

[The Hydromorphological Evaluation Tool \(HYMET\) \(Klösch & Habersack 2016\) \[1\]](#)

River engineering structures, such as bank protection or bed sills, act as constraints on the hydromorphology of rivers and limit morphodynamic processes. Accordingly, the deviations of a river's morphology from a natural reference condition have been attributed to the degree of artificiality in the observed river section and river restoration works mainly aimed at reducing artificial constraints within the river reach. Less attention has been drawn to alterations of the sediment continuum between sediment production in the river's catchment and downstream river reaches. However, the sediment supply from upstream is strongly reflected in the morphodynamics such as bar formation or the reworking of the riverbed. Any alteration of sediment supply may affect the morphological appearance of a reach and determine its deviation from an undisturbed condition.

We introduce the Hydromorphological Evaluation Tool (HYMET), which accounts in a hierarchical procedure for sediment supply and sediment transfer as catchment and river network based preconditions for sustainable morphodynamics in river reaches. At the reach scale, artificiality and the sediment budget are assessed. In contrast to existing evaluation methods for assessing hydromorphological state, no reference condition is needed for determining hydro-morphological alterations. Here, with re-established sediment supply and reduced artificiality, a river reach is expected to develop morphodynamics that approach a morphodynamically and ecologically sustainable condition.

Application to the Drau River showed that the alteration of sediment supply strongly affects the hydromorphological condition and thus the evaluation result of a restored reach, indicating the remaining potential for the re-initiation/re-establishment of morphodynamics through catchment-wide restoration plans.

Keywords

Hydromorphology; Sediment continuity; Sediment budget; River restoration

Highlights

- Evaluation method managing without the definition of a reference condition.
- Hierarchical procedure ensures consideration of sediment connectivity and transfer.
- Budgeting of sediment transfer links reach's trajectory to upstream alterations.
- HYMET indicates remaining potential for morphodynamics in already restored reaches.

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