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# Carrying Capacity Estimation for Small Hydro Plant Located in Torrential Rivers

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**Abstract :** Carrying capacity considers the maximum population a particular level of resources can support over a period of time. In pristine environments, the maximum population depends upon the abundance and the distribution of resources alongside the competition for their use, having all information generally detected through long-term data series. In regulated environments, that is, when the resource undergoes artificial alterations, a given population needs to flexibly adapt to the new scenario's conditions, facing additional distortions due to changes in the available resources over time and ontogeny. This is the case for hydropower plants, which introduce flow modifications and impinge changes in fish migration and customs. A primary tool to inspect how fish species can adapt to changed conditions is represented by ad hoc surveys, which provide information regarding fish population, sample sizes, and density before and after flow alterations. In such a context, hydrological and biological monitoring are highly encouraged as they provide insight into how flow reductions affect species adaptability and forestalling undesired exploitation circumstances. This analysis considers several scheduled steps useful to design adequate hydropower production and contextually satisfy environmental needs. Hence, the study aims to be a good compromise between technical assessment, biological needs, and social expectations. Starting from a small hydro to be restored, the analysis addresses attention to the tail of the flow duration curve (FDC), where both hydrological and environmental requirements can be accomplished. The proposed finding consists of evaluating the limit tolerable condition for the weakest sampled species (Telestes Muticellus) expressed as a low flow value detectable from the FDC of a long-term period. Results provide a practical link between hydrological and environmental information besides the simplicity to handle a unique flow value of reference for all the surveyed species, having it represent the minimum environmental flow to be released.

**Keywords :** eta beta method, fish bypass ladder, environmental flow, long term streamflow duration curve
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