MARINE FISHERIES AND MARICULTURE IN INDIA

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Foreword

Over the last four decades the aquatic systems of the world have undergone a rapid transition. Worldwide per capita fish consumption doubled from about 8 kg in the early 1950s to about 15.8 kg in 1999. Fish exports have surpassed the export of traditional crops and meat. In India, fishing activities in the pre-independent days used to be carried out at a subsistence level, almost exclusively by the traditional fishermen. During the last six decades, Indian fisheries had made tremendous progress, with the annual production increasing from 0.75 million tonnes of fish and shellfish in 1950 to 7.2 million tonnes in 2009, indicating over eightfold increase during the period. This is the outcome of research and development activities of various institutions, which developed and transferred improved fishing practices and aquaculture technologies to the fishers, fish farmers and entrepreneurs. Today, the fisheries sector has attained the status of a capital intensive industry, warranting close monitoring and managent for sustained production.

The book titled ***Marine fisheries and mariculture in India*** is a compilation of information on various aspects of marine fisheries and mariculture in India. The book addresses aspects of evolution of fisheries research and development, fishing practices, marine fishery resources and their production, coastal mariculture, post-harvest technologies, utilization, marketing and fisheries management.

This attempt on documentation and compilation of various aspects of marine fisheries and its management, mariculture technologies developed; refined and transferred over the years along with their process of development and future prospects is really a hard task and valuable contribution accomplished by Dr. N.G.K. Pillai, Former Principal Scientist & Head, Division of Pelagic Fisheries, Central Marine Fisheries Research Institute, Kochi. I congratulate the author for his untiring efforts for preparation of this updated comprehensive publication. I am confident that publication of this nature will be a very useful source of information for students, researchers, development workers, entrepreneurs, policy planners and all those concerned with the development of fisheries.

Dr. G. Syda Rao
Director
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Preface

Among the countries bordering the Indian Ocean, India, endowed with a coastline of 8129 km, 2.02 million sq. km of EEZ and 0.5 million sq. km of continental shelf has a catchable annual marine fishery potential of 3.93 million tonnes and occupies a unique position. Besides, there are vast brackishwater spread areas all along the coastline, which offer ideal sites for coastal mariculture. Among the world countries, India ranks second in aquaculture and sixth in capture fisheries production, and is one of the leading nations in marine products export. Marine fisheries sector occupies a very important place in the socio-economic development of the country. The sector has been recognized as a powerful instrument to generate income and employment as it stimulates growth of a number of subsidiary industries and is the source of cheap and nutritious food besides being a foreign exchange earner. At the same time it is an instrument of livelihood for a large section of economically backward coastal population of the country.

Technological advancements fuelled the growth of fisheries sector in India. Over eight fold increase in fish production during the last six decades was primarily due to transformation of traditional fishing practices into capital intensive industry through development and transfer of fisheries and aquaculure technologies. The available literature on the research and development process of Indian fisheries sector is scattered. Therefore, the accessibility for this information is laborious. The book ***Marine fisheries and mariculture in India*** is an effort to consolidate and comprehensively present the status of marine capture fisheries and mariculture under the following major chapters: i) evolution of fisheries research and development, ii) fisheries heritage in India, iii) evolution of marine fishing practices, iv) fishing crafts and gears, v) marine fish production- pelagic, demersal, crustacean, molluscan and deep sea resources, vi) island fisheries, vii) coastal mariculture. viii) post-harvest technologies, ix) utilization and marketing, and x) marine fisheries management. The references cited and suggested literature on the subject are listed at the end of each chapters.

The publication is primarily based on information culled out from various literatures on the subject, discussion with the experts, stakeholdes, field visits etc. The gathered information is presented in a systematic manner to facilitate the readers interested in marine capture fisheries and mariculture. This is an attempt to provide comprehensive information on all areas of marine fisheries and mariculture to the end users.

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I hope this comprehensive publication covering almost all the aspects of marine fisheries of India will fill in an important void in fisheries literature in the country. Further, this publication would facilitate evolution of suitable and relevant fisheries management plans in the Indian perspective.

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INTRODUCTION

The fisheries sector plays a very vital role in the Indian economy. It addresses various issues like food and nutritional security, employment, livelihood support and socio-economic status of fishing communities. The sector provides employment and income to over 5 million fishers and fish farmers, majority of whom live in over 3600 coastal villages, besides fisher's hamlets along major river basins and reservoirs in the country. The fish production in India registered an excellent growth during the past half century and reached 7.4 million t in the year 2008 from a meagre 0.75 million t in 1950.The fishers primarily depend on fisheries in these waters for their livelihoods.The fisheries sector in India contributes to nearly Rs. 220 billion which is 1.04% of the total national gross domestic product (GDP) and 5.34% of agricultural GDP. The sector is one of the major contributors to foreign exchange through export. In India, the seafood export industry is mainly with the private sector. India earns US $ 1.9 billion (Rs. 8,600 crores) by exporting fish and fishery products.

The inland fisheries of our country include both capture fisheries and aquaculture. Capture fisheries had been the major source of inland fish production till mid eighties. But, the fish production from natural waters like rivers, lakes, etc., followed a declining trend, primarily due to proliferation of water control structures, indiscriminate fishing and habitat degradation (Katiha, 2000). The depleting resources, energy crisis and resultant high cost of fishing have led to an increased realisation of the potential and versatility of aquaculture as a viable and cost effective alternative to capture fisheries. During the past decades the inland (aquaculture) fish production has increased from 0.51 million t in 1984-85 to 4.22 million t in 2008-09, while for inland capture fisheries the same has declined from over 0.59 million t in 1984-85 to 0.33 million t in 1994-95 and 0.5 million t in 2003-04. (Anon., 1996a, b; Anon., 2000; Gopakumar *et al.*, 1999, Dehadrai, 2003). The percentage share of aquaculture has increased sharply from 46.36 to 84.33. It is primarily because of 4.25 fold increase in freshwater aquaculture. Its share in total inland fish production has also increased from 27.95 to 65.83% (Anon., 1996a, b; Anon., 2000). Still, it has greater scope for enhancing fish production.

Among the countries bordering the Indian Ocean, India, endowed with a coastline of 8129 km, 2.02 million sq.km of EEZ and 0.5 million sq. km of continental shelf has a

catchable annual marine fishery potential of 3.93 million t and occupies a unique position. Besides, there are vast brackishwater spread areas all along the coastline, which offer ideal sites for seafarming and coastal mariculture. Among the countries, India ranks second in culture and sixth in capture fisheries production, and is one of the leading nations in marine products export. Marine fisheries sector occupies a very important place in the socio-economic development of the country. The sector has been recognized as a powerful instrument to generate income and employment as it stimulates growth of a number of subsidiary industries and is the source of cheap and nutritious food besides being a foreign exchange earner. At the same time it is an instrument of livelihood for a large section of economically backward coastal population of the country. The development of Indian marine fisheries from a traditional subsistence oriented one to industrial fisheries through Five Year Plans was phenomenal. However, the present scenario is characterized by declining yields from the inshore waters and increasing conflicts between different resource users, whereas the increasing demand for fish in domestic and export markets indicate good prospects for oceanic and deep sea fishing, large scale sea farming and coastal mariculture.

Fisheries are considered as a sub-sector of agriculture. Hence policies influencing fisheries sub-sector are embedded in the agricultural policy documents. Nevertheless, the Five-Year Plans contain some broad growth and development oriented policies for fisheries. The main objectives of fisheries policy have been:

(a) Enhancing production of fish and productivity of fishermen and fishing industry.

(b) Generating employment and higher income in fisheries sector.

(c) Improving the socio-economic conditions of traditional fisherfolk and fish farmers;

(d) Augmenting export of marine, brackish and freshwater fin and shell-fishes and other aquatic species.

(e) Increasing per capita availability and consumption of fish (present target is 11 kg per annum).

(f) Adopting an integrated approach to fisheries and aquaculture.

(g) Conservation of aquatic resources and genetic diversity (Planning Commission, 2002).

The Eleventh Plan has proposed a fish production target of 9.6 mt envisaging a growth rate of 6.0 percent per annum (marine 2.5 percent and inland 10 percent). The main objectives of the Government of India with regard to development programs in fisheries and aquaculture during the Eleventh Five Year Plan are: Enhancing the production of fish from Indian waters on an environmentally sustainable and socially equitable basis; address the hitherto unexplored potentials of Indian fisheries e.g. island fisheries and non-food fisheries; conservation of aquatic resources and genetic diversity, preservation of health of ecosystems; increasing profitability of fishers and aqua-farmers through an integrated approach from production to consumption; promoting fish as health food and meeting the changing requirements of both domestic and export markets; strengthening of