Characterising physical habitats and fluvial hydromorphology: A new system for the survey and classification of river geomorphic units (Belletti et al. 2017) [1]

Geomorphic units are the elementary spatial physical features of the river mosaic at the reach scale that are nested within the overall hydromorphological structure of a river and its catchment. Geomorphic units also constitute the template of physical habitats for the biota. The assessment of river hydromorphological conditions is required by the European Water Framework Directive 2000/60 (WFD) for the classification and monitoring of water bodies and is useful for establishing links between their physical and biological conditions. The spatial scale of geomorphic units, incorporating their component elements and hydraulic patches, is the most appropriate to assess these links. Given the weakness of existing methods for the characterisation and assessment of geomorphic units and physical habitats (e.g., lack of a well-defined spatiotemporal framework, terminology issues, etc.), a new system for the survey and characterisation of river geomorphic units is needed that fits within a geomorphologically meaningful framework.

This paper presents a system for the survey and classification of geomorphic units (GUS, geomorphic units survey and classification system) aimed at characterising physical habitats and stream morphology. The method is embedded into a multiscale, hierarchical framework for the analysis of river hydromorphological conditions. Three scales of geomorphic units are considered (i.e., macro-units, units, sub-units), organised within two spatial domains (i.e., bankfull channel and floodplain). Different levels of characterisation can be applied, depending on the aims of the survey: broad, basic, and detailed level. At each level, different, complementary information is collected. The method is applied by combining remote sensing analysis and field survey, according to the spatial scale and the level of description required. The method is applicable to most of fluvial conditions, and has been designed to be flexible and adaptable according to the objectives (e.g., reach characterisation, assessment, monitoring) and available data (e.g., image resolution). The method supports integrated hydromorphological assessment at the reach scale (e.g., the Morphological Quality Index, MQI) and therefore contributes to better establishing links between hydromorphological conditions at the reach scale, characteristic geomorphic units, and related biological conditions.

Keywords
Geomorphic units; Physical habitats; Survey system; Hydromorphological conditions

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Links
[1] https://reformrivers.eu/characterising-physical-habitats-and-fluvial-hydromorphology-new-system-survey-and-classification
[2] http://dx.doi.org/10.1016/j.geomorph.2017.01.032

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