BOOK REVIEW

GULLAND, J. A. [Compiler and Editor] 1971. **The fish resources of the ocean.** Fishing News (Books) Ltd., Surrey, England, xi+special map section+255 pp. Price £ 10.50.

Growth of human population is outstripping the rate of increase in food production of all types and the search for generating additional or new types of food, particularly in developing countries, is being intensively taken up. In this context, even a rough estimate of the different types of seafoods has become an urgent necessity. The effort of the FAO, therefore, by publishing this book is praiseworthy, which, as stated by Dr. Roy Jackson in the Foreword, is "the first comprehensive attempt to estimate the magnitude of these resources, in detail, throughout the world". The resources have been taken up separately for each area of the ocean. Many specialists such as Mr. A. Ben Tuvia, Dr. Y. Fukuda, Mr. R. S. Shomura, Mr. L. K. Boerema, Professor G. Hempel, Mr. A. C. Simpson and Dr. A. R. Longhurst have collaborated in this publication; but the book has largely been written by Dr. J. A. Gulland. The copyright in this book is vested in the FAO.

The estimates of the exploited stocks are made using the data of catch and effort, and length and age composition etc., and in respect of unexploited stocks, on the basis of (a) exploratory fishing (b) eggs and larval studies and (c) echo surveys. The potential production of animals at different trophic levels has also been estimated from the data of primary production, taking the ecological efficiency at each trophic level from 10 to 20%. Attempts have also been made to cross-check the results obtained by the different methods.

Starting from the unfished biomass (B_o), the maximum potential yield (Y_{max}) is estimated as $Y_{max} = 0.5 \times M \times B_o$, where M = the natural mortality coefficient. In the summary, however, it has been indicated that further studies are required to confirm this expression. There is an interesting discussion on the errors involved in estimating the potential fish yields from primary production and this, I am sure, would attract wide attention.

The book is no doubt a very worthy contribution, because besides giving the best available estimates of fish resources, it clearly shows how little we know about the different types of resources of the ocean. In fact, the lack of comprehensive statistics has been the main hindrance in resources estimation.

However, I feel that the wide variations in the estimates given in the book, are rather disturbing to fishery biologists. Thus, for the North Sea herring, the potential yield is estimated as less than 1.5 million tonnes (probably 1.0 million tonnes). It has, however, been mentioned that if the herring stocks of the southern North Sea and English Channel do not recover, the North Sea potential will still be lower. In the Okhotsk Sea, it is said that the pollack catch can be increased to 200,000-300,000 tonnes. Similarly, the mackeral catch of the north-west Pacific can also go up by 100,000-200,000 tonnes. I wonder if such wide variations in the estimates would be useful to planners. However, the reason for giving such a large range may be that it is so difficult to give precise estimates of the potential catch, in view of the recruitment changes which cannot be predicted so easily at present. The summary however, gives an optimistic estimate of the total potential for seafood production, varying from 100×10^6 to 2000×10^6 tonnes. The potential catch per hectare given in the book for heavily fished areas (north Atlantic and north Pacific) would be most useful for comparison with areas which are less intensively exploited.

The section on the Indian Ocean, initially prepared by R. S. Shomura, is inadequate, for considerable amount of information made available in recent years on the Indian Ocean, has been omitted. The Indian workers would not agree that, in the northern parts of the Bay of Bengal, fishing begins in November and ends in February. However, the total potential catch from the Indian Ocean including crustaceans has been estimated as 14.3 million tonnes. The potential for the crustaceans has been given separately as 250,000 tonnes. It has also been indicated that in the IIOE collections, the anchovies form 12% of the larvae at intermediate stations and 13% at the coastal stations. Thus the anchovies are one of the most abundant and underfished resources of the Indian Ocean.

The average sustainable yield of the Peruvian anchoveta is estimated as 10-12 million tonnes. But in 1970 and 1971, the catch exceeded this figure. Could the drastic fall in the catch of anchoveta in 1972 be due to overfishing. If this has happened, it would be a serious mistake, for Peruvian anchoveta is at present the biggest exploitable living sea resource. If, by any chance, the anchoveta fishery fails to revive within the coming years, the ecological implications of such a collapse would be serious. In the book it has also been indicated that per unit area, the Antarctica is 400% more productive than the rest of the ocean. The production of krill (euphausids) in the Antarctic Sea has been estimated as 200 million tonnes, and thus their annual yield, of the order of tens of millions of tonnes, is possible.

There are separate sections in the book dealing with oceanic resources, molluscan resources and crustacean resources. The total potential catch of tunas for the Indian Ocean, from all types of fishing, has been given as 110,000

tonnes, but the present catch seems to exceed this quantity. The frigate mackerel seems to be the most abundant oceanic scombroid and its world-wide potential has been estimated to be of the order of 1 million tonnes. At many places in the book, it has been emphasized that myctophids form vast untapped resources. Similarly, oceanic squids form yet another large unexploited resource. The section on molluscs is one of the most satisfying portions in the book. In this section, not only the capture fishery but also the culture fishery has been discussed and it has rightly been emphasized that large-scale mussel culture along the African and Indian coasts could give rise to millions of tonnes of mussels. The section on crustacean resources indicates that the production of spiny lobsters from the western Indian Ocean is not likely to exceed 3,000 tonnes annually. The potential prawn catch along the west coast of India is estimated to be about 100,000 tonnes (penaeid 50+caridean 40 thousand tonnes), but the present catch itself is about 150,000 tonnes.

In a number of sections, fishing activities of foreign vessels have been mentioned, but not in the section on Indian Ocean. It is also indicated that the Patagonian-Argentinian shelf is among the most productive areas of the world oceans (primary production=100-200 gC/m²/year). The claim of the Argentinians for a wide territorial limit has led to the withdrawal of foreign fishing vessels from that area.

The lighter aspects of the book make it an interesting reading; for example, the catch figures of the Philippines have been "derived from the information which might be used for tax purposes, adjusted by a factor believed to correct for misrepresentation" (p. 113) and "fortunately, in view of the deficiencies in the statistics of local fishing, there is not much long-range vessel fishing in the region far from home bases" (p. 113). The map section in the book is very illustrative and gives an excellent summary of the results.

The book is a very valuable document. Dr. Gulland deserves all the congratulations and praise from fisheries workers throughout the world for compiling and editing this book; in fact most of the sections have been written by him. As stated in the conclusion (p. 254) "too much should not be made of the detailed figures in the report, though they are the best available at present". Dr. Gulland has indeed done an excellent job. Research workers, administrators and industrialists would benefit considerably by reading this book and I shall recommend it to all marine scientists throughout the world.

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