

***Brochure regarding  
Danube River Basin  
Floodplain Restoration  
Roadmap***

## Background

The Brochure regarding the Danube River Basin 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*.

### Action plan for Danube Floodplain project pilot areas

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.

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.

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.

Three hydrological scenarios have been studied, a current state and two restoration scenarios (realistic and optimistic).

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.

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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.

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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 of flood risk reduction).

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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.

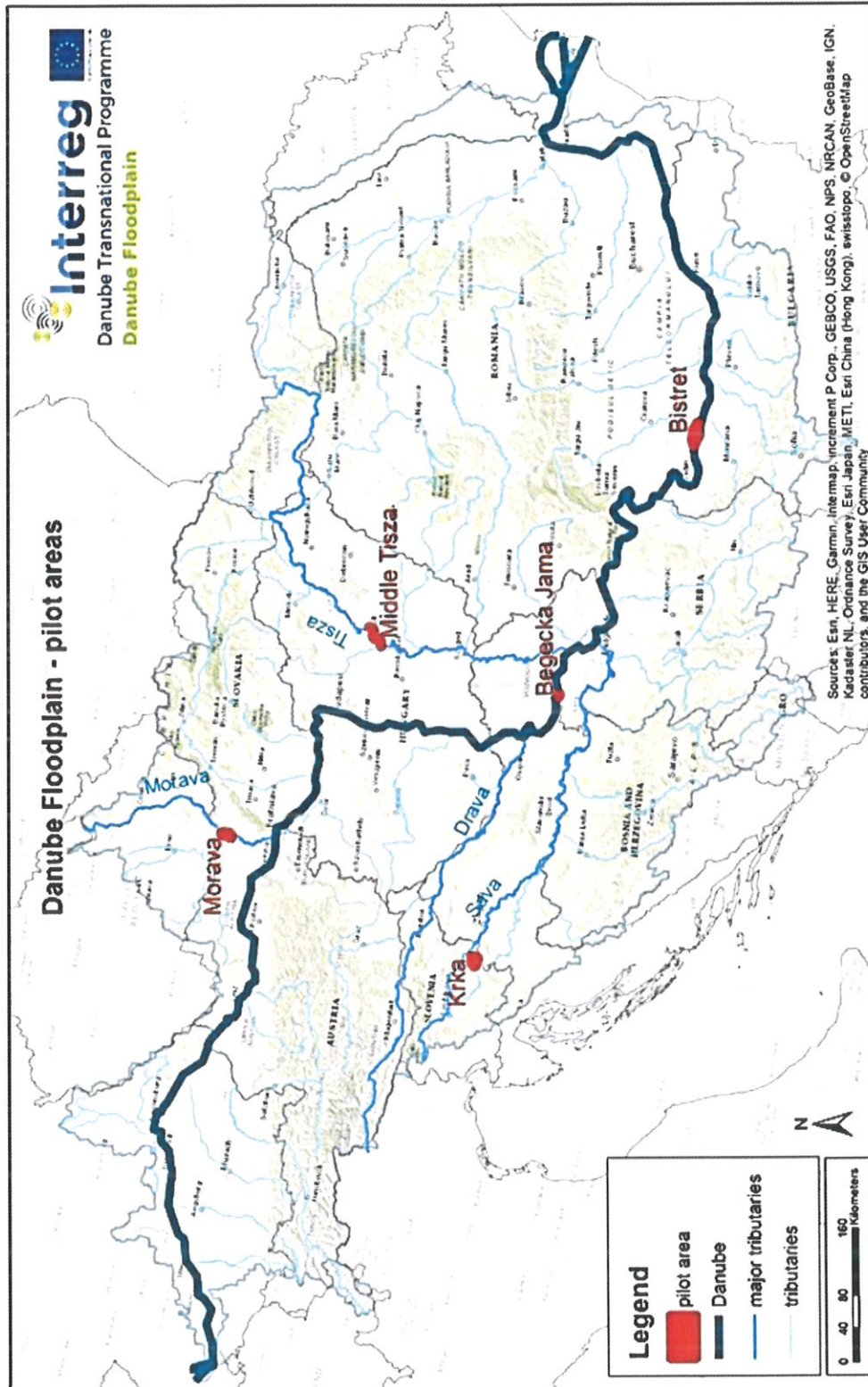


Figure 1 - The pilot areas of the Danube Floodplain project

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 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.

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

It presents the roadmap in relation with pilots' areas, comprising mainly 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.

Pilot area	Measures	Effects of measures	Responsible authority
<p>Bistret on the Danube 17,698 ha, cost estimation 52 mil. €, estimated time for implementation 2027</p>	<p>Scenario selected: Realistic</p> <p>Construction</p> <ul style="list-style-type: none"> <li>▪ dike relocation</li> <li>▪ controlled dike overtopping / gaps in the dike</li> </ul> <p>Land cover and lateral branches</p> <ul style="list-style-type: none"> <li>▪ create and connect new lateral branches or pools / new water regime</li> <li>▪ create retention areas / flood channels</li> <li>▪ connection of lateral branches/oxbows</li> </ul>	<p>Socio-economic</p> <ul style="list-style-type: none"> <li>▪ Expanding the surface and volume of Lake Bistret</li> <li>▪ Economic development of the area (aquaculture, ecotourism)</li> </ul> <p>Environmental</p> <ul style="list-style-type: none"> <li>▪ Improving the morphological conditions</li> <li>▪ Improving of aquatic species and habitats</li> </ul>	<p>Local authorities</p> <p>National Administration "Romanian Waters"</p>
<p>Begečka Jama on the Danube 1013 ha, cost estimation 1.3 mil. €, estimated time for implementation 4 years (several phases)</p>	<p>Scenario selected: Realistic</p> <p>Construction</p> <ul style="list-style-type: none"> <li>▪ change operation mode of weirs</li> <li>▪ migration permeability at weirs</li> </ul> <p>land cover and lateral branches</p> <ul style="list-style-type: none"> <li>▪ create and connect new lateral branches or pools / new water regime</li> <li>▪ connection of lateral branches/oxbows</li> </ul>	<p>Socio-economic</p> <ul style="list-style-type: none"> <li>▪ Economic development of the area (agriculture, ecotourism)</li> <li>▪ Supporting the water flow through the floodplain.</li> </ul> <p>Environment</p> <ul style="list-style-type: none"> <li>▪ Improving the functions and processes of the floodplain ecosystem.</li> <li>▪ Contributing to preserving the mosaic aquatic and terrestrial habitats on the floodplain and protection of species.</li> </ul>	<p>Local authority - city of Novi Sad</p> <p>Administration for environmental protection, through the Protected Area Management Plan.</p> <p>Protected Area Manager</p>

Pilot area	Measures	Effects of measures	Responsible authority
	<ul style="list-style-type: none"> <li>▪ deepening lateral branches/oxbows</li> </ul> <p><b>River channel geometry alteration</b></p> <ul style="list-style-type: none"> <li>▪ 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</li> <li>▪ create fish spawning areas</li> </ul>	<ul style="list-style-type: none"> <li>▪ Improving the status of typical floodplain habitats (oxbows, marshes, ephemeral channels, flooded meadows).</li> <li>▪ Enabling fish spawning and nursery in new habitats (phytophilic and phyto-litophilic).</li> <li>▪ Additional nesting and feeding ground for waterfowl.</li> <li>▪ Improving visual integrity of the landscape and aesthetic value.</li> </ul>	
<p>Kostanjevica na Krki on Krka</p> <p>3,630 ha, cost estimation 10 mil. €, estimated time for implementation 2024</p>	<p>Scenario selected: Optimistic</p> <p><b>land cover and lateral branches</b></p> <ul style="list-style-type: none"> <li>▪ create and connect new lateral branches or pools / new water regime</li> <li>▪ create retention areas / flood channels</li> <li>▪ increase floodplain area</li> </ul> <p><b>river channel geometry alteration</b></p> <ul style="list-style-type: none"> <li>▪ widening of river channel</li> </ul>	<p><b>Socio-economic</b></p> <ul style="list-style-type: none"> <li>▪ HQ100 protection of ASFP Kostanjevica na Krki</li> </ul> <p><b>Environment</b></p> <p>Improving the functions and processes of the floodplain ecosystem.</p> <ul style="list-style-type: none"> <li>▪ Preserving and improvement the mosaic of aquatic and terrestrial habitats on the floodplain and protection of species.</li> </ul>	Slovenian Water Agency
<p>Middle Tisza on Tisza</p>	<p>Scenario selected: Realistic</p>	Decreasing flood risk	Water management authorities.

Pilot area	Measures	Effects of measures	Responsible authority
4,951 ha, cost estimation 15.2 mil. €, estimated time for implementation 5-10 years	<b>Construction</b> <ul style="list-style-type: none"> <li>▪ dike relocation</li> <li>▪ dike removal</li> <li>▪ controlled dike overtopping / gaps in the dike</li> </ul> <b>land cover and lateral branches</b> <ul style="list-style-type: none"> <li>▪ convert land cover towards natural conditions</li> <li>▪ modify floodplain DEM</li> <li>▪ increase floodplain area</li> </ul> <b>river channel geometry alteration</b> <ul style="list-style-type: none"> <li>▪ removing bank stabilizations / embankments</li> <li>▪ create fish spawning areas</li> <li>▪ Removing sand bars</li> </ul>	<p>Increase in biodiversity and spawning areas as a result of habitat restoration</p> <p>Sustainable development and ecotourism</p> <p>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.</p> <p>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.</p>	Middle-Tisza Water Management Directorate Hortobágy National Park Directorate
Morava on Morava 147,37 ha, cost estimation 46.2 mil. €, estimated time for implementation 2028	<b>Construction</b> <ul style="list-style-type: none"> <li>▪ dike relocation</li> <li>▪ removal of weirs</li> <li>▪ change operation mode of weirs</li> </ul> <b>land cover and lateral branches</b> <ul style="list-style-type: none"> <li>▪ connection of lateral branches/oxbows</li> <li>▪ deepening lateral branches/oxbows</li> </ul>	<p>Socio-economic</p> <ul style="list-style-type: none"> <li>▪ Sustainable economic development of the area</li> <li>▪ Supporting the water provisions for forestry</li> </ul> <p>Environment</p> <ul style="list-style-type: none"> <li>▪ Improving the functions and processes of the floodplain ecosystem.</li> <li>▪ Contributing to preserving the mosaic aquatic and terrestrial habitats on the</li> </ul>	Morava River Basin Authority Slovak Water Management Enterprise



Pilot area	Measures	Effects of measures	Responsible authority
	<ul style="list-style-type: none"> <li>▪ reconnect old oxbow</li> <li>▪ increase floodplain area</li> <li>▪ river channel geometry alteration</li> <li>▪ change course of the river (meandering)</li> <li>▪ removing ground sills, plunges</li> </ul>	<p>floodplain with influence of annual flood</p> <ul style="list-style-type: none"> <li>▪ Improving the status of typical floodplain habitats (oxbows, marshes, ephemeral channels, flooded meadows).</li> <li>▪ Enabling fish spawning and nursery in new habitats (phytophilic and phyto-litophilic).</li> <li>▪ restoration of natural morphological processes</li> <li>▪ connecting 22.4 km of the original riverbed back to the Morava River</li> <li>▪ Return of annual flooding to 2900 ha of river floodplain</li> </ul>	

Table 1 Action plan for Danube Floodplain project pilot areas

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

A methodology was developed in order to identify and evaluate *active and potential floodplains*. Former floodplains have been identified as well. (Figure 2).

According to the Danube FLOODRISK 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*. *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.

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.

*Active and potential floodplains* were evaluated with the *Floodplain Evaluation Matrix (FEM)*, a holistic, integrative method for assessing hydrological, hydraulic, ecological,

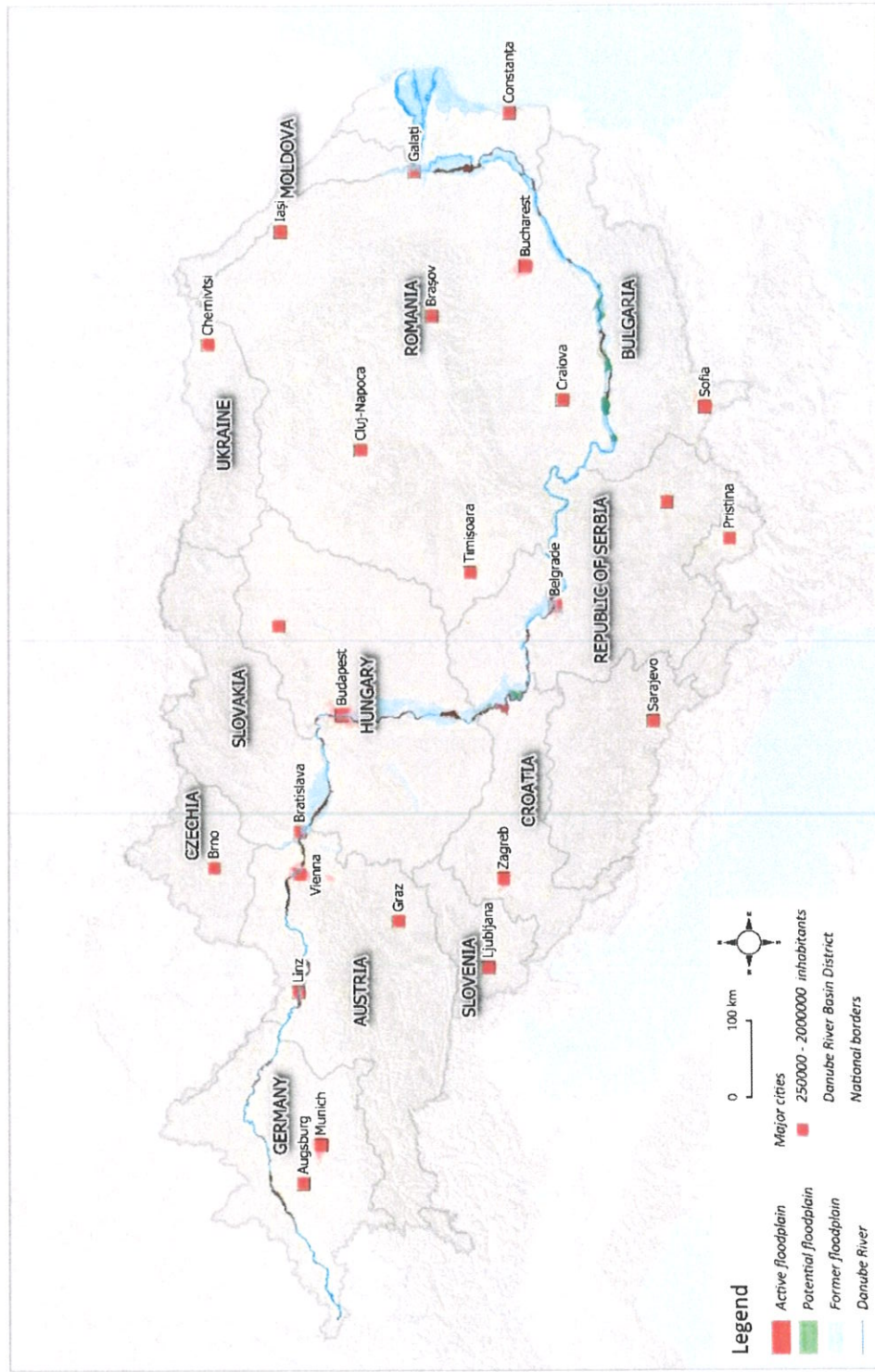
and socio-economic effects of a floodplain.

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.

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.

In the last table of this brochure, some actions to be considered in the restoration process of active and potential floodplains are presented.

## Active, Potential and Former Floodplains



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Figure 2. Active, potential and former floodplains along the Danube River

**Table 2 - Active Floodplains along the Danube River**

No.	Active Floodplain Code	Country	Location	Floodplain area (km <sup>2</sup> )
1	DE_DU_AFP01	DE	Donaueschingen	9.7
2	DE_DU_AFP02	DE	Riedlingen	6.3
3	DE_DU_AFP03	DE	Oberelchingen-Lech	155.5
4	DE_DU_AFP04	DE	Lech-Neuburg	32.3
5	DE_DU_AFP05	DE	Bergheim-Ingolstadt	21.9
6	DE_DU_AFP06	DE	Neustadt-Weltenburg	16.4
7	DE_DU_AFP07	DE	Regensburg	7.5
8	DE_DU_AFP08	DE	Geisling/Gmünd	10.6
9	DE_DU_AFP09	DE	Straubing-Isar	67.2
10	DE_DU_AFP10	DE	Isar-Vilshofen	45.3
11	AT_DU_AFP01	AT	Aschach-Ottensheim	56.4
12	AT_DU_AFP02	AT	Linz-Mauthausen	34.8
13	AT_DU_AFP03	AT	Mauthausen-Ardagger Markt	72.2
14	AT_DU_AFP04	AT	Krems-Wien	151.9
15	AT_DU_AFP05	AT	Wien-Devin	85.3
16	AT_SK_DU_AFP01	AT/SK	Devin-Wolfsthal	19.8
17	HU_SK_DU_AFP01	HU/SK	Szigetköz	140.2
18	HU_SK_DU_AFP02	HU/SK	Gönyű	40.6
19	HU_SK_DU_AFP03	HU/SK	Almásfüzitő	8.3
20	HU_SK_DU_AFP04	HU/SK	Esztergom	31.2
21	HU_SK_DU_AFP05	HU/SK	Pilismarót	14.9
22	HU_DU_AFP01	HU	Szentendre-sz. North	32.3
23	HU_DU_AFP02	HU	Szentendre-sz. South	18.2
24	HU_DU_AFP03	HU	Csepel-sziget	70.8
25	HU_DU_AFP04	HU	Dunaújváros	44.7
26	HU_DU_AFP05	HU	Dunaföldvár	63.8
27	HU_DU_AFP06	HU	Paks	20.3
28	HU_DU_AFP07	HU	Veránka-sziget	159
29	HU_DU_AFP08	HU	Bezerédy-sziget	9
30	HU_HR_DU_AFP01	HU/HR	Béda-Karapnacs	48.2
31	HR_RS_DU_AFP01	HR/RS	Kopački rit/ Gornje Podunavlje	279.9
32	HR_RS_DU_AFP02	HR/RS	Borovo/ Vajska	19.6
33	HR_RS_DU_AFP03	HR/RS	Vukovar/Bačko Novo Selo	24.6
34	HR_RS_DU_AFP04	HR/RS	Mohovo/ Karađorđevo	30
35	HR_RS_DU_AFP05	HR/RS	Ilok/ Bačka Palanka	49.2
36	RS_DU_AFP01	RS	Futog-Beočin	34.8
37	RS_DU_AFP02	RS	Koviljsko-petrovaradinski rit	74.8
38	RS_DU_AFP03	RS	Novi Banovci	27.7
39	RS_DU_AFP04	RS	Beograd	18.4
40	RS_DU_AFP05	RS	Pančevo	43.2
41	BG_RO_DU_AFP01	BG/RO	Kozlodui-Oreahovo/Ostroveni-Bistret	60.1
42	BG_RO_DU_AFP02	BG/RO	Leskovet-Ostrov/Dabuleni	32.3

No.	Active Floodplain Code	Country	Location	Floodplain area (km <sup>2</sup> )
43	BG_RO_DU_AFP03	BG/RO	Baikal-Ghigen/upstream from Corabia	29.3
44	BG_RO_DU_AFP04	BG/RO	Zagrajden-Somovit/downstream from Corabia-Islaz	81.6
45	BG_RO_DU_AFP05	BG/RO	Marten/Giurgiu	25.3
46	BG_RO_DU_AFP06	BG/RO	Popina/Chiselet-Dorobantu	33.6
47	RO_DU_AFP01	RO	Calarasi	50.3
48	RO_DU_AFP02	RO	Oltina-Rasova	79.4
49	RO_DU_AFP03	RO	Rasova-Cernavoda-Harsova	93.6
50	RO_DU_AFP04	RO	Harsova- Braila	298.8

No.	Potential Floodplain Code	Country	Location	Floodplain area (km <sup>2</sup> )
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-Karapnacs	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/Desa	82.8
16	BG_RO_DU_PFP02	BG/RO	Dolni Tibar-Oreahovo/Bistret-Bechet	279.7
17	BG_RO_DU_PFP03	BG/RO	Oreahovo-Cerkovita/Bechet-Turnu Magurele	309.7
18	BG_RO_DU_PFP04	BG/RO	Deagas Voivoda-Svistov/Traian-Zimnicea	204.5
19	BG_RO_DU_PFP05	BG/RO	Novgrad/Nasturelu	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

Country	Floodplain	Hydrology		Hydraulics	Ecology		Socio-Economics		Ranking	
		peak reduction (%)	flood wave translation (h)		water level change (cm)	connetctivity	protected species	affected buildings (n/km <sup>2</sup> )	land use	Need for preservation
DE	DE_DU_AFP_01	16.98	16.5	112	1	95	15.76	3.63	yes	medium
	DE_DU_AFP_02	2.63	9.5	89	1	54	15.58	3.92	yes	medium
	DE_DU_AFP_03	0.53	3	42	1	51	19.16	4.57	yes	high
	DE_DU_AFP_04	0.07	1	0	1	41	17.93	3.40	yes	high
	DE_DU_AFP_05	0.00	1.25	6	1	53	0.81	3.65	yes	high
	DE_DU_AFP_06	0.08	0.25	24	1	53	0.19	3.64	yes	high
	DE_DU_AFP_07	11.13	6.75	53	1	86	9.32	3.61	yes	medium
	DE_DU_AFP_08	2.83	5	38	1	115	11.39	3.52	yes	high
	DE_DU_AFP_09	15.64	5.5	64	1	20	19.58	3.40	yes	high
	DE_DU_AFP_10	1.52	2.5	172	1	62	14.04	3.76	yes	high
AT	AT_DU_AFP_01	8.24	5.5	68	1	85	3.52	3.81	yes	medium
	AT_DU_AFP_02	12.60	20.5	83	1	113	18.63	4.68	yes	low
	AT_DU_AFP_03	4.68	5	109	3	116	1.38	4.74	yes	low
	AT_DU_AFP_04	1.21	4	81	1	51	3.98	3.56	yes	high
	AT_DU_AFP_05	11.40	7	65	3	70	4.79	4.88	yes	low
HU, SK	AT_SK_DU_AFP_01	0.60	2	18	1	59	10.42	4.21	yes	high
	HU_SK_DU_AFP_02	0.06	0	19	1	56	4.71	3.57	yes	high
	HU_SK_DU_AFP_03	0.39	2	29	3	56	8.08	3.74	yes	high
	HU_SK_DU_AFP_04	0.79	0.4	1	1	56	34.77	4.08	yes	high
	HU_SK_DU_AFP_05	2.61	0	73	1	56	24.48	3.88	yes	high
HU	HU_DU_AFP_01	0.05	3	34	3	35	25.37	4.25	yes	high
	HU_DU_AFP_02	1.69	6	76	3	33	7.85	4.23	yes	medium
	HU_DU_AFP_03	1.03	7	79	3	33	8.52	4.42	yes	medium
	HU_DU_AFP_04	1.49	1	2	3	27	4.01	4.05	yes	high
	HU_DU_AFP_05									

Country	Floodplain	Hydrology		Hydraulics	Ecology		Socio-Economics		Ranking		
		peak reduction (%)	flood wave translation (h)		water level change (cm)	connectivity	protected species	affected buildings (n/km <sup>2</sup> )	land use	Need for preservation	Restoration demand
HU	HU_DU_AFP_06	27	0.34	0.5	86	3	27	2.61	4.69	yes	high
	HU_DU_AFP_07	28	5.22	7	120	3	75	12.62	4.42	yes	low
	HU_DU_AFP_08	29	0.20	0	125	3	82	0.99	4.95	yes	high
HU, HR	HU_HR_DU_AFP_01	30	1.41	5	128	3	82	0.14	4.91	yes	low
	RS_HR_DU_AFP_01	31	4.04	41.5	70	1	144	1.78	4.90	yes	low
	RS_HR_DU_AFP_02	32	0.14	2	15	1	80	0.87	4.80	yes	high
RS, HR	RS_HR_DU_AFP_03	33	0.25	2.5	30	1	80	0.53	4.97	yes	high
	RS_HR_DU_AFP_04	34	0.28	2.5	16	3	103	1.20	4.96	yes	medium
	RS_HR_DU_AFP_05	35	0.68	5	48	1	87	3.70	4.82	yes	high
	RS_DU_AFP_01	36	0.66	3	17	1	59	22.20	4.62	yes	high
	RS_DU_AFP_02	37	2.21	7.5	8	1	271	0.13	4.95	yes	low
RS	RS_DU_AFP_03	38	0.02	4	3	3	70	0.00	4.97	yes	high
	RS_DU_AFP_04	39	0.27	3	1	3	60	0.27	4.79	yes	high
	RS_DU_AFP_05	40	0.01	2.5	1	3	149	1.53	4.71	yes	high
	RO_BG_DU_AFP_01	41	0.22	1	8	3	176	0.38	4.82	yes	medium
	RO_BG_DU_AFP_02	42	0.01	2	4	3	164	0.00	4.94	yes	medium
RO, BG	RO_BG_DU_AFP_03	43	0.01	2	7	3	131	0.24	4.31	yes	medium
	RO_BG_DU_AFP_04	44	0.06	4	12	3	161	0.21	4.40	yes	medium
	RO_BG_DU_AFP_05	45	0.03	2	13	3	165	0.28	4.62	yes	medium
	RO_BG_DU_AFP_06	46	0.01	2	12	3	67	0.15	4.65	yes	medium
	RO_DU_AFP_01	47	0.02	1	24	3	116	0.56	4.98	yes	medium
RO	RO_DU_AFP_02	48	0.27	5	34	3	161	0.14	4.97	yes	low
	RO_DU_AFP_03	49	0.44	11	57	3	180	0.45	4.87	yes	low
	RO_DU_AFP_04	50	0.23	39	12	3	240	0.13	4.95	yes	low

Country	Floodplain	Hydrology		Hydraulics		Ecology		Socio-Economics		Ranking	
		peak reduction (%)	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds
FEM - rating	performance										
	low	< 1%	< 1h	< 10 cm	1	0	< 40	> 5 n/km <sup>2</sup>	< 2	at least one parameter evaluated with 5	≥ 27
	medium	1-2%	1-5h	10-50 cm	3	1-20	41-100	1-5 n/km <sup>2</sup>	2-4	no parameter evaluated with 5	23-26
	high	> 2%	> 5h	> 50 cm	5	> 20	> 101	< 1n/km <sup>2</sup>	> 4	parameter evaluated with 5	< 23

Table 4. Overview of the minimum FEM-parameters including ranking (need for preservation + restoration demand) for all active floodplains along the Danube River

Country	Floodplain	Hydrology		Hydraulics		Ecology		Socio-Economics	
		peak reduction (%)	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds
DE	DE_DU_PFP_01	1	17.62	19	117	1	95	14.95	3.61
	DE_DU_PFP_02	2	2.41	11	108	1	54	16.78	3.89
	DE_DU_PFP_03	3	0.35	0	52	1	17	5.07	4.29
	DE_DU_PFP_04	4	0.02	2	0	1	15	1.94	3.67
	DE_DU_PFP_05	5	0.33	5	25	1	53	6.63	3.31
AT	AT_DU_PFP_01	6	13.06	22	65	1	113	17.65	4.75
	AT_DU_PFP_02	7	8.51	6.25	154	3	116	1.01	4.85



Country	Floodplain		Hydrology		Hydraulics	Ecology		Socio-Economics	
			peak reduction (%)	flood wave translation (h)		water level change (cm)	conec tivity	protected species	affected buildings (n/km <sup>2</sup> )
HU	8	HU_DU_PFP_01	0.90	3	66	3	70	5.00	4.75
	9	HU_DU_PFP_02	0.20	3	96	3	27	2.00	4.56
	10	HU_DU_PFP_03	2.75	9	125	3	75	3.00	4.81
	11	HU_DU_PFP_04	0.80	5	130	3	82	0	4.90
RS	12	RS_DU_PFP_01	2.73	16	66	3	173	0.17	4.95
	13	RS_DU_PFP_02	0.92	11	9	5	240	0.25	3.05
	14	RS_DU_PFP_03	0.92	8	193	5	240	1.62	3.30
	15	BG_RO_DU_PFP_01	0.04	1	6	3	153	0.05	4.05
BG, RO	16	BG_RO_DU_PFP_02	0.27	9	23	5	205	0.02	3.99
	17	BG_RO_DU_PFP_03	0.67	22	84	3	198	0.09	4.04
	18	BG_RO_DU_PFP_04	0.19	4	7	5	200	0.23	3.93
	19	BG_RO_DU_PFP_05	0.05	2	11	3	157	1.23	4.11
	20	RO_DU_PFP_01	0.14	1	6	5	83	0	2.96
RO	21	RO_DU_PFP_02	0.05	0.5	1	5	79	0	3.00
	22	RO_DU_PFP_03	0.08	1	13	3	61	0.83	3.19
	23	RO_DU_PFP_04	0.03	3	8	3	281	0.24	4.83
	24	RO_DU_PFP_05	0.07	1	6	5	33	2.15	3.04
	FEM - rating	performance		Thres holds	Thres holds	Thres holds	Thres holds	Thres holds	Thres holds
low		< 1%	< 1h	< 10 cm	1	0	>5 n/km <sup>2</sup>	<2	
medium		1-2%	1-5h	10-50 cm	3	1-20	1-5 n/km <sup>2</sup>	2-4	
high		> 2%	>5h	>50 cm	5	>20	<1n/km <sup>2</sup>	>4	

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

Actions to be considered in the restoration process		
For active floodplains with restoration demand		
Technical	Administrative and legislative	Financial & Responsible authority
<b>Germany</b>		
<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> </ul>	
<b>Austria, Slovakia</b>		
<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project</li> <li>➤ 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)</li> <li>➤ Carrying out prefeasibility/feasibility studies.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> <li>➤ Consideration of updating legislative/regulatory provisions</li> <li>➤ Consideration of adapting administrative/institutional measures</li> <li>➤ 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)</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities at national and regional level</li> <li>➤ Local authorities (e.g., municipalities)</li> </ul>
<b>Slovakia, Hungary</b>		
<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project;</li> <li>➤ 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)</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> <li>➤ Carrying out prefeasibility/feasibility studies</li> <li>➤ Consideration of Danube Floodplain project related FEM Tool</li> <li>➤ Consider using new tools (e.g., from IDES project) to improve calculation of the floodplain status, and to determine effective measures).</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities</li> </ul>

<p><b>Hungary</b></p>	<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of “Catalogue of floodplain restoration and conservation measures”, developed in the frame of DFP Project;</li> <li>➤ 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)</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> <li>➤ Carrying out prefeasibility/feasibility studies</li> <li>➤ Consideration of Danube Floodplain project related FEM Tool</li> <li>➤ Consider using new tools (e.g., from IDES project<sup>1</sup>) to improve calculation of the floodplain status, and to determine effective measures).</li> </ul>	<p>Information and discussions with competent authorities</p>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities</li> </ul>
<p><b>Croatia, Serbia</b></p>	<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of “Catalogue of floodplain restoration and conservation measures”, developed in the frame of DFP Project;</li> <li>➤ 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);</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> <li>➤ 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</li> </ul>	<p>Information and discussions with competent authorities</p> <p>Consideration of adapting administrative/institutional measures</p>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Both state and local involvement, with state authority dealing more with design and local authority with implementation</li> </ul>

<p><b>Serbia</b></p>	<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of “Catalogue of floodplain restoration and conservation measures”, developed in the frame of DFP Project;</li> <li>➤ 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);</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> <li>➤ 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</li> <li>➤ Consideration of Danube Floodplain project related FEM Tool</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> <li>➤ Consideration of adapting administrative/institutional measures</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities</li> </ul>
<p><b>Bulgaria, Romania</b></p>	<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of “Catalogue of floodplain restoration and conservation measures”, developed in the frame of DFP Project</li> <li>➤ 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</li> </ul>	<ul style="list-style-type: none"> <li>➤ Consideration of updating legislative/regulatory provisions</li> <li>➤ Information and discussions with competent authorities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities at national and basin level</li> <li>➤ Local authorities</li> <li>➤ National scientific institutions</li> </ul>
<p><b>Romania</b></p>	<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of “Catalogue of floodplain restoration and conservation measures”, developed in the frame of DFP Project;</li> <li>➤ 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);</li> <li>➤ 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</li> <li>➤ Carrying out prefeasibility/feasibility studies</li> </ul>	<ul style="list-style-type: none"> <li>➤ Consideration of updating legislative/regulatory provisions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities at national and basin level</li> <li>➤ Local authorities</li> <li>➤ Others</li> </ul>

For potential floodplains		
Technical	Administrative and legislative	Financial & Responsible authority
<b>Germany</b>		
<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> </ul>	
<b>Austria</b>		
<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project</li> <li>➤ 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);</li> <li>➤ Carrying out prefeasibility/feasibility studies.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> <li>➤ Consideration of updating legislative/regulatory provisions</li> <li>➤ Consideration of adapting administrative/institutional measures</li> <li>➤ 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)</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities at national and regional level</li> <li>➤ Local authorities (e.g. municipalities)</li> </ul>
<b>Hungary, Croatia</b>		
<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project;</li> <li>➤ 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);</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> <li>➤ Carrying out prefeasibility/feasibility studies</li> <li>➤ Consideration of Danube Floodplain project related FEM Tool</li> <li>➤ Consider using new tools (e.g., from IDES project) to improve calculation of the floodplain status, and to determine effective measures).</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities</li> </ul>

<p><b>Hungary</b></p>	<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project;</li> <li>➤ 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);</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> <li>➤ Carrying out prefeasibility/feasibility studies</li> <li>➤ Consideration of Danube Floodplain project related FEM Tool</li> <li>➤ Consider using new tools (e.g., from IDES project) to improve calculation of the floodplain status, and to determine effective measures).</li> </ul>	<p>➤ Information and discussions with competent authorities</p>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water Management Authorities</li> </ul>
<p><b>Serbia</b></p>	<ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of "Catalogue of floodplain restoration and conservation measures", developed in the frame of DFP Project;</li> <li>➤ 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);</li> <li>➤ Priority consideration of Danube Floodplain project results of the restoration demand ranking for active floodplain</li> <li>➤ 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</li> <li>➤ Carrying out prefeasibility/feasibility studies</li> <li>➤ Consideration of Danube Floodplain project related FEM Tool</li> </ul>	<p>➤ Information and discussions with competent authorities</p> <p>➤ Consideration of adapting administrative/institutional measures</p>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> </ul>

<p><b>Bulgaria, Romania</b></p> <ul style="list-style-type: none"> <li>➤ Carrying out prefeasibility/feasibility studies</li> <li>➤ Consideration of specific measures included in the frame of “Catalogue of floodplain restoration and conservation measures”, developed in the frame of DFP Project</li> <li>➤ 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</li> </ul>	<ul style="list-style-type: none"> <li>➤ Information and discussions with competent authorities</li> <li>➤ Consideration of updating legislative/regulatory provisions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities at national and basin level</li> <li>➤ National scientific institutions</li> </ul>
<p><b>Romania</b></p> <ul style="list-style-type: none"> <li>➤ Consideration of specific measures included in the frame of “Catalogue of floodplain restoration and conservation measures”, developed in the frame of DFP Project;</li> <li>➤ 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);</li> <li>➤ 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</li> <li>➤ Carrying out prefeasibility/feasibility studies</li> </ul>	<ul style="list-style-type: none"> <li>➤ Consideration of updating legislative/regulatory provisions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Identification of proper financing sources</li> <li>➤ Water management authorities at national and basin level</li> <li>➤ Local authorities</li> <li>➤ Others</li> </ul>

*Table 6. Actions to be considered in the restoration process of active and potential floodplains*

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**Cover photo:** Bistret lake and surroundings

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