

DanubeSediment

Danube Sediment Management - Restoration of the Sediment Balance in the Danube River

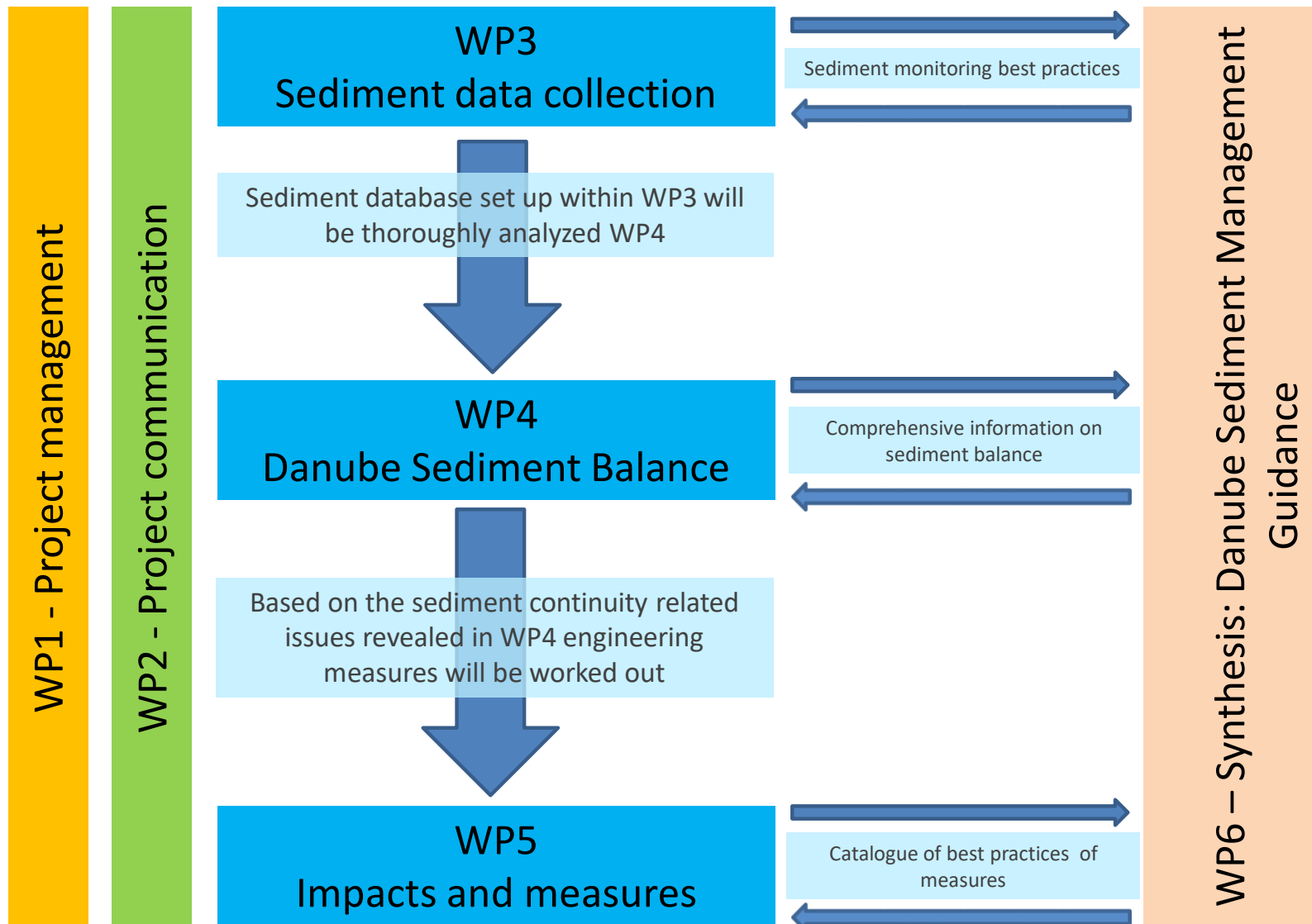
Péter Bakonyi
Project Director

24-25 Oct 2018, Bratislava
EUSDR PA4 SG

Table of content

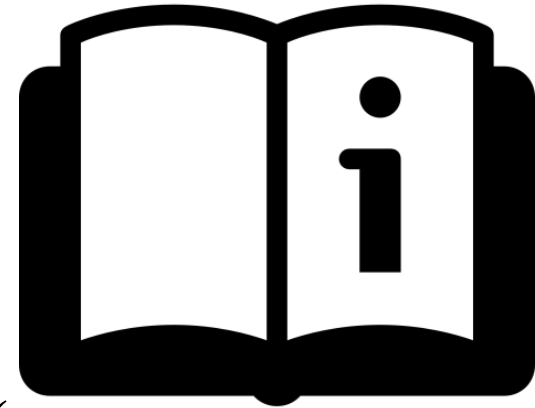
- ~~• Short info about the project~~
- Work packages (state of play)

Project methodology



Status of Deliverables:

- Internal Handbook ✓
- Communication Plan ✓
- Stakeholder List / Mapping ✓
- Internal Newsletter:
 - 1st newsletter → 120 contacts ✓
 - 2nd Internal Newsletter 4Q/2017 (Xmas) ✓
- External Newsletter:
 - 1st Newsletter sent to 300 stakeholders ✓
 - Translated and sent in 6 languages ✓
 - 2nd External Newsletter ✓
 - 3rd External Newsletter ✓



Activity 3.1 – Deliverables



Report on sediment data quantity and quality

Authors:

Baranya, S., Pomázi, F., Ermilov, A. (Budapest University of Technology and Economics)

with contributions by the project partners



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



Table of Contents

1. Introduction	6
2. Data collection	7
3. Suspended sediment data	8
3.1. Germany	11
3.1.1. Neu-Ulm Bad Held	11
3.1.2. Donauwörth	11
3.1.3. Ingolstadt Luitpoldstrasse	12
3.1.4. Straubing gauging station	12
3.1.5. Vilshofen	13
3.1.6. Kachlet	13
3.1.7. Jochenstein	14
3.1.8. Plattling (Isar)	14
3.1.9. Passau Ingling (Inn)	15
3.2. Austria	16
3.2.1. Engelhartzell	16
3.2.2. Aschach Strombauleitung	16
3.2.3. Linz	17
3.2.4. Donaukraftwerk Abwinden - Asten	17
3.2.5. Donaukraftwerk Wallsee - Mitterkirchen	18
3.2.6. Stein-Krems	18
3.2.7. Bad Deutsch-Altenburg (Bauleitung) + Hainburg Straßenbrücke	18
3.2.8. Schärding (Schreibpegel) (Inn)	19
3.2.9. Wels-Lichtenegg (Traun)	19
3.2.10. Steyr (Ortskai) (Enns)	20
3.2.11. Angern (Morava)	20
3.3. Slovakia	21
3.3.1. Devín	21

WP3: Sediment Data Collection

This map illustrates the Danube River Basin, highlighting the locations of suspended sediment monitoring stations and major cities. The Danube River is shown in blue, flowing from west to east. Tributaries are shown in light blue. The map includes national borders (red lines) and the Danube River Basin (shaded green). Monitoring stations are marked with green dots along the Danube and red dots at tributaries. Cities are marked with pink dots, with sizes indicating population ranges: 100,000 - 250,000 inhabitants (small dot), 250,000 - 1,000,000 inhabitants (medium dot), and > 1,000,000 inhabitants (large dot). A legend, scale bar (0-200 km), and north arrow are provided. The map covers Germany, Austria, Czech Republic, Slovakia, Hungary, Croatia, Slovenia, Bosnia and Herzegovina, Serbia, Romania, Bulgaria, Ukraine, and Moldova.

Legend

- Suspended sediment monitoring stations**
 - Danube (Green dot)
 - Tributary (Red dot)
- Cities**
 - 100,000 - 250,000 inhabitants (Small pink dot)
 - 250,000 - 1,000,000 inhabitants (Medium pink dot)
 - > 1,000,000 inhabitants (Large pink dot)
- National Borders** (Red line)

Scale: 1:6 000 000
0 50 100 200 km

Sources: Esri, USGS, NOAA



Interreg
Danube Transnational Programme
DanubeSediment

Budapest, April 2018

Suspended sediment monitoring stations along the Danube and at the most important tributaries (closest to the confluence)

Map 5

SUSPENDED SEDIMENT DATA QUALITY



<http://www.interreg-danube.eu/approved-projects/danubesediment>

This map was produced in the frame of the EU funded project DanubeSediment, and is based on national information provided by Contracting Parties (AT, BG, DE, HR, HU, RO, RS, SK).

Budapest, April 2018

WP3: Sediment Data Collection

Activity 3.2 (Comparative analysis)

- On-site comparison

Giurgiu (RO)
31.08.2017.



Iron Gate (RS-RO)
20.09.2017.



Bad-Deutsch Altenburg (AT)
08-09.11.2017.

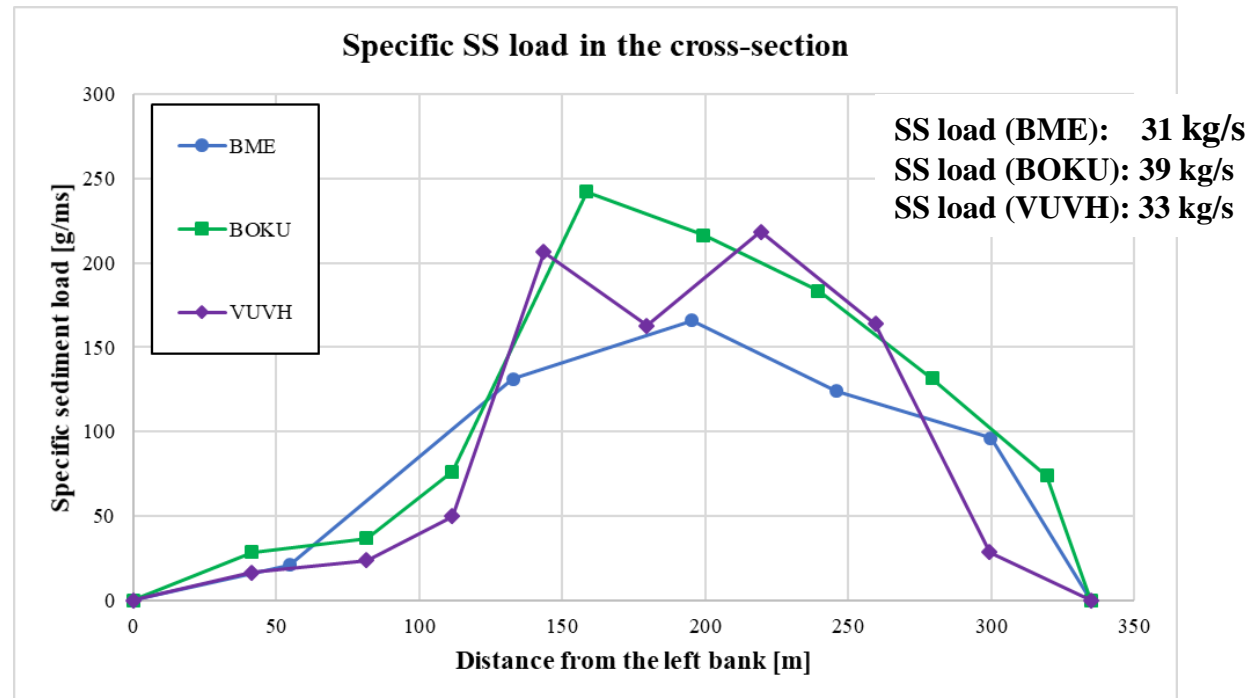


Activity 3.2 (Comparative analysis)

- 3 joint measurement campaigns

Bad-Deutsch Altenburg (AT)

08-09.11.2017.



Activity 3.2 – Deliverables



D 3.2.1

Deliverable Description

Report on good practices on sediment transport monitoring

Target Value

1.00

Delivery Period

Period 3

D 3.2.2

Deliverable Description

Proposal for a pragmatic transnational quantitative sediment monitoring network and program regarding needs and limited available resources

Target Value

1.00

Delivery Period

Period 3

- Under preparation

Activity 3.2 – Deliverables



D 3.2.1

Deliverable Description

Report on good practices on sediment transport monitoring

Target Value

1.00

Delivery Period

Period 3

D 3.2.2

Deliverable Description

Proposal for a pragmatic transnational quantitative sediment monitoring network and program regarding needs and limited available resources

Target Value

1.00

Delivery Period

Period 3

- Under preparation

Activity 3.2 – Proposal for a transnational sediment monitoring network

- **Proposed improvements in the sediment monitoring network**

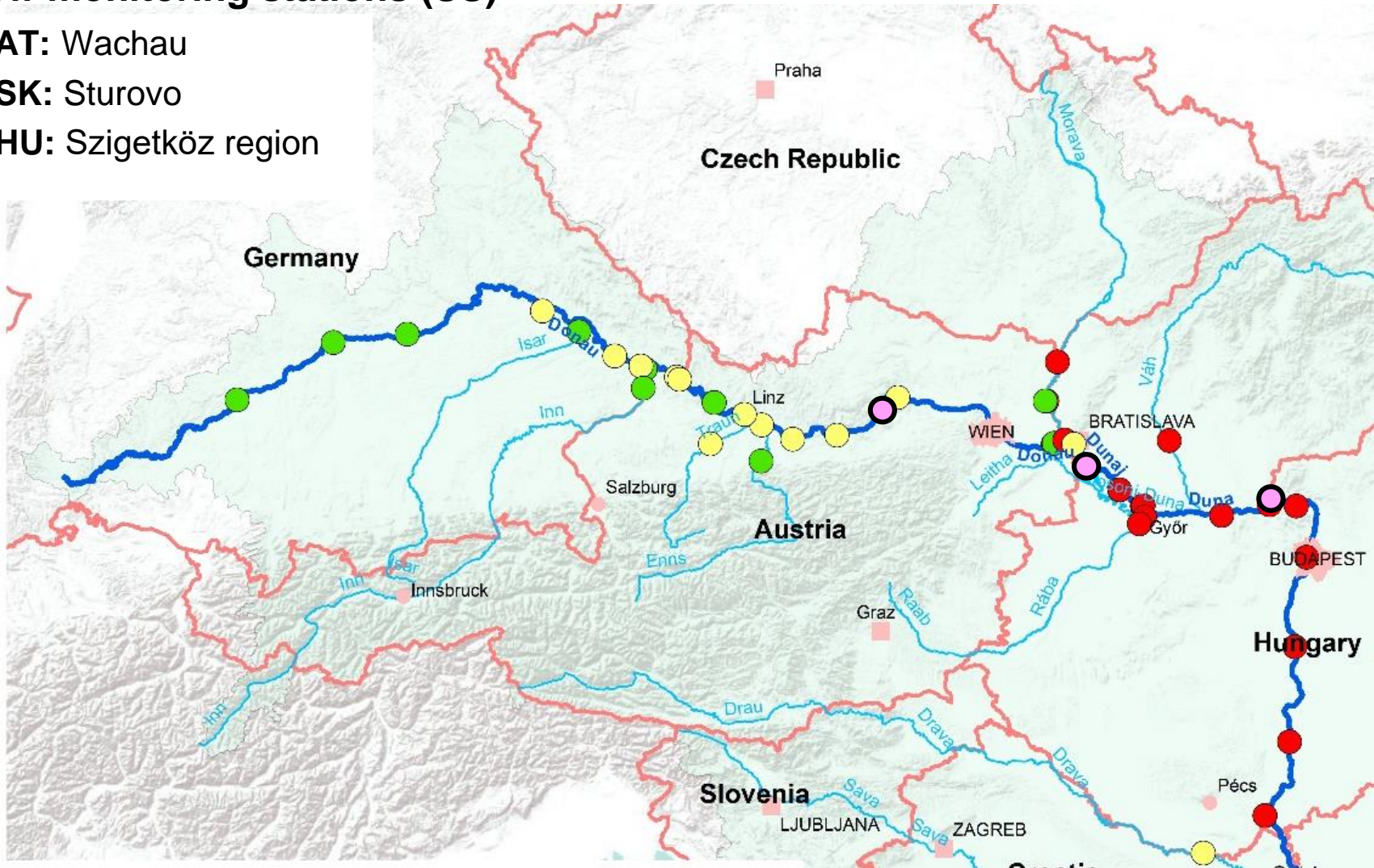
- Improvement of existing monitoring stations
 - Goal: Upgrade the existing monitoring stations applying the same monitoring strategy
 - High temporal resolution: calibrated (!) optical or acoustic backscatter sensor (OBS or ABS)
 - Representative cross-sectional data: multi-point calibration measurements 3-6 times per year with physical sampling and laboratory analysis



WP3: Sediment Data Collection

New monitoring stations (SS)

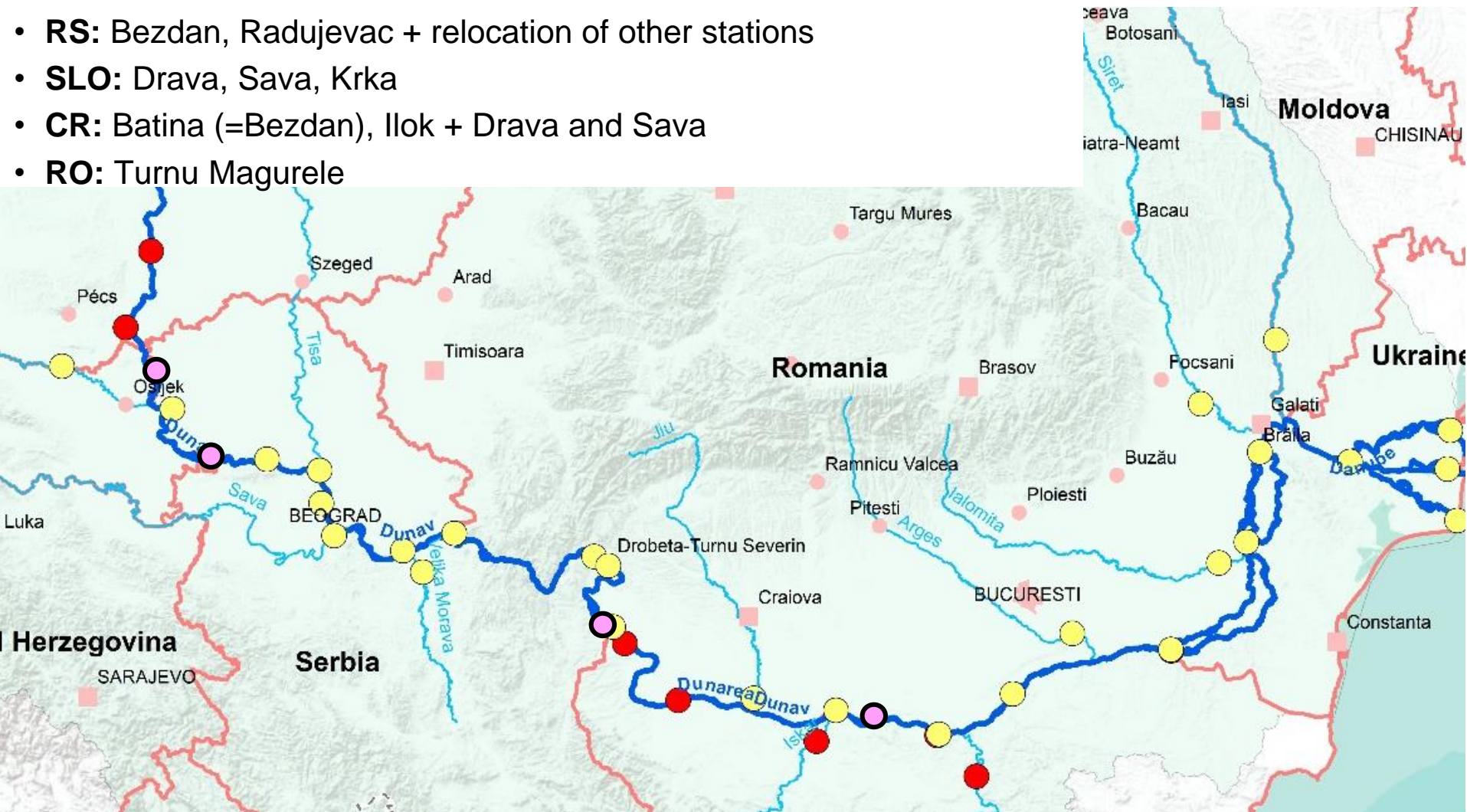
- **AT:** Wachau
- **SK:** Sturovo
- **HU:** Szigetköz region



WP3: Sediment Data Collection

New monitoring stations (SS)

- **RS:** Bezdan, Radujevac + relocation of other stations
- **SLO:** Drava, Sava, Krka
- **CR:** Batina (=Bezdan), Ilok + Drava and Sava
- **RO:** Turnu Magurele

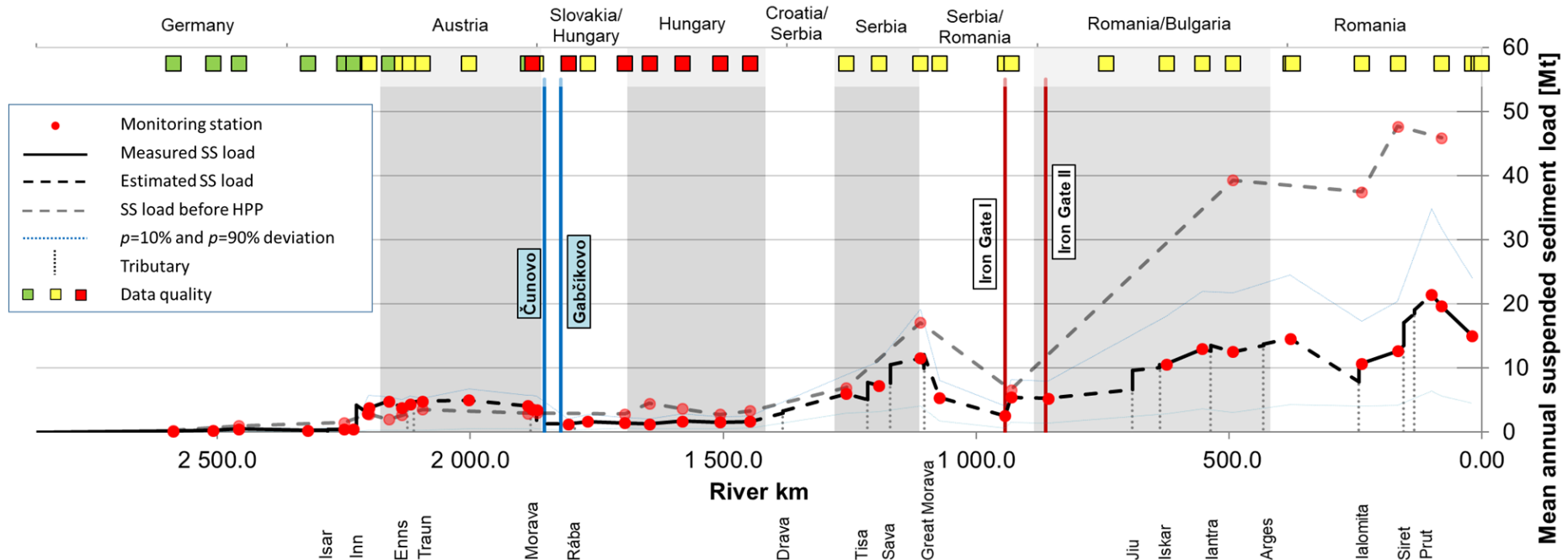


WP3: Sediment Data Collection

Activity 3.3 (Assessment of sediment data)

- Longitudinal variation of mean annual SS load (1986-2016)

Mean annual suspended sediment load of the Danube (1986-2016)



WP4

Components of the sediment budget equation:

a) Inputs

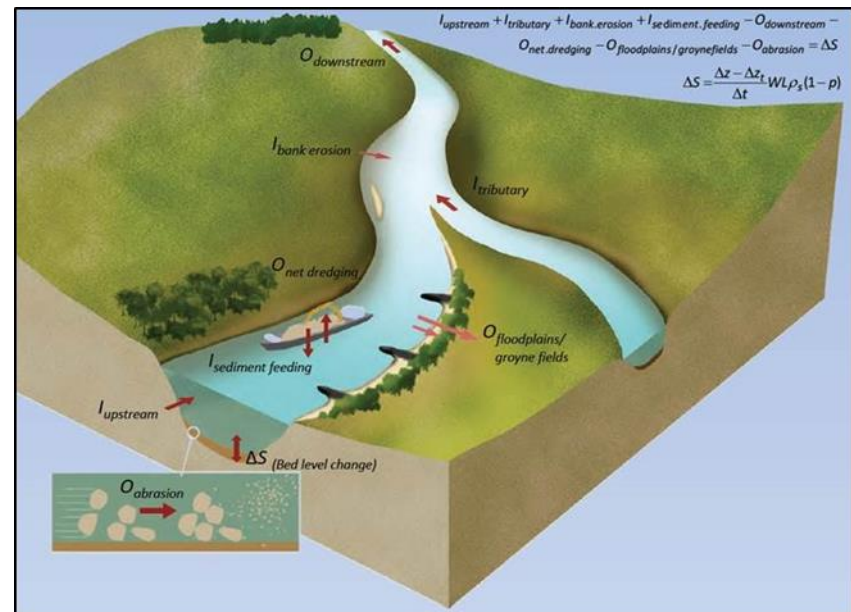
- I_u - sediment transport from upstream situated river reach
- I_t - sediment transport from tributaries
- I_a - **sediments fed artificially into the river**

b) Outputs

- O_d - sediment transport to downstream situated river reach
- O_{dr} - removal of riverbed sediments by **dredging** activities
- O_f and O_g - **sedimentation in the floodplains and/or groyne fields**
- O_a - abrasion of riverbed material

c) Storage

- ΔS – change of sediment mass stored in the area



Sediment budget equation for partial river section (in tonnes/a):
$$(I_u + I_t + I_a) - (O_d + O_{dr} + O_f + O_g + O_a) = \Delta S$$

Spatial and temporal scales for sediment balance

Large scales units:

Upper Danube from km 2600 to km 1792

Middle Danube from km 2600 to km 1792

Lower Danube from km 2600 to km 80 (0.0)

Small scales units ?

Depending on data availability – for discussion:

- 1) **Upper Danube - from Vienna to Medvedov**
AT, SK, HU (rkm 1920 – rkm 1806/rkm 1792)
- 2) **Middle–Lower Danube– from Novi Sad to Radujevac**, RS–RO, from rkm 1250 to rkm 850

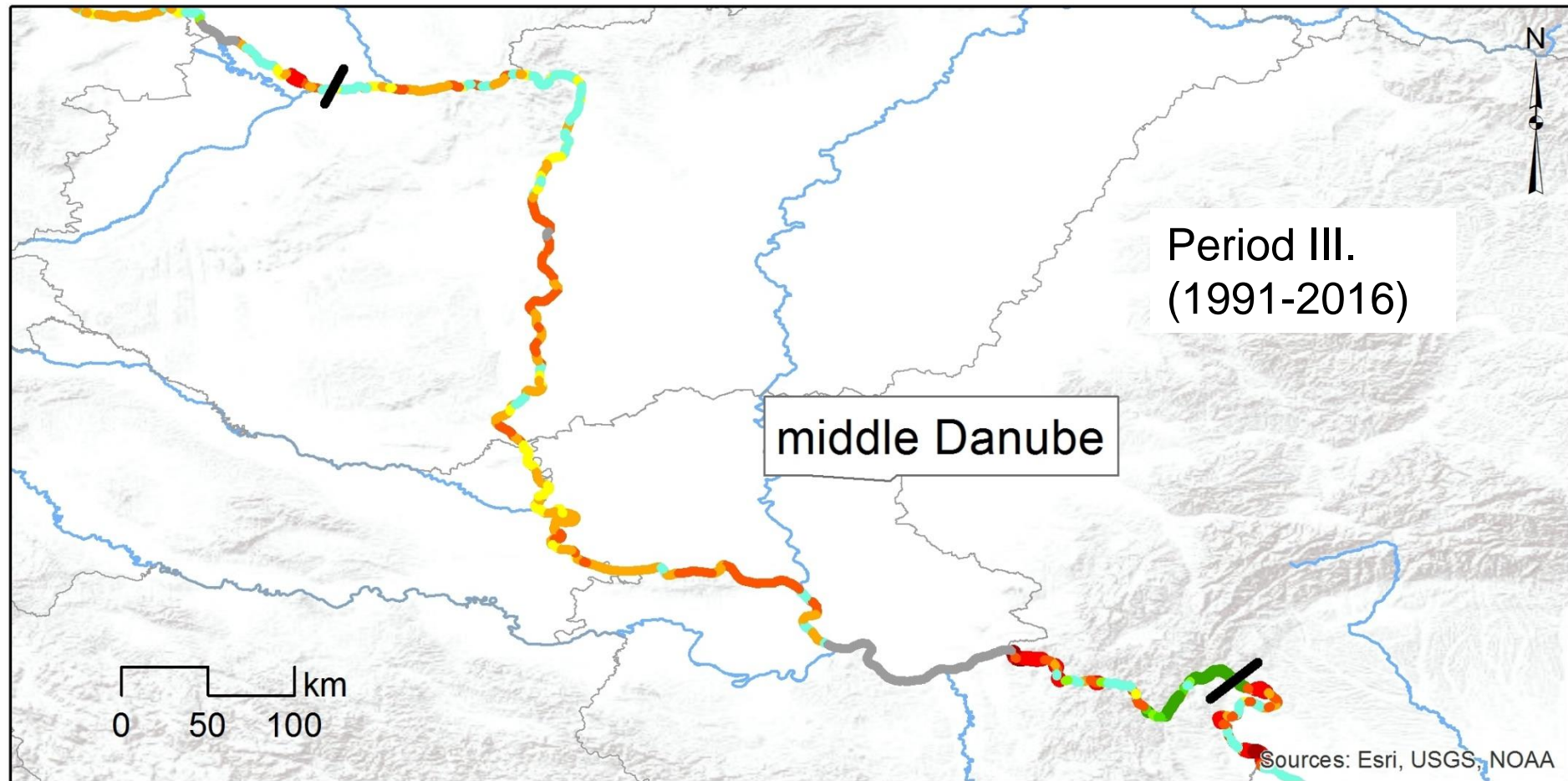
Temporal scales:

Period I - 1920 – 1970 (HPP – UD - started)

Period II - 1971 – 1990 (most HPP on UD operated, before Gabčíkovo, IG-I, II)

Period III – 1991 – 2016 (all HPPs on the Danube - operated)











Legend

 selected tributaries

**Erosion and sedimentation in 1 km reaches
amount (m3)**

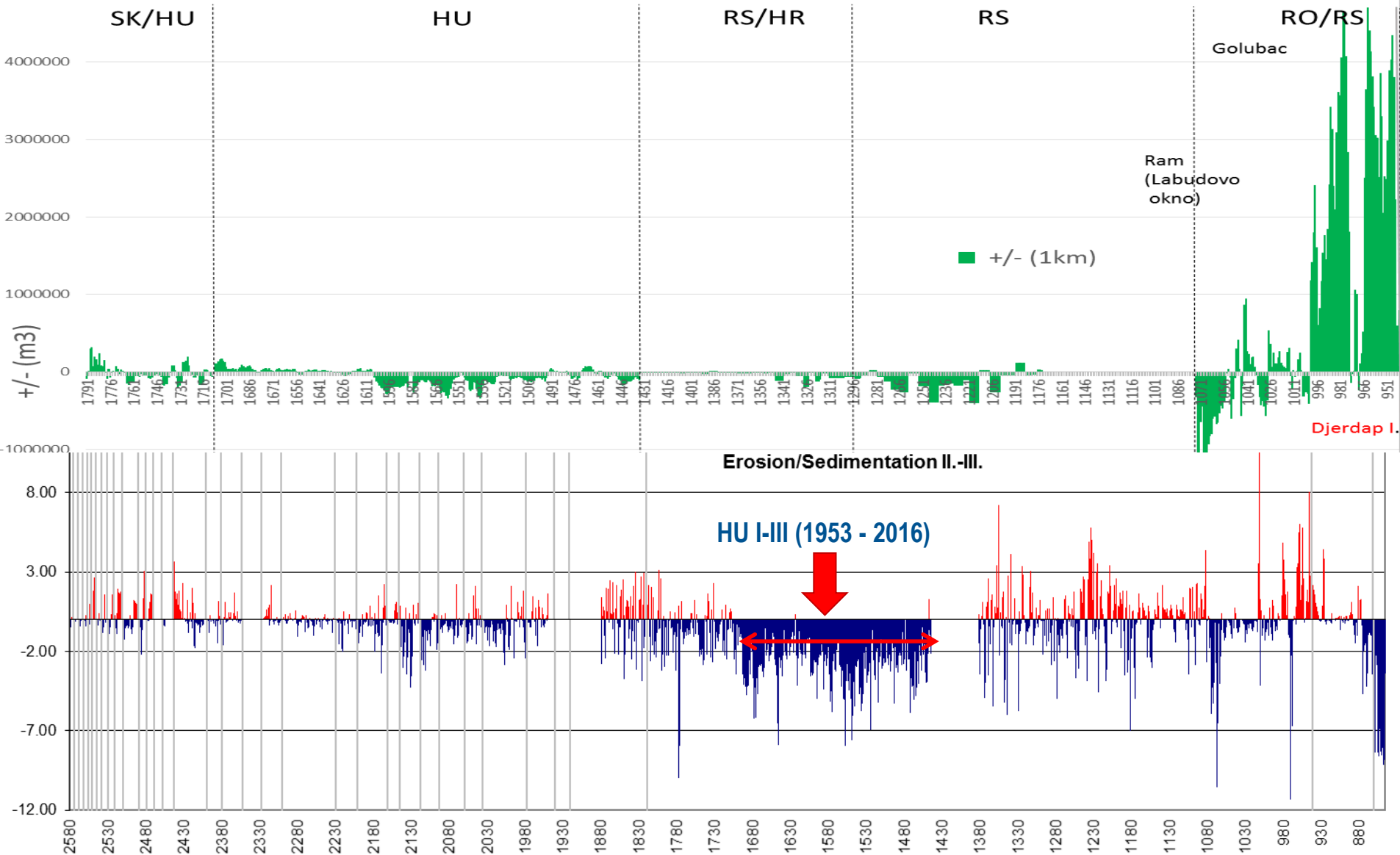
 -1,6 mil. to -1 mil.
 -0,9 mil. to -0,5 mil.

 -0,49 mil. to - 0,1 mil.
 -0,09 mil. to -0,01 mil.
 -0,009 mil. to 0
 0 - 0,01 mil.

 0,011 mil. - 0,50 mil.
 0,51 mil. to 1 mil.
 1,01 mil. to 2 mil.
 2,01 mil. to 7,5 mil.
 No data

WP4 - Sediment Balance **Act. 4.3**

Changes in the longitudinal profiles II,III

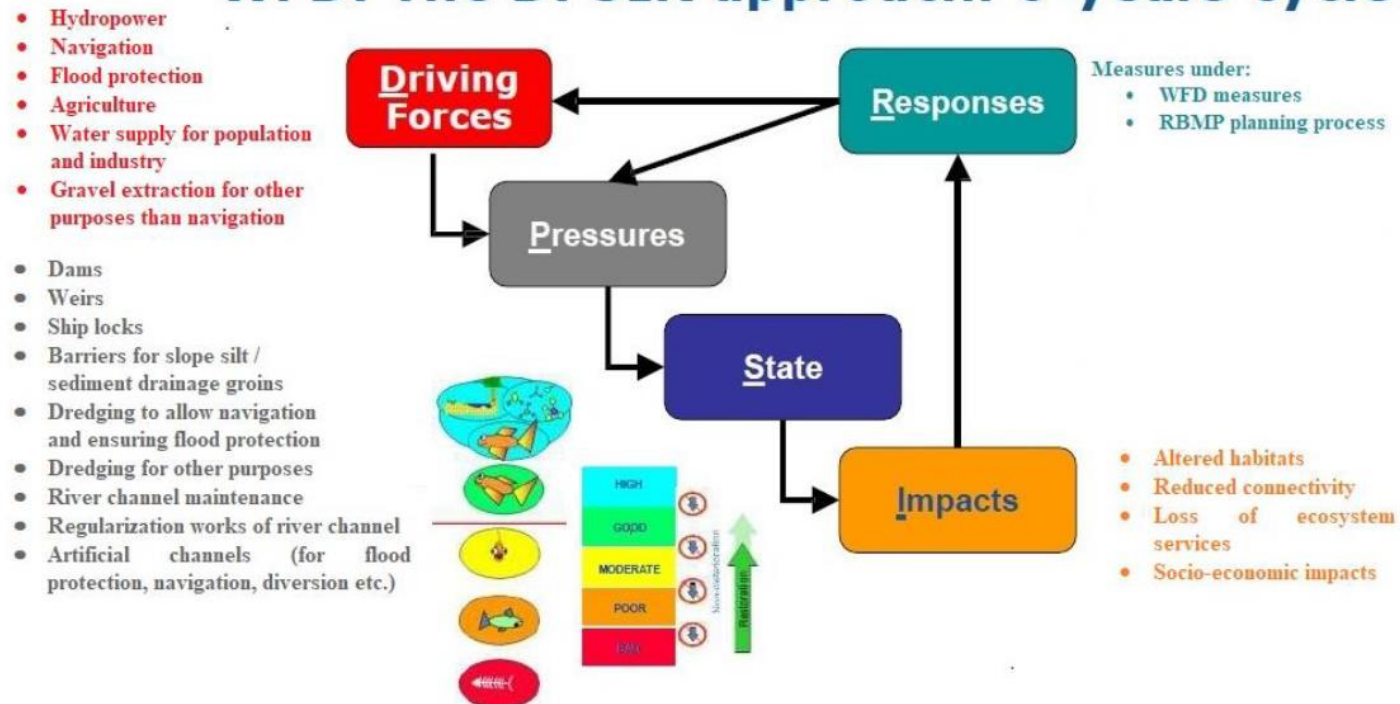


WP5: Impacts and measures

PM meeting
 01.03.2018
 WP 5 – Impact and measures

Activity 5. 1. Review of key drivers and the impacts of significant pressures on sediment quantity for Danube River (from 04/2017 – to 03/2018)

WFD: The DPSIR approach: 6-years cycle



- Pressures – longitudinal interruptions

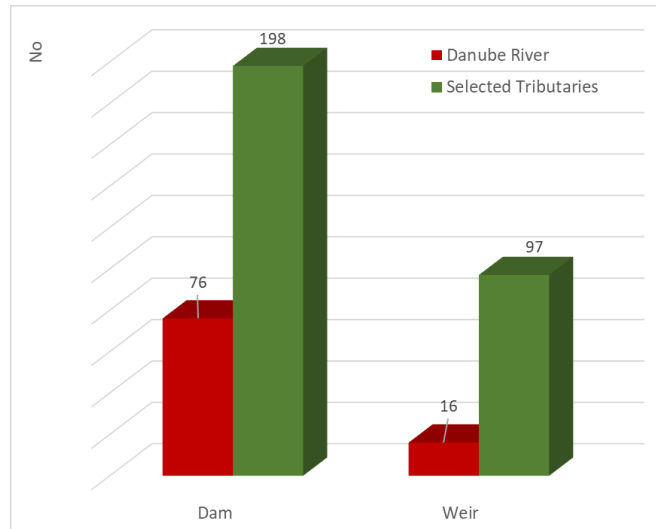


Figure no. 4. Pressures related to interruption of the longitudinal continuity of the sediment transport (Danube River and selected tributaries)

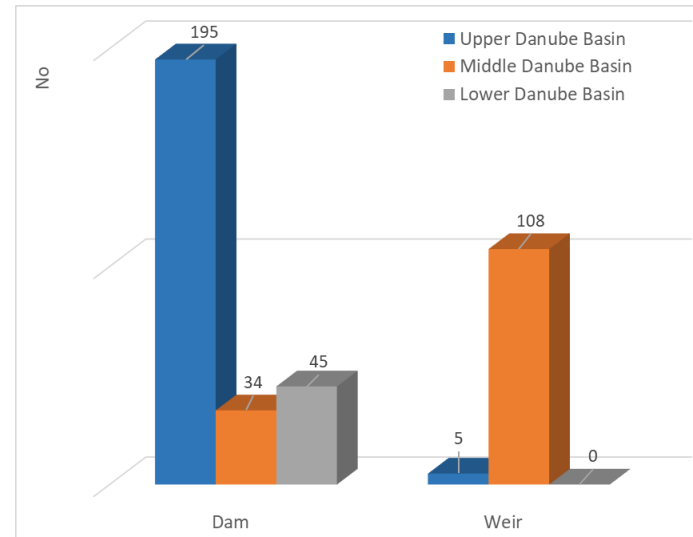


Figure no. 5. Pressures related to interruption of the longitudinal continuity of the sediment transport (Upper, Middle, Lower Danube River Basin)

WP5: Impacts and measures

- Pressures – lateral interruption

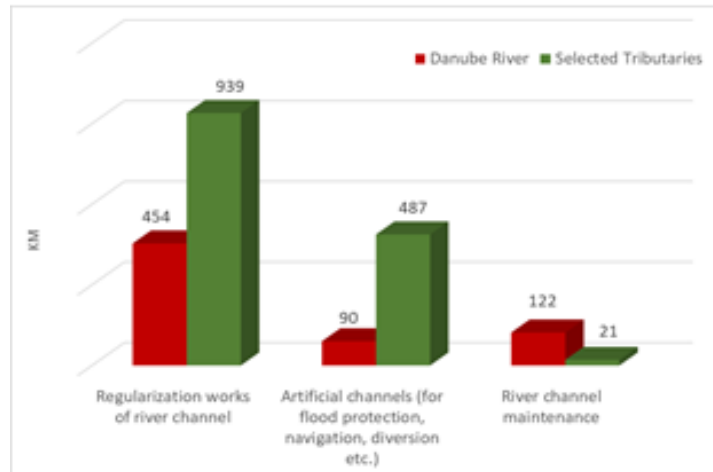


Figure no. 6. Pressures related to interruption of the lateral connectivity of the sediment transport (Danube River and tributaries)

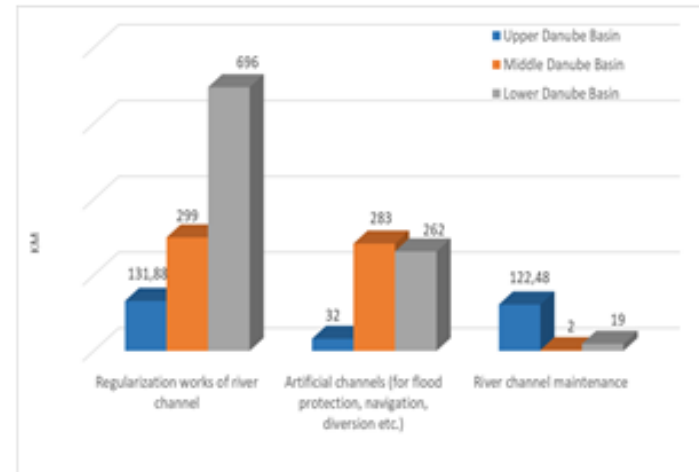


Figure no. 7. Pressures related to interruption of the lateral connectivity of the sediment transport (Upper, Middle, Lower Danube River Basin)

- Synthesis of WP3 to WP5
- Development of Danube Sediment Management Guidance (DSMG)
 - Statement of problems and needs
 - Suggestions for an improved monitoring
 - Sediment budget
 - Practical measures
 - Key question
 - Recommendations
- **Stakeholder Involvement**
- Preparation of a Sediment Manual for Stakeholders (SMS)
 - Hydropower
 - Navigation
 - Flood risk management
 - River basin management incl. ecology

Thank you for your attention