TRANSBOUNDARY WATER AND SEDIMENT POLLUTION - ANALYSIS OF MONITORING RESULTS IN SERBIA

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Background

„Implications of global megatrends for Europe's ability to meet its resource needs

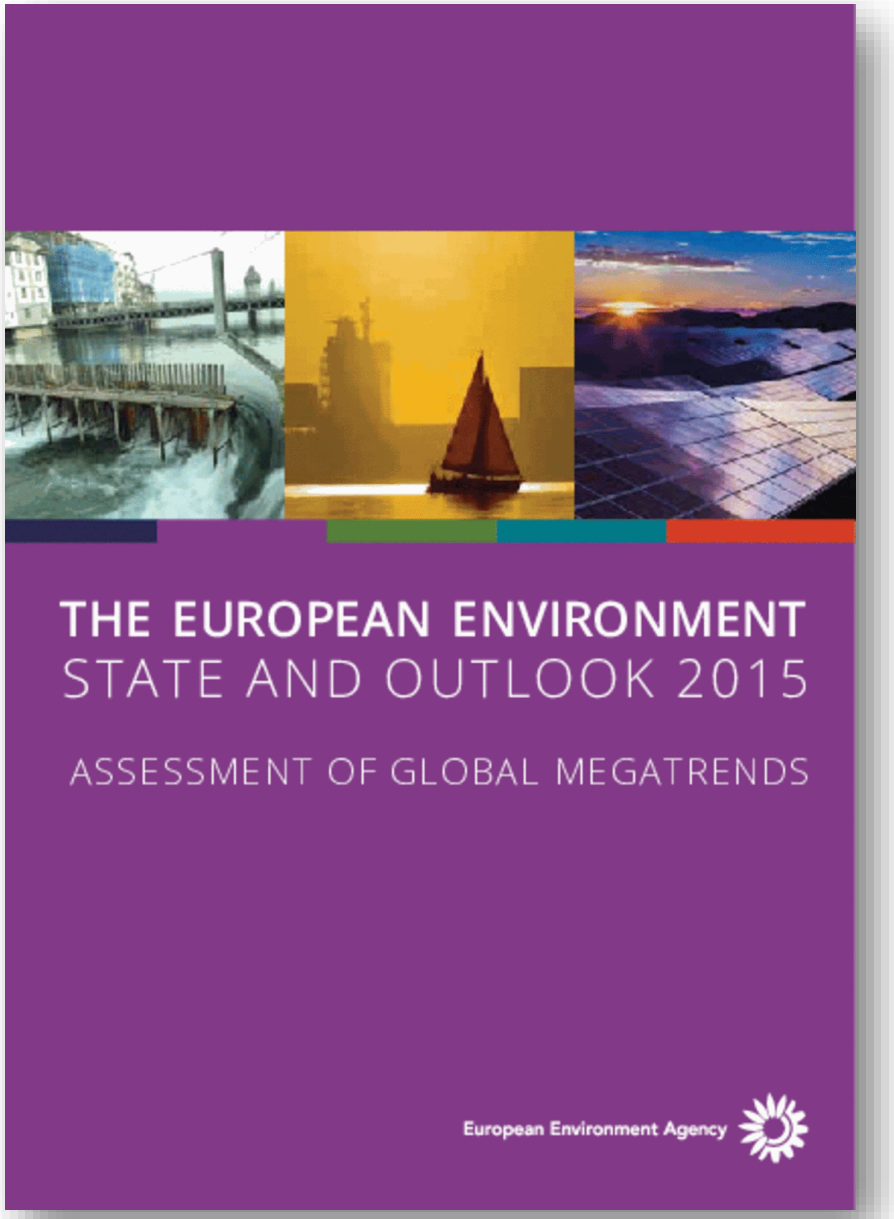
The resources that societies rely on to meet their basic needs can be classified into four major categories: food, water, energy and materials (EEA, 2013b). In addition, ecosystems are essential to ensure the availability and quality of these resource categories, as well as providing a range of other ecosystem services that shape human health and well-being.

(...)

Water

Globally, the availability of sufficient good-quality freshwater is increasingly threatened by population growth and increasing consumption, combined with adverse impacts from climate change (Murray et al., 2012).“

The European environment | State and outlook 2015, p. 9, 10.



The Danube River Basin which is shared by 18 countries has a long-standing history of international environmental cooperation

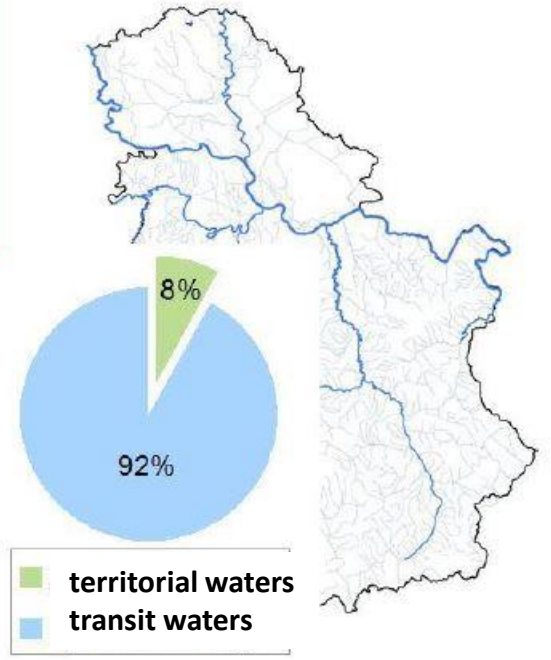
Historia est magistra vitae

The first institutional framework for adopting common programmes and measures to protect water quality was established under the Bucharest Declaration in 1985. The Declaration had as one of its objectives to observe the development of water quality of the Danube. In order to comply with this objective, a monitoring programme consisting of 11 cross-sections in upstream and downstream along the Danube River border crossings were established.

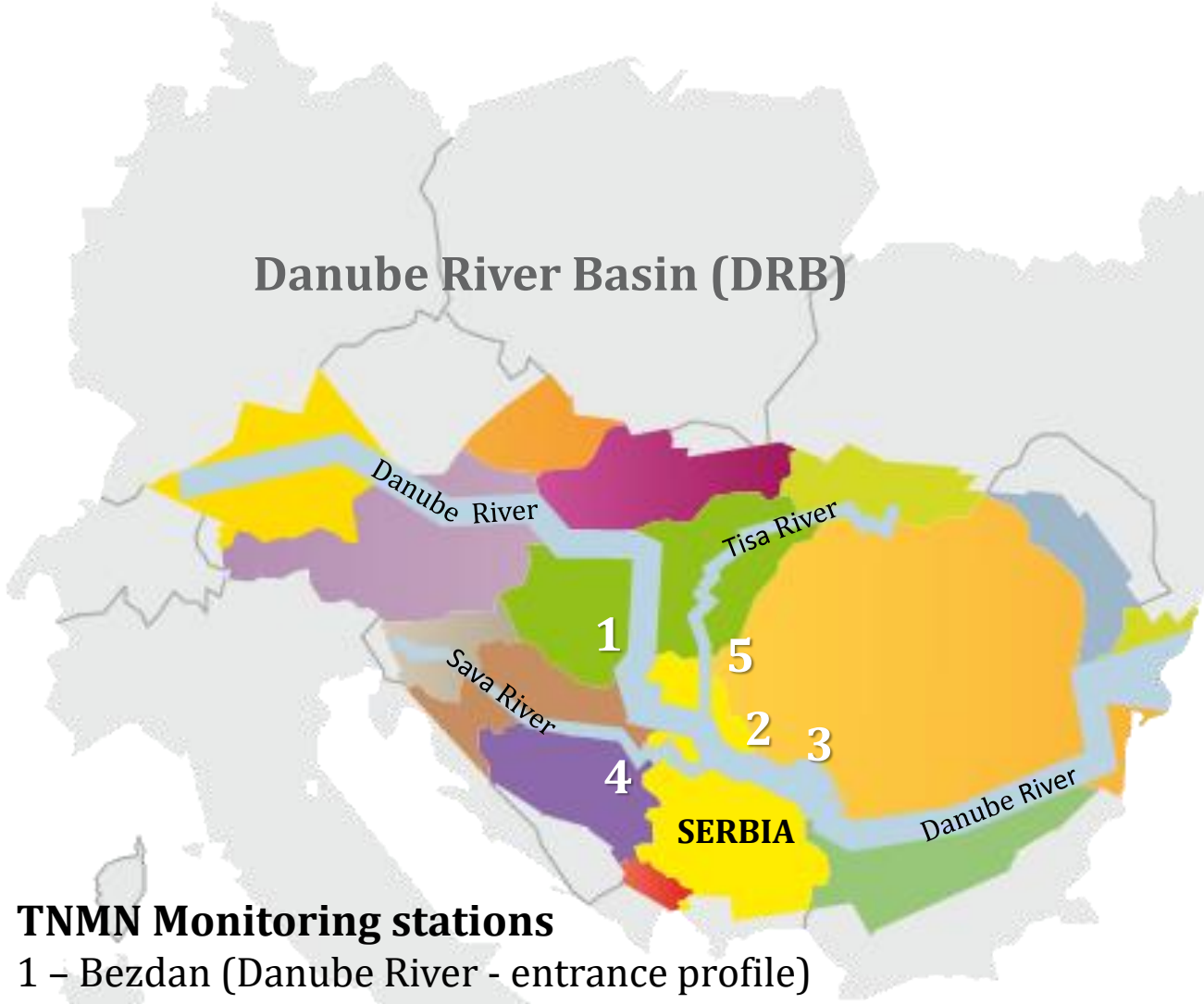
Later, a further development of the international strategy for the protection of the water resources in the Danube catchment area was established based on the UNECE Convention on the Protection and Use of Transboundary Waters (Helsinki Convention). More so, the Convention on the Protection and Sustainable Use of the Danube River also known as the Danube River Protection Convention (DRPC) was signed in June 1994 in Sofia.

The DRPC entered into force in October 1998 and became the overall legal instrument for transboundary water management at Danube basin-wide level. In addition, the International Commission for the Protection of the Danube River (ICPDR) was legally established as the main decision making body under the DRPC.

The European environment | State and outlook 2015, p. 10.



Climate change and global pollution levels also exert direct pressures on European freshwater quantity and quality. Drought and resulting water scarcity related to climate change are expected to increase considerably in southern Europe, where 80% of national water abstraction is already used for agricultural irrigation (EEA, 2013b). In contrast, western and northern Europe are likely to face increased flood damage (Rojas et al., 2012). Moreover, the transboundary transport of pollutants emitted outside Europe is anticipated to play an increasing role in the future, with potentially adverse impacts for European freshwater quality, such as water acidification (HTAP, 2010).



TNMN Monitoring stations

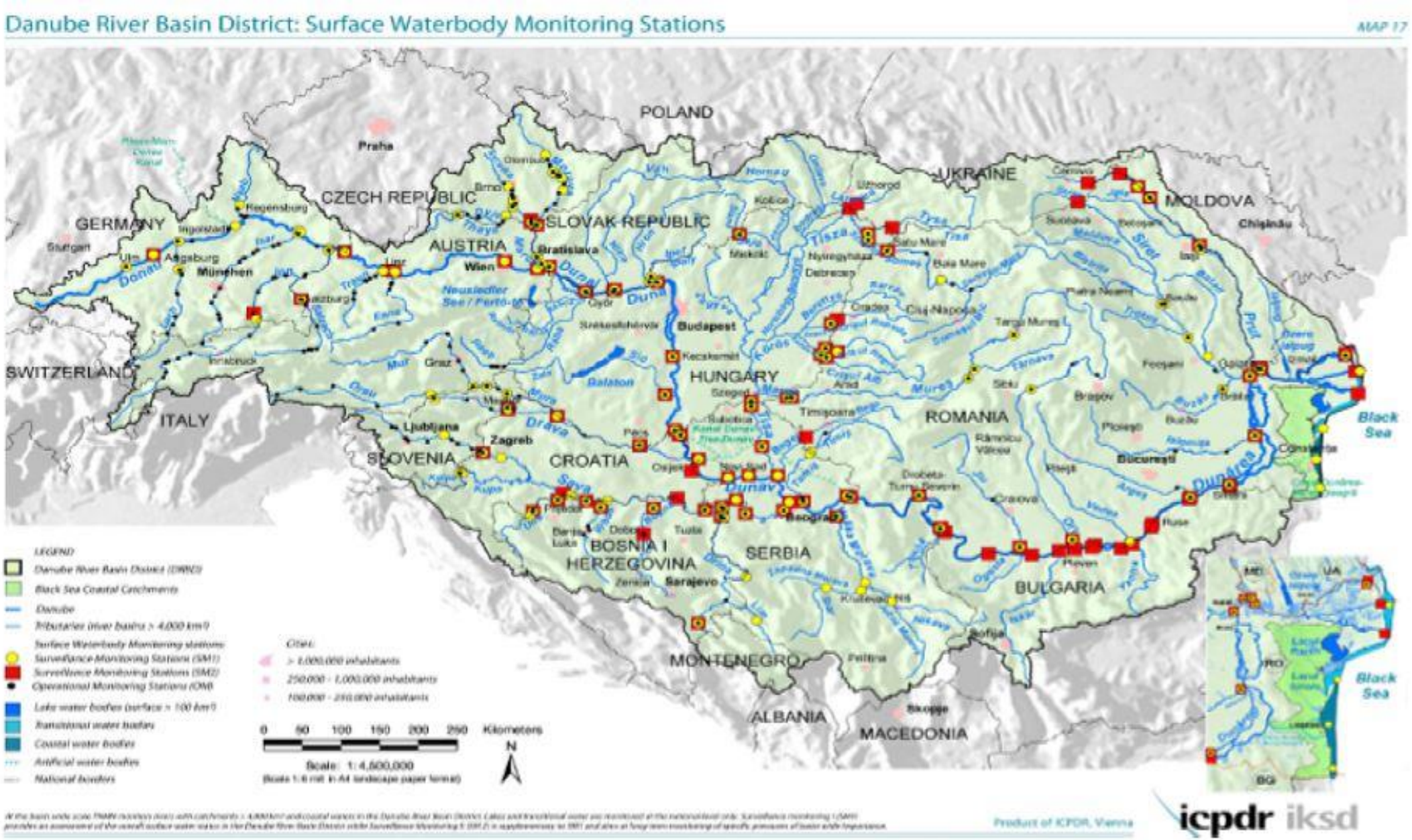
1 – Bezdan (Danube River - entrance profile)
2 – Banatska Palanka (Danube River – TNMN profile: Serbia - Romania)
3 – Radujevac (Danube River - exit profile)
4 – Jamena (Sava River - entrance profile)
5 – Martonoš (Tisa River - entrance profile)

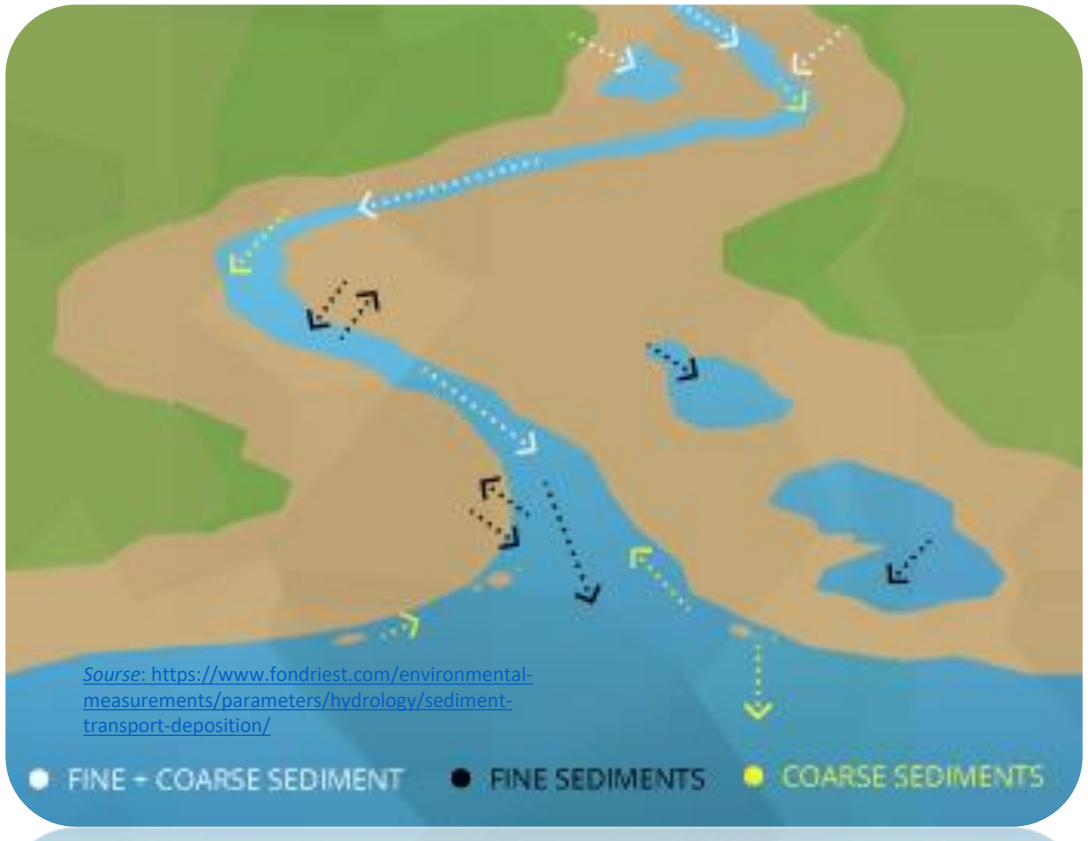
Principles of the Trans-National Monitoring Network (TNMN) design

The monitoring network in the frame of TNMN was based on the national surface water monitoring networks. Therefore, to select monitoring locations for the purposes of international monitoring network in Danube River Basin in relation to the abovementioned TNMN objectives, the following concrete selection criteria for monitoring
location were set up:

- **Monitoring station located just upstream and downstream of an international border.**
- Monitoring station located upstream of confluences between Danube and main tributaries or between main tributaries and larger sub-tributaries.
- Monitoring station located downstream of the biggest point sources.
- Monitoring station located according to control of water use for drinking water supply.

The Danube Station map Trans-National Monitoring Network TNMN (from www.icpdr.org)





What is sediment? Sediment comes from the erosion of rocks and soil. Pieces of sand, clay, silt, and soil come loose from the movement of water due to human intervention or weather events. These particles are carried through streams, rivers, and eventually (In our case) the Black sea. This sedimentation affects the quality of our drinking water and wildlife environments.

Sediment in water affects the water we drink.

When sediment is present, treating our drinking water becomes costly and time consuming. This treatment can leave us with odorous drinking water that has a bad taste. Sediment pollution is made from small soil and silt particles, but these have a big effect. From clogging fish gills to making rivers and streams unnavigable, reducing the effects of sedimentation is an imperative.

How to prevent sedimentation effectively and economically in our world today?

This is something we should consider.

First, we should consider the quality of the surface water and its sediment. **This is the content of our presentation.**

PROTOCOL ON SEDIMENT MANAGEMENT TO THE FRAMEWORK AGREEMENT ON THE SAVA RIVER BASIN

Bosnia and Herzegovina, the Republic of Croatia, the Republic of Serbia and the Republic of Slovenia (hereinafter: the Parties),

Pursuant to the provisions referred to in Article 30 and taking into account Article 8, Article 10 paragraph 4, Article 11 paragraphs a, b and c of the Framework Agreement on the Sava River Basin done at Kranjska Gora on 3 December 2002 (hereinafter: FASRB),

Having in mind that sediment is an essential, integral and dynamic part of the river system and forms a variety of habitats and environments,

Recognizing that sediment management is important for maintaining of the water regime,

Wishing to establish and improve navigation and maintenance of navigable parts of the Sava River and its tributaries,

Affirming the need to promote active international cooperation among the Parties to enhance appropriate policies and to reinforce and coordinate action at all appropriate levels for promoting sustainable sediment management related to quality and quantity issues,

Promoting sustainable sediment management solutions, which carefully balance the socio-economic and environmental values to be set within the whole Sava River Basin,

Taking into consideration, the Directive 2000/60/EC of the EU Parliament and of the Council of 23 October 2000, establishing a framework for community action in the field of water policy (Water Framework Directive) and all other relevant EU legislation, as well as European Agreement on Main Inland Waterways of International Importance (AGN),

Have agreed as follows:

Part II
SEDIMENT MANAGEMENT
Article 3

PRINCIPLES OF SUSTAINABLE SEDIMENT MANAGEMENT

The Parties shall cooperate in order to achieve sustainable sediment management in the Sava River Basin by:

(a) Respecting the natural processes;

(b) Respecting the water regime;

(c) Recognizing the sediment, considering its quality and quantity, as resource;

(d) Providing the balance between socio-economic and environmental values of sediment;

(e) Planning and executing measures to reduce up- or downstream impacts;

(f) Providing the integrated river-sediment-soil-groundwater solutions;

(g) Supporting and increasing the cooperation with stakeholders.

unesco

INTERNATIONAL SAVA RIVER BASIN COMMISSION

Doc. No: 1R-59-O-22-2/2-2

Outline of the Sediment Management Plan for the Sava River Basin

Report on Sediment Management in the Sava River Basin

November 2021

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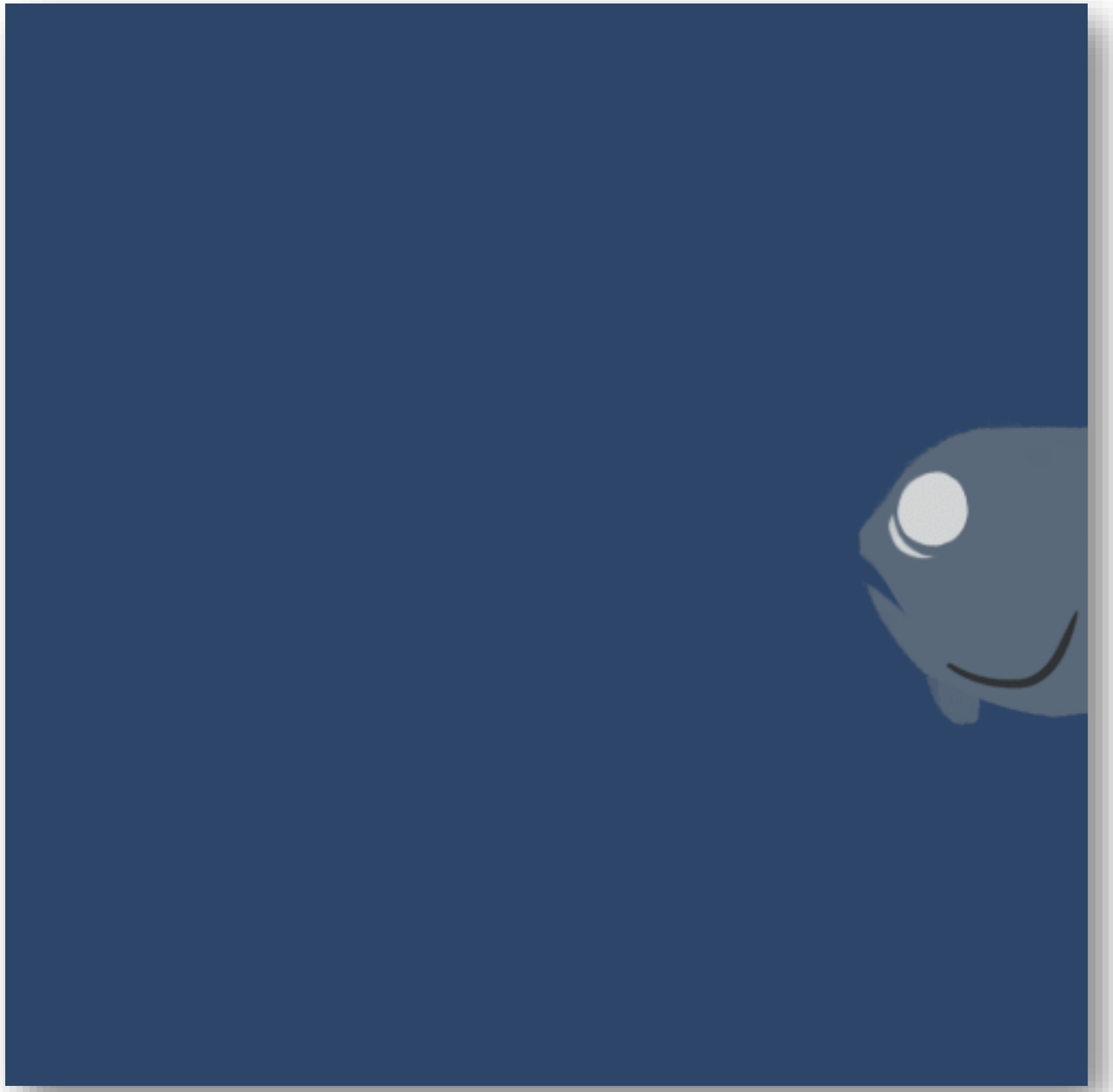


Created by Luka Stefanovic

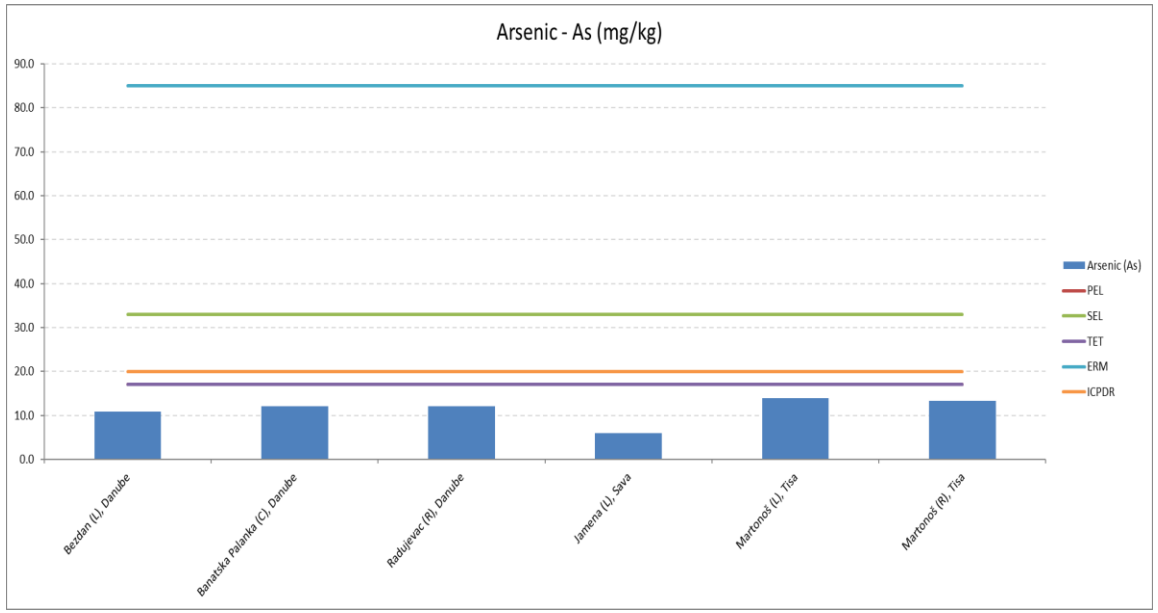
Serbian Enviromental Protection Agency (SEPA) applies two different approaches for the sediment quality assessment in order to define the limited values which will help their passing/forming of viewpoints regarding the management of contaminated sediments.

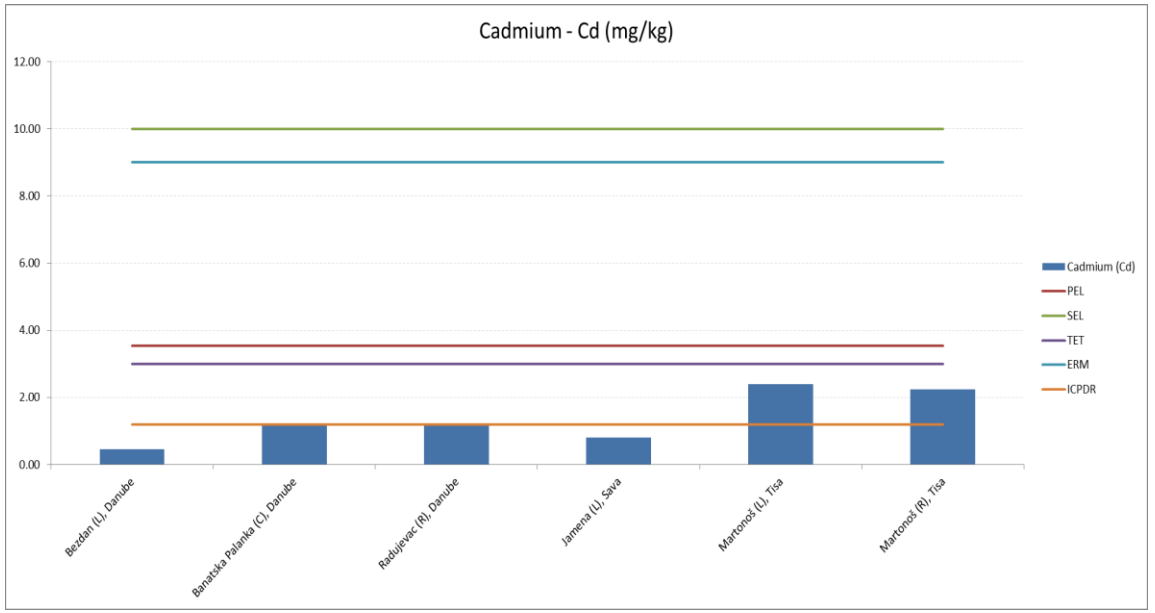
THE FIRST approach relies on the chemical characteristics of the sediment, which is compared with reference values giving us the quality rating (Decree 50/2012 RS and recommendations of ICPDR), and the second approach, where contamination of the sediment is compared to the toxic effects on aquatic life.

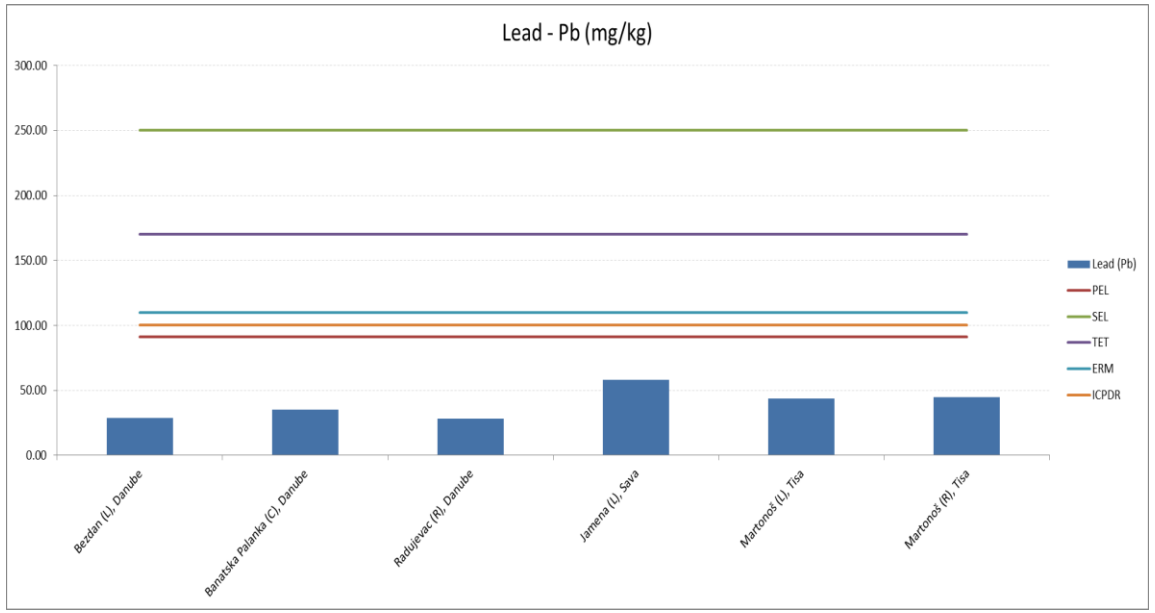
SECOND approach is the quality criterion of the sediment which generally sets two threshold levels of the pollutant content in the sediment:

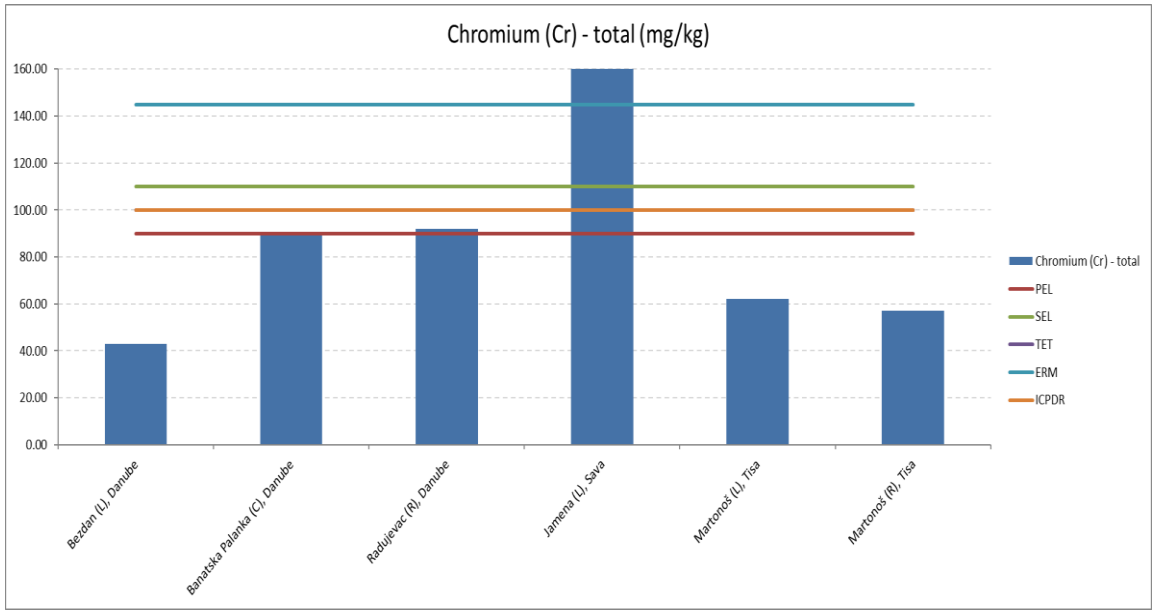
- **first threshold**, below which adverse effects rarely occurs on aquatic invertebrates (macroinvertebrate) [the lowest effect level (LEL), threshold effect level (TEL), effects range low (ERL), minimal effect threshold (MET)]; and
- **the second threshold**, beyond which the adverse effects probably occur [the severe effect level (SEL), probable effects level (PEL), effect range median (ERM), toxic effect threshold (TET)].

Values of concentrations of heavy metals in sediment in the period 2012-2017









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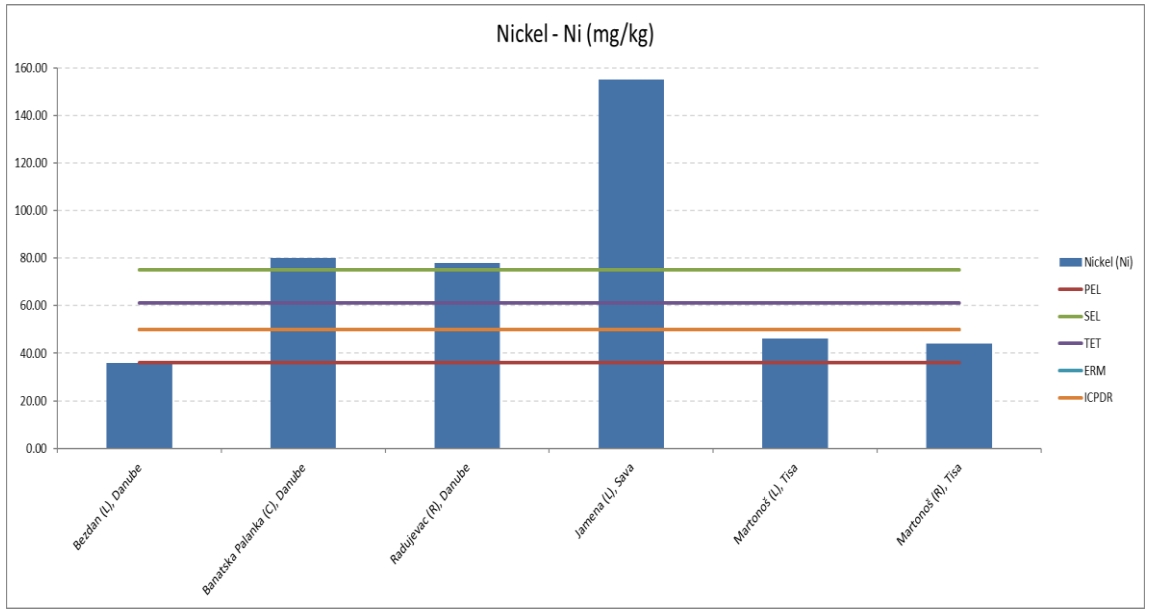
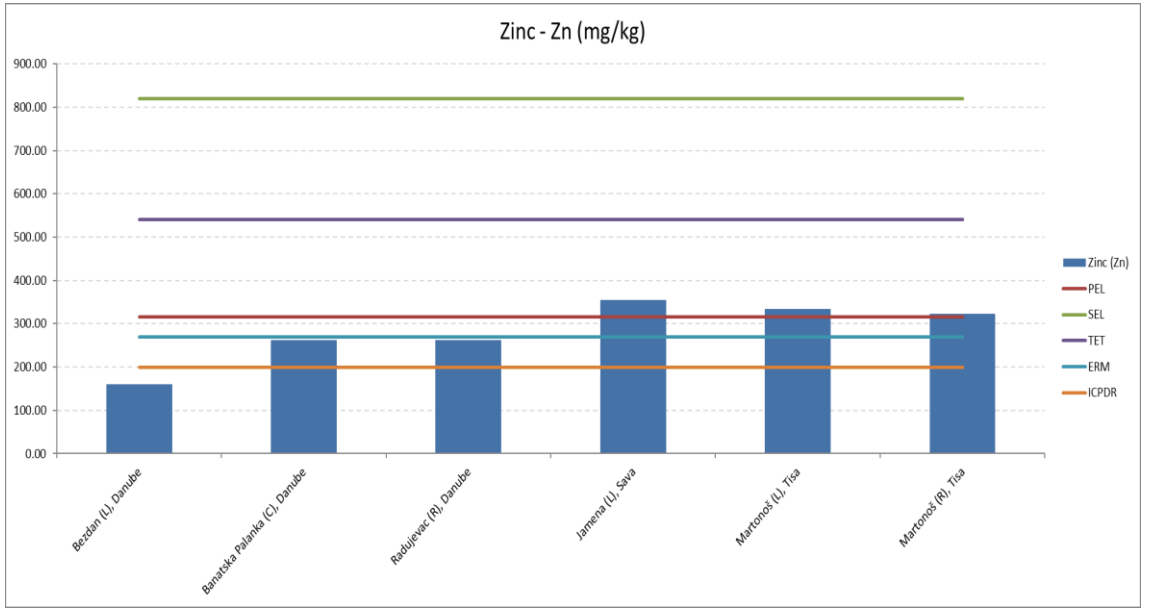
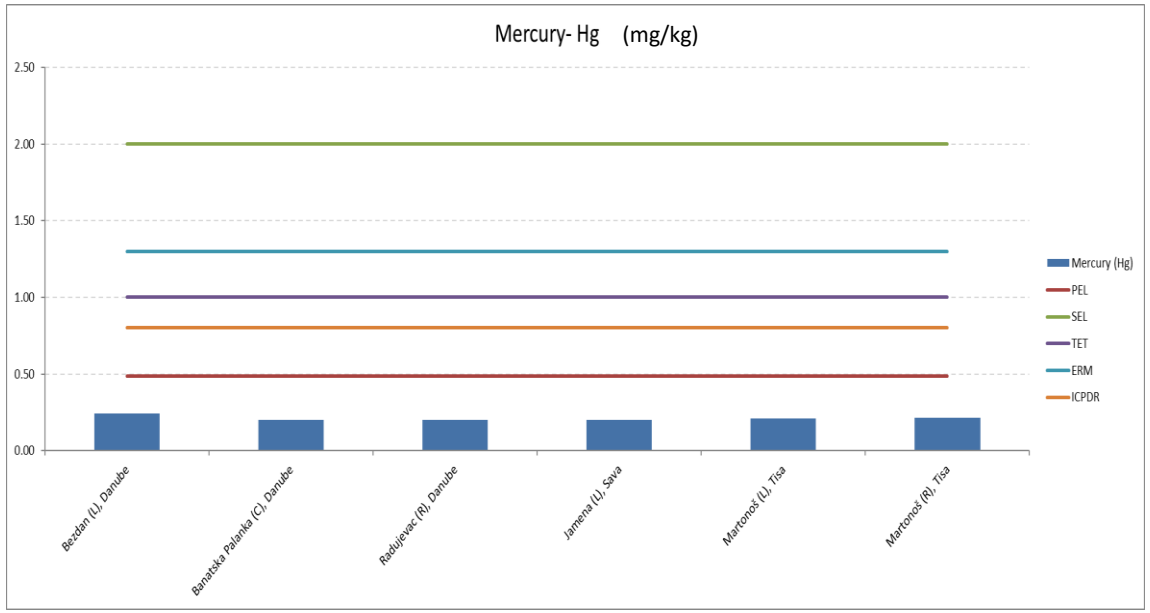
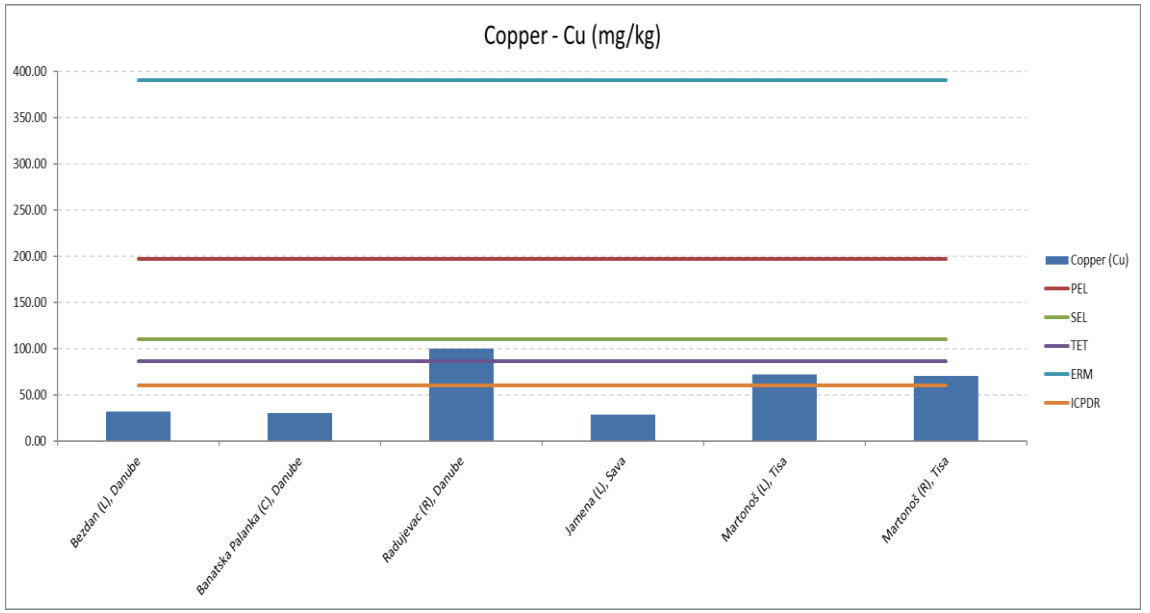
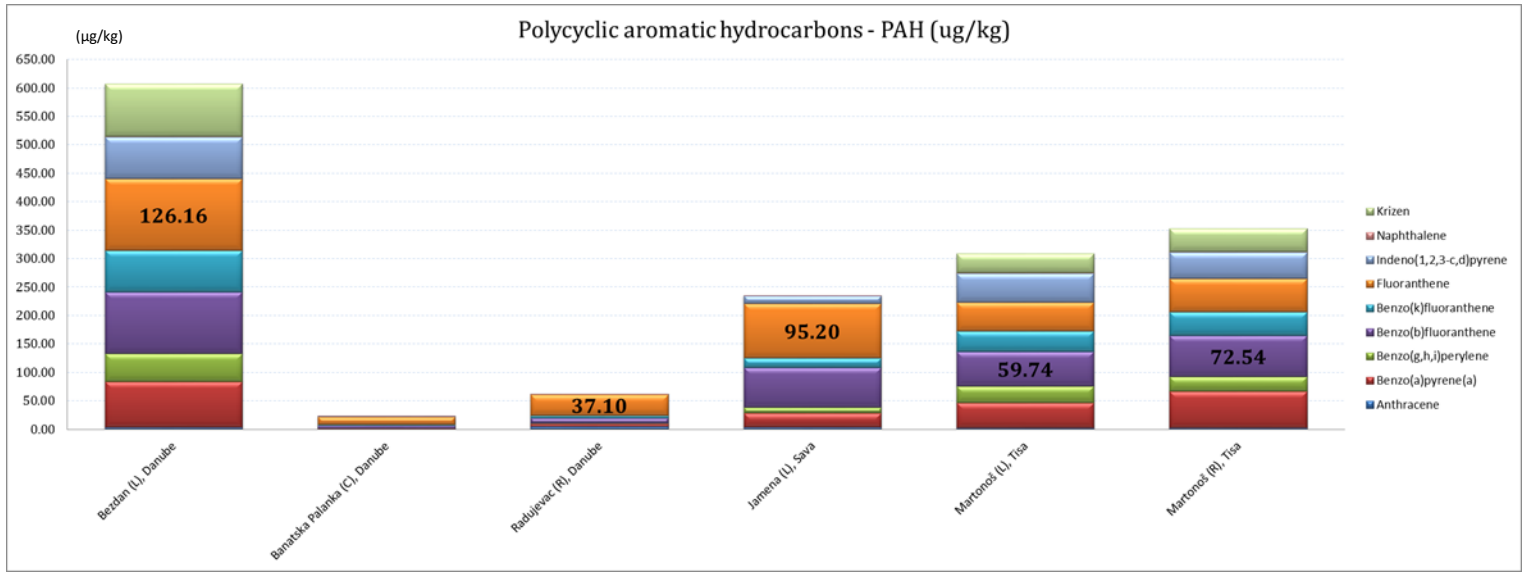


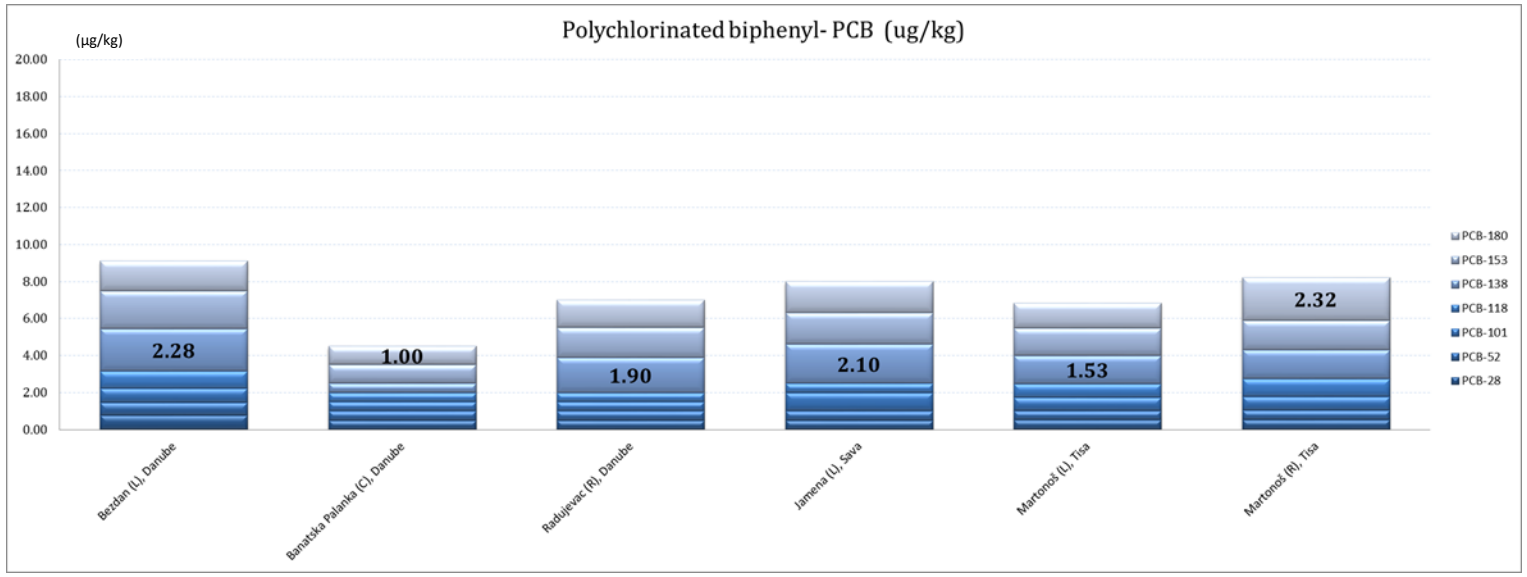






Values of concentrations of organic pollutants in sediment in the period 2012-2017





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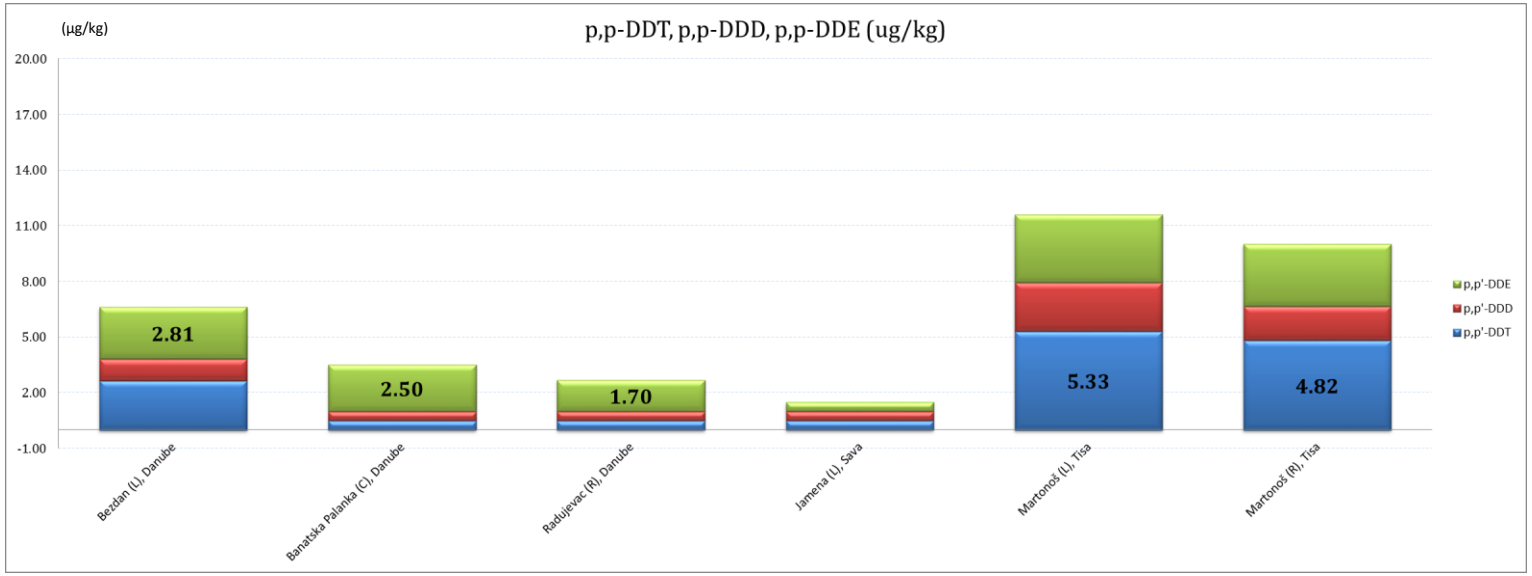

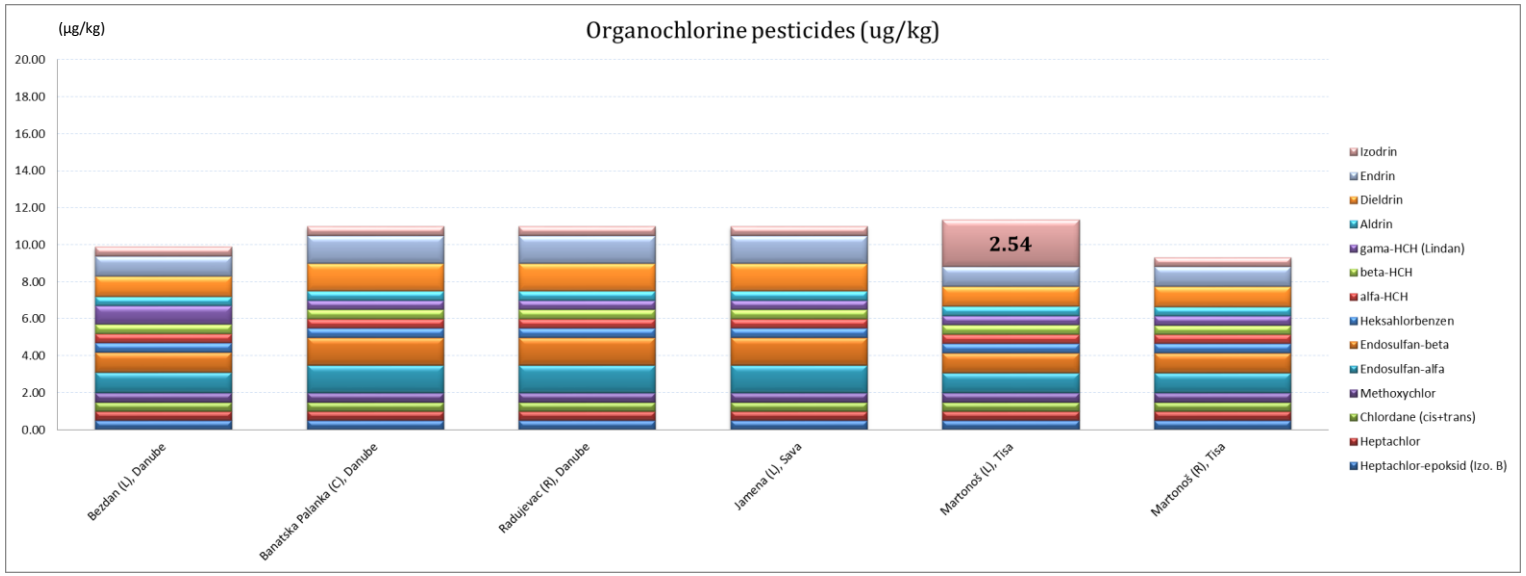

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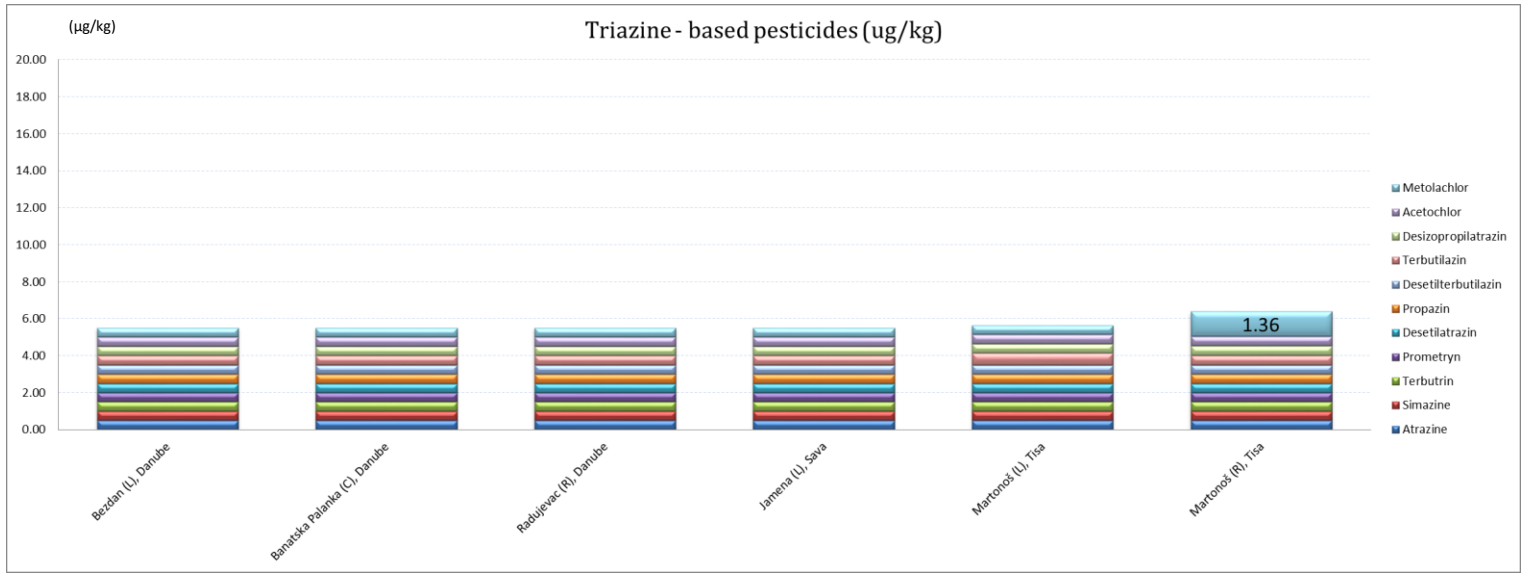

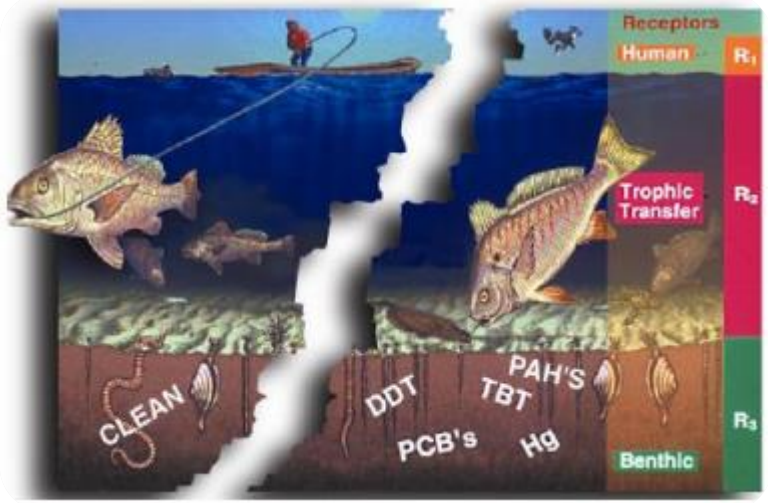

Classification of River Water Quality on transboundary profiles for 2021

(Decree 50/2012 RS)

Profile	River	Arsenic	Boron	Copper	Zinc	Chrome (total)	Iron (total)	Manganese (total)	Priority and priority hazardous substances
		Water quality classes							
Bezdan (entrance profile)	Dunav	I	I	I-II	I	I	III	III	*Ni-dissolved 2x(III/IV); Pb-dissolved 3x(III/IV); Hexachlorocyclohexane 1x(III/IV)*
Banatska Palanka (TNMN profile: Serbia - Romania)	Dunav	I	I	I-II	I	I	III	I	*Pb- dissolved 2x(III/IV);*
Radujevac (exit profile)	Dunav	I	I	I-II	I	I	III	II	-
Martonoš (entrance profile)	Tisa	I	I	I-II	I	I	IV	II	*Pb- dissolved 3x(III/IV)*
Jamena (entrance profile)	Sava	I	I	I-II	I	I	II	II	-

Discussion

The results of analysis of sediments sampled on the cross-border profiles of the rivers Danube, Sava and Tisa in the period 2012 – 2017 showed that there is pollution come from the upstream parts of basins of the mentioned rivers.

Analysis of the water quality of the Danube, Sava and Tisa rivers in 2021 on cross-border profiles shows exceeding the limit values of concentrations of heavy metals and individual priority and priority hazardous substances.

Considering that the characteristic of sediment is to contain "historical record" of pollution, future analyzes of sediment and water quality of these rivers will confirm possible cause-and-effect relationships.

In the final considerations, a recommendation was made to innovate the sediment quality study for the new period 2018-2022, initiating the definition of quality standards for treated sediments, which will expand the existing regulations governing the area of landfills and waste, taking into account the specific properties of material dredged from the river bottom.

Recommendations*

In order to ensure the long term stability of transboundary water relations in the European the following measures are recommended:

- ***Address hydro-political vulnerability in a comprehensive manner**:* the European institutions - member states and candidate countries should address hydro-political vulnerability in a comprehensive manner.

- ***Address transboundary water quantity management and water allocation**:* the constitutional limits to adopting water quantity management measures should not be used as a justification for inaction.

- ***Expand the scope of vulnerability management**:* the progressive approach to transboundary flood prevention and control should be extended to other hydrological and ecological extremes. This should include at least risk mapping, substantive obligations as well as cooperation procedures.

* Transboundary water cooperation in the European Union: a hydro-political gap assessment (2015)


THANK YOU
FOR YOUR ATTENTION