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RIVER DYNAMICS GROUP INTERIM REPORT

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Guidebook of applied Fluvial Geomorphology for River Studies in engineering and Environmental Management

from

Department of Geography,
University of Nottingham,
Nottingham NG7 2RD

1991

to

US Army Research, Development & Standardisation
Group - UK

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Meetings

The River Dynamics Group are working on the Guidebook through a management structure consisting of chapter editors and section leaders. This structure was agreed by the group at the first meeting under this project, which took place at Nottingham in June 1991. Subsequent meetings have taken place in the course of professional conferences such as those at Vienna, August 1991 (IUGG), Leeds, September, 1991 (BGRG) and Swansea, January, 1992 (IBG). The main item for discussion has been the contents and chapter break-down of the proposed *Guidebook of Applied Fluvial Geomorphology for River Engineering and Management*.

There was a very full discussion of the outline developed three years ago, especially in the light of suggestions put forward by Dr Keith Richards of the University of Cambridge. Dr Richards could not attend the meeting, but did send a long and detailed written contribution.

The RDG reviewed the basis for the book, its intended market and its relevance to the 1990s. After a long debate, it was decided to maintain the focus on geomorphology and to try produce a volume of use to engineers, fisheries & conservation officers and planners - more or less in that order. The group felt that in the future the guidebook could make an excellent text for short courses put on by the RDG for professionals working for action agencies such as the US Army Corps of Engineers, the National Rivers Authority and consultancy companies with interests in rivers and river environments.

Regarding the final format of the book, any decisions now would probably be premature. All that is required of us by the funded contract is a loose bound report (in multiple copies). Copyright remains with the writers. Quite how we present the manuscript is entirely up to the individuals who are writing the sections and will be addressed at subsequent RDG meetings. Therefore, nothing should be read into the groups' decision to use the authors' notes developed by John Wiley & Sons Ltd. as the guide to preparing the manuscript. This format was selected because it is already familiar to most of the group who publish in Wiley books and other Wiley journals and research monographs.

Following discussion with RDG members, Dr Phil Ashworth of the University of Leeds has been invited to join the group. He has indicated that he is delighted to do so.

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for

1991

The Guidebook

The length of the guidebook should be limited to about 500 pages (400 text + 100 diagrams etc.) and the content should be experience based. Each of the four main chapters should be of about 20,000 words (10,000 for introductory and closing chapters), and sections will 5,000 to 10,000 words in length.

The US Army-ERO has set no limits on the scope or content of the book, but the group felt that the case studies used should come from the UK and that the scope should be limited to mid-latitude, humid environments. It was recognised that the RDG has the expertise to cover much more of the world and that maybe we should address that - in the next project. However, there would be nothing wrong in pointing out how methods, techniques and analyses presented in the context of humid, mid-latitude rivers could be extended or applied to rivers in say, humid-tropical or semi-arid environments.

The main discussion then centred on the best mechanism for producing the manuscript, especially bearing in mind the "false starts" of the past. The group decided to review the outline contents of the book chapter by chapter, assigning responsibility to individuals for editing particular chapters. Within each chapter, major sections are to be written by small teams, led by a section coordinator. It is the responsibility of each section coordinator to ensure that the section progresses satisfactorily. The revised deadline for production of the manuscript is in summary:

| | |
|-----------------------------------|---------------|
| Initial draft sections + chapters | June 1992 |
| Final draft sections + chapters | October 1992 |
| Complete manuscript | December 1992 |

The group then considered which members of the RDG should be asked to act as chapter editors, section coordinators and section writers. We also reconsidered the draft outline of sections and made some fairly minor changes. The revised outline, with the suggested editors, coordinators and writers, is attached. The plan is for those named in the revised outline to produce draft manuscripts, initially for review by the chapter editors and later for review by the whole group. Individuals who have papers, pre-prints, unpublished reports and other material which they wish to see referenced in particular sections should send these directly to the relevant section coordinator. Clearly, there is the

potential for significant overlap between some sections. This should be handled firstly by direct contact between section coordinators during the writing of the sections and, secondly, when the draft sections are reviewed by the group.

The next full RDG meeting will be in on March 20, 1992 at Nottingham.

As you know, the RDG is an informal group with no officers, chair people, or hierarchy. While Richard Hey, Malcolm Newson and I took the initiative on obtaining funding for the production of this volume, and are willing to act as editors for the whole book, all the decisions made at the meetings to date were by common consent, and requests to individuals not present at the meeting to act as editors etc. are just that: *requests*.

If you have urgent comments or criticisms, or particularly wish to be (or not to be) an editor, coordinator or writer, please let me know a.s.a.p. I shall be in the USA on fieldwork from July 7 to 20 inclusive, but I will give any re-shuffling of responsibility a high priority when I get back.

REVISED AND UPDATED DRAFT CONTENTS FOR GUIDEBOOK OF
APPLIED FLUVIAL GEOMORPHOLOGY FOR RIVER ENGINEERING
AND MANAGEMENT

Chapter editors' names follow Chapter Title
Section writers' names are listed after each section
Section coordinators' names are underlined

Chapter 1. Introduction
(chapter editors: Richard Hey, Malcolm Newson, Colin Thorne)

Review of practical problems
Natural design approaches
Timescales in engineering and
management contexts
Hey,
Newson,
Thorne

Chapter 2. Natural channel stability and time perspective
(John Lewin, Mark Macklin)

2.1 Long-term changes in channel stability
Effect of climatic change and
Quaternary sea-level changes
Human impacts on the environment
Basin sediment systems
Fluvial landforms in alluvial valleys
Lewin
Macklin

2.2 Intermediate-term changes in channel stability
Available sources of information
Rates of change in time
Basin scale sediment budgets
Erosion, transport and deposition of sediment
Regime channels and dominant discharge
Harvey
Hooke
Lewin
Macklin

- 2.3 Short-term changes in channel stability
 - Discharge and sediment transport regime
 - Sediment sources, supply limitations and response
 - Effect of rare, large magnitude floods
 - Triggering of geomorphic thresholds

Ferguson
Leeks
Werrity

Chapter 3. River Channel and Valley Processes
(James Bathurst)

- 3.1 Environmental river flow hydraulics
 - Characteristics of river flow
 - Secondary currents and shear stress distributions
 - Flow resistance of bed and bar roughness
 - Vegetation Effects
 - Field studies and techniques
 - Formulae, applications and limits to applicability

Bathurst
Best
Carling
Hey
Thorne

- 3.2 Sediment Erosion, Transport and Deposition
 - Characteristics in different channel types
 - Erosion and Deposition
 - Pulsing of sediment transport
 - Field studies and techniques
 - Formulae, applications, limits to applicability
 - Sediment associated pollutants

Bathurst
Carling
Frostick
Lewin
Macklin
Reid
Walling
Webb

3.3 Bank erosion, stability and retreat

Characteristics of natural banks

Field studies and techniques

Bank stability calculations

Bank retreat predictions

Hooke
Lawler
Thorne

Chapter 4. Channel morphology and design procedures (Keith Richards)

4.1 Channel types and morphogenetic classification

Straight/meandering/braided

Sinuosity

Active and passive meandering

Confined and unconfined channels

Relation between channel pattern and x-section

Stream power controls on pattern and shape

Ferguson
Gregory
Hooke
Werrity

4.2 Styles of channel change

Modes and patterns of migration and evolution

Ferguson
Hooke
Werrity

4.3 Rational and regime techniques

Dominant and design discharge

Design of straight and meandering channels

using geomorphological approach

Brookes
Hey
Lewin
Richards

4.4 Prediction of morphological changes

Modelling erosion, deposition and channel change
in dynamic systems

Hey
Richards

Thorne

4.5 River dynamics and channel maintenance

Brookes
Newson
Thorne

Chapter 5. Case Studies*
(Malcolm Newson)

5.1 River stabilisation and channel design

5.2 Flood alleviation schemes

5.3 River regulation schemes
Reservoir operation, groundwater development,
inter-basin transfers

5.4 Bank protection and stabilisation projects
Revetments, grade control, Iowa vanes,
flow control

5.4 River restoration and management for
environmental and habitat improvement

5.5 Design of channel crossings
Bridges, pipelines etc.

Brookes
Carling
Gregory
Hey
Leeks
Newson
Petts
Thorne
+ others*

* This chapter is different to the others and requires special handling. Please contact the chapter editor if you have a case study to contribute to this chapter in any of the above sections.

Chapter 6 Practical Approach to Using the Guidebook
(Richard Hey, Malcolm Newson, Colin Thorne)

LIST OF CONTRIBUTORS

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