

## **Ecological flow for integrated planning of small hydropower plants: a case study from Greece**

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**Abstract** Mountainous areas, which are the dominant orography of the Greek mainland, are considered ideal locations for small hydropower plants. The development of such projects should comply with legislation on environmental protection, considering also the maintenance of a minimum environmental flow. This flow is necessary mainly during the irrigation period, not only for preserving the hydrological and water quality functions of the stream, but also for contributing to the protection of public health and water-related ecosystems. The aim of this paper is to assess the environmental flow that should be released downstream of small hydro-dams. The proposed analysis is applied in a small mountainous sub-basin located in Northern Greece, where environmental flow regimes are estimated using the Indicators of Hydrologic Alteration (IHA) and Tennant methodologies. The outcomes are compared with that resulting from the empirical methodology specified under Greek Law and a descriptive analysis is conducted for the selection of the most suitable method.

**Key words** small hydropower plants; environmental flow; ecological functions, water management; Tennant method; IHA method