JSS Subject Area 'Sediments' (Editor-in-Chief: Ulrich Förstner)*

Section 1: Sediment quality and impact assessment

Subject Editor: Ellen Petticrew

Dr. Ellen L. Petticrew, Chair of Landscape Ecology,
Geography Program, University of Northern British Columbia,
3333 University Way, Prince George, BC, Canada, V2N 4Z9;
T: 001 (0) 250-960-6645; F: 001 (0) 250-960-6533; ellen@unbc.ca

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Responsible for (see also [1–7]):

- aquatic transport and storage of sediments
- transfers of fine sediment and associated nutrients/contaminants

Areas of interest

The underlying theme of my research is the fate and effect of sediment moving from terrestrial systems through the aquatic system. My work addresses the role of inorganic and organic sediments on the biological (plants, fish), chemical (nutrients, contaminants) and physical (sediment erosion and transport) aspects of land-water systems. Specific focus areas include:

- Landscape disturbances on sediment transfers (fire, forest harvesting, agriculture)
- Biogeomorphology: influence of organisms on physical attributes of aquatic systems and vise versa
- Ecological implications of transfers and storage of fine sediment (both organic and inorganic) in rivers and lakes
- Fine sediment morphology and composition (flocculation processes)

Challenges

Research challenges in the field of aquatic sediment range over large spatial and temporal scales. Current environmental uncertainty regarding the impacts of climate change on the hydrological drivers for sediment movement means we need to be prepared for regional changes that span a broader spectrum than we currently are used to. Changes in water quantity, both in terms of the location and the timing will be linked with altered fluxes and storage of sediment in aquatic systems. The implications of these changes on human populations and ecosystems are expected to be severe. Also on very large scales we are seeing, and expect to continue to see, land use changes which alter both the quantity and quality of fine sediment in aquatic systems. Decoupling the impacts of climate change versus the changes associated with anthropogenic modifications of our landscape is expected to become more difficult, for example as agricultural, forest harvesting, and urban centres respond to extremes in water availability.

On smaller, more localized scales, researchers will continue to undertake process studies on the structure, movement and behavior of sediment and sediment-associated nutrients and contaminants. Nano-scale laboratory techniques used to investigate fine sediment composition are providing us with more detail which allows for better decision making in terms of sediment treatments and remediation. While these small field scale and laboratory studies will continue to inform us, we must be aware of the need for techniques to scale up these results to those appropriate for management and policy decisions.

Much work on sediment and contaminants is undertaken from a physico-chemical or toxicological approach. Integrating these research data to address concerns regarding the biological functioning of the system on both meso and large scales is another current research challenge. Ecosystem restoration and/or the creation of new habitats to replace contaminated/altered sites are priorities for many governments and the process knowledge generated by fine sediment researchers is extremely valuable in addressing these issues. While we can continue to do excellent work on sediment-water interactions on the lab bench, we need to formulate our questions and research with these broader linkages and larger problems in mind.

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*** Commencing in JSS 6 (4) 192–199, 262–268 (2006) and continuing in JSS 7 (1) 1, 2–8 and (2) 64, 65–66 (2007), we proceed with the presentation of the JSS Framework and associated Editors, see pp. 196–199.**