



## **Comparative research of holistic methodologies for the estimation of environmental flows in Colombia**

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Hydraulic structures are criticized since it is assumed that they carry an important negative environmental effects that are summarized in the degradation of freshwater ecosystems. Colombia is categorized as the country with the second greatest hydroelectric potential in LA. Currently, it has 26 dams in operation and 30 more are projected. In this way, it is necessary to implement methodologies for the estimation of environmental flow from a holistic approach and thus achieve a reduction in damage to freshwater ecosystems. In this research, different holistic methodologies like DRIFT or BBM, analysed as reference, and the “Ecological Limits of Hydrologic Alteration (ELOHA)” is compared to the recent methodology developed by the Colombian Ministry of Environment and Sustainable Development, called “Methodological Guide for the Estimation of Environmental Flows in Colombia (GMECAC)”. ELOHA is claimed to have the scientific basis required for the consensus-building in the decision-making process of a basin. The ELOHA is used to assess the environmental flow required at the regional level by determining the relationships between the alteration of the flow regime and the ecological response of the ecosystem. On the other side, GMECAC is a methodology recently developed that seeks to standardize the process to estimate the required environmental flows in Colombia from a holistic perspective, considering the magnitude, duration and intensity of such flows. The comparative analysis was carried out based on three aspects: technical, social and management, according to the level 1 of the framework proposed by Opperman (2018). Within the technical component, four elements were considered; hydrology, ecology, the environmental impact assessment and flow regime. According to the results of the study, it was found that both methodologies use the same principle of hydrological characterization (high, typical and low flows), but GMECAC does not take into account the ecological processes associated with the hydrological regime. Furthermore, the GMECAC criteria to determine accepted impact does not consider the response of the ecosystem to alterations, as the criteria is based on statistical tests that only correlate the natural and modified hydrological condition. From another point of view, although ELOHA does not directly contemplate the social processes in relation to the hydrological regime, it encourages spaces for negotiation in reference to the objectives of environmental flow, while GMECAC does not regard the social dimension within the asses of the environmental flow regime. Finally, in both methodologies there is the absence of a guide to evaluate their implementation, beyond the use of some indicators.