

Book Review

Large marine ecosystems: Stress, mitigation and sustainability, edited by Kenneth Sherman, Lewis M Alexander & Barry D. Gold (AAAS Press, Washington D.C.), 1993, pp. 376, Soft cover, \$ 46.95
[ISBN 0-87168-506-X]

In recent past, the restrictive definition of a marine ecosystem, as per ecological paradigm, has underwent rapid changes, especially with the advent of exclusive economic zone (EEZ). The necessity of a more holistic ecosystem approach for the utilization and management of resources and environment, is being recognized as an important recent development among marine scientists, geographers, lawyers, economists and government representatives.

The need of present and future is a great deal more relevant data, for rational management of marine ecological provinces of EEZ and further to identify, describe, delineate and compare marine ecosystems throughout the world oceans. Towards such a goal, one of the fast emerging and well-accepted concept is that of large marine ecosystems (LME). It has become focus of national and international fisheries management under the provisions of the United Nations Convention of 1982 on the Laws of the Seas.

LME are extensive areas, usually greater than 200,000 km² or even larger. They are characterized by distinct bathymetry, hydrography, productivity and trophically dependent populations. Thus LME are regional as they conform to geographical characteristics of a region and, further, they exist in a region within areas of the world ocean.

Since the last decade, plenty of scientific data have been generated on different aspects of LME. The book, under review, covers the proceedings of a symposium held at Monaco (1990) on the theme of stress, mitigation and sustainability of LME. The theme is presented and discussed under four topics, namely, sustainability, regional case studies on stress and mitigation; management; and technology applications to the monitoring process.

Focus, under sustainability, is on the integration of basic sciences and applied research in exploitation as well as protection of large marine areas. One of the positive finding is that the LME are useful areas of ocean space for linking point source problems like pollution, fish mortality and coastal zone damages,

on a local scale and global warming; ozone depletion and overfishing, on large scale issues. It is at the regional scale that biology, chemistry and physics interact to shape the character of ocean productivity and biomass yields. This has enhanced the importance of LME data, as a useful scale for regional ecosystems' research, monitoring and management. On large scale, the comparative approach of the LME concept tend to focus on the end product i.e. fish and/or other living resources and their population management on sustainable basis. An important inference from results on sustainability studies is, that no LME is an independent entity, but to a greater or lesser extent, dependent on physical and biological events in all the other LME.

The case studies on stress and mitigation of both the current and enclosed sea type LME, brings out the characteristic role of long-term variability in food chains, biomass yields and oceanography; effect of physical and biological changes on biomass yields; fishery trends and nutrient enrichment; stratified models and a comparative approach to identify factors regulating biomass yields. A variety of LME in the tropical, temperate and polar environment of the world oceans are covered. The situation of the Arabian Sea as LME, is still perplexing. Similarly, in the case of Antarctic marine ecosystems, where the convergence front is taken as northern limit, little precise geographical data, yet exist.

One of the big attraction of LME concept as presented under the sub-title, sustainability and management, is the possibility that a management system based on such an approach would be one in which the decisions could be solely grounded. The aspects of geographical boundaries, jurisdictional patterns and multiple use conflicts, related to the definition of LME are highlighted in right perspective. Especially the multiple use conflict arises, when alongwith fisheries, there may be offshore oil developments, use of ocean as dump sites, tanker shipping lanes and coastal pollution from land-based sources. An important finding is that the categorization of LME by ecological and geographical characteristics is useful but political factors are even more important.

Monitoring of expansive marine provinces, like LME, by traditional shipboard surveillance, besides being time-consuming, is not practicable. Use of mo-

modern tools and technologies like remote sensing through satellites, ocean acoustic tomography and biotechnological probes, are some options, which are discussed under technology application to monitoring processes in LME. However, the application and utility of relevant technology to problems in the study and management of LME, will largely depend on the success in convincing the public of the need to manage resources and environment from a scientifically sound database, made available in a timely manner and in adequate quantities.

The wealth of multifaceted information presented in the book, is a welcome update on the available information not only on the oceanographic data but more significantly, on the application of efficient tools and techniques towards the better understanding of the sustainability, stress, mitigation and management of LME.

A.H. Parulekar
National Institute of Oceanography
Dona Paula, Goa-403 004, India