



International scientific workshop

INFLUENCE OF ACTIVE MINES ON FRESHWATER ECOSYSTEMS

May 12-16, 2014

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Ruđer Bošković Institute
Zagreb, Croatia

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RUĐER BOŠKOVIĆ INSTITUTE
Division for Marine and Environmental Research
Laboratory for Biological Effects of Metals
Laboratory for Aquaculture and Pathology of Aquatic Organisms
Zagreb, Croatia

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UNIVERSITÉ DE PAU ET DES PAYS DE L'ADOUR/CNRS
Institut des Sciences Analytiques et de Physico-chimie pour l'Environnement et les Matériaux
Pau, France

organize

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within activities of the Projects:

1. The assessment of availability and effects of metals on fish in the rivers under the impact of mining activities (project leaders: Dr. Zrinka Dragun and Dr. Maja Jordanova)
2. Bacterial and parasitological communities of chub as indicators of the status of environment exposed to mining activities (project leaders: Dr. Damir Kapetanović and Dr. Rodne Nastova)
3. Intracellular mapping of essential and nonessential trace elements in the organs of indigenous fish by NanoSIMS (project leaders: Dr. Zrinka Dragun and Dr. Dirk Schaumlöffel)

Workshop organizers:

Dr. Zrinka Dragun and Dr. Vlatka Filipović Marijić
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Division for Marine and Environmental Research
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Dr. Damir Kapetanović and Dr. Damir Valić
Ruđer Bošković Institute, Zagreb, Croatia
Division for Marine and Environmental Research
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PROGRAMME

Monday, May 12, 2014

Arrival and registration

Tuesday, May 13, 2014

- 10:00-10:15 Zrinka Dragun, Damir Kapetanović: Welcome address and introduction to the workshop
- 10:15-10:35 Zrinka Dragun: Water quality of mining impacted rivers in the north-eastern Macedonia: I. Physico-chemical parameters and concentrations of dissolved metals/metalloids
- 10:35-10:50 Damir Kapetanović: Water quality of mining impacted rivers in the north-eastern Macedonia: II. Microbiological water quality of rivers Bregalnica, Zletovska and Kriva - Preliminary results
- 10:50-11:20 Coffee break
- 11:20-11:40 Katerina Rebok: Morphometric data of Vardar chub (*Squalius vardarensis*) in the rivers under the impact of mining activity
- 11:40-12:00 Sheriban Ramani: Accumulation of metals and metalloids in the liver and gills of Vardar chub (*Squalius vardarensis*) from three mining impacted rivers in north eastern Macedonia
- 12:00-14:00 Lunch break
- 14:00-14:20 Vlatka Filipović Marijić: Evaluation of dietary metal exposure of *Squalius vardarensis* dwelling in mining impacted rivers in the north-eastern Macedonia
- 14:20-14:40 Nesrete Krasnići: Cytosolic distribution of Cd, Co, Cu, Fe, Pb, V and Zn in liver, gills and intestine of Vardar chub (*Squalius vardarensis*) from mining impacted rivers in Macedonia
- 14:40-14:50 Irena Vardić Smrzlić: Molecular characterisation of the metazoan parasites of Vardar chub (*Squalius vardariensis*) from three rivers in north eastern Macedonia
- 14:50-15:20 Coffee break
- 15:20-15:40 Vlatka Filipović Marijić: Acanthocephalans, fish intestinal parasites, as bioindicators of metal exposure in rivers impacted by mining waste
- 15:40-16:00 Nesrete Krasnići: Metallothionein and total protein concentrations in gills and liver of Vardar chub (*Squalius vardarensis*) as biomarkers of water contamination in three rivers in Macedonia

Wednesday, May 14, 2014

- 10:00-10:15 Damir Kapetanović: Bacterial community of Vardar chub (*Squalius vardarensis*): Preliminary results
- 10:15-10:30 Damir Valić: Hematological assessment of Vardar chub (*Squalius vardarensis*) from three rivers in north-eastern Macedonia
- 10:30-11:00 Coffee break
- 11:00-11:20 Josip Barišić: Spatial and seasonal variability of histopathological alterations on the gills of Vardar chub (*Squalius vardarensis*) from mining impacted rivers in the north-eastern Macedonia
- 11:20-11:40 Maja Jordanova: Toxicopathic changes in Vardar chub (*Squalius vardarensis*) in rivers under the impact of mining activities
- 12:00-14:00 Lunch break
- 14:00-14:30 Dirk Schaumlöffel: Potential and challenges of NanoSIMS for element imaging in biological cells
- 14:30-14:45 Zehra Hajrulai-Musliu: Fatty acid composition in some river fish species in Republic of Macedonia
- 14:45-15:00 Risto Uzunov: Detection of methyltestosterone with ELISA method in fish

Thursday, May 15, 2014

- 08:00-21:00 Visit to Research marine station "Martinska" near Šibenik and National Park "Krka"

Friday, May 16, 2014

Departure

Water quality of mining impacted rivers in the north-eastern Macedonia: II. Microbiological water quality of rivers Bregalnica, Zletovska and Kriva – Preliminary results

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Risto Uzunov⁵, Aleksandar Cvetković⁵, Zehra Hajrulai-Musliu⁵, Stojmir Stojanovski⁶,
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Contamination of surface waters is a world-wide environmental problem. Anthropogenic activities like industry and mining can increase metal concentrations in the surface waters and may result in significant deterioration of water quality. Microorganisms are commonly used as biological indicators of surface water conditions. Microorganisms respond rapidly to changes in their environment due to their short generation time. Metal toxicity, acidic pH and low nutrient levels result in stressed microbial communities. High levels of heavy metals can affect the structure of microbial communities, resulting in decreased metabolic activity and diversity of microorganisms.

Therefore, there is a need to monitor microbial water quality and to provide insight into their interactions with the impact of mining and the subsequent implications on the rivers ecosystem function.

Two rivers were chosen for this study in autumn 2012, the Zletovska River, which receives waste from the Zletovo mine, and the Kriva River, which receives waste from the Toranica mine. The Bregalnica River was chosen as a non-impacted aquatic system.

Microbiological analyses of river water were performed using defined substrate technology. Total coliforms bacteria were identified using Colilert test (IDEXX Laboratories., Westbrook, USA), whereas enterococci were identified using Enterolert-E test (IDEXX Laboratories). Total coliforms and enterococci were enumerated using Quantitray 2000 (IDEXX Laboratories), which used a 97-test-well system and provided the most probable number (MPN) of bacteria/100 mL.

Analysis of the microbial water quality showed higher levels of bacterial indicators in the rivers Kriva and Bregalnica downstream from the big cities. Together with significantly higher number of bacterial indicators an increase in nitrate and phosphate was observed, indicating a particular anthropogenic impact on these rivers. A small number of bacterial

indicators were found in the Zletovska River, indicating less anthropogenic influence, but it is not possible to say is that the effect of pollution from mining activities.

Based on these preliminary results from one sampling season, it can be concluded that the impact of large cities is significant on analyzed rivers from a microbiological point of view.