Interreg
Danube Transnational Programme
SIMONA

SIMONA Sampling WG presentation

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Inventory Workshop of the SIMONA Project
10th – 11th April, 2019, Vienna

Project co-funded by the European Union
http://www.interreg-danube.eu/approved-projects/simona

WGs

Dr. sc. Gyozo Jordan, Szent Istvan University, Hungary, **Scientific Coordinator**:

The Sampling and the Laboratory WG

EXAMPLE

critically review the existing water and sediment national methods, the state-of-the-art knowledgebase, good practices and experiences in the DTP countries, including EU and non-EU countries.

Reviewing will be done against the following **criteria**: the developed protocols

(1) should be acceptable in all DTP countries,
(2) should be in-line with the ICPDR and the EU requirements,
(3) use the latest scientific knowledge, and
(4) have to be sustainable.

The **main steps** of reviewing the sampling and laboratory methods are

(1) reviewing national spatial and temporal sampling and monitoring techniques and laboratory analysis procedures for sediment quality measurements of the water phase, biota, bottom sediment, suspended sediment, floodplain sediment with passive and other sampling technics under the WFD implementation requirements;
(2) reviewing national uncertainty analysis techniques for sampling and laboratory analysis including representativity assessment; and (3) providing a critical summary and conclusions of the reviews.

Sampling WG

Based on WP3 Questionnaires - Danijel's WORK PLAN for WP4 - Activity 4.1

Activity 1 – Review

February 2019 - March 2019

Sampling

HR-HGI-CGS (Croatian Geological Survey) - sampling strategy;

RS-JCI (Institute for Development of Water Resources "Jaroslav Černi") - bottom sediment sampling procedures;

AT-GBA (Geological Survey of Austria) - suspended sediment sampling procedures;

SI-GEOZS (Geological Survey of Slovenia) - floodplain sediment sampling procedures;

Sampling WG

Danijel's WORK PLAN for WP4 - Activity 4.1

Sampling

BA-FZG (Geological Survey of Federation of Bosnia and Herzegovina) - transport and storage of sediment samples;

HU-BME (Budapest University of Technology and Economics) - sediment sampling methods related to DTP DanubeSediment project on sediment quantity;

MD-IGS-ASM (Institute of Ecology and geography of the Academy of Sciences of Moldova) - specific sampling procedures related to physiographic and climatic conditions in partner countries across the DRB;

UA-UGC (State Enterprise "Ukrainian Geological Company") - problems regarding HSs monitoring across partner countries;

BG-GI-BAS (Geological Institute, Bulgarian Academy of Sciences) - will review HSs measured in sediment across partner countries.

Sampling WG review

AT-GBA (Geological Survey of Austria), Sebastian Pfleiderer

- *suspended sediment sampling procedures. The review includes methodology for suspended sediment sampling. That means position in the stream (for example in the middle of the river, closer to river banks,...), sample volume/mass, tools and procedure including time needed to collect specific volume/mass.*

- in the national **questionnaires** only the **Geological Institute of Romania** describes the method they use for suspended sediment sampling;
- articles, Edwards & Glysson (1999) and Lalk et al. (2017) provide the most detailed descriptions.

Sampling WG review

SI-GEOZS (Geological Survey of Slovenia), Jasminka Alijagić

- floodplain sediment sampling procedures. The review includes methodology for floodplain sediment sampling. That means sampling location (for example how far from the stream,...), sample volume/mass, tools and procedure.

- Austria, Moldova, Croatia – they sample the floodplain sediment;
- Romania, Slovakia, Slovenia, Ukraine – they do not sample floodplain sediment;
- Bulgaria, Bosnia, Republic of Srpska, Hungary, Montenegro – no data.

- Sampling location: no data.
- Sample volume/mass: different mass, but mostly no data.
- Tools: various (stainless steel shovels, PVC or ceramic spoons, scoops, ...)
- Procedures: different.

Sampling WG review

BA-FZG (Geological Survey of Federation of Bosnia and Herzegovina), Ismir Hajdarević

transport and storage of sediment samples. Transport and storage equipment (bags, boxes,...). For how long are samples archived, special conditions for storage,...

Transport:

Austria, Bosnia and Herzegovina (Federation of B&H) - no specific methodology;

Bosnia and Herzegovina (Republic of Srpska), Bulgaria, Hungary, Montenegro – no data;

Croatia, Moldova, Slovakia - use refrigerators; Germany - in brown glass bottles;

Romania - suspended sediment on filters; Ukraine - dried and sieved;

Slovenia - ISO 5667 – 15: 2010 Water quality - Sampling .

Archive:

Austria, Bosnia and Herzegovina (Federation of B&H) - samples keep until project completion;

Bosnia and Herzegovina (Republic of Srpska), Bulgaria, Hungary, Montenegro, Slovakia - no data;

Croatia, Slovenia - samples are not archived; **Germany, Moldova, Romania, Ukraine – archived.**

Sampling WG review

UA-UGC (State Enterprise "Ukrainian Geological Company"), Volodymyr Klos
- problems regarding HSs monitoring across partner countries.

Summary:

- in all countries the **level** of surface water at the hydrological stations is monitored;
- use of different **coordinate** systems;
- **frequency** of monitoring is not always indicated (with the exception of Bulgaria);
- maximum experience in sediment **monitoring in Slovakia**;
- in the questionnaires - no information on the analysis of suspended substances in the water flow.

Sampling WG review

Conclusions:

- the use of an **unified** coordinate system;

- before the Vienna meeting or **before adopting** the final field research methodology - a short **report of Slovakia** about experiences in monitoring;
- similar reports from Hungary, Austria, Romania, Bulgaria – project **DanubeSediment**;
- Croatia - the results of the project Monitoring of Drava alluvial sediments ;

- the **source** of geochemical anomalies in bottom sediments – **scientific** research;
- no information about the analysis of suspended solids in the water flow – poor knowledge about it - it is possible that this **type of monitoring** should not be included in the SIMONA project – the need of more detailed **scientific** research.

Sampling WG review

BG-GI-BAS (Geological Institute, Bulgarian Academy of Sciences), Millena Vetseva

review HSs measured in sediment across partner countries. (Within this review, we should also check if there are some HSs which are not prescribed by EU WFD, specific for some partner countries because of some particular reasons (type of industry, agriculture legislative different than in EU,...).

Hazardous substances measured in sediments – priority substances prescribed by the EU WFD and specific substances – review

- the problem with the missing information is not incomplete questionnaires - **missing question** in the Qs about hazardous substances **measured in sediments**;
- preliminary **excel table** with a summary of data (HSs recommended in the Directive marked in green);

Sampling WG review

- **question** for partners: the HSs in bottom, floodplain and suspended sediment – is there any difference in the analyses in the different type of sediments;
- **contradiction** between the statement that most countries are sampling sediments - bottom, floodplain, suspended, but NO HSs are listed as analyzed;
- list of hazardous substances measured **in SOILS**;
- list of substances analyzed **in sediments – no data**,

except for

- **Slovakia:** - list of **hazardous substances concentration levels in sediments** and **overview of legislation** limiting the management of sediments on the basis of the limit values for selected elements in sediments (sediment leachates).

Sampling WG review

HU-BME (Budapest University of Technology and Economics), Barbara Keri

- sediment sampling methods related to DTP DanubeSediment project on sediment quantity;

Presentation: Sampling in large rivers

MD-IGS-ASM (Institute of Ecology and geography of the Academy of Sciences of Moldova)

- review if there are some specific sampling procedures related to physiographic and climatic conditions in partner countries across the DRB; This is more appropriate for evaluation purposes, but still, maybe there are some specific conditions for sampling.

RS-JCI (Institute for Development of Water Resources "Jaroslav Černi")

- bottom sediment sampling procedures; The review includes methodology for bottom sediment sampling. That means position in the stream (for example riverbed, inner/outer side of meander,...), sample volume/mass, tools and procedure.

Sampling WG review/Development

HR-HGI-CGS (Croatian Geological Survey)

sampling strategy, (including spatial and temporal sediment sampling design). The review includes methodologies for selection of sediment sampling locations and setting sediment sampling frequency. It also includes information on number of replicate samples and fraction to be analyzed.

The legal basis for the monitoring of PSs in sediment in EU

+

the state of the art in particular country and knowledge of a topic of

the partners (WP4 Activity 4.1. Review)

+

knowledge and experience acquired in the projects

FOREGS, GEMAS, DanubeSediment

Sampling WG CIS guidance/WFD framework

Directive **2008/105/EC** (Environmental Quality Standards Directive) and Water Framework Directive **2000/60/EC** (WFD)

Common Implementation Strategy for the Water Framework Directive (2000/60/EC)

Guidance Document No. 25
Guidance on Chemical Monitoring of Sediment and Biota under the Water Framework Directive

Guidance Document No. 19
Guidance on Surface Water Chemical Monitoring under the Water Framework Directive

Guidance Document No. 27
Technical Guidance for Deriving Environmental Quality Standards

Guidance document No. 7
Monitoring under the Water Framework Directive

Guidance document No. 9
Implementing the Geographical Information System Elements (GIS) of the Water Framework Directive (unified coordinate system: the ETRS89 coordinate reference system prescribed)

Monitoring of chemical substances in sediment

(Guidance Document No. 25)

1. Sampling strategy for chemical monitoring in sediment
2. Technical aspects of sediment sampling
3. Analytical methods

1. Sampling strategy for chemical monitoring in sediment

1.1. Selection of sediment sampling stations

- sediments are temporally variable; heterogeneous;
- anthropogenic source of pollution;
- tributaries often different sediment;
- sites with the sediment fraction <63 µm;
- alternatively suspended solid matter (SPM) - river channelization;
- sites should be accessible for years;
- ....

Sampling WG Review/Development

1.2. Number of replicate samples per station

- multiple samples in pilot phase (3-5);
- later composite samples;
- field duplicates for quality control;
- ...

1.3. Sediment sampling frequency

- once a year for – directive 2008/105/EC:
- once every three years for temporal trend analyzes;
- rule **higher** the sediment **changes** – **higher the frequency** it could be several times per year;
- suspended solids for trend analyses 4 times per year or better monthly;
- ...

Sampling WG Review/Development

1.4. Sediment sampling depth

- thick of the top layer (usually 5 - 10 cm);
- recommended 1 – 5 cm - depending of the deposition rate;
- different intervals for sediment core profiles;
- ...

1.5. Sediment fraction to be analyzed

- recommended <63 µm (clay-silt) fraction:
  - widespread in monitoring,
  - reduce influence of grain size distribution;
  - it is SPM or freshly deposited sediment.

2. Technical aspects of sediment sampling

Of the **ISO 5667 series of standards** important for sediment sampling:

- Design of sampling programs [ISO, 2006];
- Preservation and handling of samples [ISO, 2003];
- Sampling of rivers and streams [ISO, 2005];
- Sampling from lakes [ISO, 1987];
- Sampling of bottom sediments [ISO, 1995];
- Guidance on preservation and handling of sludge and sediment samples [ISO, 1999];
- Sampling of marine sediments [ISO, 2004].

Sample volume, Sediment sampler, Grab samplers, Corers, Collecting of SPM and freshly deposited sediments, Transport and sieving, Preservation and Storage.

Sampling WG future tasks

1. Complete WORK PLAN for WP4 - Activity 4.1. (February 2019 – March 2019)
   - review missing topics;
   - check/update all reviews with the updated questionnaires.

2. WP4 Activity 2 – ***Development*** - April 2019 – August 2019

Sampling WG - future tasks

WP4 Activity 2

Development of transnationally harmonized sediment sampling protocols for HSs of bottom, suspended and floodplain sediment

Includes:

- proposal for sampling design and monitoring;
- method/s for sampling technique and procedure;
- protocols.

Sampling WG

Monitoring of the stream sediment at Rivers: Drava and Mura (Croatia)

Duration: 4 years, 2004-2007

Frequency: 2 times per year, every six months, 1x in spring and 1x in autumn

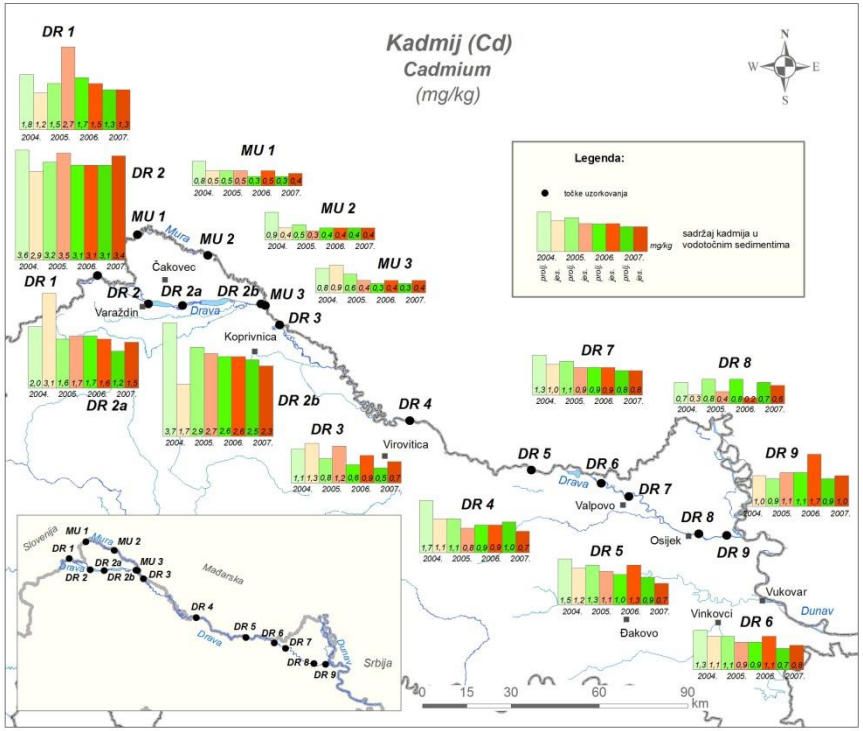
Locations: Rivers Mura (3 location) and Drava (11 locations)

Samples: composite

Laboratory: fraction <0.04 mm, *aqua regia*, ICP MS

Accuracy: standards: LKSD-2 and DS-7

Precision: duplicate samples (every 10th)



Results: Concentration of the elements Pb, Zn and Cd were several times less in the River Mura then in the River Drava. The concentration in the Drava River decreases downstream.

Source of the elevated values of Pb, Zn and Cd: geogenic and anthropogenic (Pb-Zn (Cu, As, Cd)) ore deposits and occurrences, mining, erosion of old slugs (Bleiberg, Austria; Mežica, Slovenia)

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Sampling WG members

https://docs.google.com/spreadsheets/d/1Us2HXR5TaEVRQFogWI0OnKSF6So5FXOIHAXadHgBXFA/edit?usp=sharing

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	Geological Institute, Bulgarian Academy of Sciences	BG-GI-BAS		Member
	Institute of Geology and Seismology	MD-IGS-ASM		Member
	Geological Survey of Montenegro	ME-GSM		Member
	Geological Institute of Romania	RO-IGR		Member
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Update.

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Thank you for your contribution to the Review!

Thank You for Your Attention!

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