

The volume is divided into five topical sections. Section one is titled "Natural hazards and high-mountain land-use planning". This section is extremely practical and should be of interest to anyone involved with land-use planning in mountainous areas. Papers by Kienholz, Ives and Bovis describe approaches and problems associated with mapping and rating natural hazards in the Alps and Rocky Mountains. Ives and Krebs detail case histories of responses by mountain residents and developers to such studies. The balance of the section deals with avalanches. The avalanche papers range from a review by Perla of the mechanics of artificial avalanche release to several papers on the influence of avalanches on alpine ecology in the Soviet Union.

The heading of section two is "Mountain geocological processes and changes through time". Papers range from purely geomorphological such as Luckman's paper on the geomorphic work of avalanches in the Canadian Rockies to those truly geocological in nature such as the contradictory papers on alpine pedogenesis by King and Brewster and Howell and Harris. The papers by the Soviet authors Golubev and Kotlyakou and Gorbunov are good review papers on the geography of glacial landscapes and permafrost.

Section three is titled "High mountain vegetation and landscape structures". This section deals almost exclusively with timberline ecology. Papers describe flora composing timberline communities and the geo-climatic controls and floral responses which determine their geography in such diverse areas as the boreal zone in the USSR, central Mexico and the Canary Islands. The human impact on timberline is also discussed where long term human activities such as grazing and burning have been at work. The papers on timberline in the Canary Islands and central Mexico by Höllerman and Lauer respectively are noteworthy in this account.

The heading of section four reads "High mountain regional studies". The papers in this section deal chiefly with mountain

biogeography. The majority of the papers are by Soviet authors and discuss non-tropical Asia and Eurasia, and should be good overviews for those wishing to acquaint themselves with these areas.

The paper by Zimina in this section is of general interest in that it not only reviews Caucasian natural history but details man-caused extinctions of a number of animal species in the Caucasus Mountains and current Soviet efforts in nature conservation in this region. Other papers by non-Soviet authors deal with biogeographic studies of mountainous areas of Japan, the Pacific Northwest of the United States, the Canadian Rockies and Iraq.

The final section is titled "Renewable resources of high-mountain environments: their use and over-use". Papers in this section draw on ecology in its broadest sense. Changing cultures and land uses are tied to past and present changes in mountain biogeographies. Papers include case histories from the Carpathian Mountains of Czechoslovakia, the French Alps, and the Himalayas. These papers should be of interest to anyone concerned with the myriad ways human economics and sociology impact on the natural world.

One final remark about this volume is in order with respect to North American alpine studies. The papers by European, Soviet and Japanese researchers provide perspectives on human interactions with the physical and biological environments which can be documented for hundreds or thousands of years. Similar records for mountainous areas in North America are fortunate if they span a century. Thus, these papers provide a wealth of information on the long-term resiliency of mountain ecosystems, the degree to which climatic change has influenced them, and histories of coping with natural hazards. Many valuable analogies to North American problems should be found in this volume.

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FLUVIAL SEDIMENTOLOGY. Edited by A. D. MIALL. Canadian Society of Petroleum Geologists. Memoir 5, 1978. 859 pp. \$30.00

The conference was a great success. Virtually all of the foremost fluvial researchers were in attendance, drawn to Calgary in the fall of 1977 for the First International Symposium on Fluvial Sedimentology, jointly

sponsored by the Canadian Society of Petroleum Geologists and the Department of Geography, University of Calgary. The conference organizers, Andrew Miall, Derald Smith and Norman Smith, succeeded in assembling a focussed program of papers by a wide cross-section of workers, including a number of vigorous newcomers along with the established figures. That the conference was so

fruitful for all the participants is a tribute to the insight, initiative and hard work of the organizers and sponsors.

Enrollment at the symposium was restricted. The wisdom of this policy was demonstrated at the meeting, for the sessions were of manageable size and the intimacy of the gathering fostered productive discussion. On the other hand, many interested geologists were excluded from taking part in the meeting. Consequently, it was with considerable anticipation that the sedimentological community awaited the publication of the conference proceedings. The book is now out. The wait was worth it. It is a fine volume.

From both a technical and a scientific standpoint, the book is very pleasing. The typesetting is clear and accurate, the layout generally attractive, the paper stock of good quality, and the photographs and diagrams beautifully reproduced. Practically all of the 41 papers are carefully and intelligently written, with a wealth of new information and insight that should serve as a strong basis for debate and research for a long time. First class contributions and sound editing do not always result in a satisfying book, however. How often it is that we go to a symposium volume in an attempt to thoroughly familiarize ourselves with a given subject area, only to be frustrated by a diffuse and even haphazard collection of papers with no discernible thread to tie them together. It is in this area that editor Andrew Miall has achieved notable success. He provides us with a splendid introductory article on the history of fluvial sedimentology and the present state of the art, setting the stage for all the papers that follow. These he has solicited and organized in such a manner that the reader can logically progress from one section to the next, compounding his knowledge as he goes. In the past we have seen a number of examples of Andrew Miall's remarkable ability to synthesize and distil great volumes of published information into cohesive and enlightening review articles. His capability as an editor allows him to bring the same cohesiveness to a whole volume of papers by widely differing authors.

The book is organized into nine sections. In the first, Miall's review article stands alone. The second is devoted to the texture and structure of fluvial deposits. The two papers here (Shen, Davis *et al.*), though informative, do not provide a fully representative view of current thinking in this area.

Section three is entitled "Bedforms and Bars". It contains a number of well documented case studies, including Ashley's fine work on the Pitt River in British Columbia, a post-symposium contribution by

J. H. Barwis on the differences between tidal-creek point bars and fluvial equivalents, and a commentary on bar terminology by N. D. Smith. The latter deals with the symposium workshop sessions in which Smith made a valiant attempt to forge agreement on what should be called what. Unfortunately, consensus was not achieved and the nagging problems of bar terminology remain with us. I hope that the workers involved will continue to seek agreement, for the terminology problems have already led to considerable confusion, and misunderstandings continue to proliferate.

"Modern Rivers: Geomorphology and Sedimentation" is the title of section four. Included here are a number of innovative case studies and a thoughtful article on channel classification by B. R. Rust. The paper in this section by V. R. Baker constitutes, for me, one of the highlights of the volume. In documenting the influence of climate on fluvial style he focusses our attention on a variable that has been almost totally neglected to date.

Section five, on "Ancient Fluvial Systems", is one of the strongest in the book. The first four papers are devoted to Precambrian and lower Paleozoic fluvial systems. Together they define a rather distinctive fluvial style dominated almost entirely by braided systems. As the paper by E. Cotter illustrates, pre-Devonian braided stream systems gave way to a more uniform mixture of braided and meandering systems with the advent of land vegetation in mid-Paleozoic time. The remaining seven papers in this section deal with upper Paleozoic, Mesozoic and Tertiary sequences. Highlights for me include a well illustrated article on the Scalby Formation of Yorkshire (Nami and Leeder) and a review by Puigdefabregas and van Vliet of some of the superb exposures of Tertiary meandering stream deposits in the southern Pyrenees. Another praiseworthy contribution is the paper on the Brazeau-Paskapoo Formations of west central Alberta by J. R. McLean and T. Jerzykiewicz. They describe their sequences, and then in refreshing contrast to the rather guarded approach of most authors, go on to outline a raft of ideas and even speculations about relationships between cyclicity, tectonics, coal deposition and fluvial sedimentation. They put everything on the table for the rest of us to evaluate.

The sixth section, on "Fluvial Facies Models", constitutes the heart of the book. There are nine exceptionally fine papers by some of the world's leading experts in fluvial models. The cumulative effect of the papers is somewhat disheartening, however, for there emerges a consensus that the few simple models with which we have been working for

the past 15 years are not adequate to encompass the great variety of fluvial systems. This realization in itself is a healthy sign, for it indicates a maturing of our collective thinking about fluvial facies models and a growing appreciation for the complexity of the problems. For me, the standout papers include: a well-conceived article on sand body geometry by J. D. Collinson; M. R. Leeder's paper on quantitative stratigraphic simulation of alluvial systems, an enterprise that many would regard as bordering on the intractable but one in which there is obvious need for a new initiative; and R. G. Jackson's paper on lithofacies models for meandering streams. In the latter, Jackson again acts as the conscience of the fluvial sedimentology community, decrying the use of simplistic concepts, protesting the lack of information on certain fundamental parameters (e.g. preservability), clarifying here, cautioning there. Any lingering complacency that we may harbour about our facies models is dissipated by Jackson's writing.

The seventh section, on "Paleohydraulics", deals with the exciting and comparatively new science of reconstructing channel flow parameters in ancient fluvial systems. To a greater degree than most of the subjects covered in this book, research on paleohydraulics requires a cross-disciplinary approach, involving sedimentology, river engineering, hydraulics, geomorphology, and statistics. The five papers in this section, particularly the review articles by J. S. Bridge and Ethridge and Schumm, provide a balanced review of the current status of paleohydraulic studies and, perhaps more importantly, highlight the risks involved in over-interpreting field data. Much cooperative effort is required in this field before we can feel confident in our paleohydraulic reconstructions, but an important start has been made.

I am of two minds about section eight on "Economic Applications of Fluvial Sedimentology". On the one hand, the two papers that are included are interesting contributions (one on placer gold/uranium by W. E. L. Minter, the other on uranium mineralization by B. R. Turner, both illustrated with examples from southern Africa). On the other hand, this is a grossly inadequate treatment of the subject. A whole volume could be devoted to the application of fluvial sedimentology in the search for minerals and fossil fuel resources. Perhaps some

consideration should be given to undertaking such a project.

The last section of the book contains 22 abstracts of papers read at the conference or presented in poster sessions. Most of them are enticing. It is a pity that they could not have been given fuller treatment in the volume, for they would have helped fill some of the gaps in sections two and eight. I am sorry to note, too, that what I remember as a very thoughtful keynote address by J. R. L. Allen is not reproduced in the volume. Only the abstract is printed.

Before concluding, I should touch on a few of the book's shortcomings. The spine of my copy is suspiciously loose. Although the typesetting, layout and reproduction of the book is generally good, there are lapses. For example, Figure 8 in the paper by D. E. Shwartz is spread over seven pages, with the captions located on a separate page. Some of the plates in the paper by Darryl Long are incongruously placed (e.g. Figures 19 and 20, page 329) and there is one diagram (Figure 18) which is incomprehensible to me. One of the amusing slip-ups is in Norm Smith's article on bar terminology. In his conclusions he offers four suggestions, number 10 through 13 inclusive. Just like a university professor to save his first nine comments for another publication.

In summary, it should be emphasized that this is basically a research volume. It contains the most recent ideas from people that are working at the forefront of the discipline. For all sedimentologists, geomorphologists and river engineers who are interested in coming to grips with the current status and future directions of fluvial research, the book is essential. For the more general soft rock geologists the book constitutes a useful reference work. But does the book have value for the practicing petroleum explorationist of CSPG ilk? I think that the answer is yes. If you are searching for hydrocarbons in fluvial or related deposits or if you are trying to determine how to produce from geometrically complicated fluvial sand reservoirs, then you should be aware of the tremendous complexity of fluvial deposits. I have no doubt that the committed petroleum geologist can find all kinds of valuable exploration clues in this book.

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