

# Bay of Bengal Programme

Marine Fishery Resources Management

MARINE FISHERY RESOURCES

OF THE BAY OF BENGAL

BOBP/WP/36



UNITED NATIONS DEVELOPMENT PROGRAMME



FOOD AND AGRICULTURE ORGANISATION OF THE UNITED NATIONS

BAY OF BENGAL PROGRAMME  
Marine Fishery Resources Management

BOBP/WP/36  
(RAS/81/051)

MARINE FISHERY RESOURCES  
OF THE BAY OF BENGAL

BOB P/WP/36

by . K. SIVASUBRAMANIAM  
*Senior Fishery Biologist*  
*Bay of Bengal Programme*

Executing Agency:

Food and Agriculture Organization  
of the United Nations

Funding Agency:

United Nations  
Development Programme

Marine Fishery Resources Management in the Bay of Bengal  
Colombo, Sri Lanka, October 1985.

Mailing Address: c/o FAO, PO Box 1505, Colombo 7, Sri Lanka

Street Address: NARA Building, Crow Island, Mattakkuliya, Colombo 15, Sri Lanka

Cables: FOODAGRI    Telex: 2203 A/B FAOR CE    Phones: 522380. 522381. 522383

This paper attempts to summarize available knowledge, and identify the gaps in that knowledge, on marine fisheries and fishery resources in the Bay of Bengal region. It provides information on Bangladesh, Burma, India, Indonesia, Maldives, Malaysia, Sri Lanka and Thailand—their marine fisheries, fishery resources, status of important stocks, etc.

The Consultation on Stock Assessment for Small-Scale Fisheries in the Bay of Bengal, Chittagong, Bangladesh, June 1980, was the first major attempt to collect the knowledge available on marine fishery resources in the Bay of Bengal (see BOBP/REP/10.1, BOBP/REP/10.2 and BOBP/WP/7). That attempt did not cover Maldives and Indonesia. This paper updates the three earlier papers, besides providing information on Maldives and Indonesia. The data covered is largely for the period 1974-82.

It is hoped that this document will serve as a handy reference to those interested in the subject and also provide pointers to activities that are required in the area of marine fishery resource management.

The preparation of this paper is an activity of the 'Marine Fishery Resources Management' component of the Bay of Bengal Programme (BOBP). The project commenced in January 1983 and has a duration of four years. It is funded by the UNDP (United Nations Development Programme) and executed by the FAD (Food and Agriculture Organization of the United Nations) its immediate objective is to improve the practice of fishery resources assessment among participating countries and to stimulate and assist in joint management activities between countries sharing fish stocks.

This document is a working paper and has not been cleared by the governments concerned or by the FAO.

## CONTENTS

	<i>Page</i>
Summary	<b>I</b>
1. Introduction	<b>4</b>
2. General features of the project area	<b>5</b>
3. Fishing craft and gear	<b>7</b>
4. Annual production	<b>12</b>
5. Species composition	<b>15</b>
6. Trends in the fisheries	<b>20</b>
7. Biological information	<b>35</b>
8. Status of exploited stocks and potential for development	<b>36</b>
9. Potential in the unexploited ranges of the EEZs	<b>47</b>
10. Management of marine fishery resources in the region	<b>52</b>
11. References	<b>55</b>
 <i>Tab/es</i>	
1. Approximate estimates of the coastline, continental shelf and EEZ areas of the countries within the project area	<b>7</b>
2. Estimated number of fishing crafts/vessels in the countries within the project area	<b>9</b>
3. Main fishing methods used by mechanized and non-mechanized crafts operating in the project area	<b>10</b>
4. Annual total marine production in the project area by country (1972-1982)	<b>13</b>
5. Catch composition of the countries within the project area	<b>16</b>
6. Percentage composition of pelagics, demersals and shellfish, in the production by various countries	<b>18</b>
7. Tuna catch compositions in the EEZs and international waters within the project area	<b>19</b>
8. Annual changes in trawling fleet, shrimp catch and catch rates (1979-1984)—Bangladesh	<b>22</b>
9. Estimates of production and landing of fish caught by trawlers in Bangladesh (1978-1984)	<b>23</b>
10. Marine production from onshore, inshore and offshore ranges of Burma	<b>25</b>
11. Changes in the percentage composition of certain demersal varieties (1966-1982)—Thailand	<b>26</b>
12. Trends in the production of pelagics, demersals and shellfish on the west coast of Thailand (1966-1981)	<b>27</b>
13. Catch rate trends in various fisheries on the west coast of Thailand (1973-1979)	<b>28</b>
14. Monitoring survey—trawl	<b>28</b>
15. Catch rate of 30 t trawler	<b>28</b>
16. Variation in the annual marine production on the west coast of Peninsular Malaysia (1970-1981)	<b>29</b>

17.	Tuna longline catches of bigeye and yellowfin tunas in the project area (1976-1982)	32
18.	Bigeye and yellowfin tuna catches, hook rates and mean weights in 5°x 5° grids within the project area	33
19.	Summary of estimates of biomass, standing stock, potential yields and sustainable yields, by country and source	41
20.	Results of the tuna longline fishing trials conducted by Sri Lanka (1982-1983)	49
20A.	Experimental tuna longlining around India (1983-1984)	50

*Figures:*

1.	EEZ boundaries of the littoral and island nations in the Bay of Bengal region (Based on Klawe, 1981)	4
2.	Provisional demarcation of major ecological boundaries within the project area	6
3.	Annual marine fishery production in project area, 1972-1982	
4.	Diagrammatic representation of the types of exploited stocks in the project area	37
5.	'Dr. Fridtjof Nansen'—Bottom trawl catch per hour during October/November 1979 (Numerator) and May 1980 (Denominator) in 30'x30' Grids within the EEZ of Bangladesh.	51

*Appendix*

1.	Sequence of action for marine fishery resources management in the region	63
----	--	----

	<i>Publications of the Bay of Bengal Programme</i>	64
--	--	----

## SUMMARY

### Area studied

The area under review is bounded by the equatorial line in the south; the Maldive islands and the east coast of India on the west; Bangladesh in the north; and the west coast of Thailand, the west coast of Malaysia and the northern half of Sumatra (Indonesia) on the east. The EEZs cover about three quarters of the project area.

The study indicates that a number of fish stocks are probably being shared by two or more countries, but joint management of any kind is absent. The BOBP's FAO/UNDP project, 'Marine Fishery Resources Management in the Bay of Bengal', has selected a few of these stocks for joint studies by participating countries.

Data considered in this paper relate mainly to the period 1974-1982.

### Fishing craft and gear

About 325,000 fishing crafts of various types, primarily of the small-scale variety, operate in the project area.

In India, Burma, Bangladesh, Maldives and north Sumatra, the number of non-mechanized craft far exceeds that of mechanized craft. The percentage of non-mechanized craft is 95% in India and Burma, 80% in the Maldives, 75% in Bangladesh, and 72% in the northern half of Sumatra. In Thailand and Malaysia, the mechanized fleet significantly exceeds the non-mechanized fleet which accounts for only 10-12% of the total number. In Sri Lanka, the two types are almost equal with non-mechanized craft making up 51% of the fleet.

Only Malaysia and Thailand exploit about 50% or more of their EEZs in the project area.

The number of fishing craft has increased significantly in Bangladesh and Burma in recent years; this trend is not visible in other countries.

A few types of traditional craft are common to some countries. Examples: the log rafts of Sri Lanka and India, and the pole-and-line crafts in the Maldives and India. On the whole, however, traditional crafts in different countries are not directly comparable in design and operational and fishing efficiency.

### Production highlights and trends

The annual production from the EEZs of project countries is approximately 2.2 million tonnes, while the production from international waters of the area—by far eastern nations—is in the region of 6,000 tonnes/annum, excluding sharks.

Percentage contributions to the total production, according to available figures, are: Malaysia 20%, Burma 20%, India 19%, Indonesia 15%, Sri Lanka 8.8%, Thailand 8.7%, Bangladesh 6.6%, Maldives 1.4%.

Only Sri Lanka and Bangladesh claim a steady increase in total production. The years of peak production for other countries: Thailand (west coast) 1973, India (east coast) and Sumatra island 1975, Malaysia (west coast) 1980, Burma and Maldives 1981.

The reliability of catch statistics for at least some of these countries is a matter for concern. The production from the international waters may have peaked in 1980, but data available to confirm this observation are incomplete.

### Fish species

Over 215 demersal fish species, 65 pelagic species, 20 shrimp species and 40 cartilaginous species enter the fisheries of the project area. Estimates of catch composition are reasonably good in some countries, incomplete in a few and totally lacking in the others. The grouping of species differs from country to country.

In Maldives, Sri Lanka and the west coast of Sumatra, the production of pelagics exceeds that of demersals, according to available information. In other countries or EEZs, the production of demersals exceeds that of pelagics.

In recent years, ponyfishes on the east coast of India; small demersals (trash fish) and mackerels in Malaysia; and *Hilsa* in Bangladesh appear to show a significant increase in production. Shrimp production and catch rates show a declining trend in the project area, except in Sri Lanka and Bangladesh, which, however, are minor producers. The production of coastal surface tuna fluctuates in the Maldives and India, and shows a slight increase in Sri Lanka, Thailand and Sumatra. Since 1980, there has been no evidence of increased production of oceanic deep-swimming tunas.

The production of small pelagics has declined in Sri Lanka, India (particularly the state of Tamil Nadu), Thailand and Indonesia, as also that of valuable demersals in Bangladesh, Thailand and Malaysia. The demersals of Indonesia declined sharply before the 1980 ban on trawling.

An increase in the catches of threadfin breams (*Nemipterus* spp.) and bulls eye (*Priacanthus* spp.) is evident in Thai and Malaysian fisheries, because the trawl fishery has moved to deeper waters.

### Status of exploited stocks and potential for development

Reliable estimates of catch in relation to effort are lacking in almost all the participating countries. Biological studies have been qualitative and insufficient for stock assessment. Correct species identification also presents a problem in some areas.

This paper discusses the reliability of various methods used to estimate resource potential and the types of shared stocks. It summarizes, for each country, estimates of maximum sustainable yield and potential yield on the basis of past studies.

In the Maldives, the main tuna stocks in the exploited range appear to have been intensively exploited; further increases may have to come from the unexploited range of its EEZ. However, production of other pelagics and demersals from the reef waters could go up.

In Sri Lanka too, the production of large pelagics seems to show a trend similar to that in the Maldives; the status of small pelagics could not, however, be evaluated. As for demersals, the production of valuable demersals could possibly rise; that of small and less valuable demersals could rise significantly.

On the east coast of India, major stocks appear to have been intensively exploited; a significant increase from exploited areas seems unlikely, a possible exception being the northern part.

In Bangladesh, demersal production may be close to optimum yield levels, shrimp production may be close to the maximum potential or perhaps beyond it; the status of pelagics is rather vague.

In Burma, recent surveys indicate the possibility of a 35% rise in production from the continental shelf area.

In Thailand and Malaysia, the major resources are already being heavily exploited. A rational increase in production from the exploited ranges does not seem possible. Possible exceptions: some crustaceans and molluscs.

In the Indonesian waters of the Malacca Straits, demersal fish and shrimp stocks exceeded the **MSY before** the 1980 ban on trawling, but a 20% increase in the production of small pelagics over the 1980 level seems possible. On the west coast, a 40% increase in demersal production may be possible, but the prospects for small pelagics and shrimps in presently exploited areas are not bright.

### **Potential in unexploited ranges of the EEZs**

Acoustic surveys and experimental trawling operations indicate substantial resources of deep sea fish, shrimp and lobsters in the unexploited ranges (80-350m) of almost all the EEZs. However, the economic viability of harvesting deep sea shrimps and lobsters is uncertain; so is the commercial value of deep sea fishes.

Tunas and sharks constitute the main pelagic resource in the unexploited ranges of the EEZs, excluding that of Malaysia. Possibilities for expanding surface fishery for tunas are favourable in the EEZs of Maldives, Sri Lanka, India, Thailand and Indonesia (west coast of Sumatra). The oceanic longline fishery for deep-swimming tunas in the Indian Ocean as a whole exceeded the MSY in the 1970s. Future entry into this fishery in the project area, therefore, depends on the reduction of fishing effort by the far eastern nations.

### **Management of marine fishery resources in the region**

Management of marine resources is difficult at the national level; it is even more so at a multi-national or regional level. Nonetheless, it is essential.

Some of the problems in determining and applying management measures are lack of biological and economic information; poor linkage between research and statistical institutions; insufficient coordination; enforcement problems such as non-cooperative fishermen socio-political factors; difficulties of inspection; limited power vested in enforcement officers; and the cost of the whole process of implementation, inspection and legal action against erring fishermen.

Some of the management measures that one does encounter in the area are mesh-size regulation; allocation of fishing ranges according to craft size and type of fishing; ban on trawling; closed fishing seasons and areas.