenario selected: Realistic **Construction** • dike relocation • controlled dike overtopping / gaps in the dike **Land cover and lateral branches** • create and connect new lateral branches or pools / new water regime • create retention areas / flood channels • connection of lateral branches/oxbows	**Socio-economic** • Expending the surface and volume of Lake Bistret • Economic development of the area (aquaculture, ecotourism) **Environmental** • Improving the morphological conditions • Improving of aquatic species and habitats	52	Local authorities National Administration "Romanian Waters"	2027

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Pilot area	River	Pilot area size (ha)	Brief description of Pilot area	Measures	Effects of measures	Cost estimation mil. €	Responsible authority	Estimated time for implementation
Begečka Jama	Danube	1,013	Begečka Jama Nature Park is located on the left bank of the Danube River, upstream from Novi Sad. It the past it was a part of a larger floodplain reduced to the current extent due to agriculture and flood protection measures (early 18th c.). Several geomorphologic types of fluvial erosion of different ages (islands, ridges, oxbow lakes and backwaters) enabled a mosaic of wetland habitats, representing a refuge for many animal and plant species. The area is a vital reproduction area for many fish, amphibians and bird species. The wetland habitats and the hydrological regime have significantly deteriorated due to siltation and aggradation (natural processes, anthropogenic activities, e.g., forestry, pollution, flood protection). Intensive land use caused habitat degradation and fragmentation. River training and flood protection measures disrupted the dynamics of flood events. The planting of poplar plantations enabled the spreading of invasive plant species whilst the backwaters, oxbows and wet meadows were filled up due to forestry activities and needs. The attractiveness of the area for visitors is decreased due to the loss of aesthetic and recreational values.	Scenario selected: Realistic **Construction** • change operation mode of weirs • migration permeability at weirs **land cover and lateral branches** • create and connect new lateral branches or pools / new water regime • connection of lateral branches/oxbows • deepening lateral branches/oxbows **river channel geometry alteration** • increase the diversity of the river morphology (riffles, pools, potholes, sand or gravel banks, cut banks and slip-off-slope, broader and narrower passages of the river,...); diversity of cross profiles of the river • create fish spawning areas	**Socio-economic** • Economic development of the area (agriculture, ecotourism) • Supporting the water flow through the floodplain. **Environment** - Improving the functions and processes of the floodplain ecosystem. - Contributing to preserving the mosaic aquatic and terrestrial habitats on the floodplain and protection of species. - Improving the status of typical floodplain habitats (oxbows, marshes, ephemeral channels, flooded meadows). - Enabling fish spawning and nursery in new habitats (phytophilic and phyto-litophilic). - Additional nesting and feeding ground for waterfowl. - Improving visual integrity of the landscape and aesthetic value.	1,3	Local authority - city of Novi Sad Administration for environmental protection, through the Protected Area Management Plan. Protected Area Manager	4 years (several phases)

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Pilot area	River	Pilot area size (ha)	Brief description of Pilot area	Measures	Effects of measures	Cost estimation mil. €	Responsible authority	Estimated time for implementation
Krka	Krka	3,630	The Krka Sub-basin has an area of 2,315.07 km^2 with approximately 120.000 inhabitants. From administrative point of view, 23 municipalities are positioned on its territory. It is a tributary of the Sava river to which the Krka river discharges just some 11 km upstream the cross section where Sava discharges from Slovenia to Croatia. Beside the main watercourse of the river in the length of 94 km its tributaries and springs in the upper part of the river basin are mainly karstic. Land use: forest, agriculture, settlements area. The pilot area comprises Kostanjevica na Krki together with Krakovski gozd (Krakovski forest) and Šentjernejsko polje (Šentjernejsko field) Most of the land use in the municipalities related pilot area is intended for forest areas (Krakow Forest area), followed by areas of agricultural land. In the area of Kostanjevica, the land along the left bank of the Krka is intended for production activities. the area of the old town is defined as the area of central activities	Scenario selected: Optimistic **land cover and lateral branches** • create and connect new lateral branches or pools / new water regime • create retention areas / flood channels • increase floodplain area **river channel geometry alteration** • widening of river channel	**Socio-economic** HQ_{100} protection of ASFP Kostanjevica na Krki **Environment** - Improving the functions and processes of the floodplain ecosystem. - Preserving and improvement the mosaic of aquatic and terrestrial habitats on the floodplain and protection of species.	10	Slovenian Water Agency	2024

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Pilot area	River	Pilot area size (ha)	Brief description of Pilot area	Measures	Effects of measures	Cost estimation mil. €	Responsible authority	Estimated time for implementation
Middle Tisza	Tisza	4,951	The Middle Tisza is mainly characterized by meanders. Flood risk and vulnerability are of particular importance in the area. After the river regulation in the 19th - 20th centuries both riversides are their dyke construction. These dyke sections protect the settlements, industrial zones and the arable lands from flood event. The Middle Tisza section is the lower section of the river, so in this area can accumulated more sediment on the floodplain area and lose the conveyance capacity between the dykes. In the floodplain the main land use type is the forest, the second is crops and we can find some other less land use type (e.g., pasture). The river regulation and dyke construction works were finished on the Hungarian section of the Tisza River in the early 20th century. These measures created a new situation for the Hungarian flood protection. Over time, we had to face with new problems after the river has been situated between the dykes. The major challenges are that the river can only deposit the transported sediment between the embankments and the percentage of floodplain plantations has increased tenfold over the last hundred years as a consequence of which morphology and pattern of the watercourse has been changed. One of the largest increases in flood waves is caused by the rise of invasive species. Lack of pests and parasites which regulate their population, deterioration of habitats due to river regulation, frequent disturbances and decline of traditional forms of farming play a major role in becoming invasive	Scenario selected: Realistic **Construction** • dike relocation • dike removal • controlled dike overtopping / gaps in the dike **land cover and lateral branches** • convert land cover towards natural conditions • modify floodplain DEM • increase floodplain area **river channel geometry alteration** • removing bank stabilizations / embankments • create fish spawning areas • Removing sand bars	Decreasing flood risk Increase in biodiversity and spawning areas as a result of habitat restoration Sustainable development and ecotourism While the biggest share from the benefits is associated with flood risk reduction, periodic flooding of the area will improve certain ecosystem services in the area.t In the Fokorúpuszta area, afforestation of plantations and invasive species and the establishment of a fish spawning are also planned. Together, these interventions could have a positive impact in economic, social and ecological terms.	15,2	Water management authorities. Middle-Tisza Water Management Directorate Hortobágy National Park Directorate	5-10 year

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Pilot area	River	Pilot area size (ha)	Brief description of Pilot area	Measures	Effects of measures	Cost estimation mil. €	Responsible authority	Estimated time for implementation
Morava	Morava	147,37	The Morava pilot area is located at the confluence of the Thaya and Morava River. Naturally, the Morava has been an actively meandering river with extensive oxbows and backwaters. In the current state, the majority of the hydrologically connected area is covered by a mixed riparian forest. The backwaters provide habitat for amphibians and fish species, whose habitats are reduced by limitations of connectivity	**Construction** • dike relocation • removal of weirs • change operation mode of weirs **land cover and lateral branches** • connection of lateral branches/oxbows • deepening lateral branches/oxbows • reconnect old oxbow • increase floodplain area **river channel geometry alteration** • change course of the river (meandering) • removing ground sills, plunges	**Socio-economic** • Sustainable economic development of the area • Supporting the water provisions for forestry **Environment** - Improving the functions and processes of the floodplain ecosystem. - Contributing to preserving the mosaic aquatic and terrestrial habitats on the floodplain with influence of annual flood - Improving the status of typical floodplain habitats (oxbows, marshes, ephemeral channels, flooded meadows). - Enabling fish spawning and nursery in new habitats (phytophilic andphyto-litophilic). - restoration of natural morphological processes - connecting 22.4 km of the original riverbed back to the Morava River - Return of annual flooding to 2900 ha of river floodplai	46,2	Morava River Basin Authority Slovak Water Management Enterprise	2028

Table 1 - Action plan for Danube Floodplain project pilot areas

Danube basin wide action plan for active and potential floodplains assessed along the Danube

Background

Within the project, a methodology[11] was developed in order to identify and evaluate active and potential floodplains. Former Floodplains has also been identified. (Figure 2).

Figure 2 - Active, potential and former floodplains along the Danube River[12]

According to the Danube FLOODRISK[13] project, a flood event with a return period of 100 years (HQ_{100}) was widely accepted as the design discharge for flood protection measures along the Danube River and chosen as the data basis for the identification of the active floodplains.

[11] Report on the evaluation of floodplains along the Danube River
[12] Eder, M., Scheuer, S., Tritthart, M., Perosa, F., Gelhaus, M., Cyffka, B., van Leeuwen, B., Tobak, Z., Sipos, G., Smetanova, A., Bokal, S., Samu, A. Gruber, T., Galie, A., Moldovenau, M., Petrisor, M., Habersack, H. (in preparation). Identifying active, potential and former floodplains - Methods and lessons learned from the Danube River. Water.
[13] https://www.icpdr.org/main/activities-projects/danube-floodrisk-project

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Active floodplains are defined as all areas that are still flooded during an HQ_{100} flood event. Potential floodplains are currently not inundated in the case of a HQ_{100} , and also not during smaller floods, but with restoration measures, these areas can be reconnected to the river system leading to inundation during a HQ_{100} event and during more frequent flooding events as well.

Both floodplain types are presented in the Danube GIS[14] and the Danube Floodplain GIS, a geographic information system developed in frame of the project. A preliminary analysis of former floodplains areas based on the HQ_{1000} inundation outlines, estimating how much of the former floodplains are still active or potential inundation areas has been also performed.

In the next step, *active and potential floodplains* were evaluated with the *Floodplain Evaluation Matrix (FEM)*, a holistic, integrative method for assessing hydrological, hydraulic, ecological, and socio-economic effects of a floodplain[15]. The FEM methodology was further developed with all project partners' help to serve the project's needs best. Further, the need for preservation and the restoration demand of a floodplain was assessed and ranked. Based on the levels of performance for each FEM related parameter, three levels of restoration demand were defined for each active floodplain: *High; Medium and Low*

The tables below present the active floodplains and the overview of the minimum FEM-parameters, including ranking (need for preservation + restoration demand) for all active floodplains along the Danube River. Details on the entire assessment can be found in the deliverable: *D.3.2.1. Report on the evaluation of floodplains along the Danube River.*

[14] Geographic information system, using and providing geo-information services on the web, whose development is supported by the ICPDR contracting parties
[15] Habersack, H., Schober, B., 2020. Floodplain Evaluation Matrix FEM – A multiparameter assessment methodology. Journal of Flood Risk Management 13, e12614.

Table 2 - Active Floodplains along Danube River

No.	Active Floodplain Code	Country	Location	Floodplain area (km²)
1	DE_DU_AFP01	Germany	Donaueschingen	9.7
2	DE_DU_AFP02	Germany	Riedlingen	6.3
3	DE_DU_AFP03	Germany	Oberelchingen-Lech	155.5
4	DE_DU_AFP04	Germany	Lech-Neuburg	32.3
5	DE_DU_AFP05	Germany	Bergheim-Ingolstadt	21.9
6	DE_DU_AFP06	Germany	Neustadt-Weltenburg	16.4
7	DE_DU_AFP07	Germany	Regensburg	7.5
8	DE_DU_AFP08	Germany	Geisling/Gmünd	10.6
9	DE_DU_AFP09	Germany	Straubing-Isar	67.2
10	DE_DU_AFP10	Germany	Isar-Vilshofen	45.3
11	AT_DU_AFP01	Austria	Aschach-Ottensheim	56.4
12	AT_DU_AFP02	Austria	Linz-Mauthausen	34.8
13	AT_DU_AFP03	Austria	Mauthausen-Ardagger Markt	72.2
14	AT_DU_AFP04	Austria	Krems-Wien	151.9
15	AT_DU_AFP05	Austria	Wien-Devin	85.3
16	AT_SK_DU_AFP01	Austria/Slovakia	Devin-Wolfsthal	19.8
17	HU_SK_DU_AFP01	Slovakia/ Hungary	Szigetköz	140.2
18	HU_SK_DU_AFP02	Slovakia/Hungary	Gönyű	40.6
19	HU_SK_DU_AFP03	Slovakia/Hungary	Almásfüzitő	8.3
20	HU_SK_DU_AFP04	Slovakia/Hungary	Esztergom	31.2
21	HU_SK_DU_AFP05	Slovakia/ Hungary	Pilismarót	14.9
22	HU_DU_AFP01	Hungary	Szentendrei-sz. North	32.3
23	HU_DU_AFP02	Hungary	Szentendrei-sz. South	18.2
24	HU_DU_AFP03	Hungary	Csepel-sziget	70.8
25	HU_DU_AFP04	Hungary	Dunaújváros	44.7
26	HU_DU_AFP05	Hungary	Dunaföldvár	63.8
27	HU_DU_AFP06	Hungary	Parks	20.3
28	HU_DU_AFP07	Hungary	Veránka-sziget	159
29	HU_DU_AFP08	Hungary	Bezerédy-sziget	9
30	HU_HR_DU_AFP01	Hungary/Croatia	Béda-Karapancsa	48.2
31	HR_RS_DU_AFP01	Croatia /Serbia	Kopački rit/ Gornje Podunavlje	279.9
32	HR_RS_DU_AFP02	Croatia /Serbia	Borovo/ Vajska	19.6
33	HR_RS_DU_AFP03	Croatia /Serbia	Vukovar/Bačko Novo Selo	24.6
34	HR_RS_DU_AFP04	Croatia /Serbia	Mohovo/ Karađorđevo	30
35	HR_RS_DU_AFP05	Croatia /Serbia	Ilok/ Bačka Palanka	49.2
36	RS_DU_AFP01	Serbia	Futog-Beočin	34.8
37	RS_DU_AFP02	Serbia	Koviljsko-petrovaradinski rit	74.8
38	RS_DU_AFP03	Serbia	Novi Banovci	27.7
39	RS_DU_AFP04	Serbia	Beograd	18.4
40	RS_DU_AFP05	Serbia	Pančevo	43.2
41	BG_RO_DU_AFP01	Bulgaria/Romania	Kozlodui-Oreahovo area/ Ostroveni-Bistret area	60.1
42	BG_RO_DU_AFP02	Bulgaria/Romania	Leskovet-Ostrov area/Dabuleni area	32.3
43	BG_RO_DU_AFP03	Bulgaria/Romania	Baikal-Ghighen area/upstream from Corabia area	29.3
44	BG_RO_DU_AFP04	Bulgaria/Romania	Zagrajden-Somovit area/ downstream from Corabia-Islaz area	81.6
45	BG_RO_DU_AFP05	Bulgaria/Romania	Marten area/Giurgiu area	25.3
46	BG_RO_DU_AFP06	Bulgaria/Romania	Popina area/Chiselet-Dorobantu area	33.6
47	RO_DU_AFP01	Romania	Calarasi area	50.3
48	RO_DU_AFP02	Romania	Oltina-Rasova area	79.4
49	RO_DU_AFP03	Romania	Rasova-Cernavoda-Harsova area	93.6
50	RO_DU_AFP04	Romania	Harsova- Braila area	298.8

Floodplain		Hydrology		Hydraulics	Ecology			Socio-Economics		Ranking	
		peak reduction (%)	flood wave translation (h)	water level change (cm)	connectivity (-)	protected species (-)		affected buildings (n/km²)	land use (-)	Need for preservation	Restoration demand
DE_DU_AFP_01	1										
DE_DU_AFP_02	2										
DE_DU_AFP_03	3	16,98	16,5	112	1	95	95	15,76	3,63	yes	medium
DE_DU_AFP_04	4	2,63	9,5	89	1	54	54	15,58	3,92	yes	medium
DE_DU_AFP_05	5	0,53	3	42	1	51	51	19,16	4,57	yes	high
DE_DU_AFP_06	6	0,07	1	0	1	41	41	17,93	3,40	yes	high
DE_DU_AFP_07	7	0,00	1,25	6	1	53	53	0,81	3,65	yes	high
DE_DU_AFP_08	8	0,08	0,25	24	1	53	53	0,19	3,64	yes	high
DE_DU_AFP_09	9	11,13	6,75	53	1	86	86	9,32	3,61	yes	medium
DE_DU_AFP_10	10	2,83	5	38	1	115	115	11,39	3,52	yes	high
AT_DU_AFP_01	11	15,64	5,5	64	1	20	20	19,58	3,40	yes	high
AT_DU_AFP_02	12	1,52	2,5	172	1	62	62	14,04	3,76	yes	high
AT_DU_AFP_03	13	8,24	5,5	68	1	85	85	3,52	3,81	yes	medium
AT_DU_AFP_04	14	12,60	20,5	83	1	113	113	18,63	4,68	yes	low
AT_DU_AFP_05	15	4,68	5	109	3	116	116	1,38	4,74	yes	low
AT_SK_DU_AFP_01	16	1,21	4	81	1	51	51	3,98	3,56	yes	high
HU_SK_DU_AFP_01	17	11,40	7	65	3	70	70	4,79	4,88	yes	low
HU_SK_DU_AFP_02	18	0,60	2	18	1	59	59	10,42	4,21	yes	high
HU_SK_DU_AFP_03	19	0,06	0	19	1	56	56	4,71	3,57	yes	high
HU_SK_DU_AFP_04	20	0,39	2	29	3	56	56	8,08	3,74	yes	high
HU_SK_DU_AFP_05	21	0,79	0,4	1	1	56	56	34,77	4,08	yes	high
HU_DU_AFP_01	22	2,61	0	73	1	56	56	24,48	3,88	yes	high
HU_DU_AFP_02	23	0,05	3	34	3	35	35	25,37	4,25	yes	high
HU_DU_AFP_03	24	1,69	6	76	3	33	33	7,85	4,23	yes	medium
HU_DU_AFP_04	25	1,03	7	79	3	33	33	8,52	4,42	yes	medium
HU_DU_AFP_05	26	1,49	1	2	3	27	27	4,01	4,05	yes	high
HU_DU_AFP_06	27	0,34	0,5	86	3	27	27	2,61	4,69	yes	high
HU_DU_AFP_07	28	5,22	7	120	3	75	75	12,62	4,42	yes	low
HU_DU_AFP_08	29	0,20	0	125	3	82	82	0,99	4,95	yes	high
HU_HR_DU_AFP_01	30	1,41	5	128	3	82	82	0,14	4,91	yes	low
RS_HR_DU_AFP_01	31	4,04	41,5	70	1	144	144	1,78	4,90	yes	low
RS_HR_DU_AFP_02	32	0,14	2	15	1	80	80	0,87	4,80	yes	high
RS_HR_DU_AFP_03	33	0,25	2,5	30	1	80	80	0,53	4,97	yes	high
RS_HR_DU_AFP_04	34	0,28	2,5	16	3	103	103	1,20	4,96	yes	medium
RS_HR_DU_AFP_05	35	0,68	5	48	1	87	87	3,70	4,82	yes	high
RS_DU_AFP_01	36	0,66	3	17	1	59	59	22,20	4,62	yes	high
RS_DU_AFP_02	37	2,21	7,5	8	1	271	271	0,13	4,95	yes	low
RS_DU_AFP_03	38	0,02	4	3	3	70	70	0,00	4,97	yes	high
RS_DU_AFP_04	39	0,27	3	1	3	60	60	0,27	4,79	yes	high
RS_DU_AFP_05	40	0,01	2,5	1	3	149	149	1,53	4,71	yes	high
RO_BG_DU_AFP_01	41	0,22	1	8	3	176	176	0,38	4,82	yes	medium
RO_BG_DU_AFP_02	42	0,01	2	4	3	164	164	0,00	4,94	yes	medium
RO_BG_DU_AFP_03	43	0,01	2	7	3	131	131	0,24	4,31	yes	medium
RO_BG_DU_AFP_04	44	0,06	4	12	3	161	161	0,21	4,40	yes	medium
RO_BG_DU_AFP_05	45	0,03	2	13	3	165	165	0,28	4,62	yes	medium
RO_BG_DU_AFP_06	46	0,01	2	12	3	67	67	0,15	4,65	yes	medium
RO_DU_AFP_01	47	0,02	1	24	3	116	116	0,56	4,98	yes	medium
RO_DU_AFP_02	48	0,27	5	34	3	161	161	0,14	4,97	yes	low
RO_DU_AFP_03	49	0,44	11	57	3	180	180	0,45	4,87	yes	low
RO_DU_AFP_04	50	0,23	39	12	3	240	240	0,13	4,95	yes	low
performance		Thresholds	Thresholds	Thresholds	Thresholds	Thresholds		Thresholds	Thresholds	Threshold	Threshold
low		<1 %	<1 h	<10 cm	1	0	<40	>5 n/km²	<2	at least one parameter evaluated	≥ 27
medium		1-2 %	1-5 h	10 - 50 cm	3	1-20	41-100	1-5 n/km²	2-4	with 5	23-26
high		>2 %	>5 h	>50 cm	5	>20	>101	<1 n/km²	>4	no parameter evaluated with 5	<23

Table 3 - Overview of the minimum FEM-parameters including ranking (need for preservation + restoration demand)

24 **potential floodplains** (see table below) were identified in the frame of the Danube Floodplain project. Potential floodplains represent, in fact, one of the key interest points considering improving the lateral connectivity on the Danube River and tributaries. Restoring floodplains not only generates more environmental and socio-economic benefits, especially in the long term, but also lowers the flood risk. Therefore, reducing the flood risk while maximizing benefits for river morphology and biodiversity conservation should consider the potential floodplains, not particularly those identified in the project but to all areas assessed in the national approaches.

No.	Potential Floodplain Code	Country	Location	Floodplain area (km²)
1	DE_DU_PFP01	DE	Oberelchingen-Lech	167
2	DE_DU_PFP02	DE	Lech-Neuburg	37.4
3	DE_DU_PFP03	DE	Großmehring	4.9
4	DE_DU_PFP04	DE	Katzau	3.1
5	DE_DU_PFP05	DE	Geisling/Gmünd	25
6	AT_DU_PFP01	AT	Krems-Wien	160.7
7	AT_DU_PFP02	AT	Wien-Devin	121.4
8	HU_DU_PFP01	HU	Szigetköz	157.1
9	HU_DU_PFP02	HU	Paks	22.1
10	HU_DU_PFP03	HU	Veránka-sziget	161.7
11	HU_DU_PFP04	HU	Béda-Karapancsa	54.7
12	RS_DU_PFP01	RS	Siga-Kazuk	60.6
13	RS_DU_PFP02	RS	Vajska	59.9
14	RS_DU_PFP03	RS	Kamarište	100.7
15	BG_RO_DU_PFP01	BG/RO	Slivata-Orsoia area/Desa area	82.8
16	BG_RO_DU_PFP02	BG/RO	Dolni Tibar-Oreahovo area/Bistret-Bechet area	279.7
17	BG_RO_DU_PFP03	BG/RO	Oreahovo-Cerkovita area/Bechet-Turnu Magurele area	309.7
18	BG_RO_DU_PFP04	BG/RO	Deagas Voivoda-Svistov area/Traian-Zimnicea area	204.5
19	BG_RO_DU_PFP05	BG/RO	Novgrad area/Nasturelu area	31.7
20	RO_DU_PFP01	RO	Borcea Buliga	8.6
21	RO_DU_PFP02	RO	Bentu	0.7
22	RO_DU_PFP03	RO	Garliciu	10.8
23	RO_DU_PFP04	RO	Tichilesti	318.1
24	RO_DU_PFP05	RO	Cotu Pisicii	11.6

Table 4 - Potential floodplains identified in the frame of the Danube Floodplain project. Source: D 3.2.1 & Manual DFP

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Danube Floodplain
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The table 5 present the overview of the minimum FEM-parameters, for all identified potential floodplains along the Danube River. Details on the entire assessment can be found in the deliverable: D.3.2.1. *Report on the evaluation of floodplains along the Danube River.*

Floodplain		Hydrology		Hydraulics	Ecology		Socio-Economics	
		peak reduction (%)	flood wave translation (h)	water level change (cm)	connectivity (-)	protected species	affected buildings	land use (-)
DE_DU_PFP01	1	17,62	19	117	1	95	14,95	3,61
DE_DU_PFP02	2	2,41	11	108	1	54	16,78	3,89
DE_DU_PFP03	3	0,35	0	52	1	17	5,07	4,29
DE_DU_PFP04	4	0,02	2	0	1	15	1,94	3,67
DE_DU_PFP05	5	0,33	5	25	1	53	6,63	3,31
AT_DU_PFP01	6	13,06	22	65	1	113	17,65	4,75
AT_DU_PFP02	7	8,51	6,25	154	3	116	1,01	4,85
HU_DU_PFP01	8	0,90	3	66	3	70	5,00	4,75
HU_DU_PFP02	9	0,20	3	96	3	27	2,00	4,56
HU_DU_PFP03	10	2,75	9	125	3	75	3,00	4,81
HU_DU_PFP04	11	0,80	5	130	3	82	0	4,90
RS_DU_PFP01	12	2,73	16	66	3	173	0,17	4,95
RS_DU_PFP02	13	0,92	11	9	5	240	0,25	3,05
RS_DU_PFP03	14	0,92	8	193	5	240	1,62	3,30
BG_RO_DU_PFP01	15	0,04	1	6	3	153	0,05	4,05
BG_RO_DU_PFP02	16	0,27	9	23	5	205	0,02	3,99
BG_RO_DU_PFP03	17	0,67	22	84	3	198	0,09	4,04
BG_RO_DU_PFP04	18	0,19	4	7	5	200	0,23	3,93
BG_RO_DU_PFP05	19	0,05	2	11	3	157	1,23	4,11
RO_DU_PFP01	20	0,14	1	6	5	83	0	2,96
RO_DU_PFP02	21	0,05	0,5	1	5	79	0	3,00
RO_DU_PFP03	22	0,08	1	13	3	61	0,83	3,19
RO_DU_PFP04	23	0,03	3	8	3	281	0,24	4,83
RO_DU_PFP05	24	0,07	1	6	5	33	2,15	3,04
performance		Thresholds	Thresholds	Thresholds	Thresholds	Thresholds	Thresholds	Thresholds
low		<1 %	<1 h	<10 cm	1	0	>5 n/km²	<2
medium		1-2 %	1-5 h	10 - 50 cm	3	1-20	1-5 n/km²	2-4
high		>2 %	>5 h	>50 cm	5	>20	<1 n/km²	>4

Table 5 - Overview of the results for the minimum FEM-parameters for all identified potential floodplains along the Danube River.

The elaboration of a detailed action plan regarding the active and potential areas is difficult in this stage, mainly due to the need to identify proper restoration and preservation scenarios. Further, addressing each active or potential floodplain individually is also premature. Moreover, several Danube Floodplain project partners are scientific entities, universities, making it more difficult to conclude on future steps without consultation with relevant stakeholders and competent authorities.

However, references to an indicative future approach (in general terms) in relation with active and potential floodplains could be provided. Therefore, the action plan proposes several predefined technical, financial, administrative and legislative actions which are particularly addressed to each country having in view the future actions on active and potential floodplains. It indicates the main steps that will be further considered in the floodplain restoration process on a national and basin-wide level considering the results of the Danube Floodplain project.

Country	Actions to be considered in the restoration process			Responsible authority
Active floodplains with restoration demand				
	Technical	**Administrative and legislative**	**Financial**	
Germany	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project	➢ Information and discussions with competent authorities		
Austria, Slovakia	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process) ➢ Carrying out prefeasibility/feasibility studies.	➢ Information and discussions with competent authorities ➢ Consideration of updating legislative/regulatory provisions ➢ Consideration of adapting administrative/institutional measures ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA, FEM-Tool) ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain	➢ Identification of proper financing sources	➢ Water management authorities at national and regional level ➢ Local authorities (e.g., municipalities)
Slovakia, Hungary	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process) ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain ➢ Carrying out prefeasibility/feasibility studies ➢ Consideration of Danube Floodplain project related FEM Tool ➢ Consider using new tools (e.g., from IDES project) to improve calculation of the floodplain status, and to determine effective measures).	➢ Information and discussions with competent authorities	➢ Identification of proper financing sources	➢ Water management authorities
Hungary	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process) ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain ➢ Carrying out prefeasibility/feasibility studies ➢ Consideration of Danube Floodplain project related FEM Tool ➢ Consider using new tools (e.g., from IDES project[16]) to improve calculation of the floodplain status, and to determine effective measures).	➢ Information and discussions with competent authorities	➢ Identification of proper financing sources	➢ Water management authorities

[16] http://www.interreg-danube.eu/approved-projects/ides

Country	Actions to be considered in the restoration process			Responsible authority
Active floodplains with restoration demand				
	Technical	**Administrative and legislative**	**Financial**	
Croatia, Serbia	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA	➢ Information and discussions with competent authorities ➢ Consideration of adapting administrative/institutional measures	➢ Identification of proper financing sources	Both state and local involvement, with state authority dealing more with design and local authority with implementation.
Serbia	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA ➢ Consideration of Danube Floodplain project related FEM Tool	➢ Information and discussions with competent authorities ➢ Consideration of adapting administrative/institutional measures	➢ Identification of proper financing sources	➢ Water management authorities
Bulgaria Romania	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA)	➢ Consideration of updating legislative/regulatory provisions ➢ Information and discussions with competent authorities	➢ Identification of proper financing sources	➢ Water management authorities at national and basin level ➢ Local authorities ➢ National scientific institutions
Romania	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA ➢ Carrying out prefeasibility/feasibility studies	➢ Consideration of updating legislative/regulatory provisions	➢ Identification of proper financing sources	➢ Water management authorities at national and basin level ➢ Local authorities ➢ Others

Potential Floodplains				
	Technical	**Administrative and legislative**	**Financial**	
Germany	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project	➢ Information and discussions with competent authorities		
Austria	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Carrying out prefeasibility/feasibility studies.	➢ Information and discussions with competent authorities ➢ Consideration of updating legislative/regulatory provisions ➢ Consideration of adapting administrative/institutional measures ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA, FEM-Tool) ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain	➢ Identification of proper financing sources	➢ Water management authorities at national and regional level ➢ Local authorities (e.g. municipalities)
Hungary-Croatia	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain ➢ Carrying out prefeasibility/feasibility studies ➢ Consideration of Danube Floodplain project related FEM Tool ➢ Consider using new tools (e.g., from IDES project) to improve calculation of the floodplain status, and to determine effective measures).	➢ Information and discussions with competent authorities	➢ Identification of proper financing sources	➢ Water management authorities
Hungary	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain ➢ Carrying out prefeasibility/feasibility studies ➢ Consideration of Danube Floodplain project related FEM Tool ➢ Consider using new tools (e.g., from IDES project) to improve calculation of the floodplain status, and to determine effective measures).	➢ Information and discussions with competent authorities	➢ Identification of proper financing sources	➢ Water Management Authorities

Potential Floodplains				
	Technical	**Administrative and legislative**	**Financial**	
Serbia	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA ➢ Carrying out prefeasibility/feasibility studies ➢ Consideration of Danube Floodplain project related FEM Tool	➢ Information and discussions with competent authorities ➢ Consideration of adapting administrative/institutional measures	➢ Identification of proper financing sources	
Bulgaria-Romania	➢ Carrying out prefeasibility/feasibility studies ➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA	➢ Information and discussions with competent authorities ➢ Consideration of updating legislative/regulatory provisions	➢ Identification of proper financing sources	➢ Water management authorities at national and basin level ➢ National scientific institutions
Romania	➢ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project; ➢ Consideration as concrete restoration and preservation areas in frame of National River Basin Management Plan and Flood Risk Management Plan (including in the screening process); ➢ Consideration in the National River Basin Management Plan and Flood Risk Management Plan of key results of the project (methodology for identification and evaluation of active and potential floodplains, Ecosystem service assessment, extended CBA ➢ Carrying out prefeasibility/feasibility studies	➢ Consideration of updating legislative/regulatory provisions	➢ Identification of proper financing sources	➢ Water management authorities at national and basin level ➢ Local authorities ➢ Others