

FLUVIAL HYDRO-MORPHOLOGY AS INDICATOR FOR THE ECOSYSTEM SERVICES PROVIDED BY RIVER CORRIDORS

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Abstract

Rivers and floodplains are often intensely used by several sectors of society, e.g. for hydropower, navigation, agriculture, drinking water supply, or recreation and tourism. These intense uses are often competing for the same area and water body, and produce significant trade-offs. In addition, the management of rivers is regulated by several EU directives. Hence, it is often difficult to prioritize the various uses and management goals in space and time. In this situation, it may be helpful to assess of the availability of the various ecosystem services offered by specific areas in river corridors under several management scenarios, and use this result for decision support. For that purpose, we developed a novel non-monetized approach to quantify a wide array of ecosystem services, the River Ecosystem Service Index (RESI) (www.resi-project.info). The RESI, which is compatible with the international CICES list of ecosystem services, first collects and collates suitable indicator data, and then applies algorithms to calculate scores of the availability of single ecosystem services ranging from 1 to 5. This allows visualizing the spatial distribution of specific ecosystem services along rivers and within floodplains, and to analyze their local trade-offs. Among the 17 ecosystem services that can be quantified so far for the RESI, 9 are partially or mainly assessed based on variables featuring the hydrology and morphology of the respective river corridor. These ecosystem services are namely provisioning of water, retention of C, N and P, regulation of floods, droughts and sediment transport, formation of soils, and habitat provisioning. This shows the importance of hydro-morphological variables not only for modelling the functioning of lotic ecosystems, but also for predicting their usability by humans. The RESI may be used to compare complex river and floodplain management scenarios, including transparent inter-sectoral visualization, and may hence serve as a decision support tool for inter- and transdisciplinary communication. The RESI has been already been implemented in practice in the framework of an official regional planning prioritization procedure for an 80-km section of the Danube River in Bavaria (Germany).

Keywords

river management; flood protection; nature conservation; recreation; ecosystem functions; GIS; assessment; ecosystem services