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ABSTRACT BOOK

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THE NEXT 100 YEARS:
SENSING AND SAFEGUARDING INLAND WATERS

ON388

Lagrangian profiles of riverine autotrophy, organic matter transformation, and micropollutants at extreme drought and the consequences in the estuary

Norbert Kamjunke[1], Liza-Marie Beckers[2], Peter Herzsprung[1], Wolf von Tümpling[1], Oliver Lechtenfeld[3], Jörg Tittel[1], Götz Flöser[4], Holger Brix[4], Ingeborg Bussmann[5], Claudia Schütze[3], Dietrich Borchardt[1], Markus Weitere[1]
[1]Helmholtz Centre for Environmental Research UFZ, Magdeburg, Germany, [2]Federal Institute of Hydrology, Koblenz, Germany, [3]Helmholtz Centre for Environmental Research UFZ, Leipzig, Germany, [4]Helmholtz-Zentrum hereon, Geesthacht, Germany, [5]Alfred-Wegener-Institut, Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany

On their way from inland to the ocean, flowing water bodies, their constituents and their biotic communities are exposed to complex transport and transformation processes. However, detailed process knowledge as revealed by Lagrangian measurements adjusted to travel time is rare in large rivers, in particular at hydrological extremes. To fill this gap, we investigated autotrophic processes, heterotrophic carbon utilization, and micropollutant concentrations applying a Lagrangian sampling design in a 600 km section of the River Elbe (Germany) at historically low discharge. Under base flow conditions, we expect the maximum intensity of instream processes and of point source impacts. Phytoplankton biomass and photosynthesis increased from upstream to downstream sites. Concentrations of dissolved macronutrients decreased to almost complete phosphate depletion and low nitrate values. Molecular analyses revealed a longitudinal increase of many DOM components due to microbial production, whereas saturated lipid-like DOM, unsaturated aromatics and polyphenols, and some CHOS surfactants declined. Decomposition experiments suggested predominant oxidation of younger algal DOM over older river DOM. Micropollutants determining toxicity for algae showed higher concentrations from the middle towards the downstream part but calculated toxicity was not negatively correlated to phytoplankton. Overall, autotrophic and heterotrophic process rates and micropollutant concentrations increased from up- to downstream reaches, but their magnitudes were not distinctly different to conditions at medium discharges. In the estuary, however, phytoplankton biomass died off leading to the release of dissolved nutrients and distinct minima of pH and oxygen saturation.

ON135

Comparing four different in-lake treatments to control sediment nutrient release in an enclosure study

Li Kang[1], Maira Mucci[1], Miquel Lurling[1]
[1]Wageningen university and research, Wageningen, Netherlands

An enclosure experiment was performed between April and August 2020 to compare the efficiency of dredging, adding the aluminium-modified zeolite Aqual-P™ (AMZ), the lanthanum-modified bentonite clay Phoslock® (LMB) and $FeCl_2$ to mitigate nutrient release from the sediment in the eutrophic Bouvigne pond (Breda, the Netherlands). The treatments improved water quality. Mean total phosphorus (TP) concentrations in water were 0.091, 0.058, 0.032, 0.031, 0.030 mg P L^{-1} in controls, and dredged, $FeCl_2$, LMB and AMZ treated enclosures, respectively. Mean filterable P (FP) concentrations were 0.056, 0.010, 0.009, 0.0049, 0.0048 mg P L^{-1} in controls, dredged, $FeCl_2$, AMZ and LMB treatments, respectively. The course of nitrogen species, metals and water quality variables will be discussed; lanthanum was elevated in LMB treatments, Fe and Cl in $FeCl_2$ treatments, and Al and Cl in AMZ treatments. After 112 days, sediment was collected from each enclosure revealing that the mobile P pool in the sediments had reduced by 71.4%, 60.2%, 38% and 5.2% in dredged, AMZ, LMB and $FeCl_2$ treatments compared to the controls. No sign of vivianite formation was obtained. A sediment core incubation experiment was started simultaneously with the enclosure experiment and revealed that FP fluxes were positive in controls and cores from dredged area, while they were negative in LMB, AMZ and $FeCl_2$ treated cores. Dissolved inorganic nitrogen (DIN) release rate in LMB treated cores was much higher than in controls, and other treatments. Overall, the in-lake treatments improved water quality, but what to choose will depend on the target lake.

ON173

Biodiversity and anthropogenic impacts on fishes of Shohimardon River drainage, Ferghana valley, Central Asia

Bakhtiyor Karimov[1], Erkin Karimov[2], Bernhard Zeiringer[3], Johan Coeck[4], Daniel S. Hayes[5]
[1]National research University "Tashkent Institute of Irrigation and Agricultural Mechanization Engineers" (TIIAME NRU), Ecology and water Resources Management, Tashkent, Uzbekistan, [2]Tashkent state Agrarian University, General Zootechnology and Veterinary, Qibray, Uzbekistan, [3]University of Natural Resources and Life Sciences, Department of Water, Atmosphere and Environment, Institute of Hydrobiology and Aquatic Ecosystem Management, Vienna, Austria, [4]Research Institute for Nature and Forest, Brussel, Belgium, [5]University of Natural Resources and Life Sciences, Vienna, Institute of Hydrobiology and Aquatic Ecosystem Management, Wien, Austria

Central Asia features large-scale irrigated agriculture with a plethora of hydro-technical infrastructure and diversion schemes developed since the 1960ies. At the same time, it is regarded as a data-deficient region regarding freshwater biodiversity and biogeography. To fill these knowledge gaps, this study presents an in-depth analysis of human impacts and fish community status of a mountain river flowing from the northern slopes of the Alai and Turkestan ranges (Western Tyan-Shan) to the Ferghana valley. Here, we present results from fish ecological surveys conducted 2021-2022 in the 112km long Shohimardon River, a transboundary river between Kyrgyzstan and Uzbekistan, within the framework of the Hydro4U project funded by the European Union. The Shohimardon River, particularly its middle reaches, features over ten barriers, of which seven are fully impassible for upstream migrating aquatic biota. The field surveys revealed the presence of the snow trout species *Schizothorax eurystomus*. Snow trout populations between the mapped barriers exist but are likely only kept alive by colonization from upstream reaches. Also, fish in the diverted river reaches are smaller than those upstream. Still, signs of early sexual maturity have been detected, hinting at a slow growth rate of snow trout in Shohimardon River. Another widespread threat to native fish populations is poaching. Overall, this research underlines the high anthropogenic pressure on fishes of the studied river, particularly potamodromous species such as *S. eurystomus*. Management must prioritize fish passage and environmental flows as means of river restoration to protect aquatic biodiversity in Central Asia's mountain streams.

ON393

Eco-Evolutionary dynamics considering incompatible defence with respect to size dependent adaptation of prey against predators and parasites

Minoru Kasada[1,2], Patch Thongthaisong[1], Sabine Wollrab[1], Hans-Peter Grossart[1]
[1]Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Stechlin, Germany, [2]Tohoku University, Sendai, Japan

In natural communities, prey species are faced with multiple types of consumers and might need to adapt resistance against them simultaneously. Potential consequences of prey adaptation against multiple consumers on species abundance and community feedbacks remain unclear. Here, we have investigated how the isolated and combined presence of predators and parasites affects adaptation of prey resistance and how this influences community dynamics using a differential equation model. The model food web consists of an adaptive phytoplankton species with variable size, a zooplankton species with adaptable size, and parasitic chytrids. We assumed that parasitic chytrids are more likely to infect larger cells of the phytoplankton population, while zooplankton preferentially feeds on smaller cell sizes, but cannot ingest large phytoplankton cells. Furthermore, we assume that the phytoplankton can decrease/increase its size to escape parasite infection/predation. Correspondingly, phytoplankton faces a size tradeoff between their tolerance to predators or parasites. The model results suggest that the adaptation tradeoff may control phytoplankton's biomass and adaptation dynamics. We see that potential indirect facilitation between zooplankton and chytrids occurs. In this case, zooplankton and chytrids reach higher biomass levels and phytoplankton biomass was strongly suppressed compared to the cases with solely the predator or parasite. Yet, competitive exclusion between zooplankton and parasitic chytrids can occur in some cases. We will discuss the key parameters to induce indirect facilitation or competition at the predator/parasite level. Our study provides insight into a potentially important mechanism to control phytoplankton dynamics in response to multiple consumers.