

units and the screening of all sorts of recreative activities. However, the integration of vegetation data and criteria into the model, its implementation and evaluation was not clear enough to me.

The 53,456 ha of coastal dune formations were surveyed and mapped for the first time. A wealth of data on all 423 species, plant ecological aspects, vegetation classification and management is now available and presented clearly in the first and fourth report. The second summarizes and catalogues all recorded site and species data, stored in a computerized vegetation database.

The general concept of the project is useful and directly relevant for the problems concerned, inviting many others to face similar problems. An engaging example of engaged research!

Albert H.P.M. Salman
Duinbehoud/EUDC
Leiden 2301 EB, The Netherlands

Marine Mineral Resources, Fillmore C.F. Earney, 1990. Routledge, London, 387 p. Stg. £65.00. ISBN 0-415-02255-X (hardback).

Marine Mineral Resources claims to be a wide ranging, contemporary reference work. It concentrates on the economic, and political advantages and constraints of marine mineral extraction and forms part of a series confronting various aspects of ocean management policy.

Following a brief description of the important marine minerals and an extremely simplified consideration of marine geology, a review of the intricate and unresolved Law of the Sea issues and their possible solutions is presented.

The minerals of the deep sea bed and continental margins (generally interpreted to be greater than 200 metres water depth) are then considered in detail. These include ferromanganese nodules and crusts of the deep sea bed together with latest information on polymetallic sulphides. The technological and economic viability of extraction is appraised with an opportune assessment of the associated environmental impacts.

The minerals of the continental margins are divided into placers and subsea-bed metallics, construction aggregates, industrial chemicals

and coal and oil. There is also an evaluation of the possibility that sea water may provide significant quantities of uranium, magnesium, freshwater and salt.

As a conclusion, case histories including problems associated with the US EEZ, a comparison between the UK and Norway offshore petroleum development policies, and the geopolitics of offshore oil exploration are used to highlight the complexity of marine mineral resource claims.

In short, the book fulfils its aim admirably. As a consequence it will be useful as an introduction to a diverse readership ranging from undergraduates to planners wishing to understand more of the technical (to a lesser degree), and both the political and economic aspects of the marine environment.

Throughout this readable, informal, but thoroughly referenced text there is simple but effective use of diagrams, figures and tables. Surprisingly there is also a praiseworthy consideration of developing countries' interests, given the capital intensive research and exploration often required for mineral extraction. However the use of named consultants' comments is unnecessary, whilst personal letters and obscure references will at times make further research frustrating. Finally the plethora of acronyms *e.g.* LGD—landlocked and geographically disadvantaged (perhaps ISR should be added—in some respects!)—throughout the book is initially tiresome.

Overall the strength of this volume is that it offers an introduction into all aspects of marine minerals. I think it should be read by anyone with even a remote interest in marine mineral issues.

Ian Selby
Chichester, UK

Biology, Epidemiology and Management of Pyrodinium Red Tides, G.M. Hallegraeff and J.L. Maclean, (eds.), 1989. ICLARM (International Center for Living Aquatic Resources Management), MC P.O. Box 1501, Metro Manila 1299, Philippines, 286p. \$US 40.00 (paper bound). No ISBN.

Red tides, the sudden appearance of discolored water because of blooms of microscopic

algae and bacteria, have been described since biblical times. The phenomenon is of increasing concern because of impacts on increasing populations because the blooms may cause massive fish kills, contamination of shellfish, paralytic shellfish poisoning (associated with consumption of the contaminated shellfish), and human fatalities.

A dinoflagellate (*Pyrodinium bahamense* Plate) responsible for red tides in Southeast Asia was first described in 1906 from Atlantic sources, where red tides associated with this organism were tourist attractions (owing to the persistent luminescent blooms). In the early 1970s human fatalities occurred as a result of *Pyrodinium* blooms in Southeast Asia. Several types of red tide are known in that area, but *Pyrodinium* red tides were declared to be the number one red tide danger for the Ido-West Pacific region.

This volume summarizes papers presented at

a workshop in May 1989. It is a useful volume for the coverage of the topics and the expertise of the contributors. Not surprisingly, there is thorough coverage on the distribution, biology, and toxicology of the organism (14 papers), as well as the epidemiology (two papers) and economic aspects (two papers) of the red tides. In addition, concern for management of red tide appears (seven papers, including a short one on control methods). The book will also be useful because about 30% of it is devoted to field and laboratory methods for investigating the dinoflagellate.

This book is recommended to those interested in red tides, but also to those interested in field and laboratory methods for dinoflagellates.

Dean F. Martin
Institute for Environmental Studies
University of South Florida
Tampa, Florida