A multi-scale hierarchical framework for developing understanding of river behaviour to support river management (Gurnell et al. 2016) [1]

This paper introduces this special issue of Aquatic Sciences. It outlines a multi-scale, hierarchical framework for developing process-based understanding of catchment to reach hydromorphology that can aid design and delivery of sustainable river management solutions. The framework was developed within the REFORM (REstoring rivers FOR effective catchment Management) project, funded by the European Union's FP7 Programme.

Specific aspects of this 'REFORM framework' and some applications are presented in other papers in this special issue.

The REFORM framework is founded on previous hierarchical frameworks, sixteen examples of which are reviewed. However, the REFORM framework has some particular properties that reflect the European context for which it was developed. The framework delineates regional landscapes into nested spatial units at catchment, landscape unit, segment, reach, geomorphic unit and finer scales. Reaches, regardless of their 'naturalness', are assigned to a river type based on valley confinement, planform and bed material. Indicators are quantified at each spatial scale to feed three groups of assessments. First, contemporary indicators at reach and geomorphic unit scales investigate present processes, forms and human pressures within each reach. These feed assessments of present reach hydromorphological function/alteration, including whether the reach is functioning appropriately for its type; riparian corridor function and alteration; and hydromorphological adjustment. Second, indicators at catchment to segment scales investigate water and sediment production and delivery to reaches and how these are affected by human pressures now and in the past. These are used to construct an inventory of changes over space and time. Third, historical reach and geomorphic unit scale indicators are used to construct the trajectory of reach-scale changes. Contemporary reach-scale assessments, space–time inventory, and trajectory of changes are then combined to establish how river reaches of different type, subject to different human pressures, and located in different environmental contexts behave in response to changes at all considered spatial scales. These support forecasts of the likely responses of

reaches to future scenarios (e.g., changes in climate, land cover, channel interventions).

Keywords: REFORM framework, Space scale, Time scale, Hydromorphology, River management, River rehabilitation

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Gurnell, A. M., M. Rinaldi, B. Belletti, S. Bizzi, B. Blamauer, G. Braca, A. D. Buijse, M. Bussettini, B. Camenen, F. Comiti, L. Demarchi, D. García de Jalón, M. González del Tánago, R. C. Grabowski, D. M. Gunn, H. Habersack, D. Hendriks, A. J. Henshaw, M. Klösch, B. Lastoria, A. Latapie, P. Marcinkowski, V. Martínez-Fernández, E. Mosselman, J. O. Mountford, L. Nardi, T. Okruszko, M. T. O'Hare, M. Palma, C. Percopo, N. Surian, W. van de Bund, C. Weissteiner, L. Ziliani (2015) A multi-scale hierarchical framework for developing understanding of river behaviour to support river management. Aquatic Sciences: research across boundaries 78: 1-16.

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http://dx.doi.org/10.1007/s00027-015-0424-5 [2]

Links

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[1] https://reformrivers.eu/multi-scale-hierarchical-framework-developing-understanding-river-behaviour-support-river-management
[2] http://dx.doi.org/10.1007/s00027-015-0424-5

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