

Davies' book is the fourth in a series of geomorphology texts being edited by K. M. Clayton, a British geomorphologist. The format adopted for the series is functional and attractive and, even more important, it is rapidly being accepted as indicative of thorough, well written and up-to-date assessments of important geomorphologic topics.

Davies uses as a foundation the ideas he advanced in "A Morphogenic Approach to World Shorelines," published in *Zeit. f. Geomorph.* in 1964. It is obvious that in the past 10 years his thoughts have both matured and expanded. Yet in the preface he refers to the present volume as an "effort in stocktaking." And, indeed, it is, if we think of stocktaking as an assessment of the present state of our knowledge about coasts. Such an assessment, however, is hampered by two factors which, although not unique to coastal studies, are exemplified all too well by them. First, far too few data are yet available about coasts to warrant many unqualified statements. Second, conclusions proposed by many workers in different parts of the world are often contradictory. It is ironic, of course, but in most cases each of the conflicting arguments is correct—even if only for the particular environment in which it was derived.

Given two such severe handicaps it is little wonder that Davies resorted frequently to the use of such words and phrases as "probably," "likely," "it appears possible to suggest," "certainly imply," and so forth. In this reviewer's opinion such qualifiers are not an indictment against the author but rather an indication of the relative infancy in which the study of coasts finds itself.

Excluding brief, but well composed, introductory and concluding statements, the book is composed of 10 chapters, which fall logically into two parts. The first part (Chapters 2-5) is used to examine the various factors important in influencing the geographical variation of coasts. These factors are discussed in three broad groups, namely: those operating landward (lithology, tectonic stability, and denudation), those operating in the sea (wave regime, tidal type and range, and seawater characteristics), and biological factors. The second part (Chapters 6-11) deals with those ways in which the variations in these major fac-

tors are related to coastal processes and form. Included are discussions on transport systems, erosion, wave construction, the beach, dunes, and coastal inlets.

The 130 illustrations add much to the text. The maps are uncluttered, to the point, and easily interpreted. Some are modifications of previously published maps but others appear to be original. Although a large proportion of the illustrations are from "down under" (Davies lives in Australia) they have been chosen well. One of the volume's most useful features is an excellent bibliography. With so many virtues it is easy to recommend the book to the serious student who has a basic knowledge of the physical sciences.

In his conclusion the author makes a pitch for a latitudinal zonation of the important shore processes. His argument is provocative and is certain to elicit comment from other coastal workers.

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Les Bassins des Fleuves Sénégal et Gambie: étude géomorphologique. PIERRE MICHEL. Office de la Recherche Scientifique et Technique Outre-Mer, Mémoire 63, Paris, 1973. 2 vols., maps, diags., tables, biblio. and index.

This detailed study of the geomorphologic evolution of the Senegal and Gambia basins covers an area of 420,000 km² and reflects some 15 years of field work by its author. The watersheds extend from the subarid, desert margins of the Sahara (with 300 mm. precipitation) to the humid, forested, slopes of the Fouta Djallon (over 2000 mm. precipitation).

Documented by numerous, excellent sections, maps, and photographs, Michel proceeds to outline the background physical geography; bedrock and structural provinces; weathering and regional pedogenesis; Mesozoic and Tertiary planation surfaces and their lateritic cover mantels; Pleistocene pediments and related bajada deposits or alluvial terraces; as well as the late Pleistocene dune, beach, and alluvial formations. Four planation surfaces, all associated with posterosional laterites, date from the mid-Jurassic, early Cretaceous, early Eocene, and late Pliocene. Fine paleogeographic recon-

structions are given for each period, and the insights into planation versus tropical pedogenetic processes are of unusual value. The three Pleistocene pediment-and-bajada complexes give a somewhat oversimplified picture of that time span. Significant is the evidence for soil formation under moister conditions coincident with high, late Pleistocene and mid-Holocene sea levels, in contrast to the drier paleoclimates indicated by advancing dune fields during the last glacial maximum.

Altogether this is a fine regional study, competently resolving the evolution of these river basins at a level of detail available for few other world river systems. All the more disappointing is the limited familiarity with or application of, modern quantitative and theoretical approaches in geomorphology. Similar criticisms can be voiced for Michel's consideration of broad problems and issues of Pleistocene isotopic chronology, cyclic sea-level changes, and extraregional stratigraphy.

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ENVIRONMENT AND MAN

Modifying the Weather: A Social Assessment. W. R. DERRICK SEWELL, et al. Dept. of Geography, University of Victoria, Western Geographical Series, Volume 9, Victoria, B. C., 1973. xvi and 349 pp., tables, maps, plates, figs., graphs and refs.

This volume contains papers prepared for the Symposium on Human Interactions with the Atmosphere sponsored by the National Center for Atmospheric Research in October, 1972. It presents a current review of major issues to be met in the continuous expansion of weather modification programs and suggests questions most urgently in need of research, especially as they relate to the human and ecological consequences of such programs. The papers vary in approach and content but each relates to the central theme throughout—human interaction with weather and possible consequences from weather modification. Some of the topics discussed are social concerns and public policies related to weather modification, issues in the design of social research for the management of atmospheric

resources, scientific response to public concern about the atmosphere, ecological opportunities and problems of weather and climate modification, social choice and weather modification concepts and measurement of impact, and politics and weather modification.

Scientists are capable of predicting, with limitations, what type of environmental impact will result from certain major man-caused atmospheric alterations. However, little progress has been made toward answering questions of impact evaluation and actions that should be taken as a result of the evaluation. The trend has been to investigate atmospheric problems from a physical perspective and as single isolated questions without regard for the important societal implications. Physical scientists need to become more aware and more concerned with social questions. For example, in 1964 a decision to alter the track of Hurricane Cleo would have turned it away from major population centers in Florida reducing total damage. However Georgetown, South Carolina would have been hit by the storm. "Who is to judge whether the citizens of Florida are more important than those of South Carolina?"

This volume addresses itself to the physical characteristics and influences of certain adverse climatic phenomena (drought, hail, hurricanes), how these phenomena affect the people, how the weather can be modified, and the consequences that certain populations might face as a result of a particular weather modification. Questions of social, economic, and political involvement in the human interaction between weather and weather modification are discussed and suggestions made for further inquiry. Many papers are enhanced by the incorporation of photos, maps, and statistical tables. The volume is interesting, informative, and enlightening. It is a welcome addition to an area that has not been given sufficient attention. Its value lies in bringing the field up-to-date, raising many questions that need to be considered, and presenting the case for a much greater research effort in the interaction of man and weather modifications.

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