

Preface

The 2006 Binghamton Geomorphology Symposium on The Human Role in Changing Fluvial Systems

1. Origins of the 2006 Binghamton Symposium

The 2006 Binghamton Geomorphology Symposium on *The Human Role in Changing Fluvial Systems* explores how humans alter river morphology. The original concept of the symposium grew from concerns that a large body of site-specific studies on human impacts in rivers was growing rapidly, but that few works had moved beyond case studies to advance general models, theories, broad syntheses, global-scale studies, or methodological perspectives. The need for a venue dedicated to summarizing the many disparate geomorphology studies on human impacts in rivers was clear, and a Binghamton Geomorphology Symposium on the topic was an obvious solution.

The synthesis of studies concerned with the anthropogenesis of rivers might have remained stuck forever in the “to do file,” however, had it not been for the 50th anniversary of *Man's Role in Changing the Face of the Earth*, an international symposium held at Princeton University in 1955 with a set of papers published the next year (Thomas, 1956a). The proceedings volume was dedicated to George P. Marsh and stands as a scholarly milestone that raised awareness of the pervasive nature of anthropogenic alterations on the Earth's surface. The breadth of topics in those proceedings – combined with the prestigious list of contributors – ensured that the *Changing the Earth* volume made a lasting imprint. Many modern environmental scientists and managers cut their teeth on those papers that covered soil erosion, deforestation, climate, hydrology, water quality, and a host of other anthropogenically driven changes. The Binghamton Geomorphology Symposium commemorates the 50th anniversary of that landmark publication. It was concerned with a similar theme – improving the understanding of anthropogenically driven changes to the Earth's surface – although it maintains a specific focus on rivers and watershed dynamics.

The primary purpose of the 1955 *Changing the Earth* conference and 1956 proceedings was to produce a permanent record of the wide range of human impacts to the Earth – a record that would be accessible to a broad audience of non-specialists (Thomas, 1956b). At the *Changing the Earth* symposium, 47 of the 53 invited papers in the volume were completed early and circulated to other participants well in advance of the conference. This obviated the reading of papers at the meetings, allowed speakers to range widely from their topics, and left ample time for dialog at three half-day discussion sessions. As stated by Thomas:

The challenge to the symposium was to rise above the level of the content of the papers into the realm of ideas – the next higher realm of abstraction, as it were – dealing not with the recitation of facts or with the exchange of anecdotes but with the conjunction of thoughts. (Thomas, 1956b: p. xxii)

The *Changing the Earth* symposium filled six full days and was structured in three sections: *Retrospect*, *Process*, and *Prospects*, chaired by Carl Sauer, Marston Bates, and Lewis Mumford, respectively. Each section in the volume is comprised of at least seven papers and is followed by a summary of the corresponding half-day discussion session. The proceedings closed with summaries by the three session chairs. The emphasis of the *Changing the Earth* symposium on producing a comprehensive thematic proceedings is in harmony with the long-standing Binghamton Geomorphology Symposium tradition of producing a lasting proceedings volume that synthesizes a major theme in geomorphology.

2. The Binghamton Geomorphology Symposium

Many developments have taken place in the 50 years since the *Changing the Earth* proceedings. Methods

now include a wide host of digitally enabled techniques and dating tools; funding for environmental studies has sky rocketed; firms, nonprofit agencies, government agencies, and academic departments dedicated to environmental impact studies have proliferated; and knowledge of the breadth and depth of anthropogenic impacts has grown immeasurably. The sheer volume of environmental research and the ever-increasing rate of environmental change make it difficult, however, to integrate the work or to develop clear statements regarding the magnitude and extent of impacts, the interaction of processes, and potential future changes. The need for conferences and proceedings that provide state-of-the-field syntheses is even greater than it was in 1955.

2.1. Purpose and scope

The 2006 Binghamton Geomorphology Symposium, *The Human Role in Changing Fluvial Systems*, brings together many leading researchers in river systems to develop an integrated portrait of: (a) how humans have altered river morphology; (b) why, where, and when these changes have occurred; and (c) what changes can be expected to occur in the future. This focus parallels the *Retrospect, Process, and Prospects* structure of the 1955 *Changing the Earth* symposium. While the 2006 Binghamton Geomorphology Symposium honors the intent of the *Changing the Earth* conference, it does not attempt to replicate the 1956 symposium. The 1956 conference dealt only briefly with changes to hydrology, river channels, sediment loading, and other topics of concern to fluvial geomorphologists, although articles by Luna Leopold (1956) and Arthur Strahler (1956) – to whom we dedicate this volume – would strike familiar chords with geomorphologists. Rather than directly addressing geomorphology, most of the 1956 *Changing the Earth* articles addressed changes in culture, cultural landscapes, or changes in regional to continental scale land-use and vegetation cover. These changes are highly relevant to fluvial systems, but the geomorphology of rivers was not mentioned directly. Moreover, the work was largely qualitative, often relying on a historical narrative to describe and explain human–nature interactions, or on a recitation of case examples to explain process. Quantitative data and equations were uncommon, with the notable exception of Arthur Strahler’s (1956) article on soil erosion.

In contrast, much of the research in this 2006 Binghamton volume relies on quantitative data and analyses, although qualitative description is still widely used and authors have attempted (like the *Changing the*

Earth proceedings) to make the quantitative analyses accessible to the educated public. Also in contrast, the 2006 Binghamton Symposium papers intentionally focus on a limited but important realm of human impacts; changes to fluvial geomorphology, which is far narrower than the 1956 panoply of topics. This focus reflects a necessity of modern science where specialization has created such extensive knowledge that even synthesis within subfields is difficult.

The collection of papers in this volume does, however, represent a broad interpretation of fluvial systems, including both direct and indirect drivers of channel change. Some human impacts, such as dams, urbanization, or channelization, have direct impacts on river systems that are relatively easy to recognize over months to decades. Other processes, such as changes in land-use, animal populations and activities, or fire frequencies, indirectly affect channels through their influence on runoff, sediment production, wood, and bank stability. These indirect processes can have large magnitude impacts on channels, although often over inter-generational time scales that make it difficult to “observe” the changes. Given the importance of indirect changes to fluvial systems, their inclusion in this volume is essential to understanding processes, locations, persistence and magnitudes of change.

2.2. Structure of the symposium and proceedings

The 2006 Binghamton Geomorphology Symposium began on Friday afternoon with a walking field trip along the Congaree River, Columbia, South Carolina, organized by William L. Graf with assistance from several students. That evening, an icebreaker was held in the Capstone Building, a rotating restaurant that provided a panorama of the University and downtown. As is traditional, the symposium presentations were held throughout Saturday and finished at midday on Sunday. Presentations began Saturday morning with an opening talk by M. Gordon (Reds) Wolman, who provided historical context. With a career which started at the U.S. Geological Survey in the 1950s, Professor Wolman provided a personal portrait of human impact research in fluvial geomorphology since the *Changing the Earth* conference. The participation of Reds Wolman was especially fitting because his father, Abel Wolman, contributed a paper on waste disposal to the *Changing the Earth* proceedings (Wolman, 1956).

This proceedings volume begins with an introductory paper by ourselves (James and Marcus) that provides historical context for the meeting, summarizes some of the major changes in this field since the 1950s, and

anticipates future directions in human impact research in fluvial systems. Ken Gregory's paper presents a synthesis and a systematic framework for conceptualizing change in river systems and takes a look to a future where fluvial geomorphology, cultural studies, and river policy become (hopefully) more intertwined. The proceedings follows the Symposium by being loosely structured into two major divisions as seen in the Table of Contents: one on *Scales and Locales of Change* and the other on *Processes of Change*. The dividing line between these two sections is by no means clear-cut or absolute; all of the "global and regional" papers discuss drivers and processes of change, just as the "process" papers discuss local and regional variations. In spite of inherent limitations to such classification attempts, these divisions reflect major directions in geomorphic research over the last 50 years. A large and ever-growing body of literature exists on specific anthropogenic impacts and process responses in rivers, ranging from urbanization to mining to channelization to dams — to name just a few. Likewise, many studies take a spatially integrative approach, looking at how the cumulative impacts of a wide range of human activities lead to regional variations in fluvial geomorphology. Both lines of research are critical to understanding human impacts on the fluvial system, and both are highlighted in this volume.

The first group of papers provides integrative portraits of how cumulative anthropogenic impacts in streams vary globally or with locality and scale. Examples include global syntheses of human impacts on suspended sediment loadings (Walling) and mountain rivers (Wohl), plus regional syntheses of human impacts on rivers in the Andes (Harden), ecosystems in the United States (Poff et al.), the Upper Mississippi Valley (Knox), and the Mediterranean (Hooke). The *Processes of Change* section includes papers on specific triggers of change, including: dams (Graf), channelization (Simon and Rinaldi), climate (Goudie), in-stream wood (Brooks et al.), mining (Macklin et al.), changes in animal populations (Butler), and urbanization (Chin; Kang and Marston). Many of the papers address the resultant spatial distributions and persistence of the impacts.

An evening keynote speech was delivered by Andrew Goudie on the implications of global climate change for fluvial geomorphic systems and is included in the *Processes of Change* section of this volume. A series of posters presented prior to the evening banquet provided another opportunity for dialogue. Poster abstracts were made available at the conference web site. The brief duration of the meeting and the absence of

concurrent sessions meant that a half hour could be allocated to each speaker for presentations and questions, with time for deeper discussion during breaks, in poster sessions, at meals, during the banquet, and at special sessions dedicated to discussion.

The short duration of the symposium and the single-session format limited the number of authors who could be invited. In 2004, the lead authors of papers in this volume were invited to contribute papers to the conference. The criteria for selecting authors was to seek experts in the field who represent a range of disciplines (ecology, geography, geology, hydrology) and different geographic locales. Each paper received at least two reviews and in some cases three, not including additional reviews by us and reviews by Jack Vitek, the senior editor for special issues of *Geomorphology*. The limited number of slots for papers prevented coverage of all the topics and locales that would ideally be examined. The coverage by papers in this collection, therefore, is somewhat limited in scope. It also represents research perspectives primarily from English-speaking countries and does not examine, except in passing, river research from Asia or Africa. One hope in holding this conference is that it may promote similar conferences that address some of these omissions.

In terms of location, the 2006 Binghamton Geomorphology Symposium went south to the University of South Carolina in Columbia, SC. This location primarily drew for participants coming from the eastern and central United States and from western Europe. The conference was held in the newly renovated Callcott Building, home of the Department of Geography at the University of South Carolina.

Acknowledgments

This conference and the proceedings volume were made possible by the contributions and support of many individuals and institutions. The initial proposal for the symposium was reviewed and helpful suggestions were forwarded from the Binghamton Steering Committee, which was chaired by David R. Butler. Several symposium participants played important roles at the conference and we thank them for their contributions. William L. Graf moderated the meetings and co-led the field trip along with Kevin Borden, Ben Chow, Joe Dickerson, Stephanie Dodds, Mike Finewood, David Glenn, Lauren Gregory, Bandana Kar, Kirsten Lackstrom, Ke Liao, Kimberly Meitzen, Shama Perveen, Todd Patterson, Eli Peneva, Tara Plewa, Jinyoung Rhee, Courtney Russell, Matt Schmidlien, Sarah Schwartz, David Shelley, Laura Stroup, and Billy Terry. M. Gordon

(Reds) Wolman graciously agreed to provide opening remarks at the conference, and Andrew Goudie generously accepted our invitation to give the keynote address.

Our host institutions, the University of South Carolina (USC) and the University of Oregon (UO), provided financial and logistical support. We thank Cynthia Steele, Jim Twitty, and others at USC Academic Enrichment and Conferences for arranging registration, lodging, and food. Several students (unknown at the time of writing) helped with on-site arrangements, shuttling participants to and from the airport, setting up poster easels, and other important tasks. We thank UO for hosting the web site. Drs. David J. Cowen and William L. Graf were highly supportive in their sequential roles as chair of the hosting USC Geography department during the preparation and implementation stages of the conference, respectively. Thanks also go to Mary Anne Fitzpatrick, Dean of the College of Arts and Sciences, for a welcoming address to participants. In particular, we thank Dr. Harris Pastides, Vice President for Research at USC, for authorizing substantial funds to defray some of the costs to participating authors, to allow us to extend travel funds to students, and to provide some extra flavor and panache, allowing some demonstration of South Carolina hospitality to our guests.

Production of the proceedings volume was made possible by Richard Marston, Senior North American Editor for *Geomorphology*, who made arrangements with Elsevier to publish the reviewed papers in this proceedings volume prior to the meeting. John (Jack) D. Vitek, special issue editor of *Geomorphology*, screened all papers for acceptability to the journal and edited them for grammar and style. Femke Wallien, Geosciences Publisher for Elsevier, was highly supportive of the conference and the proceedings volume. Tony Smit,

Content Development Manager at Elsevier, provided timely processing of manuscripts that enabled us to provide this volume prior to the conference. The conference proceedings could not have been produced without the volunteer labor of external reviewers. Reviewers, like the authors, had tight time lines and we appreciate their willingness to work within our deadlines.

Finally and importantly, we wish to thank the authors and other participants in the convention who made the synergism of the 2006 Binghamton Geomorphology Symposium possible. We saw our role in organizing this proceedings as that of a catalyst. As such, we depended entirely on the energy, creativity, and open-mindedness of the participants to develop an atmosphere of open discourse and intellectual exploration. We thank all of you for making this volume a reality.

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