Introduction to the Science underpinning River Basin Management Planning

Experiences from the Danube River Basin

ERS 2021 – Session 3
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The Danube River Basin

800,000 km², 2,860 km, 6,500 m³/s, 80 Mio people, 19 countries
From Black Forest to Black Sea

1, 2, 4, 6: wikipedia/GFDL; 5 ICPDR/Mello
Ecological prioritisation approach for continuity restoration - general prioritisation scheme

Beluga *(Huso huso)*

Nase *(Chondrostoma nasus)*

Barbel *(Barbus barbus)*

Danube salmon *(Hucho hucho)*

Grayling *(Thymallus thymallus)*

Tributaries Hyporhitral

Tributaries Potamal

Danube

Upstream

Highest numbers of migratory species → *higher priority*

Less migratory species → *lower priority*
Development

For rivers with a catchment size >4000 km² in the DRBD

• First implementation in the DRBMP 2009 (Annex 18)

• First update for the DRBMP 2015 (Annex 15)
  • Extended by hydromorphological pressures
  • Highlighting barriers within the LDM-habitat equipped with fish passes for MDM-species

• Second update for the DRBMP 2021 (Annex 16)
## Input data and criteria rating

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Variables</th>
<th>rating</th>
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</thead>
<tbody>
<tr>
<td>Migratory Habitat</td>
<td>LDM (Danube)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>LDM</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MDM</td>
<td>1</td>
</tr>
<tr>
<td>River Segment</td>
<td>1st in Danube</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1st in Tributary</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>2nd in tributary</td>
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<td></td>
<td>3rd in tributary</td>
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<tr>
<td>Length of reconnected habitat</td>
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<td></td>
<td>40-100 km / 20-50 km</td>
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<tr>
<td>Protected site</td>
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<td>Pressures</td>
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</table>

LDM = Long distance migratory species
MDM = Medium distance migratory species

Segment = Section between two tributaries

Natura2000 or other protection areas for water-dependent species/habitats

Impoundments, water abstractions and hydropoaking sections (waterbody level)

$$PI = \text{migratory habitat} \times (1 + \text{river segment} + \text{length reconnected} + \text{protected site} + \text{pressures})$$
Ecological Prioritisation Regarding Restoration Measures for River and Habitat Continuity

DRBMP 2021 (DRAFT)

Legend:
- Utmost priority for LDM
- Utmost priority
- Very high priority
- High priority
- Medium priority
- Low priority
- No priority
- Not applicable - out of the fish area
- Fish pass in MDM habitat or in headwaters
- MDM fish pass in LDM/MDM habitat

<table>
<thead>
<tr>
<th>PI</th>
<th>Barriers</th>
<th>Priority</th>
<th>Population</th>
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<tbody>
<tr>
<td>&gt;30</td>
<td>2</td>
<td>Utmost LDM</td>
<td>&gt;250,000</td>
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<td>21-30</td>
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<td>Utmost</td>
<td>200,000-2,000,000</td>
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<td>16-20</td>
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<td>Very high</td>
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<td>11-15</td>
<td>25</td>
<td>High</td>
<td>1,000-10,000</td>
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<td>6-10</td>
<td>108</td>
<td>Medium</td>
<td>500-1,000</td>
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<td>1-5</td>
<td>320</td>
<td>Low</td>
<td>50-500</td>
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©2021 by EEA and DBRM Plan - Update 2021 - MAP 39
Joint Danube Survey 4

One of the world’s most comprehensive investigative surface-water monitoring efforts in the world

by Péter Kovács
JDS4 OVERVIEW

✓ WFD investigative monitoring;

✓ Provided opportunity for harmonization and training in WFD related monitoring and covered information gaps for the Danube River Basin Management Plan Update;

✓ Parallel application & comparison of classical and new monitoring techniques for WFD assessment;

✓ New concept of JDS4 with more active participation of countries proved to be successful.
JDS4 SAMPLING SITES
JDS4 KEY FINDINGS

✓ Parallel application of traditional biological assessment techniques and modern molecular methods demonstrated a big potential of DNA and environmental DNA-based approaches for biodiversity and WFD ecological status class assessments;

✓ HYMO monitoring showed intensified restoration on the still strongly altered Upper/Middle Danube and only insignificant deteriorations on the Lower Danube, the long reaches of which are still only slightly to moderately altered;

✓ Analysis of antibiotic resistant bacteria showed a significant increase in multi-resistance.
JDS4 KEY FINDINGS

✓ Wide-scope chemical target screening and non-target screening proved to be a promising alternative to target analysis of WFD PS and RBSPs;

✓ Analysis of groundwater showed that for some compounds lower concentrations were detected in groundwater than in the Danube, but the opposite situation was also observed;

✓ First ever comprehensive screening of microplastics along the Danube established a baseline of pollution by MP;