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Co-organised by Ruđer Bošković Institute and University of Dubrovnik, with the participation of IAEA

11<sup>th</sup> International SedNet conference

Sediment as a dynamic natural resource - from catchment to open sea

3-5 April 2019 – Dubrovnik, Croatia



Universität für Bodenkultur Wien



Hochschule für Angewandte Wissenschaften Hamburg  
Hamburg University of Applied Sciences



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**THANK YOU TO THE LOCAL ORGANISING TEAM:**

Jasmina Obhodaš, Ruđer Bošković Institute

Ana Bratoš Cetinić, University of Dubrovnik

Marijana Pečarević, University of Dubrovnik

Marija Marguš, Université Lille & Ruđer Bošković Institute

**AND TO:**

**Marinka Kutle, Josip Gregac, Andrija Vinković**

# Sediment as a dynamic natural resource - from catchment to open sea



## Wrap up platform sessions

1. Sediment management concept and sediment policy
2. Sediment quality guidance, sediment quality assessment
3. How can sediment management influence ecosystem services provision?
4. Climate change and sediments: direct and indirect consequences
5. Circular economy – sediment as a resource (SedNet WG CE)
6. Impacts of disturbed sediment continua & mitigation measures (SedNet WG Q)
7. The impact and transport of micro-plastics
8. Ballast water and sediments – BWM Convention
9. Nuclear and isotopic analytical techniques in sediment analysis



# 1. Session “Sediment Management/Policy”

1. Examples showing the need to rethink sediment management (3 hotspots in Italy, 3 bypasses on Rhone (France), contaminated marine sediments in Northern countries, Elbe: contaminants come from upstream: need to go to court?,...)
2. Many River Basins have or are making a Sediment Management Concept (Elbe, Sava, Danube, Rhine, Scheldt, Swedish agenda, SMC’s in Italy,...)
3. Many want to make a Sediment (Management Concept) Guidance Document (Sava, Danube, SedNet, ECOSTAT,...)  
=> Would be nice to work together!
4. SedNet will start a working group on “Sediment Management Concepts & Education-Science-Policy Interfacing”  
Want to share experiences? Want to help develop SMC Guidance Document, Sediment Game and Sediment Movies? Let us know!

## 2. Session “Sediment Quality Guidelines, Sediment Quality Assessment”



1. We haven't yet understood the complexity of the sediment-water-biota system and need to gain greater biogeochemical knowledge. For management purposes, however, there is a need to be pragmatic but we may make mistakes due to the lack of understanding.
2. Many countries have revised their national frameworks for sediment assessment in recent years or are currently developing sediment quality guidelines and decision support systems for different purposes (remediation, DM management etc). They usually address a (very) limited list of chemicals, few of them emerging substances.
3. ...while still new substances are detected in the environment which may have toxic potential.
4. Ecotoxicological data are considered to have an important role in the assessment of sediment quality, and new frameworks and tools are being developed. But there are still challenges to deal with regarding their use for regulatory purposes.

## 2. Session “Sediment Quality Guidelines, Sediment Quality Assessment”



5. A number of case studies illustrated the extent of contamination problems, that still exist (the “fiberbank” in Sweden, the boat harbor contamination in Nova Scotia) or are just created, e.g. due to tourism (Krka NP)
6. Different methods such as chemical forensic analysis and transport modelling could help to identify polluters and make them pay.

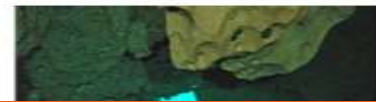




## WGMS

Working Group on Marine Sediments in Relation to Pollution

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## MCWG

Marine Chemistry Working Group

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## WGBEC

Working Group on Biological Effects of Contaminants

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## Workshop on sediment classification and management decisions - in situ and ex situ, freshwater and marine



Prepared by Susanne Heise

Propose a joined up workshop of SedNet sediment management group with members of Ices working groups WGMS (Working group for marine sediments in pollution); MCWG (Marine Chemistry Working Group), and WGBEC (Working group for Biological Effects of contaminants)

This block contains two logos. On the left is the SedNet logo, which includes the text 'SedNet' in blue, the European Union flag, and the text 'European Sediment Research Network' written vertically. On the right is the ICES/CIEM logo, which features a stylized blue and green circular emblem with white dots, followed by the text 'ICES' and 'CIEM' in blue. Below the logos are the words 'Groups' and 'Committees' in red and blue respectively.

When: September 2019

Aims to further define approaches for developing sediment guidelines, including ecotox methods

Contact: Susanne Heise or Claire Mason

### 3. Session “How sediment management can influence Ecosystem Services (ES) provision”

1. **Van der Biest *et al.*** (Belgium) developed a ready to use, spatially explicit GIS tool to evaluate and select best options for relocation of dredged material in estuaries to boost provision of 7 sediment related ES
2. **Gallani & Maglio** (USA) successfully relocated dredged material in several US estuaries to construct berms and reconstruct wetlands. Thus boosting ES provision, mainly by sedimentation and thus habitat creation behind the berms
3. **Basson & Sawadango** (South Africa) provided the scientific underpinning for removing disposed, blocking dredged material thus restoring the connection of an estuarine lake to the sea. This will likely reduce the silt content and thus provide potential to boost ES provision (a.o. fish production)
4. **Zumbroich & Hahn** (Germany) developed the Kolmameter<sup>®</sup> to measure colmation, i.e. the level of compaction of a gravel bed due to clogging by fine sediment. Colmation presumably hinders achieving WFD Good Ecological Status
5. **Koenig *et al.*** (Germany) tested at the Lower Rhine their Valmorph method which evaluates hydro-morphological conditions and measures to restore these conditions. Restoration results in better habitats and thus ES provision is boosted.



## 4. Session “Climate Change and Sediments”

- \* Elvira Bura Nakic revealed how Sediments reflect the Paleo-record of redox processes, and explained how this can be shown through Assessment of Isotopic composition of Mo and U.
- \* Examples of modelling effects of Climate Change were explained by Qilong Bi (Scheldt), and Ewa Szalinska (Raba River, Poland)
- \* Daan Renders explained about the latest developments in modelling in Flanders.
- \* Luca Sittoni told about the progress made in the Living Mud Laboratory of Ecoshape.

## 5. Session “Circular Economy - Sediment as a Resource”

Beneficial use options (raw, substitute for minerals)

Beneficiary sectors (climate change, agronomy, sustainable transport and infrastructure)

Technologies for stabilization, treatment, monitoring

Case studies: full scale and pilot operations

Thinking another way

Still some barriers : regulation, social acceptance, easy mining of sand /gravel, => let's cooperate to remove these barriers. Do not evaluate environmental quality, but the added value

# 6. Session “Impacts of disturbed sediment continua and mitigation measures”



- **Sediment quantity: A SedNet working group exists and quantity is an upcoming and important topic for the conference**
- **Example of Mekong disturbed sediment continuum with far-reaching impact on FWE nexus (Matt Kondolf)**
  - Integrative approach: Only building the HPP having the smallest impact on sediment disruption compared to their effectiveness
  - Taking economic view of the total lifespan of a HPP into account (also deconstruction) often leading to a shift to other renewable energies
- **Example of long-term sediment management at Elbe and Rhine River (Stefan Vollmer)**
  - showed that mitigation measures on the whole catchment area worked and stopped the erosion trend (for the Rhine River).
  - An evaluation concept (ValMorph) was presented serving as a sound method to quantify morphological changes
- **Soil erosion in East Africa (Maarten Wynants)**
  - Addressing the global problem of soil erosion by using an integrative approach
  - Together with effected population mitigation methods are discussed and implemented (education as an important factor for the success of measures)

## 7. Session “The Impact and Transport of Microplastics”



- Presence of microplastics in different aquatic environments (rivers and ports, continental shelf seas, caves)
- Different sites → different sources → different sampling techniques → different challenges → different standards

Take away: Standardization of sampling techniques and standards necessary!  
ISO have so far prepared one guidance document on this issue



- In each environment the transport pathways were investigated (spheres, filaments, weathering of particles) through sampling and modelling

Take away: We still have a lot to learn about how these microplastic particles and filaments move and interact – especially with sediments



- Toxicity and bioaccumulation is a big concern – microplastics eaten by benthic fauna and therefore enter the food chain

Take away: Bioaccumulation means the plastics ‘we’ dispose of may end up in our guts!!



# Session 8/9: Ballast Water Management convention & Nuclear and isotopic analytical techniques in sediment analysis sessions



- 1. Dr. Vladivoj Valković**, Sagittarius Consulting: Sediments in ballast waters have been shown to be forgotten problem. They have to be analyzed before disposal for potential toxic chemicals and for biological species hidden in sediments. The method based on electron beam irradiation has been proposed to biologically neutralize sediments.
- 2. Dr. Günseli Yaprak**, Ege University, Turkey: Has shown the use of nuclear analytical methods applied in dating of sediment cores in combination with studies of heavy metals as contaminants in Candarli Gulf of Turkey. The results have shown the improvement of the sediment quality with time, especially in relation to Hg and closure of the mercury bulbs factory.
- 3. Dr. Sylvia Sander**, IAEA, Monaco, Keynote presenter: Overview of the IAEA RER7009 project “Enhancing coastal management in the Adriatic and the Black Sea by using nuclear analytical methods” which is focused on analysis of sediments as environmental archives for climate changes and pollution loadings has been presented. This included explanation of the project activities, accomplishments & plans for the end of the project Phase I. The Phase II for the next 4 years of the project, which will include Caspian as well as the Aral Sea, has been also described.

4. **Prof. Octavian Dului**, from Bucharest University, Romania: Presented elaborated and very interesting results for the sediment core obtained from the Black Sea, representing 1000 years of history. It has been shown in the presentation that Black Sea became anoxic before 7000 years ago. The evidences of this can be seen in increased content of Se (16x), Mo (40x) and U (4x). However no evidences of the reduced Fe has been found, but research on this has been continued.

5. **Dr. Marija Marguš**, Ruđer Bošković Institute, Croatia and University of Lille, France: Development of the electrochemical analytical method for field applications has been presented for trace elements analysis of sediments. Some interesting results have been presented for the Wallonia region, France. Good comparison between electrochemically obtained results and ICP-OES has been obtained.

6. **Prof. Marina Frontasyeva**, JINR, Russia: The analytical capabilities of epithermal neutron analysis has been presented and some analysis on the sediments from the Black Sea (Romania and Russia) and Mediterranean (Egypt) have been presented. It has been shown that neutron activation is a very powerful method for sediment analysis.

# **12<sup>th</sup> SedNet Conference in Lille**

## **See you there in 2021!**





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