ing virtually undiluted Mediterranean water, which was discovered in the Western Atlantic, a distance 4000 km from its source region.

These regional studies are however variable in depth. The most detailed studies came from the Western North Atlantic, where the intensive MODE and POLYMODE observational programs were made. The chapters by Richardson on Gulf Stream rings, Rossby and others on the Lagrangian float program and McWilliams *et al.* on the local dynamics of eddies, provide the deepest insight into the characteristics and dynamics of quasi-geostrophic eddies. This is perhaps not surprising given the large investment by the United States in these programs. The remaining contributions, though not as complete as the Western Atlantic programs, do give a fascinating glimpse of the wealth of methods which have been used by less well funded oceanographers. The methods include surface drifters, ship drift, XBT campaigns, and remote sensing techniques, which have all provided valuable information for the mapping of ocean eddies. Bennett for instance, gives a good appraisal of the efforts of many Australian oceanographers in attempting to understand the dynamics of the East Australian current. It is shown that this current, which is continuous and intense off the south Queensland coast breaks up into a series of eddies, as it moves southwards, losing all its identity as continuous current. This example makes the point that the Gulf Stream is not necessarily a good model for all western boundary currents.

Dickinson and Emery follow the regional description with global summaries of eddy statistics. Dickinson uses the fluctuation energy determined from current mooring as a measure of eddy activity, whilst Emery uses temperature variance, as estimated by XBT surveys, as his measure. The former measures eddy kinetic energy whilst the latter measures eddy potential energy. Much of Dickinson's contribution is related to the North Atlantic, but an attempt is made to include less well observed regions such as the Drake Passage. However, in the Weddell Sea, where there is only one data point, one wonders about the representativeness of the statistics.

The observational studies are followed by two concise chapters on the mathematical modeling of eddies, which give important clues to the mechanisms responsible for the generation of eddies. Despite the idealized geometry used, Holland gives convincing evidence for the upgradient fluxes of momentum by eddies which maintain narrow intense current systems, such as the Gulf Stream and its recirculation zone. He also shows how eddy activity above the thermocline can induce intense quasi-permanent circulations in the deep ocean. If we accept the validity of the models, then one is left in no doubt that the eddies, in similarity with the atmosphere, are instrumental in maintaining the general circulation of the oceans.

The remaining contributions are devoted to the effects and applications of eddies, which include coastal interactions, biological studies, and acoustics. It is here where the imperfections in understanding become more apparent. Angel and Fasham have painstakingly asembled some biological studies which are influenced by eddies. Most of the source of this material is from the study of cold Gulf Stream rings. It is clear from the authors comments that improvements in continuous collection techniques are required if biological oceanographers are to adequately resolve the appropriate space and time scales of the eddy field.

The final chapter is devoted to instruments and methods, which have developed considerably during the U.S. mesoscale eddy program in 1970s. However, for the most part, these techniques are not specific to the study of eddies and can be used on all scales. New techniques, such as remote sensing and tomography which are the most likely methods for the real time mapping of eddy fields in the future, are given only the briefest of mentions.

Overall this text is a heavyweight, both in size and its thoroughness of coverage. It gives an excellent synthesis of the results of the major eddy programs in the last decade and as such it is an important milestone in oceanography.

It is perhaps inevitable that the book is already dated, in that at the time of writing, a number of laboratories are making experimental real-time predictions of ocean eddies.

However, the book contains such a wealth of information and ideas that it is likely to be a major reference for the coming decade. It is a book which deserves a place in every library which purports to have an interest in marine science.

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**World Fish Farming: Cultivation and Economics**(second edition), by E. Evan Brown, 1983, A Publishing Company, Inc., Westpoint, Con-

necticut, USA, 516p. $US39.50, ISBN 0-87055-427-1.

The seventeen authors of this volume have presented, in varying detail, a review of the status of aquaculture in 31 countries covering North America, Europe, Australia and Asia. Latin America and Africa are not included. The book describes existing aquafarming practices and the authors in some countries have also covered details on the farm economics including marketing and distributional channels. The book covers more than 100 species of finfish and 13 species of shrimp/prawns and crayfish. Most major aquaculture systems such as ponds, raceways, cages, pens and their application in different local conditions are also included.

The title suggests a global coverage of fish cultivation. Hence, the omission of Latin America and Africa, although explained in the preface, is hardly justified, especially as countries such as Papua New Guinea, Sweden and Belgium/Luxemburg are included and in view of relatively rapid increases in aquaculture production output in Latin America. Whilst the second edition is certainly an apparent improvement in terms of coverage and scope, the exclusion of countries such as India, Bangladesh and Sri Lanka as well as Malaysia is a serious omission. Latest statistics indicate that India contributed no less than 0.8 million metric tons of finfish through aquaculture or approximately 8.3% of world total aquaculture output. The production from village ponds plays a very important role in fish protein supply in rural areas in Bangladesh. Although total output from Malaysian aquaculture is small, Malaysia's traditional and modern industrial scale aquafarming deserves inclusion in this volume.

The title of the book has also given an impression that it covers all aquatic living commodities as the term "fish" in fisheries usually covers all commercially important aquatic living organisms. The inclusion of mollusc and seaweed culture in this volume would have been useful to the readers who are interested in having a broad orientation of world aquaculture. Seaweed cultivation has contributed to more than 23% and mollusc culture 32% of world aquaculture production in 1983. Their importance in contributing to the world economy cannot be underestimated.

The 31 countries selected inevitably leads to heavy emphasis on the culture of salmon and trout. The culture of these two species in Europe, North America and even in Asia is very similar. However, cultivation of Chinese and Indian major carp, which figures largely in total world finfish production and also is an important source of protein for the rural poor, should receive equal if not heavier emphasis. High-priced commodities which are popularly cultivated in Asia include the seabass (*Lates calcarifer*), grouper (*Epinephelus spp.*) and snapper (*Lutjanus spp.*), which, unfortunately, are not included in the book. The impotance of *Tilapia* in polyculture systems in China and their contribution to culture-based open water fisheries in man-made lakes and reservoirs in Sri Lanka is also deserving of inclusion.

Despite the above omissions and exclusions, the book provides a very general picture of world main aquaculture activities for finfish and their economic contribution to national development and certainly provides a worthwhile record of aquaculture development in these 31 countries.

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**Coastline Changes: A Global Review**, by Eric C.F. Bird, 1985, John Wiley (Interscience), Chichester, 219p. ISBN 0-471-90649-8.

This is a country-by-country summary of observed 20th Century coastal changes, erosion or accretion, around the world. It is not an alphabetic, but sequential arrangement, as on a world map, starting at the top-left with Alaska and finishing with Antarctica. Eric Bird is chairman of the International Geograhical Union's Commission on the Coastal Environment, and this work is the product of a decade-long process of observation and collection. The results are descriptive and difficult to quantify, but the generally upward trend of mean sea level in the present century seems to confirm the Bruun Rule that the equilibrium coastal form (of unconsolidated material) is shifting upward and somewhat landward — to the dismay of riparian residents and investors.

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**Living With Long Island's South Shore**, by L.R. McCormick, O.H. Pilkey, Jr., W.J. Neal, and O.H.