

Preface

Since the early 1980s, the International Commission on Continental Erosion (ICCE) of the International Association of Hydrological Sciences (IAHS) has organized a large number of highly successful symposia and workshops dealing with various aspects of erosion and sedimentation. These have included:

- The Symposium on Erosion and Sediment Transport Measurement*, Florence, Italy, 1981 (IAHS Publ. 133);
- The Symposium on Recent Developments in the Explanation and Prediction of Erosion and Sediment Yield*, Exeter, UK, 1982 (IAHS Publ. 137);
- The Symposium on Dissolved Loads of Rivers and Water Quantity/Quality Relationships*, Hamburg, Germany, 1983 (IAHS Publ. 141);
- The Symposium on Drainage Basin Sediment Delivery*, Albuquerque, New Mexico, USA, 1986 (IAHS Publ. 159);
- The Workshop on Erosion, Transport and Deposition Processes*, Jerusalem, Israel, 1987 (IAHS Publ. 189);
- The Symposium on Sediment Budgets*, Porto Alegre, Brazil, 1988 (IAHS Publ. 174);
- The Symposium on Sediment and the Environment*, Baltimore, USA, 1989 (IAHS Publ. 184);
- The Symposium on Erosion, Debris Flows and Environment in Mountain Regions*, Chengdu, China, 1992 (IAHS Publ. 209);
- The Symposium on Erosion and Sediment Transport Monitoring Programmes in River Basins*, Oslo, Norway, 1992 (IAHS Publ. 210);
- The Symposium on Sediment Problems: Strategies for Monitoring Prediction and Control*, Yokohama, Japan, 1993 (IAHS Publ. 217);
- The Symposium on Variability in Stream Erosion and Sediment Transport*, Canberra, Australia, 1994 (IAHS Publ. 224);
- The Symposium on the Effects of Scale on the Interpretation and Management of Sediment and Water Quality*, Boulder, USA, 1995 (IAHS Publ. 226);
- The Symposium on Erosion and Sediment Yield: Global and Regional Perspectives*, Exeter, UK, 1996 (IAHS Publ. 236);
- The Symposium on Human Impact on Erosion and Sedimentation*, Rabat, Morocco, 1997 (IAHS Publ. 245);
- The Symposium on Modelling Soil Erosion, Sediment Transport and Closely Related Hydrological Processes*, Vienna, Austria, 1998 (IAHS Publ. 249);
- The Symposium on the Role of Erosion and Sediment Transfer in Nutrient and Contaminant Transfer*, Waterloo, Canada, 2000 (IAHS Publ. 263);
- The Workshop on Erosion and Sediment Transport Measurement in Rivers: Technological and Methodological Advances*, Oslo, Norway, 2002 (IAHS Publ. 263);
- The Symposium on the Structure, Function and Management Implications of Fluvial Sedimentary Systems*, Alice Springs, Australia, 2002 (IAHS Publ. 276);
- The Symposium on Erosion Prediction in Ungauged Basins: Integrating Methods and Techniques*, Sapporo, Japan, 2003 (IAHS Publ. 279);
- The Symposium on Sediment Transport through the Fluvial System*, Moscow, Russia, 2004 (IAHS Publ. 288)

The Foz do Iguaçu symposium on Sediment Budgets builds on this legacy and focuses on the important topic of sediment budgets. In so doing, it returns to a theme that was first considered almost 17 years ago, also in Brazil, at the Porto Alegre

Symposium on Sediment Budgets (IAHS Publ. 174). It is highly appropriate that Brazil should again be the venue of this second symposium on sediment budgets, both because of the success of the first meeting and because of the many sediment-related problems that are faced by this vast country, with its many large rivers and its wide range of physiographic conditions. Also, with nearly 17 years having elapsed since the original symposium, it is timely to revisit this important topic, which draws together the many different aspects of erosion and sediment mobilization, sediment transport, sediment storage, and sediment yield, by providing an integrated view of the sediment sources, transfers, sinks and outputs of drainage basins, at many different scales. The symposium has been co-sponsored by UNESCO and represents a contribution to the International Sedimentation Initiative (ISI) of the UNESCO International Hydrological Programme (IHP VI).

There have been several key developments in the general area of sediment budget investigations during the years since the Porto Alegre symposium. First, there has been an increasing awareness of the wide-ranging environmental implications of increased sediment loads in rivers and of the need for an improved understanding of catchment sediment budgets as an essential prerequisite for the development of effective sediment management and control strategies. Second, there have been major developments and advances in the techniques and models available for establishing and predicting catchment sediment budgets. The use of environmental radionuclides, such as ^{137}Cs , ^{210}Pb and ^7Be , as sediment tracers has, for example, opened up many new opportunities for investigating catchment sediment budgets, particularly in relation to identifying sediment sources, quantifying rates of sediment mobilization, and establishing the importance of sediment sinks. In addition, the continuous recording of surrogate measures of suspended sediment flux (e.g. turbidity) *in lieu* of manual sampling, with all its attendant problems, has provided an improved understanding of the short-term temporal variability of suspended sediment concentrations and has resulted in more reliable estimates of suspended sediment fluxes. Equally, developments in distributed modelling and the use of remote sensing have been exploited in sediment budget investigations to provide an improved capacity to represent the marked spatial variability in the components of the sediment budgets encountered in many catchments and river basins. Further, the advent of readily available GIS software for desktop computers and associated databases has provided a much more accurate basis for spatial analysis and for providing details on the type of land-use variations that can exercise significant impacts on erosion and sediment yield. Finally, there appears to be a growing recognition of the significance of fine sediment as a carrier of a wide variety of chemical constituents, including trace elements, persistent organic pollutants, and nutrients, and the need to quantify sediment-associated chemical fluxes. Many of these developments are usefully exemplified in the papers of the Foz do Iguaçu Symposium.

The response to the call for papers for the Foz do Iguaçu symposium far exceeded expectations (more than 150 abstracts), and should be viewed as an indication of how significant sediment-related issues are to the environmental and scientific communities. As a result, the symposium was extended over the full duration of the Scientific Assembly (five days). More than 80 papers were selected for oral presentation and inclusion in the pre-published proceedings, and a substantial number of the remaining papers will be presented as posters. It is hoped to publish the poster papers as a CD.

For the first time for an ICCE symposium, it has proved necessary to produce two volumes of proceedings (IAHS Publications 291 and 292); these contain 81 papers.

The papers published in the two proceedings volumes cover a wide range of topics, and draw together information and findings from many different areas of the world, including North and South America, Australia, Europe, Africa and Asia. The inclusion of a significant number of papers with a South American focus represents an important achievement, since this area of the world has been poorly represented in most previous symposia, with the notable exception of the Porto Alegre Symposium held in 1988. The papers have been grouped into eight themes that cover the key components of catchment sediment budgets as well as a number of integrating themes.

Volume 1 of the proceedings focuses on the main components of the sediment budget and includes sections dealing with, firstly, *Sediment mobilization and sources*, secondly *Sediment transport and transfer*, thirdly *Sediment storage*, and, finally, *Sediment yields*. The papers highlight important advances in our understanding of soil and sediment redistribution in small catchments, the major developments in sediment source tracing that have occurred since 1988, key improvements in monitoring techniques, greatly improved understanding of the role and behaviour of sediment sinks, particularly river flood plains, and the increasing availability of reliable data on sediment yields from different areas of the world and particularly for many of the large rivers of Brazil.

Volume 2 includes four sections containing papers that emphasize the value of sediment budgets in providing an integrating framework, or perspective, for both scientific investigations and for environmental management. The section on *Sediment budgets* reports the results of studies for catchments in a wide range of environments and emphasizes the increasing availability of information on the nature of such budgets. The next section on *Modelling sediment budgets and their components* highlights both the wide range of modelling approaches, and the potential for applying existing models within a sediment budget framework. The section on *Human impact on sediment budgets* emphasizes the potential importance of human activity, especially land-use activities, in modifying both the individual components of the sediment budget and the overall budget, and contains a number of papers dealing with the impact of dams. Finally, the section on *Sediment problems and sediment management strategies*, whilst containing only a limited number of papers, demonstrates how the sediment budget concept can be integrated into environmental management strategies.

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files containing the papers and their figures and tables, and converted, standardized and formatted them to produce the final printed volumes, in record time. They also provided valuable guidance and gentle reminders of deadlines and outstanding tasks, which ensured that the editors completed their work by the final deadline.

Art Horowitz

*US Geological Survey, Peachtree Business Center
3036 Amwiler Road, Atlanta, Georgia 30360, USA*

Des Walling

*Department of Geography, University of Exeter
Amory Building, Rennes Drive, Exeter EX4 4RJ, UK*