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Refinement of biomonitoring of urban water courses by combining descriptive and ecohydrological approaches

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Abstract

Two approaches are proposed for developing adapted metrics, proposing realistic and sustainable ecologic objectives, and suggesting a management strategy for stream rehabilitation. The first approach implemented a harmonization system of French standardized biotic indices. The second one was based on the development of functional traits (FTrs), which were defined by oligochaete assemblages inhabiting coarse surface sediments and the hyporheic system. The harmonization system allowed to define a weighted general ecological quality. The FTrs characterized an ecological potential (EP) resulting from interactions between physical factors (dynamics of hydrologic exchanges between surface water and groundwater) and chemical factors. An example of using both approaches at the same urbanized site is presented and serves for planning of rehabilitation activities. The benefits, drawbacks and progress of both approaches are discussed.

Keywords: urbanized hydrosystems, biotic indices, ecosystem functioning

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Hydric potential of landscape and integrated river basin management in mountain and submontane regions

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Abstract

As water becomes increasingly scarce, water managers are seeking new and sustainable solutions to water supply problems. Any inappropriate human activity in a river basin can bring about a series of irreversible changes that may completely influence the character of water resources and the way of their downstream usage. The presented methodical principle represents an attempt to solve problems of the international interest in relationship between human activities, the environment and natural resources, particularly water and soil resources. The main idea of the principle is to select areas with the greatest landscape potential for infiltration and retention of atmospheric precipitation. Then, in the areas there follows management of human activities for supporting of precipitation infiltration and retention as well as for minimizing possible adverse environmental and socio-economic consequences. Methodology was used in the upper Váh river basin (Slovakia) which represents a significant territory of the Váh River spring areas.

Key words: IRBM, water resources, infiltration, retention, precipitation, human activities

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Appearance of toxigenic cyanobacteria in two Polish lakes dominated by *Microcystis aeruginosa* and *Planktothrix agardhii* and environmental factors influence.

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Abstract

The aim of this study was to analyze and compare the relationship between environmental factors (temperature; pH; total phosphorus - TP and nitrogen - TN and their ratio) and occurrence of microcystin producing cyanobacteria in two shallow, eutrophic Polish water bodies, Sulejów Reservoir (Central Poland) and Bnińskie Lake (Western Poland). Samples for analyses were collected from June till October 2005. Cyanobacteria *Microcystis aeruginosa* and *Planktothrix agardhii*, responsible for microcystins production, were detected respectively for Sulejów Reservoir and Bnińskie Lake. Molecular analysis of the *mcyE* gene, indicated the presence of toxigenic strains of cyanobacteria in both water bodies throughout the whole sampling period. The highest extracellular microcystins toxicity established by PPIA was 2.83 $\mu\text{g dm}^{-3}$ and 2.19 $\mu\text{g dm}^{-3}$ in samples dominated by *M. aeruginosa* and *P. agardhii* respectively. Two different environmental factors in studied water bodies were crucial in occurrence of hepatotoxic cyanobacteria. The strong correlation between biomass of *M. aeruginosa* and total nitrogen (TN) in Sulejów Reservoir ($R=0.83$; $p<0.05$) was observed. Strong negative correlation was found between biomass of *P. agardhii* and temperature ($R=-0.77$; $p<0.05$ and $R=-0.70$; $p<0.05$) in Bnińskie Lake.

Keywords: cyanobacteria; *mcyE* gene; microcystins; environmental factors; toxicity

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**Nearshore fluctuations in water chemistry,
microcystins and coliform bacteria
during the ice-free season in Lake Winnipeg,
Manitoba, Canada**

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Abstract

The aim of this study was to identify empirical relationships among 12 water chemistry parameters, microcystins, and coliform bacteria at four beaches in Lake Winnipeg, Canada. While microcystin fluctuations were not synchronized among the different sites, concentrations were marginally correlated with concurrent nitrate levels at individual sites, but lagged more significantly behind soluble inorganic phosphorus, and inversely behind the nitrate-N/soluble phosphorus ratio (NPR). Microcystins were also inversely correlated with copper, which was used as an algaecide in the lake. Total coliform bacterial counts (TC) were significantly greater at times of increased turbidity, temperature, and higher inorganic phosphate and dissolved organic matter. TC were also inversely correlated with NPR.

Key words: nitrogen, phosphorus, copper, cyanobacteria, beaches

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Overview of limitations, and proposals for improvement, in education and capacity building of Ecohydrology

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Abstract

Ecohydrology has the potential to make a significant contribution to the global need for improved water resources management. An investigation was conducted into educational and capacity building activities related to ecohydrology in an effort to better integrate understanding, promote awareness of existing activities, and to recommend action for global knowledge translation. Based on a survey of key partners and a review of the literature, three key observations were made: 1) consistency in the use of the definition and key concepts behind ecohydrology must be achieved, 2) development of a framework for courses in ecohydrology be developed for application on a regional and global scale and 3) there may be existing educational materials on ecohydrology but they are not well publicized or accessible even to seasoned practitioners. These recommendations are currently being implemented with the development and testing of three pilot courses.

Key words: water resource management, hydroecology, ecohydraulics, environmental flow

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Water quality in cutaway peatland lakes in Seda mire, Latvia

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Abstract

Transformation into shallow lakes can be a major post-harvesting land-use option for cutaway peatlands. We focused on lakes created on areas of a cutaway bog in the Seda Mire, Latvia, and the aim of our study was to analyse factors influencing water quality and communities in the cutaway lakes. It has been found that the residual peat amount and the lake feeding conditions (the balance between ground water and inflow from adjacent river during the spring season) are the major factors influencing aquatic chemistry and studied habitats. The studied cutaway lakes can not be considered as typical bog lakes regarding hydrochemical composition (especially concentrations of major dissolved ions, pH and water colour) and hydrobiological features (metabolic activity, biomasses and number of species in phytoplankton and zoobenthos). Considering aquatic chemistry and community structure of the cutaway lakes, a recommendation has been made in respect to peat excavation to transform peat mining sites to lakes.

Keywords: biological diversity, cutaway lakes, cutaway peatland, Latvia, water quality

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Monitoring of organic load in a tropical urban river basin (Cameroon) by means of BOD and oxydability measurements

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Abstract

The tenor in organic matter has been assessed in an urban aquatic ecosystem the Mfoundi River Basin of Cameroon. The double technique of the Biochemical Oxygen Demand (BOD₅) and the Oxydability test have been employed in this assessment. The results obtained indicate a high content of organic matter in the watershed with the highest values of BOD 297.5 mg O₂ dm⁻³ and Oxydability 50.255 mg O₂ dm⁻³ observed at the Akeu stream. The spearman correlation coefficient between BOD₅ and Oxydability for the seasonal distribution is 0.22 which is positive but not statistically significant due to a high variability of biodegradable and non-biodegradable organic matter present in the river basin. The same value calculated between these organic tests with respect to the sampling sites is negative (-0.15) due probably to their abiotic and biotic heterogeneity. The results reveal a high tenor in organic matter in the hydro-system during the dry season, with a relative reduction during the rainy season, a situation that exposes the population of Yaoundé and its environs to acute pollution which can lead to numerous water related health hazards.

Key words: Assessment, BOD, Oxydability, Bio-degradable substances, pollution, hydrosystem

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Spread of alien *Impatiens glandulifera* along rivers invaded at different times

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Abstract

Invasion of *Impatiens glandulifera* was reconstructed along rivers in the Czech Republic, central Europe, based on floristic records. The occurrence was assessed along river banks, outside the river banks, and along tributaries downstream from the first records of the species in 1902, 1903, 1978 and 1995, respectively. The following main results were obtained: (a) The species nowadays occupies 77% of the river length in the country. (b) The rivers, investigated in detail, did not differ in the occurrence of the species along the river banks. (c) There were some significant relationships between the penetration of *I. glandulifera* far from the river banks both in terms of the lateral dimension in the main valley, and upstream along the tributaries, and the time of the first occurrence of the species on the river. (d) It took approximately 20 years from the first occurrence on the main river and the start of spread along the tributaries. The process of invasion is still in progress after about one century and further spread is expected.

Key words: Czech Republic; Invasive plant; Rate of spread; Riverine habitats; Time of invasion

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Life history pattern of the Bitterling *Rhodeus amarus* (Bloch, 1782) in Siahroud River (southern Caspian Sea-Iran)

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Abstract

A total of 272 specimens of *R. amarus* caught in Siahroud River at the southern Caspian Sea from March 2006 to February 2007 were examined for life history attributes. Length-at-age was different between sexes. The von Bertalanffy growth function fit to back-calculated size at age data were: $L_t = 94.16 [1 - e^{-0.31(t+0.321)}]$ and $L_t = 92.33 [1 - e^{-0.32(t+0.488)}]$ for males and females respectively. WLR was estimated as $W = 0.0074TL^{3.4546}$ for males and $W = 0.0133TL^{3.0550}$ for females, positive allometric for both sexes. There was no significant difference from parity in the overall sex ratio. The reproductive season is extended from March to June, with a culmination point in April. Two kinds of eggs were found; small eggs measuring between 0.42 and 0.91mm with a mean value of 0.57 ± 0.08 , and large yolk-filled eggs ranged from 0.88 to 2.20mm with a mean value of 1.49 ± 0.24 (S.D.). The average absolute and relative fecundities were 329.74 eggs and 187.40 eggs g^{-1} respectively. Variability of life history patterns of the fish in the basin could be interpreted as species response to basin condition.

Key words: *Rhodeus amarus*, age structure, reproduction, Iranian Caspian basin

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