



Regional Scalability Plan Danube floodplain restoration AT

Imprint

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1 For the reader

The overall goal of this “Future Danube Plan” is to support decision makers towards developing management plans to support a holistic approach for freshwater ecosystem restoration at the Austrian Danube on large scale and at the whole Austrian Danube stretch. To meet this aim diverse stakeholders have to be addressed like local, federal and governmental decision makers, implementing institutions, scientists, businesses and local communities in direct link to the Austrian Danube. Additionally, this document is also aimed at international representatives in the restoration of rivers of similar dimension and condition to the Danube.

For the Austrian Danube stretch and the implementation of measures the key actors are the Federal Ministry of Agriculture, Forestry, Regions and Water Management as well as the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology, viadonau – Austrian Waterway Management Company, ICPDR – International Commission for the Protection of the Danube River, Donau-Auen National Park and Verbund-Austrian Hydropower AG which are responsible for governance, regulation, navigation, power production, conservation of freshwater ecosystems, funding of restoration activities and implementation of measures.

The “Future Danube Plan” is based on the approach to upscale successful restoration measures at small-scale to a larger extent. In this particular case several measures implemented at the Danube east and west of Vienna are scaled up and adapted for revitalising the whole Austrian Danube stretch from the German border to the border with Slovakia. The aim is to connect and complement already completed restoration projects to achieve positive ecological improvements which will also affect flood and drought mitigation for example.

To gain sustainable effects this document also describes which stakeholders need to be involved from the very beginning of the process as well as including the EU’s Green Deal with a detailed view on biodiversity, climate change related topics and inclusivity.

Developing such an action plan needs to involve different actors to meet the goal. In the writing process we consulted the national implementing partner viadonau and its stakeholder board who is doing restoration works at the Danube east of Vienna since the last 25 years with an integrative approach. We also included experts from the above-mentioned ministries and partners from our twinning case study (LIFE IP IRIS) locally acting on other Austrian rivers and streams. Additionally, the Verbund AG – Austria’s largest hydropower provider – was contacted to get insights on their restoration efforts at the Danube west of Vienna.

The “Future Danube Plan” was thought to be integrated in national strategies and management activities for river restoration. In Austria holistic concepts for freshwater restoration at large scale and for whole catchment areas are still missing or at the developing stage. Therefore, this plan is thought to be a supporting document for the planning and implementation process on longer river segments.

2 Focus of the RSP

The Austrian Danube is of economic, cultural and geographic importance and provides a unique natural landscape. It is an international waterway connecting the North Sea with the Black Sea, already relevant during the Roman Period, still visible today through the remains of the city of Carnuntum for example. The Austrian Danube catchment is home to 7.7 million people and natural habitat for several fish and bird species, mammals as well as diverse plants (ICPDR, 2006).

In this regard the vision for the Austrian Danube until 2050 is having a “climate resilient, habitat and species rich Danube including all stakeholders and providing recreational space for all”. This vision was developed during the MERLIN National Day together with stakeholders from the case study board, from the LIFE IP IRIS project, representatives of viadonau, ministries, federal decision makers and scientists from BOKU University.

In particular the vision includes in terms of improving biodiversity net gain a reconnection of decoupled side-arms, fish passability for all hydropower dams, an ecological network of habitats and reduction of river bed incision in combination with a balanced sediment management. The riparian forests are free of neophytes, are managed close to nature and protected areas are designated. Ecosystem services (ES) are already on the agenda when permits are issued and stand above private interests. The ES relevant for the Austrian Danube cover all three categories (regulating, cultural and provisioning ES) but differ a bit between the eastern and the western part. In detail the following ones were identified by stakeholders to be relevant for the National Park Donau-Auen (Danube east of Vienna): (RES) habitat provision, sediment regulation, flood mitigation, air pollution regulation, low-flow regulation, water purification, soil formation; (CES) landscape aesthetics, boating, hiking and biking, fishing, ice skating, research and education, natural monuments; (PES) drinking water. For the Danube west of Vienna the relevant ES were identified according to data availability and valuation methods within the Interreg IDES project. The following ones are most important: (RES) nitrogen removal, phosphorus retention, green house gas regulation, flood mitigation, low-flow regulation, sediment transport regulation, habitat provision; (CES) landscape aesthetics, knowledge systems, cultural heritage and diversity; (PES) arable crop production, grassland production, firewood and timber production, water provision.

For climate related goals any stressors (e.g. nutrients, hormones, drugs, plastic etc.) are reduced to a minimum, flood protection is solved through implementation of NBS (where possible) – by providing more room to the river – a complete overview of all groundwater withdrawals exists and to prevent drought intensive agricultural use is reduced at defined fields which are then provided as retention areas. To ensure inclusivity regular information of all stakeholders, even before projects start, is important to gain their trust but also to ensure that they are aware of river restoration projects and their effect on river systems. This is crucial to raise awareness among the next generations.

2.1 Regional characteristics

The Danube with its approximately 2900 river kilometres is the second-longest river in Europe. It drains an area of about 800,000km² and connects 19 countries. Large dimensioned regulation projects were first implemented within the 19th century and since then the river system suffers from biodiversity loss, morphological degradation, decoupling of side-arms and floodplain systems and nutrient pollution as well as effects of climate change (Funk et al., 2020).

The Danube section in Austria, which is defined as the Upper Danube, reaches from the source of the Danube (Germany) to Bratislava (Slovakia). In this stretch the Danube has the character of an alpine river with a flow velocity of about 8-9km/h due to the average slope of 0.4‰ which is in comparison to the neighbouring countries quite steep (Bavaria: 0.02‰ and Hungary: 0.06‰). It drains more than 96% of Austria's territory and the largest tributaries are Inn, Enns and March (ICPDR, 2006). The discharge ranges from 600m³/sec (low flow) to 11,000m³/sec (100-year flood) while the medium flow varies between 1,500 to 1,900m³/sec. The flow velocity is about 1-3 m/sec and the last major flooding event was in June 2013 with a discharge of 10,100m³/sec which was not much less than the historical event in 1501 with 14,000m³/sec (<https://www.donauauen.at/en/facts/nature-science/the-danube>).

In the middle of the 19th century first regulation measures were implemented on the one hand to facilitate navigation and on the other hand to protect the surrounding farmlands from flooding. Later, in the early 20th century the focus shifted to energy generation. Thus, the former natural character with meandering, braided and canyon sections was clearly impaired and today the Danube has 10 hydropower plants in the Austrian part. With

these interventions, connectivity of habitats, sediment transport as well as the spatial extension of the Danube's wetlands were immensely reduced (Jungwirth et al., 2014).

In 1996 the Donau-Auen National Park was established including parts of Vienna as well as the area in Lower Austria up to Bratislava to safeguard the sensitive ecosystem. According to IUCN the protected area is a category 2 area of 9,600ha extent from which 65% are riparian forests, 15% meadows and the other 20% are covered with water. Furthermore, the national park is embedded in the Natura 2000 network in accordance with the Fauna-Flora-Habitat and the Birds Directive. In 2007 the Viennese part was declared a European nature reserve whereas the Lower Austrian part was declared in 2007 and 2011 (NPDA, 2019).

2.2 Justification for the region

The Danube east of Vienna is a well-studied model area being one of the last two free-flowing Danube stretches in Austria with a length of approximately 48 kilometres. Since 1996 more than 9000 hectares are put under protection to safeguard this floodplain landscape. At the same time a holistic approach was implemented to restore the river section by covering ecological, flood protection and navigational aspects - the Integrated River Engineering Project. The output was the Catalogue of Measures including a bedload management to reduce river bed incision and for stabilised surface and groundwater levels, optimising regulating structures, reconnection of side-arms and removal of embankments and groynes. Step by step river restoration projects are realised to keep the "good ecological status" according to the WFD. All the implementation measures are supported by scientific monitoring and a stakeholder board.

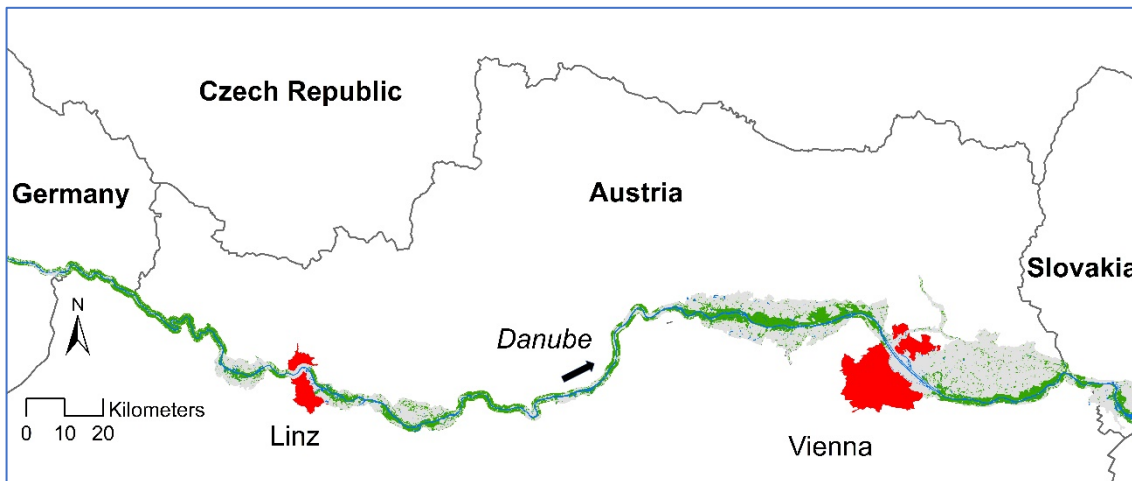


Figure 1 The Austrian stretch of the Danube

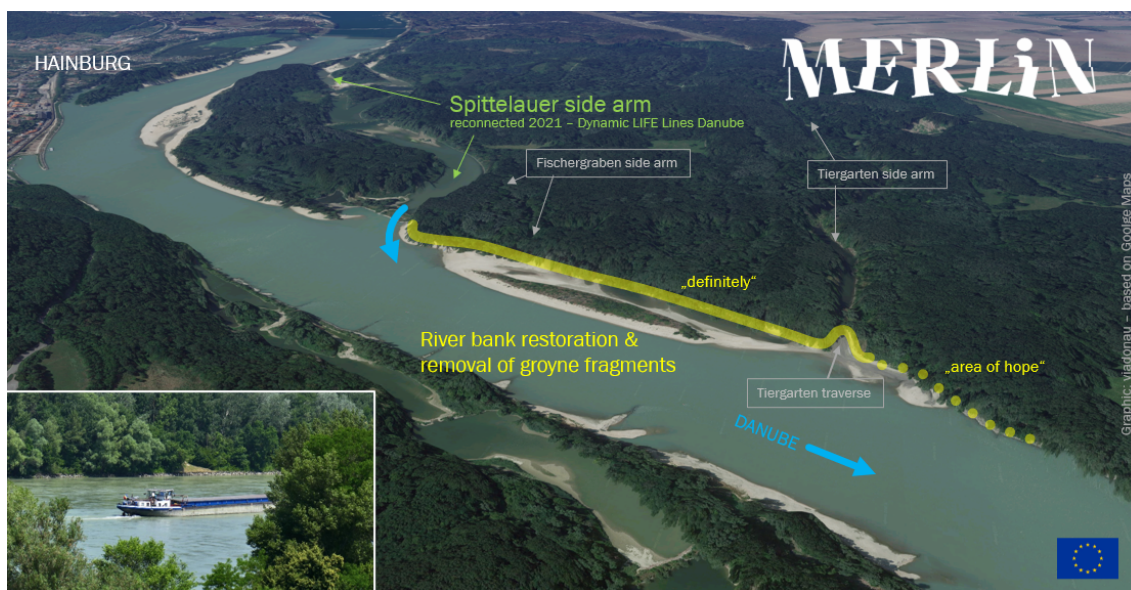


Figure 2 The MERLIN implementation site east of Vienna. Restoration of 800m of shoreline by removing embankments from the river and deepening the side channel.

The Danube west of Vienna is heavily modified and impounded by 10 hydropower dams. Nevertheless, in this area is also the second free-flowing section in Austria – the “Wachau” with another 35 river kilometres and economic importance for the country. Since 2000 it is UNESCO World Cultural and Natural Heritage and makes a significant contribution to Austria’s tourism sector. Successful restoration is ongoing like for example within the LIFE+ Traisen project at the VERBUND hydropower dam Altenwörth (<https://www.life-traisen.at/en-at/project>). Connectivity for potamodromous fish species is one of the components of the WFD and VERBUND hydropower AG as operator is responsible to implement it in joint action with viadonau who provides the property in many cases. With regard to stakeholder involvement there is only a loose contact when considering the whole stretch. However due to the interest in preserving the landscape in the “Wachau” the association “Weltkulturerbe Wachau” (<https://www.weltkulturerbe-wachau.at/en/>) is also supporting terrestrial measures (e.g., conservation of dry grassland) to restore the river and its surroundings. Representatives of the tourism sector are involved in the implementation of projects as their main focus is on maintaining cycling paths or boat jetties, which might be impacted by restoration efforts. In general, the stakeholder engagement is more project-based and often communities are initiators as well as fisheries associations from Upper and Lower Austria who also sponsor the plans.

2.3 Linkages and synergies with other initiatives

This “Future Danube Plan” builds upon other frameworks, strategies and documents.

Relevant legal framework and informal land tenure for the Danube:

- Federal Waterways Act (BGBl I no. 177/2004)
- Natura 2000 (Birds Directive 79/409/EEG & FFH Directive 92/43/EEG)
- Water Framework Directive (2000/60/EG)
- Flood Risk Directive (2007/60/EC)
- Aktionsprogramm Donau 2030 (in German) (https://www.viadonau.org/fileadmin/content/viadonau/01Newsroom/Dokumente/2023/Aktionsprogramm_Donau_2030_BMK_viadonau.pdf)
- CEF Regulation (EU) 2021/1153
- Danube River Basin Management Plan (DRBMP) Update 2021 (<https://www.icpdr.org/tasks-topics/tasks/river-basin-management/danube-river-basin-management-plan-2021>)
- Biodiversitäts-Strategie Österreich 2030+ (in German) (file:///C:/Users/drexler/Downloads/Biodiversitaetsstrategie_2030.pdf)
- Auenstrategie Österreich 2030+ (in German) (file:///C:/Users/drexler/Downloads/RZ_BMLRT_Auenstrategie_A4_1209_Digital_barrierefrei_geprueft_final.pdf)
- Federal, municipal and private territory

Other projects with restoration focus along the Danube and its tributaries are for example:

- Dynamic LIFE Lines Danube (DLLD): <https://webgate.ec.europa.eu/life/publicWebsite/project/LIFE18-NAT-AT-000733/dynamic-life-lines-danube>
- DANUBE4all: <https://www.danube4allproject.eu/>
- LIFE WILDisland: <https://wildisland.danubeparks.org/>
- INTERREG-Projekt “Thaya Wellendynamik”

<https://www.viadonau.org/newsroom/news/detail/start-fuer-bisher-groesstes-renaturierungsprojekt-an-der-unteren-thaya>

- LIFE+ Netzwerk Donau

<https://www.life-netzwerk-donau.at/en-at/life-network-danube>

- LIFE Natur Vernetzung Donau-Ybbs

https://www.life-donau-ybbs.at/pages/english/News_e.htm

- LIFE Blue Belt Donau Inn

<https://www.life-blue-belt-danube-inn.eu/en-at/news-from-the-projects>

- MERLIN Twinning Project: LIFE IP IRIS

<https://life-iris.at/en/>

- LIFE+ Traisen

<https://www.life-traisen.at/en-at>

All of the above-mentioned projects focus on river restoration including NBS. The main aim is to meet biodiversity goals in aquatic and terrestrial habitats. In some cases (e.g LIFE+ Netzwerk Donau) the fish passability is in the foreground. And in others like our twinning project LIFE IP IRIS also the systemic approach for river restoration processes is stressed as well as taking into account biodiversity and flood protection issues.

3 Stakeholders of the RSP (who)



Figure 3 MERLIN National Day Austria ©JoselynArreaga

3.1 Further stakeholder opportunities

The main stakeholders for the RSP and implementation of river restoration at the Austrian Danube are the Federal Ministry of Agriculture, Forestry, Regions and Water Management as well as the Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology, federal governments (Upper and Lower Austria and Vienna) and viadonau – Austrian Waterway Management Company. They are responsible for governance, regulation, funding and implementation of measures. ICPDR as a transboundary organisation is responsible for governance, water management and protection for the whole Danube river basin.

In terms of navigation viadonau, the chamber of commerce – inland navigation and Pro Danube Austria are relevant.

For the Danube west of Vienna communities are very often initiators for restoration projects and at the same time the funding partners. Verbund Hydropower AG is the biggest power provider in Austria and in charge of the Danube hydropower dams. Therefore, they are an important stakeholder for financing and implementation.

For environment and protection the stakeholders are WWF Austria, Donau-Auen Nationalpark, BirdLife, Umweltdachverband, Forum Wissenschaft & Umwelt, VIRUS and Weltkulturerbe Wachau (west of Vienna). The fisheries associations for Upper and Lower Austria (which are part of the civil society) are also relevant for fish habitat provision and thereby also for environmental issues.

Tourism associations are only consulted as stakeholders at the Danube west of Vienna, not yet east of Vienna as it is not a relevant factor for this area. Nevertheless, their involvement should be considered for the future.

All listed stakeholders from the table below were already consulted and collaborated in river restoration projects. In particular the representatives in the stakeholder board for the Danube east of Vienna are already empowered as they are involved in decision making.

ID #	Name of stakeholder	Acronym	Sector	Involvement status*		Scale (level)	Ownership	Description: Expectations, interests, responsibilities	WebLink
1	Federal Ministry of Agriculture, Forestry, Regions and Water Management	BML	Governance and regulation	Already involved	COL	National	Public	Expects major restoration efforts to meet WFD goals	https://info.bml.gv.at/en/
2	Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology	BMK	Governance, regulation, funding	Already involved	COL	National	Public	Owner and financer of viadonau; land owner of public water areas; authority for navigation and for national parks; one of the owners of national park	https://www.bmk.gv.at/en.html
3	Federal governments (e.g. Lower Austria, Upper Austria)		Governance, regulation, funding	Already involved	COL	Regional	Public		
4	International Commission for the Protection of the Danube River	ICPDR	Governance, transboundary water management, protection	Already involved	COL	Transnational	Public	Expects major restoration efforts - especially along the Danube east of Vienna - and measures to fight riverbed erosion	https://www.icpdr.org/
5	viadonau – Austrian Waterway Management Company	viadonau	Funding, implementation; navigation	Already involved	COL	National	Public	Public company, responsible for inland navigation, the improvement of environmental conditions and flood protection along the Austrian Danube	https://www.viadonau.org/en/home
6	Chamber of Commerce - Inland Navigation	WKO	Navigation	Already involved	COL	National	Community Group	Save and economic fairway conditions along the Danube	https://www.wko.at/austrian-economic-chambers
7	Pro Danube Austria	Pro Danube	Navigation	Already involved	COL	National	Community Group	Save and economic fairway conditions along the Danube	https://www.prodanubeaustria.at/
8	Local communities (espec. West of Vienna)		Funding, initiators for measures	Already involved	COL	Regional			
9	Verbund Hydropower AG	Verbund	Power production, implementation, funding	Already involved	COL	National	Public	Restoration measures to meet WFD goals	https://www.verbund.com/en-at
10	WWF Österreich	WWF	Environment, climate and disaster	Already involved	COL	National	NGO	Expects major restoration efforts - especially along the Danube east of Vienna - and measures to fight riverbed erosion; land owner in the national park stretch (locally), owner of fishery rights (locally)	www.wwf.at
11	National Park Donau-Auen	NPDA	Environment, climate and disaster	Already involved	COL	National	Public	Expects major restoration efforts - especially along the Danube east of Vienna - and measures to fight riverbed erosion	https://www.donauauen.at/en
12	BirdLife	BirdLife	Environment, climate and disaster	Already involved	COL	National	NGO	Expects major restoration efforts - especially along the Danube east of Vienna - and measures to fight riverbed erosion	https://birdlife.at/page/homepage
13	Umweltdachverband	UWD	Environment, climate and disaster	Already involved	COL	National	NGO	Expects major restoration efforts - especially along the Danube east of Vienna - and measures to fight riverbed erosion	https://www.umweltdachverband.at/

ID #	Name of stakeholder	Acronym	Sector	Involvement status*		Scale (level)	Ownership	Description: Expectations, interests, responsibilities	WebLink
14	Forum Wissenschaft & Umwelt	FWU	Environment, climate and disaster	Already involved	COL	National	NGO	Expects major restoration efforts - especially along the Danube east of Vienna - and measures to fight riverbed erosion	https://fwu.at/
15	VIRUS	VIRUS		Already involved	COL	Regional	NGO	Expects major restoration efforts - especially along the Danube east of Vienna - and measures to fight riverbed erosion	https://virus.wuk.at/
16	Weltkulturerbe Wachau		Environment	Already involved	COL	Regional	Community group		https://www.weltkulturerbe-wachau.at/en/
17	Niederösterreichischer Landesfischereiverband	NOE-LFV	Fishery	Already involved	COL	Regional	Community group	Expects improvement of fish habitats, connectivity and passability	https://www.noel-fv.at/
18	Oberösterreichischer Landesfischereiverband	LFV-OOE	Fishery	Already involved	COL	Regional	Community group	Expects improvement of fish habitats, connectivity and passability	https://www.lfvooe.at/
19	Tourism associations (Danube west of Vienna)		Tourism	Already involved	COL	Regional	Community group		
20	Citizens of surrounding communities				COL	Regional			

* Level of stakeholder engagement:

INF	Information
CON	Consultation
COL	Collaboration
COO	Cooperation
EMP	Empowerment

4 Green deal goals

The EU Green deal goals were elaborated in the MERLIN proposal to meet the Green Deal also in the field of river restoration. Thirteen goals were defined and for the MERLIN implementation site east of Vienna (see box 1) the most relevant ones were identified.

When regarding the whole Austrian Danube stretch and particularly for scaling up the Austrian restoration efforts the following green deal goals were chosen as relevant from the stakeholders present at the MERLIN National Day: biodiversity, climate related and inclusivity goals.

4.1 SMART Green Deals relevant for the region: primary goals

The primary goal at Austrian's Danube is the biodiversity net gain. As the river is impacted by river regulation, sediment loss, habitat loss and nutrient loads biodiversity loss is a consequence of this. It is fundamental to reconnect decoupled side arms to improve habitat availability and connectivity, to improve the transition zone between aquatic and terrestrial zones, to provide fish passability up- and downwards, as well as sediment management. All these factors contribute to recover a natural river system and to meet the legal requirements for Natura 2000 and the Water Framework Directive (WFD).

The following maps presents restoration measures at the Danube east of Vienna until 2050 and all projects implementing fish bypasses as well as other ecological measures at the Danube west of Vienna.

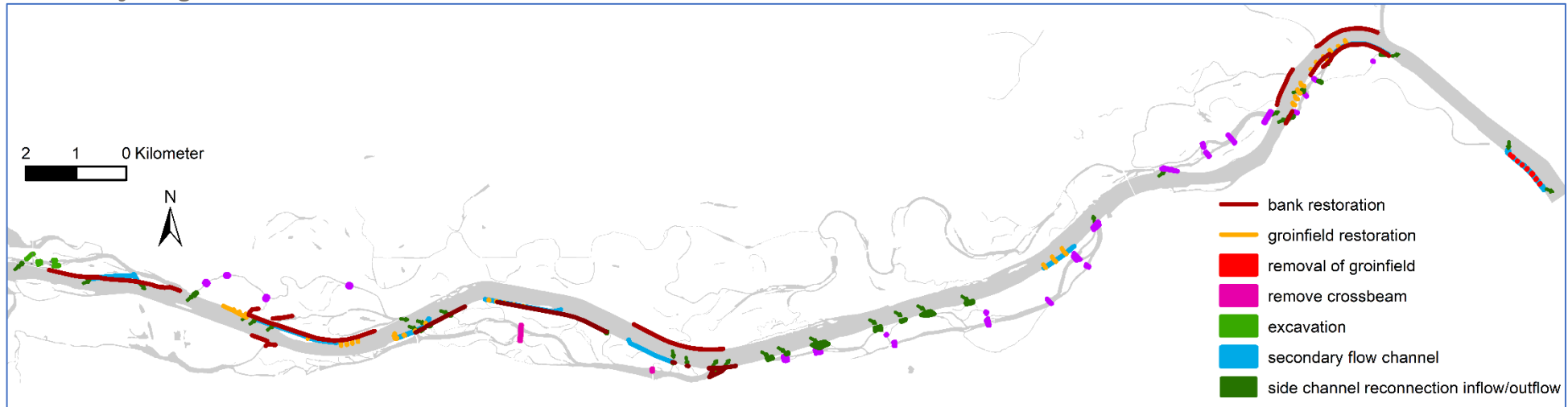
Biodiversity net gain:

Figure 4 Map of the restoration measures planned in the area of case study 7a, "Nationalpark Donauauen" situated in the Upper Danube (AT), until 2050

- Restoration measures include approx. 38 km of reconnected sidearms in the floodplain and the creation of approx. 7 km of secondary flow channels along the mainstream.
- For approx. 17 km of the shoreline restoration is planned, i.e. the removal of the hard riverbank structures is planned.
- Further about 2.5 km length of groynes and other engineering structures will be optimized and approx. 200 m removed.

Integrative targets of the measures are i) a stabilization of the surface water levels of the Danube by reducing the pressure on the riverbed due to discharge distribution and widening of the channel and therefore reducing the vertical erosion of the riverbed, ii) maintenance and improvement of the floodplain habitats according to WFD and conservation goals for protected species (HD, BD) and iii) to secure navigation along the waterway also during low flow conditions.

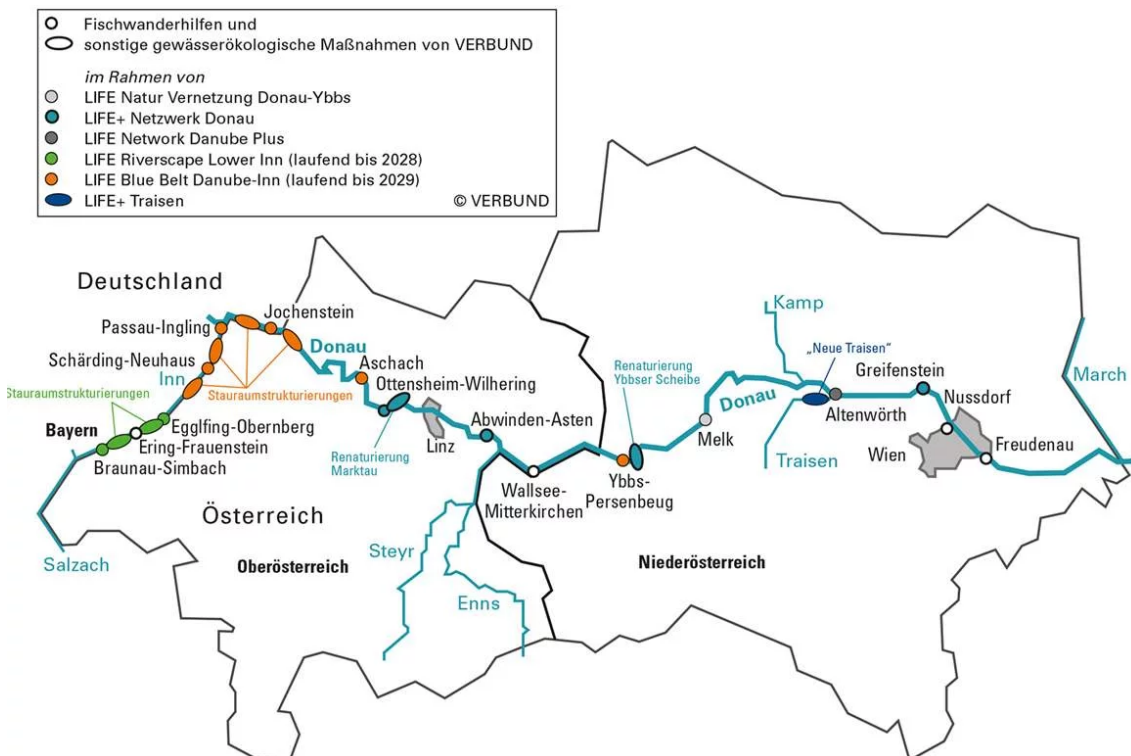


Figure 5 Map of the restoration measures implemented by VERBUND at the Danube west of Vienna including fish bypasses and other relevant ecological mitigation measures. Source: <https://www.verbund.com/de-at/ueber-verbund/kraftwerke/renaturierung-life-projekte>

4.2 SMART Green Deals relevant for the region: secondary goals

The following secondary goals have evolved as most relevant for the stakeholders involved in the development of the RSP: flood and drought resilience as well as overall goal climate related aims and inclusivity.

Climate goal:

Flood and drought resilience are met by reconnecting floodplains and wetlands to the river system, providing inundation areas, removing embankments of rivers. Giving the river enough space will improve the storage of groundwater as well as provide enough space for flooding. On top this will additionally mitigate climate related problems like drought and flood events in residential areas bordering the river.

Inclusivity goal:

Accessibility of freshwater ecosystems and understanding what natural ecosystems look like are key for the acceptability of the society for river restoration. Awareness raising measures are not only needed when projects are implemented at specific areas but it must be a continuous process in daily life of the society for a better understanding about dynamic processes of rivers and streams.

5 From general goals to actions

The discussion round at the MERLIN National Day revealed that going for the vision of a “climate resilient, habitat and species rich Danube including all stakeholders and providing recreational space for all” has to be broken down to three overarching objectives.

(1) Adaptations at the strategic level:

For example

- providing long-term restoration and financing plans
- define and provide (through land purchase) a Danube-corridor for river restoration on a large-scale (whole Austrian Danube stretch)

(2) Implementation:

For example

- provide inundation areas
- provide zoning concepts for river restoration
- compensations for restrictions on use

(3) Measures:

For example

- ensuring fish passability
- reconnection of side arms
- approaching original morphological river type

5.1 Climate Goal

To reach the Climate Goal the following actions were identified for the Austrian Danube (the list does not claim to be complete and contains strategic and operational actions):

- Water retention in agricultural areas
- More water for the “Lobau”
- Passive flood protection (by maintaining and improving natural water retention, keeping floodplains free and adapting farming practices)
- Money from the disaster fund for restoration activities
- Provide more inundation areas
- Relocation of dams, villages and buildings
- Supporting climate-adapted cultivation

5.2 Biodiversity Goal

To meet the Biodiversity Goal for the Austrian Danube the following actions were identified (the list does not claim to be complete and contains strategic and operational actions):

- reconnection of decoupled side arms
- Securing areas for river restoration
- Promoting key species
- Grassland in HQ30 (frequently occurring flood events with a statistical probability of occurrence of 30 years) floodplains
- Grazing on floodplains
- Connecting habitats
- Create ecological corridors
- Lowering surrounding areas
- Shoreline restoration (removing of hard riverbank structures)
- Optimisation and removal of engineering structures (e.g. groynes)

5.3 Inclusivity goal

The following list includes actions to be taken to reach the Inclusivity Goal for the Austrian Danube (the list does not claim to be complete and contains strategic and operational actions):

- Stakeholder mapping before any action starts
- Including stakeholders from the very beginning of the process
- Providing option to make decisions on implementations
- Cooperation with other successful stakeholder boards (exchange on experiences and lessons learned)
- Easy access to stakeholder boards
- Information for general public about restoration measures

- Awareness rising on “what a natural river looks like” (dynamics, changes in hydromorphology, organisms in and around freshwater ecosystems,
- Awareness rising to be started at an early stage (e.g. kindergarden, elementary schools etc.)

To sum up the above listed goals the following actions have to be set to implement the RSP until 2050.

1. Defining a river restoration strategy for the whole Austrian Danube stretch by including all relevant stakeholders
2. Breaking down the strategy to specific restoration measures (defining measures and areas of restoration or bringing together what is already planned for the sections east and west of Vienna and identify the gaps for a large-scale restoration effort); adaptation of measures to the latest scientific findings/knowledge
3. Apply for restoration projects (including implementation, monitoring and dissemination)
4. Providing the needed land for implementation
5. Implement the defined measures
6. Monitor the measures
7. Involve the society for better understanding of river restoration

6 Proposed timeline

The following is proposed based on the actions defined in chapter 5.

	period (2-yr interval)					period (5-yr interval)		
	2025–2026	2027–2028	2029–2030	2031–2032	2033–2034	2035–2039	2040–2044	2045–2050
1. Defining a strategy	X	X						
2. Defining missing restoration measures	X	X	X					
3. Apply for projects		X	X	X	X	X	X	X
4. Providing land		X	X	X	X	X		
5. Implement identified measures			X	X	X	X	X	
6. Monitor implemented measures				X	X	X	X	X
7. Involve society	X	X	X	X	X	X	X	X
1. Defining a strategy	X	X						

7 Budget

The budget needed for river restoration is difficult to fix for a specific measure, as different goals are in the focus. For the Danube west of Vienna mainly the passability of hydropower dams is in the foreground and the table below gives an overview of expenses for the previous and ongoing projects. These costs include as cost categories roughly personnel costs, implementation costs and dissemination costs.

Project	Finalisation	Length of measure [km]	Expenses [EUR]
Fish bypass Melk (within the LIFE Natur Project Vernetzung Donau-Ybbs)	2007	2 km	2,5 Mio. EUR
LIFE+ Traisen	2016	9,4 km	30 Mio. EUR
Fish bypass Ottensheim	2016	14,2 km	7,9 Mio. EUR
Marktau	2018	0,6 km	1,4 Mio. EUR
Fish bypass Abwinden	2020	5,3 km	6,4 Mio. EUR
Ybbser Scheibe	2019	1,8 km	2,4 Mio. EUR
Fish bypass Greifenstein	2018	3,8 km	7 Mio. EUR
Fish bypass Altenwörth	2022	12,5 km	10,6 Mio. EUR
Fish bypass Aschach*	2024/2025	1,9 km	12 Mio. EUR
Fish bypass Ybbs*	2025/2026	1,6 km	9 Mio. EUR

* Estimation of costs (according to the project proposal) as not yet finalised. All other costs listed are invoiced costs including costs within project lifespan.

The projects are financed via EU-funding and in-kind costs of VERBUND but also including budget from other partners like e.g. fishing associations, federal provinces, communities etc. In case of the fish bypass at Altenwörth for example the funding partners were as follows: 5,5 Mio. EUR from VERBUND, 4 Mio. EUR from EU, 1 Mio. EUR from Federal Province of Lower Austria and 100.000 EUR from Fishing Association of Lower Austria. Not included in the above listed costs are costs for the preparation of the projects (e.g submission plans, implementation planning, feasibility studies).

According to the most recent implementation measures at the MERLIN site (Danube east of Vienna) we can estimate that 1 km of river restoration costs approximately 1 Mio. EUR. These costs include personnel costs, implementation costs and dissemination costs.

8 Uncertainties and assumptions/ boundary conditions

Changing governments can always be a risk factor as policy framework and the focus on environmental topics can change with new governments. In addition to the change in the political situation also the national funding options might change and less money will be provided for river restoration in particular.

Uncertainties are also given in getting needed land for river restoration without having immediate implementation plans. Land is only available in terms of ad hoc measures. But to develop strategic large-scale and long-term restoration projects corridor provision is crucial. Otherwise still only small-scale restoration effects can be achieved without including the entire Danube stretch.

9 References

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