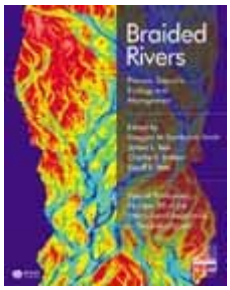
Journal of Sedimentary Research
An International Journal of SEPM
Colin P. North and Kitty L. Milliken, Editors
A.J. (Tom) van Loon, Associate Editor for Book Reviews
Review accepted 22 January 2007



Braided Rivers—*Process, Deposits, Ecology and Management*, edited by G.H. Sambrook Smith, J.L. Best, C.S. Bristow & G.E. Petts, 2006. International Association of Sedimentologists Special Publication 36. Blackwell Publishing Ltd, 9600 Garsington Road, Oxford OX4 2DQ, UK. Paperback, 390 pages. Price GBP 75,00; USD 149.50. ISBN 1-4051-5121-8.

I started reading "Braided Rivers" with a beating heart: I was excited about such a large book entirely devoted to fluvial sedimentology. It appeared already soon, however, that my enthusiasm was a bit premature. In my opinion, the title "Braided Rivers: Process, Deposits, Ecology and Management" is misleading. It suggests a primarily sedimentological content, whereas 60% of the book consists of papers concerning hydrologic modelling as well as the application of new methods in studying the changes of fluvial morphology. Only 20% of the papers might be considered as "pure" sedimentology. A title such as "Numerical Approaches to Braided Rivers" or "Braided Rivers: New Analytical Trends" would have been much more appropriate. The book contains nearly 400 large-sized pages with eighteen papers. Some of them are too long, and reading them is therefore sometimes wearisome. It is not possible to deal with all papers in this review, so I concentrate on the most essential ones.

Let me start with the papers in the book that are devoted to the methods of hydrologic documentation of rivers. These are recently dominated by digital photogrammetry and laser altimetry. Lane's paper ("Approaching the system-scale understanding of braided river behaviour") is a comprehensive review of these new methods. It contains also some quantitative models of braided fluvial systems. The earth-science literature shows that the usefulness of these methods for the recognition of the braid belt's morphology (and, for example, estimating the aggradation ratio) has been tested before, with a positive result. Recently, they tend to become also more commonly used as an effective tool for sedimentological analyses of contemporary fluvial systems. Other researchers use the same remote methods for measuring hydraulic parameters (mainly during large floods, when traditional measuring methods cannot be applied). This is elaborated in, for example, the contribution by Hicks et al. ("Use of remote-sensing with two-dimensional hydrodynamic models to assess impacts of hydro-operations on a large, braided, gravel-bed river: Waitaki River, New Zealand"), which provides a description of remote-sensing techniques applied to determine specific discharge and shear stress data of river flows. These methods are still in a stage of testing and can, consequently, not yet been used as sources of reliable data for establishing new sedimentological fluvial models.

Estimating the evolution of river morphology with numerical models is discussed extensively in the book. Bernini et al. point out ("Numerical modelling of alternate bars in shallow channels") that—even if the bar dimensions can be simulated well—the prediction of long-term channel-belt morphological changes is still impossible. Quite similar critical conclusions are drawn by Doeschl et al. ("Methods for assessing exploratory computational models of braided rivers"), who verified the 1994 fluvial numerical model of Murray & Paola, which is recently popular. The theoretical results of this model are compared with the actual morphological changes of a braided river, viz. the Sunwapta River (Canada).The theoretical and actual topographic characteristics

appear to be completely different, so that the Bernini et al. study shows that numerical models should still be treated very cautiously by fluvial sedimentologists.

Palaeohydrological aspects are dealt with by Kelly ("Scaling and hierarchy in braided rivers and their deposits: examples and implications for reservoir modelling"), who estimates the geometry of Jurassic deposits at a various scales of depositional units: bedsets, storeys and complexes. He points out that the thickness and width of these units show quite a good correlation, which can be a helpful tool for palaeohydraulic estimates of channel depth and width, as well as for the prediction of reservoir dimensions.

A paper by Huggenberger & Regli ("A sedimentological model to characterize braided river deposits for hydrogeological applications") combines sedimentological and hydrogeological elements. Unfortunately, I have quite a lot of critical comments regarding the sedimentological part of this work. For example, the authors identify the colour of deposits with some values of textural parameters (mean grain size and sorting), and introduce a new, very complex lithofacies code. After the reading of this contribution, I could only deduce that a physics-oriented approach of the earth sciences (with sedimentology, obviously, included) and applied geology (here: hydrogeology) are, at least, if considered through the eyes of Huggenberger & Rugli, so far apart that their marriage is doomed to fail. Yet, one interesting—and surprising—sedimentological conclusion comes forward from this study: it appears that the deposits of gravel-bed braided rivers are mainly represented by trough-shaped bodies derived from ancient scour pools, not the sheet-like bodies, as it is generally accepted in well-known models.

"Pure" sedimentology is represented in the book by two papers. The leading study by Bridge & Lunt ("Depositional models of braided rivers") should be mentioned first. It is a semi-monographic work. Three large rivers are regarded as model examples: the gravel-bed periglacial Sagavanirktok River in Alaska, the slightly braided (transitional) sand-bed Calamus River in Nebraska, and the sand-bed braided Brahmaputra and Jamuna river system in the foreland of the Himalayas. The morphology, dynamics, and sedimentary record of these fluvial environments are presented, and two sedimentological models result and are described: those of gravel- and sand-bed braided rivers. The contribution can be considered as a recapitulation of results from previous studies by both authors on these rivers. While explaining the models, substantial emphasis is put on the lithology of the fluvial sediments, which makes this work highly valuable. In my opinion, this contribution can be regarded as one of the best sedimentological monograph publications on braided rivers that have been published for several years. If anything were to be improved in the paper, I think that the two fluvial environments were to be compared with each other by means of model-like illustrations.

The next sedimentological work is a paper by Sarker & Thorne ("Morphological response of the Brahmaputra–Padma–Lower Meghna river system to the Assam earthquake of 1950"). I think very high of this contribution. It contains original observations of morphologic changes in the upper reaches of a large-scale braided river resulting from an earthquake. The effect of a sediment wave moving downstream the fluvial system is analysed with respect to sediment-load concentration, riverbed aggradation, changes in channel-belt width, and braiding index. The results of this research are very interesting, particularly because they differ from previously assigned sedimentological rules for river response to an increasing sediment input. In my opinion, this paper is a significant step forward in our knowledge of fluvial metamorphosis.

What is the final judgement on "Braided Rivers"? The book is certainly worth being studied by each young scientist interested in hydrology, geomorphology and sedimentology of braided fluvial systems, especially if they are active nowadays. The book can be regarded as a summary of contemporary fluvial research, which describes and evaluates modern methods, and shows new ways of river research. For older and more settled sedimentologists, most of the book may seem too modern, and they may not feel challenged to read the book in detail. They too, however, can find a few exciting "pearls" that may bring further progress in the traditional sedimentology of fluvial environments.

Tomasz Zielinski
Institute of Geology

A. Mickiewicz University
Makow Polnych 16
61-606 Poznan
Poland
E-mail: zielu@amu.edu.pl

SEPM - The Society for Sedimentary Geology