

[Diagnosing problems produced by flow regulation and other disturbances in Southern European Rivers: the Porma and Curuenõ Rivers \(Duero Basin, NW Spain\) \(González del Tánago et al. 2016\) \[1\]](#)

This research presents an analysis of river responses to flow regulation and other disturbances over time. The study was conducted in the Porma and Curuenõ rivers, using the hierarchical multi-scale process-based framework developed within the European REFORM Project. The characterisation of the rivers at the landscape unit, segment and reach scales under current and past conditions by different hydro-morphological indicators has provided a useful approach to (1) identify where and how main channel adjustments have occurred, (2) establish causal relationships at different scales and (3) discuss potential future scenarios and restoration strategies.

Reduction of mean annual flow at the catchment scale has been observed and associated with forest expansion in the uplands. Channel narrowing, braiding reduction and riparian vegetation encroachment have occurred along both rivers, although with variable intensity among the reaches as a result of their landscape setting. Damming and flow regulation of the Porma River have been directly associated with locally accelerated narrowing, vertical bank profiles, the absence of bare gravel bars and no Salicaceae recruitment observed in certain reaches. The vertical bank profiles and the absence of in-channel bare gravel deposition forms are good indicators of sediment starvation downstream from the dam. The findings from this study suggest the importance of multi-scale approaches to assess the impacts of human-induced, short-term changes (e.g., flow regulation by dams and reservoirs) in the context of other disturbances at broader scales (e.g., climate and land cover changes) and their utility in the diagnosing problems and the proposal of restoration measures.

Keywords: Flow regulation, Dam effects, Land cover changes, Channel narrowing, Vegetation encroachment, Spain

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