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Prediction of storm-related sediment-associated contaminant loads in a watershed scale

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Abstract

Suspended sediment moving in watersheds provides a pathway for the transport of sediment-associated contaminants. Information about sediment and nutrients exported from catchments as well as related erosive processes are required by catchment managers and decision-makers. Due to lack of adequate data in this respect, the Modified Universal Soil Loss Equation (MUSLE) model has been applied in storm-related sediment yield predictions in the Kojour watershed, Iran, to estimate the phosphorus (P) and organic matter (OM) loads associated with storm-related sediments The results of this study showed that a calibrated MUSLE model could estimate storm-related OM and P losses in the study area within an acceptable estimation error (RE) of 33% and 23%, respectively.

Key words: sediment-associated contaminant, organic matter, phosphorus loss, MUSLE, sediment graph, chemographs.

Biosorption of Cd and Ni by inactivated bacteria isolated from agricultural soil treated with sewage sludge

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Abstract

In this study, the capacities of the bacterial biomass in binding simultaneously two metals, Cd and Ni, isolated from soils subject to long-term sewage-sludge applications in Ahvaz, were investigated. Three strains of bacteria were isolated based on their resistance to these metals; namely, *Actinomycete* sp*., Streptomyces* sp. and *Bacillus* sp. The inactivated forms of these bacterial cells were investigated. *Actinomycete* sp. was the most tolerant isolate to Cd and Ni ions. Freundlich isotherms indicated that the sorption capacities on the biomass surfaces increased with increasing initial metals concentration of both metals. Generally, the biosorption of Ni was slightly higher than that of Cd. These results suggest that native bacteria in polluted area are competent candidates for bioremediation and improving soil quality for agricultural purposes.

Key words: Biosorption, metal resistant bacteria, MIC, Cd, Ni.

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Distribution of macroinvertebrates in relation to the quantity and quality of organic matter in streams in the western Czech Republic

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Abstract

Data on benthic macroinvertebrates from the western Czech Republic were used to test the hypothesis that benthic macroinvertebrates are either 'low-cost' or 'high-cost' life forms. A wide head and long legs were regarded as 'high-cost' features, whereas a simple tube-like body without appendages as 'low-cost'. A second hypothesis was that the quantity and nutritional value of benthic and suspended organic matter ingested was correlated to the forms present. The suspended organic matter deposits on the bottom, so total organic carbon concentration (TOC) was used to represent food availability. Because the nutritional value depends on the quantity of algae, the chlorophyll-a concentration to TOC ratio (Chl-a : TOC) was used to represent food quality. The results confirmed both hypotheses, showing that the high-cost life forms prefer high food quality (Chl-a : TOC) and low food quantity (TOC), whereas the low-cost life forms prefer the opposite. The findings help to better understand the distribution patterns of rare and endangered species.

Key words: total organic carbon, chlorophyll-a, food.

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Phytoplankton communities in ecological assessment of the Southern Bug River upper reaches (Ukraine)

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Abstract

We conducted an environmental assessment for the first time in the upper reaches of the Southern Bug River utilizing data on phytoplankton communities and hydrochemistry. Chlorophyta (40%), Bacillariophyta (19%), and Euglenophyta (18%) were among nine identified divisions of common phytoplankters which included 281 taxa. The results of a statistical comparison of species richness showed that the investigated part of the river can be divided into two parts for follow-up monitoring. Class II-III waters reflect a trophic status equivalent to an oligo- to meso-trophic state. Using algal indicators as well as environmental variables and statistical methods, we identified major factors impacting the algal communities, such as phosphate and ammonia.

Key words: Phytoplankton, species composition, indicators, abundance, biomass, statistics.

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The role of a eutrophic lowland reservoir in shaping the composition of river phytoplankton

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Abstract

The manuscript documents the role of a shallow eutrophic reservoir, Siemianówka Dam Reservoir, in deterioration of water quality in a dammed lowland river basin. Changes in phytoplankton composition and abundance were observed along a 152.5 km section of the Narew River. Favourable conditions for phytoplankton growth (TN > 1.5 mg dm-3, TP > 100 μg dm-3, water temperature between 18-25°C, pH 6-9) in the reservoir resulted in a more than one hundred fold increase in phytoplankton biovolume. The significant effect of limnoplankton on potamoplankton was manifested by the dominance of Cyanobacteria from mid-summer to autumn in the river reach below the dam. Water retention time, daily water outflow and molar TN:TP ratio were the factors favouring mass development of Cyanobacteria in the reservoir. However, the meandering character and low flow velocities in the outflowing river, together with the way of operating the dam gates, favoured the Cyanobacteria development in the river reach below the dam. The study demonstrated that water retention time exceeding 3 months in shallow dam reservoirs significantly increases the risk of river water quality deteriorating as a result of mass development of Cyanobacteria.

Key words: river continuum, long water retention time, eutrophication, change of phytoplankton composition.

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Feeding of small-sized European perch, *Perca fluviatilis*, in a littoral zone of a restored lake

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Abstract

The study focuses on the feeding of small-sized European perch, *Perca fluviatilis*, in a lake after stocking with predatory fish and their effect on zooplankton in view of on-going lake restoration. It has been assumed that predator-prey interactions should lead to increased trophic activity of perch in the littoral zone. The studies were carried out from June to October 2008. The results of catches indicated that small perch were eliminated from open water and were recorded only in the littoral zone of the lake. In their diet, a total of 19 food items were found, primarily represented by invertebrates: Cladocera, Copepoda, Diptera and sporadically Rotifera. Herbivorous forms, i.e. Calanoida or *Daphnia* sp., were frequently picked as food items (F = 40-50%). The most important food component was zooplankton, which accounted, on average, for 90% of the total numbers of consumed animals and nearly 65% in terms of food mass. Cladocera constituted for a larger part of the selected food items than Copepoda, but only in late spring and partly in summer. Significant feeding pressure on large filterfeeders of the genus *Daphnia* is expected only periodically.

Key words: zooplankton, biomanipulation, fish feeding, meromictic lake.

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Qualitative and quantitative methods for sampling zooplankton in shallow coastal estuaries

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Abstract

There are many techniques for collecting zooplankton, hence the data obtained using different methods can differ from each other. The effectiveness of quantitative and qualitative zooplankton sampling with the use of the Ruttner sampler and the Apstein plankton net was compared during a study conducted in the Vistula Lagoon. The analysed zooplankton community comprised Crustacea and Rotifera species. No significant differences ($p = 0.5294$, $\alpha = 0.05$) in the qualitative composition of zooplankton samples collected with the Ruttner sampler and the Apstein plankton net were noted in the saltwater intrusion section. Significant differences ($p = 0.0277$, $\alpha = 0.05$) were observed in the freshwater inflow, indicating that the Ruttner sampler delivers more reliable results in zooplankton communities marked by greater qualitative variation. Significant differences ($\alpha = 0.05$; $p = 0.0008$ for saline section and $p = 0.0000$ in freshwater section) in the effectiveness of quantitative sampling from both lagoon sections suggest that fewer individuals are collected with the plankton net than with the Ruttner sampler.

Key words: catching devices/sampling gears, Ruttner sampler, plankton net, Vistula Lagoon, gear efficiency.