

Book Reviews

Soil Erosion and Sediment Redistribution in River Catchments Measurement, Modelling and Management

Editors: Phil N Owens* and Alison J Collins

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Soils and sediments are integral components of river basins, and their interaction with hydrology, chemistry and ecology in these systems gives rise to a number of fundamental processes that drive these systems. Whilst many publications are available on individual aspects of these interactions, for example focusing on soils, sediments or hydrology, an integrated approach to the subject, and at the river-basin scale, is needed to allow sustainable management and development of river basins. This book does just that, by taking an integrated approach to the subject.

This book arises from a conference in 2003, and the chapters comprise individual peer-reviewed contributions to this meeting, from an impressive range of international researchers. As such, most chapters are case-studies but together they form an integrated resource, which will prove invaluable to students, researchers, academics, and practitioners in the field of soil, sediment and water quality management.

The book is partitioned into five sections. An **introduction** by the editors gives an excellent, although necessarily brief, overview of the measurement, modelling and management of soil and sediments in river catchments, whilst a summary at the end sets out future directions and unanswered questions. The **main section** of the book is split into *measurement*, *modelling* and *management*, with each section comprising a number of chapters, either repre-

sented reviews or case studies of a global nature. A wide range of environments are represented, including agricultural, natural and urban catchments under humid, temperate, arid and tropical climate regimes.

- The section on *measurement* includes contributions on tracing and monitoring (Walling, Blake et al.), hillslope and soil erosion (Peart et al., Belyaev et al., Shakesby et al.) and sediment yield and transport (Evans, Farguell & Sala, Hejduk et al., Evans and Gibson, Petticrew, Foster).
- The *modelling section* covers prediction and understanding of soil erosion (Nearing, Kuhn, Sidorchuk et al., Kinnell, Elliott, Licciardello et al.), gully incision (Jetten et al.) and fine sediment delivery modelling (Jarritt & Lawrence).
- Finally, the *management section* contains contributions on managing sediment delivery (Wood et al., Rickson), impacts of erosion from land-use changes (Walsh et al., Visser, Nunny et al.), and managing sediment in urban systems (Droppo et al.) and the landscape (Morgan).

The book is well-produced with excellent photographs and illustrations throughout, printed in hardback form on high quality paper. It will form an excellent resource and although its price may restrict personal use, I would highly recommend it as a state-of-art book that should be present in all libraries. It should certainly be recommended reading for undergraduate and postgraduate students on environmental, hydrological and geomorphological courses.

* Phil N. Owens, JSS Subject Editor, area 'Sediments', Section 3: Sediment management at the river basin scale [see this issue, p. 7]

Further Reading:

Owens PN (2005): Conceptual models and budgets for sediment management at the river basin scale. *J Soils Sediments* 5 (4) 201–212

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Background, Aims and Scope. Sediment management in rivers basins has tended to deal with local issues associated with either excessive amounts of sediment (clean and contaminated) or sediment deficit. With sediment management increasingly needing to address both sediment quantity and sediment quality issues, it is becoming increasingly apparent that for sediment management to be effective the river basin represents the most appropriate scale for consideration. Although local and site-specific sediment issues are still likely to be the main scales at which interventions are made they need to be placed within a broader context and with full appreciation and consideration of their impacts within the river basin. This paper describes some of the reasons why the river basin scale represents the most appropriate scale for sediment management, while recognizing the needs for site-specific interventions. It also describes the development of conceptual river basin models (CRBM) for sediment.

Main Features. A CRBM should identify, in a conceptual framework, the relevant key environments (subsystems) within a river basin and the interrelationships between the environments. From a sediment perspective, key information includes the identification of sources of

sediment (and associated contaminants and nutrients), the pathways of sediment and contaminants within and between the various environments, and the role of storage elements. Additional information that informs the CRBM includes, the assessment of sediment fluxes (including storage), the residence time of sediment storage, and information on exchanges between sediment and contaminants, although such information is often not available at the scale of the river basin. An example of a CRBM for sediment for a hypothetical river basin and examples of several sediment budgets (for basins in USA and Zambia, and for Europe) are presented which are based on data and information on sediment sources, sediment fluxes and storage. These are discussed and some of the advantages and disadvantages for decision-making for sediment management are described.

Conclusion and Recommendation. Conceptual frameworks and models for sediment offer considerable potential for certain stages of the management process. They are, however, only part of a much larger decision-making process, which involves, amongst other things, stakeholder participation, evaluation of the appropriate legislation and guidelines, and the use of risk assessment and societal cost-benefit analysis.