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Linking ecology to hydrology and geomorphology using river reach classification for the Greater Mekong Region

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Large-scale development projects, such as hydropower dams, in the Greater Mekong Region (GMR) are putting high pressure on freshwater resources. Environmental impact assessments are needed in the region to understand the possible impacts of these projects. These assessments often require biodiversity data that can be costly to acquire both in terms of time and money. It is often assumed that river or ecosystem classes, based on geo-physical characteristics, can be used as biodiversity proxies in large scale assessments to account for a lack of biodiversity data. However, there has been little research to compare the spatial distribution of river classes and fish species. It is unclear how well river classes are able to represent the distribution of fish and, more generally, biodiversity.
To address this question, a set of two classifications were compared to a newly available dataset of fish species distribution in the GMR (Allen et al., 2012). The classifications were derived from two different methods to test which could potentially better represent fish assemblages. The first classification is derived using regional expert knowledge and the second using K-mean analysis. Both are using the same geophysical datasets.
The two datasets were used in a Redundancy Analysis (RDA) to calculate which proportion of the variability in the fish species data can be explained by the river classes.
The RDA resulted in R2 of 0.44 for the supervised classification and 0.41for the statistical classification, showing a moderate correlation between the datasets.
Based on these results, using river classes as biodiversity proxy is deemed reasonable. However, some of the variability in the distribution of fish species cannot be related simply to geophysical factors. River classes may capture different elements such as unique habitats and associated, possibly unknown, endemic species that indices based only on biological data do not. Hence, river classes can be a good alternative and, also, a good complement to detailed species data for the biodiversity proxies needed in large scale assessments.