



Das Land
Steiermark

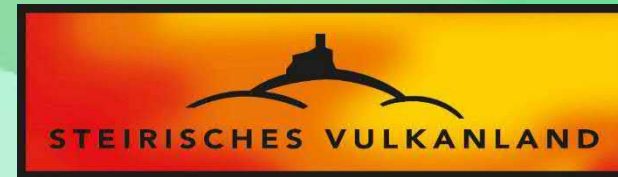


POMGRAD

VODNOGOSPODARSKO PODJETJE



INSTITUTE OF THE REPUBLIC OF SLOVENIA
FOR NATURE CONSERVATION



→ Wasserwirtschaft

Federal Ministry
Republic of Austria
Agriculture, Regions
and Tourism



Interreg



EUROPEAN UNION

Danube Transnational Programme

lifelineMDD



Universität für Bodenkultur Wien
University of Natural Resources
and Life Sciences, Vienna



ПОКРАЈИНСКИ ЗАВОД
ЗА ЗАШТИТУ ПРИРОДЕ



PRIRODA

VARAŽDINSKE ŽUPANIJE

JU za upravljanje zaštićenim dijelovima prirode

lifelineMDD

Cross-sectoral restoration of connectivity

Kerstin Böck, WWF Austria

Mura-Drava-Danube 5-country Biosphere Reserve Conference

Project co-funded by European Union funds (ERDF, IPA)

Objectives

- **strengthen transboundary cross-sectoral cooperation** between nature protection and water management
- develop an integrated **TBR MDD River Restoration Strategy**

River restoration in lifelineMDD

- River restoration in a transboundary river corridor needs an **integrated approach** to be effective, efficient, use synergies as much as possible and provide benefits not only locally but on a **transboundary scale**.
- Focus on measures for **sediment mobilisation** & improvement of the **sediment balance**

Report about experience exchange on river restoration

Part I Summary of study visit inside TBR MDD area

- ▶ Road Trip AUT, SLO, HUN, CRO, SRB
- ▶ May / June 2022

Part II Collection of ongoing and past restoration projects within the TBR MDD area



Liberty Island, Hungary: © WWF Hungary



Lässer Au, Austria: © Office of the Styrian Government

Study visit





Collected projects

- **3 rivers**
- **5 countries**
- **14 projects**
 - 10 past projects
 - 4 ongoing projects
 - Some of them in short version

Table 1: Fully described ongoing projects

Name	Countries	River	Duration	Total costs
DRAVA LIFE	Croatia	Drava	2015 - 2024	-
NATURA MURA	Slovenia	Mura	2020 - 2023	-
WISEDRAVALIFE	Hungary, Croatia	Drava	2018 - 2023	-

Table 2: Fully described past projects

Name	Countries	River	Duration	Total costs
BIOMURA	Slovenia	Mura	2006 - 2011	€ 1,975,519
DANUBEISLAND-FOREST	Hungary	Danube	2009 - 2013	€ 1,795,529
DRA-MUR-CI Alter Graba 11-mill channel	Slovenia	Mura	2009 - 2013	No data
DRA-MUR-CI Sichelndorf	Austria	Mura	2012	€ 147,826
DRA-MUR-CI Trummer-Lahn	Austria	Mura	2012	No data
MUERERLEBEN II, Lässer Au	Austria	Mura	2012 - 2013	€ 470,000
OLD-DRAVA LIFE	Hungary, Croatia	Drava	2014 - 2019	€ 833,985
Unteres Murtal – Gosdorf I	Austria	Mura	2006 - 2008	€ 600,000

Table 3: A glimpse into past projects

Name	Countries	River	Duration	Total costs
Boroš-Drava & Aljmaški rit branches	Croatia, Hungary	Drava	2017 - 2019	€ 1,340,124
ECOWET	Croatia, Serbia	Danube, Sava	2017 - 2019	€ 355,013
Wetland Restore	Croatia, Serbia	Danube, Sava	2019 - 2021	No data

Example – DRAVA LIFE

DRAVA LIFE

The project aims at creating benefits for numerous types of endangered habitats and species in four Natura 2000 areas along 310 km of the Drava river.



Key Facts

Project	DRAVA LIFE – Integrated river management
Country	Croatia
River	Drava
River section type²	Drava I, Drava II, Drava III
Planned measures	<ul style="list-style-type: none"> • Restoration or reconnection of seven old side channels • Riverbed widening • Creation of an initial channel to increase dynamics • Securing land for restoration • No interaction erosion /restore dynamics of a steep bank • Habitat management for river birds • Habitat management and reintroduction of river plants
Implementation period	2015 - 2024
Funding Source	<p>60% co-funded by the European Union, LIFE NATURE Programme 40% co-funded by five project partners. Additionally:</p> <ul style="list-style-type: none"> • For WWF Austria's work: Austrian Federal Ministry for Sustainability and Tourism and the Coca Cola Foundation • For Zeleni Osijek's work: Office for the Cooperation with NGOs of the Republic of Croatia
Project participants	Hrvatske vode, Legal entity for water management, Green Osijek, Association for Nature and Environment protection, WWF Austria, Public Institution for Management of Protected Natural Areas and Ecological Network in Virovitica Podravina County, Public Institution for Management of Protected Natural Values in Varaždin County, Public Institution for the Management of Protected Natural Values in Koprivnica – Križevci County
Contact	Hrvatske vode (Croatian Waters), www.drava-life.hr/en/project , info@drava-life.hr

Addressed problems

ADRESSED PROBLEMS			
Bank degradation	-	Flow alteration	X
Barriers/connectivity	X	Habitat degradation	X
Channelization	X	Invasive species	-
Disturbed sediment regime	X	Water abstraction	-

Restoration goals

RESTORATION GOALS			
Adapt land use	X	Re-establish/ improve lateral connectivity	X
Flow management	-	Re-establish morphological river type / improve morphology	X
Increase of (cultural) ecosystem services	-	Reservoir flushing management	-
Mitigate hydropеaking	-	Restoration/ improvement of flood habitats	X
Raising awareness	X	Secure land in the river corridor	X
Re-establish/ improve longitudinal connectivity	-	Sediment management	-



Restoration site "Donja Dubrava - Legrad": Side channel entrance area, gradual sedimentation noticeable



Restoration site "Donja Dubrava - Legrad": Site overview - former, nowadays partly sedimented, side channels that will be restored

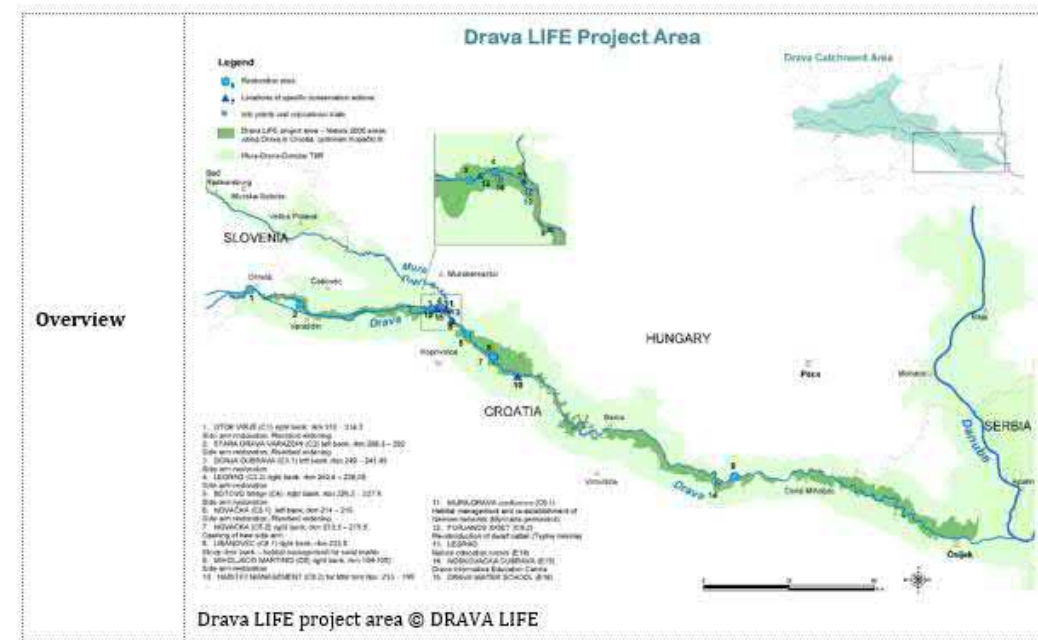
Planned measures

To deal with problems with regards to



SEDIMENT MANAGEMENT			HABITAT	
	Erodible ("soft") banks	X	Neophyte management	-
	Mechanical widening	X	Structures for reintroduction of native animals (design of steep banks)	X
	Initial channels	X	Reintroduction of plant species	X
	Lowering the foreland	-	Reforestation of floodplain forest	-
	Sediment input	-	FLOOD PROTECTION	
	Structures to enhance erosion	-	Protection of the hinterland	X
			RIVER CONTINUITY	
			Removing or scaling back migratory obstacles	-

Map of the project areas

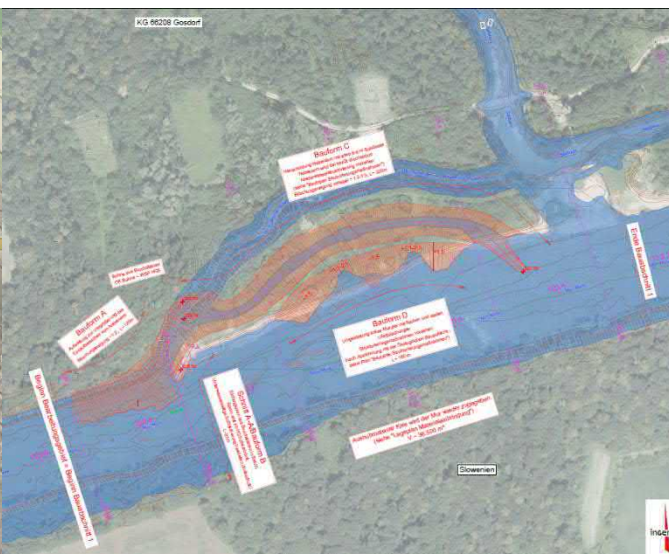
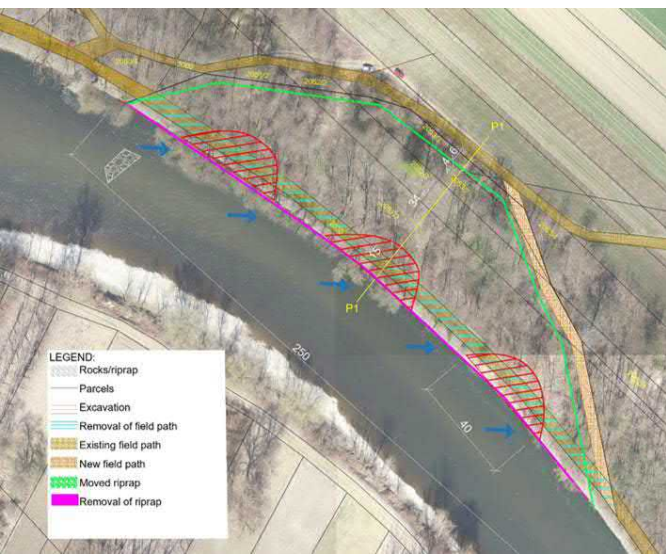


Pilot implementation of river restoration measures

- **Three pilot restoration actions:**
 - **Austria:** Enhancement of an old river branch reconnection on Austrian Mura (Stmk)
 - **Slovenia:** riverbed widening and lateral sediment mobilization at a section of the Slovenian Mura (VGP)
 - **Serbia:** Improvement of the water management and retention in the floodplain and oxbows on Serbian Danube floodplains (INCVP)
- BOKU – scientific accompaniment and laboratory model

Pilot measures - Goals

- Improve **habitat connectivity and morphodynamics** within the TBR MDD
- Provide practical cases for **transboundary cross-sectoral learning, planning and joint review** of results in the field
- **Input** to TBR MDD River Restoration Toolbox and Strategy
- **Benefit** from involvement of interdisciplinary transboundary partnership in the planning process





Hydromorphological laboratory model

Fine sediment layer



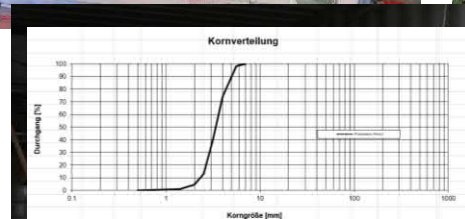
Coarse sediment layer



Sandwich panels



Construction of fixed outer banks



Sediment analysis



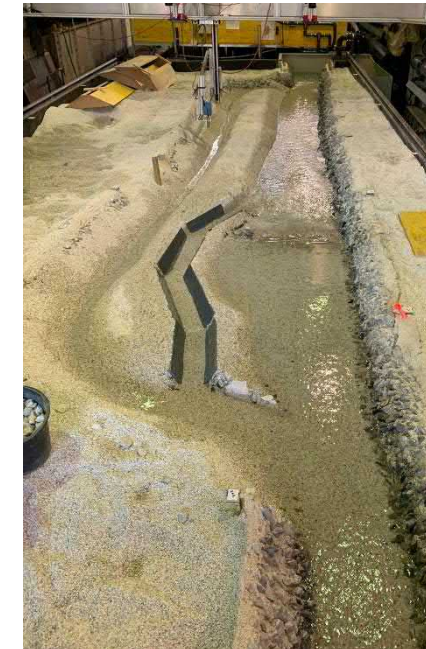
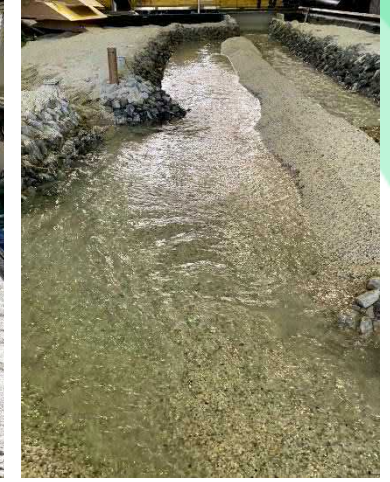
Steel frame



Roughness calibration

Conducted experiments

- Preliminary tests
 - fixed mid channel bar
 - mobile mid channel bar
- Calibration runs
- Status quo
- Different planning variants



Pilot measure Slovenia




Danube Transnational Programme
lifelineMDD

Varstvo in obnova ekološke poveziivosti rečnega koridorja
Mura-Drava-Donava z medsektorskim sodelovanjem

ŠIRITEV STRUKE REKE MURE

Mura, Drava in Donava sta dve največji reki v Sloveniji. Vzhodni del reke Mure je bil v preteklih letih zaradi intenzivne kmetijske dejavnosti in gradnje objektov za namakanje močno zamažen in zmanjšana je bila njegova ekološka poveziivost. Zaradi tega se je zmanjšala tudi sposobnost reke, da si sama očisti in obnovi naravno obliko. Zaradi tega se je zmanjšala tudi sposobnost reke, da si sama očisti in obnovi naravno obliko. Zaradi tega se je zmanjšala tudi sposobnost reke, da si sama očisti in obnovi naravno obliko.






POMGRAD
OPUŠČINA





RIVER RESTORATION TOOLBOX

MEASURES TO IMPROVE
SEDIMENT BALANCE OF RIVERS
IN THE 5-COUNTRY BIOSPHERE RESERVE
MURA-DRAVA-DANUBE



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River Restoration Toolbox

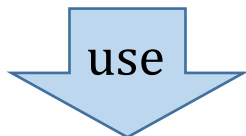
with focus on sediment mobilization

- practical planning guide (general and specific approaches)
- offers concise information on methods for achieving local sediment input through revitalization
- shows a selection of 6 key planning modules (on their own or in combination)
- offers key planning steps and planning tools

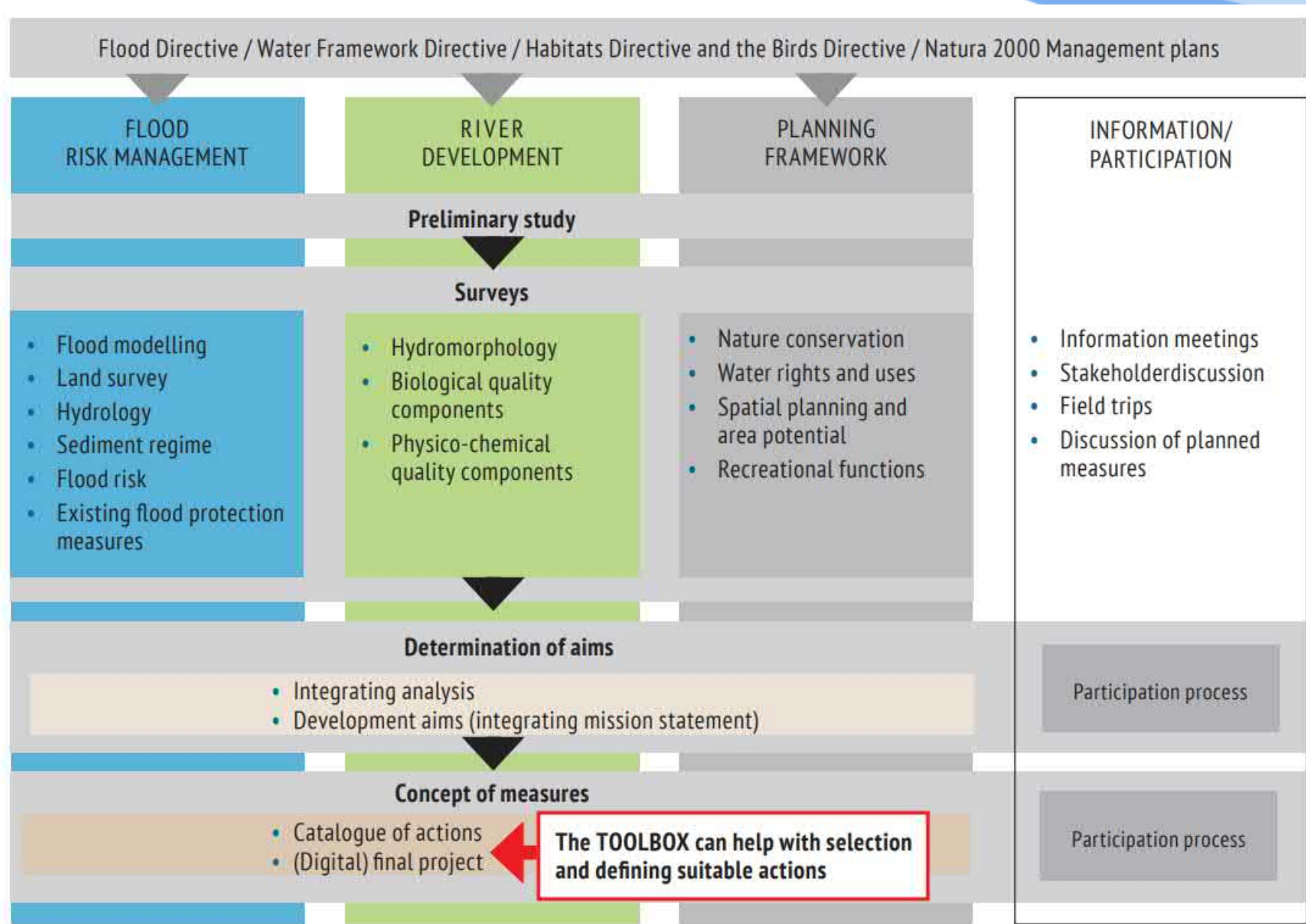
- addresses river experts, biologists, landscape planners, stakeholders
- and everyone interested in the topic and in integrated river management

First steps..

Identification of river stretches for future implementation of actions



River Restoration Toolbox with focus on sediment mobilization



Key planning steps & planning principles

1 Map and analyse the current situation, identify deficits

- Long-term development of bedload situation (incision/sedimentation, bed load retention, excavation)
- Morphology (potentials, bottlenecks)
- Hydrology, hydraulics
- Geometry of river and surrounding area
- Habitats/animals, biological quality elements

2 Clarify framework conditions

- Availability of land (e.g. purchase, lease, bartering)
- Land use of higher value, infrastructure, bridges, water supply, settlements
- Spatial planning
- Hydrological and bedload framework conditions
- Financial framework

3 Define objectives of measures concerning

- Riverbed stabilisation
- Provision of bedload
- Flood protection - structures, increase of retention capacity
- Choriotopes and fish habitats (e.g. spawning grounds)
- (Semi-)terrestrial habitats (gravel bars etc.)

4 Define target state

- Reflect on the water body's "reference state" and define the "target state" by taking into account the prevailing framework parameters
- Consider longitudinal slope, hydrology, grain size
- Estimate expected river morphology by using empiric hydraulic engineering formulas as the method of DaSilva or HyMoCARES tools (<https://hymo.azurewebsites.net/>)
- Match goals and measures with the target morphology

5 Find the best variant

Follow basic hydraulic engineering approaches

- Define a "river development corridor," wherein the planning modules can be placed as initial measures, creating a dynamic river landscape in the long term
- Achieve target morphology by using planning modules or combinations as described in the toolbox
- Suggest variants of combinations of measures
- Analyse the pros and cons of the variants
- Select, coordinate and optimise the best variant in an interdisciplinary manner

Planning principles:

- Provide as much width and length as possible to achieve full potential for aquatic, terrestrial and semiterrestrial habitats, with a range from gravel bars to alluvial forests
- Secure bedload material
- Allow the river to erode its banks and foreland



6 Create a detailed plan

- Define measures in detail to achieve the target morphology in future: apply measures that initiate erosion, reduce stabilisation measures to the necessary extent
- Use hydraulic modelling to optimise the set of initial measures (location, extension)
- Analyse impacts on nature protection, biodiversity, use of water and land, ...
- Secure bedload material: leave the material in the system. Ensure, restore or improve bedload feed in the upper reaches

7 Obtain permits and get the land

- Prepare documents for obtaining the permits linked to legal framework (water law, nature conservation law, forestry law)
- Agree on and sign contracts to make the necessary land available (e.g. lease land over decades, purchase land)

8 Consider logistics and tender

- Prepare execution plans considering implementation logistics, construction roads, material transport, time schedule, etc.
- Use tendering to get the best price

9 Implement pilot actions and monitor them

- Control success for hydromorphology, river ecology, nature conservation, etc.
- Identify weak points and improve them



Planning module M01
**Erodible ("soft")
banks** (p.20-23)



Planning module M02
**Mechanical
widening** (p.24-27)



Planning module M03
Initial channels
(p.28-31)



Planning module M04
**Lowering of the
foreland** (p.32-35)



Planning module M05
**Additional input of
sediment** (p.36-39)



Planning module M06
**Structures to
enhance erosion**
(p.40-43)

Set of planning modules

- that focus on re-establishing natural morphodynamic processes
- that remove or set back constraints
- that allow lateral dynamics such as widening and migration
- that supply sufficient sediment to maintain a more natural morphology at dynamically stable bed levels

Select/combine planning modules

- situation of riverbed incision
- prevailing sediment
- framework conditions (e.g. availability of land, nature conservation aspects)
- morphological target state
- time to achieve the target state

lifelineMDD River Restoration Strategy

- Commitment to
 - **Support** each other
 - Work towards the **implementation** of a functional 5-country Biosphere Reserve "Mura-Drava-Danube"
 - Consider the proposed actions and recommendations in the "Synthesis Report on science based needs for action" and the "River Restoration Toolbox" as a **basis for future restoration plans & activities**
 - Participate in **future transboundary projects** for the practical implementation of the TBR MDD

Steps towards the River Restoration Strategy

- Strategy will be drafted and coordinated by WWF
- Will build on project outputs
 - River Restoration Toolbox
 - Synthesis Report → still to be finalized
- Input/Feedback/Discussions with the lifelineMDD partnership on the draft strategy
- Will be promoted by the partnership in their regions
- Uptake and use of the River Restoration Strategy within future implementation projects

Who to involve?

- Strategy shall be signed by same level of stakeholders in all countries
- lifelineMDD partnership (PPs & ASPs)
- TBR MDD Steering Committee members

An aerial photograph of a river winding through a lush green forest. A large, light-colored sandbar is visible in the middle of the river, partially covered with green vegetation. The water is a deep blue-green color. The surrounding forest is dense and vibrant green.

Thank you!



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PRI RODA

VARAŽDINSKE ŽUPANIJE

JU za upravljanje zaštićenim dijelovima prirode