(Aim of the study, continued)

The study analyses the ecological status of river banks and floodplain areas and prioritizes their restoration potential. The restoration proposals are based on the **guiding principle** of **initiate and promote hydromorphological dynamics** and self- sustaining, **natural dynamic processes**. The whole spectrum of riverine habitats and species can be restored in that way.

The proposed restoration options were prioritised in 3 classes – moderate, high, very high - and assessed by 6 parameters: land use and habitats, nature protection status, flood protection from the aspect of water retention capacity, hydromorphological status, dike removal or replacement, river section type (reference conditions).

The prioritisation of the proposed restoration options focused on the overall management objectives:

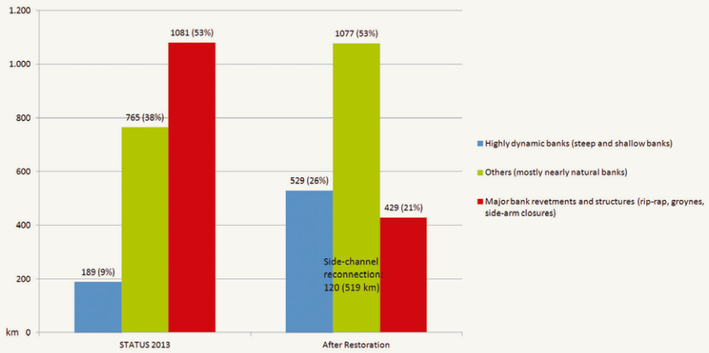
- Hydromorphological improvements;
- Ecological improvements;
- Flood mitigation.

Results

The assessment covers a total river length of 725 km (of Mura, Drava and Danube) and an area of 886,400 ha.

The restoration potential is considerable:

- All in all **652 km of river banks could be restored** to near natural or highly dynamic conditions by removing existing embankments.
- A total of **120 major side-channels** with a length of 519 km could be r**econnected with the rivers**.
- About **165,318 ha of new floodplains** areas could be **created** through the replacement of existing dikes.



The total **cost** for the **proposed restoration** would be **€1.1 billion** (calculated with costs in 2010), which would be an enourmous impetus, especially for the local economy.

Conclusions

There is a substantial restoration potential in the planned "Mura-Drava-Danube" Transboundary UNESCO Biosphere Reserve. This study outlines a way forward for comprehensive restoration efforts in all five countries, starting with the removal of river bank reinforcements and the reconnection of side-channels, culminating in the large-scale reconnection of floodplain areas with the rivers.

Restoration projects, if implemented accordingly, could significantly reduce the further degradation of the river and floodplain areas. As already demonstrated by first restoration efforts carried out by the MDD countries, this will safeguard the long-term survival of the characteristic habitats and species, and benefit of healthy river system for nature and local communities.

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POTENTIAL FOR RIVER AND FLOODPLAIN RESTORATION IN THE TRANSBOUNDARY UNESCO BIOSPHERE RESERVE "MURA-DRAVA-DANUBE"

WWF FACTSHEET 2015

In cooperation with EURONATUR

PHOTO © G. SAFAREK

Potential for River and Floodplain Restoration in the Transboundary UNESCO Biosphere Reserve "Mura-Drava-Danube"

Ecoregion
Danube-Carpathians

Priority Place
Greater Black Sea basin

Area
Rivers and floodplains of Mura, Drava and Danube

Countries
Austria, Croatia, Hungary, Serbia, Slovenia

In the heart of the Danube basin, the lower courses of the Drava and Mura rivers, as well as related sections of the Danube, span over more than 700 km, across Austria, Croatia, Hungary, Serbia and Slovenia. Together, they form one of Europe's ecologically most important river and floodplain area: the so-called "Amazon of Europe".

The rivers, which shall soon be protected as a Transboundary Biosphere Reserve "Mura-Drava-Danube" (TBR MDD) are notable for having the largest and best preserved softwood forests and floodplain areas along the entire Danube. Furthermore, highly dynamic river stretches, with typical habitats such as gravel and sand banks, steep banks, river islands, network of side-arms and oxbows are of utmost ecological importance. The whole area is home to rare species such as little tern, white-tailed eagle or ship sturgeon, besides, the region is vital to the people who live there.

Benefits of restoration

Despite outstanding natural features, protection status and international commitments, the area is suffering from an ongoing degradation of habitats and loss of endangered species in the river and floodplain areas (e.g. sturgeons, white-tailed eagle, black stork, softwood forest). A century of river channelling, the construction of dikes, the extraction of gravel and sand as well as the construction of hydropower plants led to a **loss of up to 80%** of the **former floodplain areas** and the **alteration of about 1,100 km of natural river banks and associated stretches**. The situation can only improve if the characteristic natural conditions are restored. In addition to conserving biodiversity, restoration would also entail **multiple benefits** for flood protection, water purification (and thus healthy drinking water), favourable groundwater conditions[1], fish stocks, small scale agriculture and forestry and recreation for local people.

The recommended restoration measures support the implementation of EU environmental legislation: the Birds,- Habitats,- Water Framework,- and the Floods Directives, as well as the objectives agreed in the international "Drava Declaration" in Maribor in September 2008.

Aim of the study

Faced with these challenges, the WWF conducted a study to assess the restoration potential of the TBR MDD. The aim of the study is to provide impetus for ongoing and future restoration efforts and to serve as a baseline document for strategic restoration planning in the area. One particular goal is to support the countries in the implementation of EU environmental directives and the TBR MDD.

PHOTO © G. SAFAREK

Floods during spring and early summer are natural and crucial important for wetland habitats

1 The groundwater level increases along the river due to capillar connection between river and its floodplain if riverbed incision is stopped and reversed.

Assessment of the Restoration Potential in the TBR MDD

Potential Restoration Areas and all Restoration Measures

WWF EURONATUR

On 27 March 2011, the ministers responsible for environment and nature conservation of the five countries agreed to jointly protect and manage this shared area as the Transboundary UNESCO Biosphere Reserve “Mura-Drava-Danube”.

Despite outstanding natural features and international commitments, the area is struggling with a continuing degradation of habitats and loss of endangered species in the river and floodplain areas.

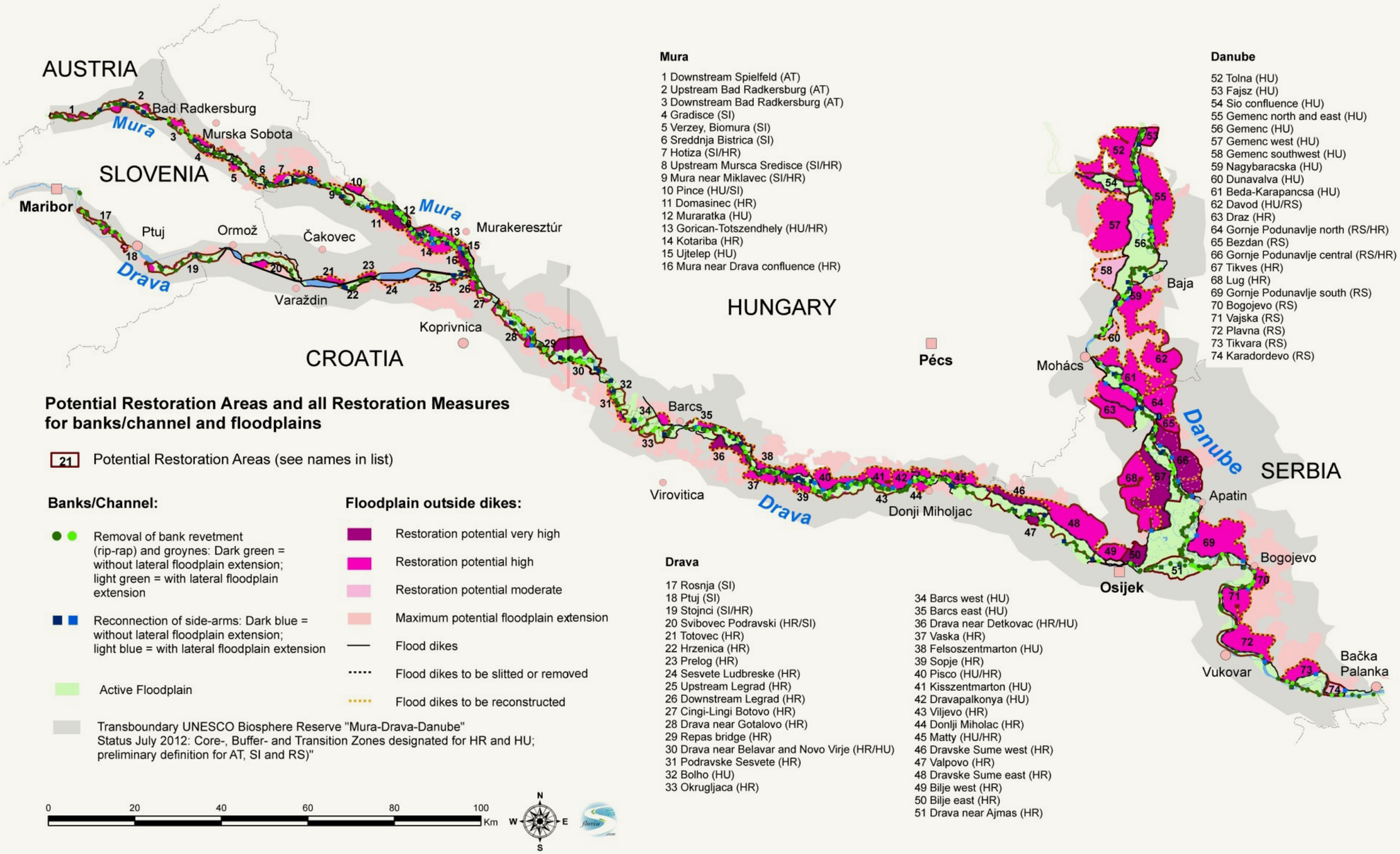
PHOTO © G. SAFAREK

Steep banks are excellent nesting sites for sand martins

In order to achieve the appropriate implementation and management of the five-country UNESCO Biosphere “Mura-Drava-Danube”, a transboundary river restoration programme should be developed across the five countries.

EU funding such as Life+ or Structural funds should be used to develop and implement concrete restoration projects.

Once established, the 1 million ha large Transboundary UNESCO Biosphere Reserve “Mura-Drava-Danube” would be Europe´s largest protected river area and the first five-country Biosphere Reserve world-wide.



Mura

1 Downstream Spielfeld (AT)
2 Upstream Bad Radkersburg (AT)
3 Downstream Bad Radkersburg (AT)
4 Gradisce (SI)
5 Verzey, Biomura (SI)
6 Sreddnja Bistrica (SI)
7 Hotiza (SI/HR)
8 Upstream Mursca Sredisce (SI/HR)
9 Mura near Miklavec (SI/HR)
10 Pince (HU/SI)
11 Domasinec (HR)
12 Muraratka (HU)
13 Gorican-Totszendhely (HU/HR)
14 Kotariba (HR)
15 Ujtelep (HU)
16 Mura near Drava confluence (HR)

Danube

52 Tolna (HU)
53 Fajsz (HU)
54 Sio confluence (HU)
55 Gemenc north and east (HU)
56 Gemenc (HU)
57 Gemenc west (HU)
58 Gemenc southwest (HU)
59 Nagybaracska (HU)
60 Dunavalva (HU)
61 Beda-Karapancsa (HU)
62 Davod (HU/RS)
63 Draz (HR)
64 Gornje Podunavlje north (RS/HR)
65 Bezdan (RS)
66 Gornje Podunavlje central (RS/HR)
67 Tikves (HR)
68 Lug (HR)
69 Gornje Podunavlje south (RS)
70 Bogojevo (RS)
71 Vajska (RS)
72 Plavna (RS)
73 Tikvara (RS)
74 Karadordevo (RS)

Drava

17 Rosnja (SI)
18 Ptuj (SI)
19 Stojnci (SI/HR)
20 Svibovec Podravski (HR/SI)
21 Totovec (HR)
22 Hrzenica (HR)
23 Prelog (HR)
24 Sesvete Ludbreske (HR)
25 Upstream Legrad (HR)
26 Downstream Legrad (HR)
27 Cingi-Lingi Botovo (HR)
28 Drava near Gotalovo (HR)
29 Repas bridge (HR)
30 Drava near Belavar and Novo Virje (HR/HU)
31 Podravske Sesvete (HR)
32 Bolho (HU)
33 Okrugljaca (HR)
34 Barcs west (HU)
35 Barcs east (HU)
36 Drava near Detkovac (HR/HU)
37 Vaska (HR)
38 Felsoszentmarton (HU)
39 Sopje (HR)
40 Pisco (HU/HR)
41 Kisszentmarton (HU)
42 Dravapalkonya (HU)
43 Viljevo (HR)
44 Donlji Miholac (HR)
45 Matty (HU/HR)
46 Dravske Sume west (HR)
47 Valpovo (HR)
48 Dravske Sume east (HR)
49 Bilje west (HR)
50 Bilje east (HR)
51 Drava near Ajmas (HR)

Potential Restoration Areas and all Restoration Measures for banks/channel and floodplains

21 Potential Restoration Areas (see names in list)

Banks/Channel:

- Removal of bank revetment (rip-rap) and groynes: Dark green = without lateral floodplain extension; light green = with lateral floodplain extension
- Reconnection of side-arms: Dark blue = without lateral floodplain extension; light blue = with lateral floodplain extension
- Active Floodplain
- Transboundary UNESCO Biosphere Reserve "Mura-Drava-Danube" Status July 2012: Core-, Buffer- and Transition Zones designated for HR and HU; preliminary definition for AT, SI and RS)"

Floodplain outside dikes:

- Restoration potential very high
- Restoration potential high
- Restoration potential moderate
- Maximum potential floodplain extension
- Flood dikes
- Flood dikes to be slitted or removed
- Flood dikes to be reconstructed

0 20 40 60 80 100 Km

N W E S

PHOTO © G. SAFAREK

Drava has a huge meandering capacity

PHOTO © A. MOHL

Destroyed natural river bank on Drava

PHOTO © T. GRUBER

Floodplain forests and meadows are essential habitats of TBR MD

PHOTO © M. TOLDI

Steep banks and unregulated river stretches are characteristic for the area features of the rivers