

***Rivers and Floodplains - Forms, Processes and Sedimentary Record*, by J. Bridge, 2003.  
Blackwell Science Ltd, Oxford, UK; 504 pp., paperback; £ 34.99; ISBN 0632064897.**

This work by John Bridge belongs to the relatively large group of books dealing with fluvial problems. It is, in my opinion, one of the most interesting publications on this topic that appeared in the last few years. I will share here my impressions with you, just after reading the book.

After a short hydro-geomorphic introduction (Overview of river systems), Bridge's manual on sedimentology starts with some hydraulic principles. This chapter (Fundamentals of water flow) is clearly written with great care. Particularly the last part of this chapter seems to be useful for sedimentological practice: it includes a discussion of flow resistance, separation zones and flow regimes. However, quantitative data are, in my opinion, lacking. For instance, some attention to the values of various resistance coefficients would make the theory more useful for palaeohydraulic calculations. Moreover, some old, classical papers (by D.B. Simons and co-workers) from the sixties deserved to be mentioned in the part concerning flow regimes. It would have made the relationships between bed roughness and flow regime easier to understand for the reader.

In the next chapter, the threshold conditions of sediment entrainment and modes of hydraulic transport are discussed. The structure of this part is, fortunately, very logical. The author leads the reader 'by his hand' from erosion processes to depositional forms and sedimentary structures, which are the matter of next chapter. In this part, Bridge touches also (however roughly) the topic of mass flows. This complex problem is, however, presented on two pages only. Bridge was presumably of the opinion that gravity-induced transport and deposition do not belong to hydraulic phenomena and are not strictly connected with alluvial environments. This may, obviously, be true, but it seems wrong to neglect these processes and deposits almost completely, for some old (upper) valley terraces contain significant amounts of colluvial (i.e. mass-flow) deposits.

Chapter 4 (Bed forms and sedimentary structures) is written perfectly. Succeeding types of bedforms are characterized in detail; this concerns their morphology, hydrodynamics, sediment transport modes, and sedimentary record. I especially liked the part on supercritical bedforms, where the reader can find a lot of suitable information on antidunes, transverse ribs, rhomboid ripples, and chutes-and-pools.

The chapter 'Alluvial channels and bars' is written with unusual expertise. In what other book can you find nine meanings of the term 'braiding index'? This chapter will increase the insight into channel-pattern controls for most readers. This is of fundamental importance for anyone trying to make a palaeogeographic interpretation on the basis of alluvial deposits. Bridge also provides valuable empirical formulas related to the transition from braided to meandering patterns, the relationship between channel depth and width, and relationships between discharge and meander parameters. Meandering and braided rivers are analysed individually in the sense of flow pattern and dynamics, sediment transport and bed topography.

The author also reports new research tendencies in fluvial sedimentology. Sometimes this attention to modern views is at a cost of the older, more traditional (but still useful) methods and models. This is reflected clearly by the relative attention to the subjects of two succeeding subchapters: (1) Paleocurrents of channel deposits, and (2) Porosity and permeability of channels deposits. The second subchapter is two times as long as the first one ... Bridge appropriately pays attention to geophysical methods for defining the architecture of subsurface depositional bodies:

gamma-ray logging and radar profiling. The results of these investigations are the input data for paleohydraulic evaluations of channel depth and channel-belt width.

The chapter 'Floodplains' starts with a short description of flow patterns over floodplains, and of the factors controlling overbank deposition. Deposits of levees, crevasse splays and floodbasins are well illustrated, but the text is fairly limited. The subchapters on soils and palaeosols, on the other hand, are very comprehensive. These subjects are currently very popular in manuals on sedimentology (see, for example, 'Analysis of Sedimentary Successions' by Ghattacharyya & Chakraborty).

The chapter 'Along-valley variations in channels and floodplains' starts very well. The author discusses the problem of morphological reactions of fluvial systems to active tectonism. This highly interesting start comes, however, to an end very soon. I missed here a discussion of the characteristics of 'proximal' and 'distal' rivers, as well as attention to tendencies of grain-size changes along fluvial systems. Bridge skips instead over to another subject: alluvial fans and deltas. These two alluvial environments are, in my opinion, so important that they should rather have been treated in individual chapters. In this book, however, fans and deltas are dealt with quite superficially. There are neither classifications of these forms nor discussions of the differences in the depositional records of their various subenvironments.

Presumably nobody will be disappointed by the next chapter, 'Channel-belt movements across floodplains'. Almost the entire chapter is devoted to avulsion, a very 'fashionable' subject in present-day fluvial sedimentology. In my opinion, this chapter is the best review of avulsion that one can find in accessible literature.

A well-structured review of research methods and model evolution with respect to alluvial stratigraphy is presented in the chapter 'Long-term, large-scale evolution of fluvial systems', in which reactions of fluvial systems to tectonic movements and to climatic cycles are discussed first. Depositional and erosional fluvial processes controlled by sea-level changes come next. In this way, Bridge approaches to the topic of sequence stratigraphy. This part of book can certainly not be recognized as a manual on sequence stratigraphy: it is rather a critical review of its possible application in the research of fluvial deposits. At the end of this chapter, two case studies are presented. They deal with the influence of tectonics, climate, and sea-level changes on fluvial systems for the Lower Mississippi during the Holocene and the alluvial Tertiary Siwaliks Group of Pakistan.

The last chapter can be regarded as exceptional for a book on sedimentology. This chapter, 'Fossils in fluvial deposits' focuses on ichnocoenoses. Assemblages from alluvial, lacustrine, and transitional-to-marine environments are characterized and illustrated with numerous photos and drawings. One can find there even some curiosities as fossil termite, ant, and bee nests.

Appendix 1 concerns hydraulic measurements in active alluvial channels: depth and velocity of flow, bed-load and suspended-load sediment sampling, as well as deposit sampling.

Appendix 2 is of special value. In 'Methods of describing and interpreting sedimentary strata' one can find very interesting subchapters, such as those on 'Seismic profiles' and 'Ground penetrating radar'. I do not know any book on sedimentology that includes these new methods of sedimentological research. The subchapter on age dating is short and superficial. In the last subchapter, 'Interpretation of different scales of strata', the author proposes a three-fold subdivision of depositional units as a basis for the interpretation of sedimentary processes at various scales of time and space.

Let me, after dealing with the contents of Bridge's book, also deal with its presentation. It contains a lot of short subchapters with clearly defined subjects; this is a very useful structure,

because the reader can find quickly a topic that he is interested in. In addition, some of the words that are important from a nomenclature point of view, are written in bold letters. This is very helpful, especially for readers who feel uncertain about sedimentological terminology, because they can easily find explanations of these terms.

Some chapters of this book are written in the way of a textbook, i.e. on the one hand simply and intelligibly, on the other hand with interesting particulars. The rest of the chapters could rather be considered as the author's personal impressions on particular subjects. It means that 'Rivers and Floodplains' is a very personally written book. It is not a classical textbook because a lot of sedimentological models are lacking, particularly those that were established in the 1970's and 1980's. Bridge's book could therefore have been given the 'New tendencies in fluvial sedimentology' rather than its present subtitle 'Forms, processes and sedimentary record'. This is underlined by the reference list of book: nearly 40% of the works listed in it are not older than 13 years.

In my opinion, Bridge's book is a professional and modern work. I can therefore recommend it to professionals in this field; however, not to students. For them this book will be too difficult in some parts. Miall's 'The Geology of Fluvial Deposits' still remains the basic textbook on rivers and floodplains for students.

Tomasz Zielinski  
Faculty of Earth Sciences, University of Silesia  
Sosnowiec, Poland