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Water observation and information systems for decision support

Water observation and information systems for decision support: editorial

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Assessment methods as Ecohydrology drivers

Towards ecohydrological approach of biomonitoring in running waters

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Abstract

The biomonitoring of aquatic life by traditional tools (qualitative indices) is more than 60 years old. These traditional tools are still developed and routinely used, particularly for the European WFD implementation which needs such cheap methodologies based on simple taxonomical identifications, and being likely shared by the greatest numbers of partners. More modern conceptual frameworks and functional methodologies were developed during the 1970s and 1980s, including production studies, but did not receive enough attention. The abuse of traditional concepts and methods leads to significant conceptual and methodological impoverishments in freshwater biomonitoring. A new multi-disciplinary ecohydrological approach, based on a functional conceptual framework (EASY concept, harmonization system), functional tools (functional traits, riverscape types), and a research management guidance, is proposed. Its development is discussed, demonstrating that it is possible to conciliate innovation and routine application, particularly when rehabilitation or restoration actions are planned.

Key words: Running waters, Ecohydrology, functional biomonitoring, research management guidance

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Novel algorithm for diatom classification in Lake Prespa using log-normal distribution

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Abstract

One way to discover the indicating properties of the diatoms and the suitable conditions for their survival is to use ordination techniques. However, these techniques lack of easy interpretability. Also, according to some researches the latest technique used, detrended correspondance analysis (DCA), can hide the real data structure or can even introduce new distortions. In this paper, we propose a novel algorithm that aims to discover the diatom indicating properties directly from the measured data. Our algorithm induces pattern trees (PTs) that are resistant to over-fitting and are robust to data changes. In order to provide a more accurate prediction, we use log-normal distribution.

Key words: Pattern tree (PT), log-normal distribution, Lake Prespa, diatom models, water quality classes

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Water pollution induced by rainfed and irrigated agriculture in Mediterranean environment at basin scale

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Abstract

The study area is a small basin (190 ha), located in centre of the Portugal, and the agricultural activity is developed in the winter and irrigation season. The nitrates and the total dissolved solids load depends, all time, on the availability in the soil and the runoff volume, due to its solubility. The ammonium shows a different dynamic; when it is present in large amount in the soil, its load depends on the sediments load and the extremes peak flow. The total daily load of sediments does not show a direct relation with de runoff volume, except when it has a sufficient energy to detach and carry out, as during extreme events.

Key words: irrigation, non-point source pollution, pollution transfer, watershed, Ecohydrology

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Ecosystem controlling factors to focus the research

Surface and groundwater drought evaluation with respect to aquatic habitat quality applied in Torysa river catchment, Slovakia

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Abstract

Natural conditions of drought occurrence are often combined with human activities strengthening drought consequences. Occurrence of meteorological, surface and groundwater droughts was analysed for the upper part of the Torysa river catchment. The influence of water abstraction was evaluated. Habitat suitability curves derived according to IFIM methodology were constructed for *Barbus carpathicus*. Minimum flow, below which unfavourable life conditions for barbel occur, was estimated on $0.300 \text{ m}^3 \text{ s}^{-1}$. The longest period of drought with the discharge below the minimum flow occurred during the multiyear drought 1986-1987. The problem of minimum flow preservation should be solved in the upstream part of the catchment, where natural streamflows are strongly influenced by water abstraction. Such an approach is fully compatible with the requirements of the integrated water resources management strategy.

Key words: surface water, groundwater, drought, IFIM methodology, natural regime, abstractions

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Assessment of riparian forest vegetation of rivers supporting the Prespa trout in the Transboundary Prespa Park

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Abstract

The QBR (Riparian Forest Quality) index and the RMP (Riparian Macrophyte Protocol) were used to assess habitat quality and inventory riparian forests in four rivers sustaining the endemic Prespa trout (*Salmo peristericus*). Total QBR index and total riparian cover (first component of the QBR index) values were found significantly higher in the upper parts of Brajcinska and Kranska rivers, while lower values were recorded in the upper parts of Agios Germanos river and Leva stream. Cover structure, cover quality and channel alteration (the other three components of the QBR index) did not differ significantly between the four watersheds. The greater presence of *Fagus sylvatica* in the former rivers principally contributes to their increased total riparian area and riverbed cover compared to those of the two latter rivers. In the altitudes below 900 m.a.s.l., where gradients are gentle and human activities intense, vegetation types in all four systems change considerably with the participation of non-native species, while riparian area and riverbed cover are reduced.

Key words: habitat quality, rapid assessment methods, macrophyte functional groups, *Salmo peristericus* conservation

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Effects of climate change on zooplankton community structure of the middle stretch of the Daugava river over the last 50 years

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Abstract

The aim of this research was to evaluate dynamics of the zooplankton community in the middle stretch of the Daugava river over the last 50 years and the possible impact of the climate change namely variability of temperature and hydrology on zooplankton community fluctuations. Quantitative (abundance, biomass, number of taxa), qualitative (species composition) characteristics, species diversity (Shannon–Wiener index) and saprobity index (S) were employed for the analysis of zooplankton community structure in the Daugava river. For determination of zooplankton community correlated similarity Renkonen percentage similarity (Renkonen index) was used. Historic hydrological and air temperature data were analysed. A tendency for the total abundance of zooplankton and species diversity to decrease has been recorded. Relevant changes in species structure have been stated. There are also changes in the species occurrence according to seasons. Such changes could be attributed to the long-term changes in climate, namely variability of temperature and hydrology of the Daugava drainage basin.

Key words: large river, long-term changes, Rotifera, Cladocera, Copepoda

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Temporal variability of nutrients and chlorophyll *a* in the Boka Kotorska bay, eastern Adriatic Sea

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Abstract

The Boka Kotorska bay, located in the SE part of Adriatic Sea, is influenced by great influx of fresh waters from numerous water streams and submarine springs. Seawater samples were taken from five depths (0, 2, 5, 10 and 15 m) weekly, at one station in Kotor bay, from March 2008 to February 2009. Nutrient salts varied widely, with maximum values 23.91 $\mu\text{mol dm}^{-3}$ for nitrates, 1.52 $\mu\text{mol dm}^{-3}$ nitrites and 0.77 $\mu\text{mol dm}^{-3}$ for phosphates. Chlorophyll *a* concentration ranged from 0.12 to 11.13 mg m^{-3} and the highest value was measured in winter period of the year (February). It seems that the reason for this is the land-based nutrient input into the coastal area. According to the different criteria for nutrients and chlorophyll *a* concentration the area could be mesotrophic, and we could conclude that the natural eutrophication still prevails over the anthropogenic eutrophication in this part of the Adriatic Sea. This study should help in determining future data needs for monitoring of water quality and human and climate influence on the health of the bay.

Key words: eutrophication, Adriatic Sea, monitoring, physico-chemical parameters

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Natural processes as tools to reduce human impacts

Co-conception of integrated flood management solutions: riverscapes to facilitate dialog

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Abstract

When involved late in flood mitigation projects, biologists can suggest only minor changes. Conception should be multidisciplinary from the start. Riverscapes appear an excellent support to exchange information and share common conceptual views. Biologists thus summarize their expertise and local analyses, including a description of the potential biodiversity and processes. We built a riverscape typology for Polish mountain rivers and used it as a support to discuss compromises and adaptations for dry dams and river training. Translating the technical solutions into shift of types guide the choices. Serving a purpose, the typology is case-dependant and could be revised during a project. Riverscapes could also potentially be useful in multidisciplinary research.

Key words: flood mitigation, Polish Silesia, dry dams, river training

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Low water transport in fractal microstructure of tropical soils: application to chlordecone pesticide trapping

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Abstract

Chlordecone, a toxic organochlorine insecticide, is a major long term source of pollution of soils and water resources in West Indies. Allophanic soils have been strongly polluted and we show that the clay microstructure should be an important physicochemical characteristic limiting the transfer of the pesticide in water. We demonstrate the fractal structure of the allophane clay, at the nanoscale and show that it exist a correlation between the allophane fractal structure and the poor pesticides transfer from allophanic clay to water. We propose that the fractal features and associated poor low transport properties could explain why allophane clay is able to retain pesticides. Comparatively, these allophanic clays could be highly polluted but less contaminant for water resources and diffusion in environment.

Key words: water pollution, chlordecone, pesticide, allophane, fractal structure, diffusion coefficient

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Coal ash as adsorbent for heavy metal ions in standard solutions, industrial wastewater and streams

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Abstract

One of the subjects of interest in the last years, is to develop new applications of fly ash, produced in growing quantities by burning coal in all coal-fired power stations. In this study, we have investigated the possible effects of Kosova lignite fly ash as adsorbent for removal of heavy metal ions in standard solutions, industrial wastewater and the natural water body (Sitnica river). Achieved results showed that 10 minutes of contact time, for standard solutions and natural water body, were appropriate for efficient adsorption of ions reaching the maximum removal to 99.89 wt% and 60 minutes of contact time for industrial wastewater, reaching the maximum removal of 98.12%.

Key words: fly ash, adsorption, pollution

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