Sediment management in the context of water policies

António Gonçalves Henriques[1]

[1]LNEC, Av. Brasil 101, 1700-066 Lisboa, Portugal
Instituto Superior Técnico, Av. Rovisco Pais, 1, 1049-001 Lisboa, Portugal

Phone: +351 21 844 3623
E-mail: agh@lnec.pt

Surface water bodies are much more than streams of fresh water, collecting multiple surface water and groundwater flows of a river catchment. They are, in fact, a continuum of flows of matter, namely water and sediments, energy and life, in various forms, from upstream to downstream but also from downstream to upstream. The spatial and temporal heterogeneity of the rivers, particularly the variation of the flow regime, determines the diversity and dynamics of the aquatic habitats and thus the associated biodiversity. The processes of transport of water, sediments, energy and living mater along a river network, as well as laterally between the watercourses, their margins and alluvial plains, constitute the core of the concepts of river continuum introduced by Vannote *et al*. 1980 and the "flood pulse" of Junk *et al*. 1989, which are fundamental in any water management policy. These concepts explain how river flows, water quality, river morphology and species dynamics in surface water bodies and adjacent alluvial plains, are interconnected. Nutrients and sediments generated in the headwaters of river systems are recycled downstream, determining plant growth and biotic productivity. The regular flooding of alluvial plains increases the decomposition of organic matter and recycling of nutrients and determines the development of adaptation strategies of species that are closely related to the flooding regime. However, the development of multiple human activities caused the fragmentation of more than 60% of rivers on a global scale (Revenga *et al*. 2000). In particular, river damming introduced discontinuities in the river continuum that disrupt or alter the natural flows of matter, energy and life. This conduced to the Serial Discontinuity Concept (Ward & Stanford 1995).

The environmental objectives established in the Water Framework Directive for surface waters in the EU, i.e. the chemical status and the ecological status or the ecological potential, must be understood in the light of the River Continuum, the Flood Pulse and the Serial Discontinuity concepts, even though the implementation of the programmes of measures required by the directive to achieve those environmental objectives tends to address each water body in a piecemeal form, overlooking those concepts at the river basin scale. Erosion and sediment transport are integral components of the river basin processes that condition not only the chemical status but also the ecological status or the ecological potential of the surface water bodies, in particular in alluvial rivers. To explore how the erosion and sediment transport processes are interconnected with the environmental objectives of the Water Framework Directive must be, in my opinion, the top priority research topic of all those concerned in the SedNet.

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