



CMERI Diamond Jubilee Publication

# Status and Perspectives in Marine Fisheries Research in India



*Editors*

**Mohan Joseph Modayil  
N.G.K. Pillai**



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**Central Marine Fisheries Research Institute**  
*(Indian Council of Agricultural Research)*

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**Mohan Joseph Modayil and N.G.K. Pillai**

*Published by :*

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Kochi - 682 018, Kerala, India

Mohan Joseph Modayil and N.G. K. Pillai (Eds.) 2007. *Status and Perspectives in Marine Fisheries Research in India*, Central Marine Fisheries Research Institute, Kochi, 404 pp.

© 2007 Central Marine Fisheries Research Institute, Kochi

**ISBN : 81-901219 6-0**

*Cover design & Layout :*  
Dr. N.G.K. Pillai

*Printed at :*  
Niseema Printers & Publishers, Kochi - 682 018, Kerala, India

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K. Sangeetha Prathap***

## Foreword

Fishing is one of the oldest recorded sources of livelihood. In India, the fisheries sector contributes significantly towards strengthening household food and nutritional security, generation of gainful employment and income. These facts established fisheries sector as an important enterprise of Indian economy. 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 6.4 million tonnes in 2006, indicating over eightfold increase during the period. Marine fishery sector contributes to 50% of the total fish production and earns foreign exchange over Rs. 8000 crores annually through seafood export.



The transformation of the marine fisheries in the country, over the last six decades, from a traditional livelihood avocation to a well-developed industrialized sector was phenomenal. 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. Practically, it transformed the traditional sector of fifties to a developing multicore industry.

Established in 1947, the Central Marine Fisheries Research Institute (CMFRI) is the largest among the eight fisheries research institutes under Indian Council of Agricultural Research and mandated to carryout R&D activities in marine fisheries and mariculture. The Institute has grown significantly, in size, stature and research infrastructure over the past six decades. Looking back, on the occasion of the Diamond Jubilee Year, we the members of the CMFRI family are proud to see the results of the voluminous research that have been carried out by the dedicated workers and the impacts made in the fisheries sector. CMFRI has taken into consideration the need of the sector, society and changing national and global scenarios, and systematically addressed them through a prioritized research agenda. CMFRI now enjoys the status of a premier research organization comparable to the best fisheries research Institutions in the world.

Today we look back with pride and satisfaction at the growth and revolution in marine fisheries research in the country during the last 60 years. But there is no room for complacency, as we face new problems in the sector. Marine fisheries in the world, including India, are currently passing through crisis mainly due to stagnation in production, higher cost of operation and low profitability. Looking forward, we are fully aware of and prepared to take up the challenges facing the sector on account of the resource dynamics, anthropogenic impacts, climate change, market dynamics, global pressures and changing world scenarios. At a time when the world marine fisheries are passing through a period of crisis, there is need for strategic and proactive research-based interventions to make marine fisheries sustainable, environment friendly, economically profitable and socially relevant. With the fast changing marine fisheries scenario and emergence of mariculture as an alternate approach for enhancing coastal fish production, the Institute has tuned its mandate in consonance with the needs of the time. The Institute is also in the process of focusing on frontier areas of research such as biotechnology, bioprospecting, bioinformatics, remote sensing and climate change.

This Commemorative Volume titled *Status and Perspectives in Marine Fisheries Research in India* being brought out on the occasion of the Diamond Jubilee Year contains 13 papers on marine fisheries. The book addresses aspects of status and perspectives in capture fisheries, biodiversity, stock assessment, mariculture, fishery environment, biotechnology, fishery economics and extension. I am delighted to thank the authors of various chapters for their untiring efforts for preparation of this comprehensive publication. I am confident that publication of this nature will be of immense interest and help to the students, researchers, development workers, planners, policy makers and all those concerned with the development of fisheries. Further, this publication would facilitate evolution of suitable and relevant fisheries management programmes in the Indian perspective.

Kochi - 682 018  
November, 2007

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## Acronyms

AFH	Artificial Fishing Habitat
AFLP	Amplified Fragment Length Polymorphism
APCP	Air Prevention and Control of Pollution
APDRC	Asian Pacific Data Research Center
AR's	Artificial Reefs
ARIS	Agricultural Research Information System
ARMA	Agency for Restructuring and Modernisation of Agriculture
ATIC	Agricultural Technology Information Center
ATREE	Asoka Trust for Research in Ecology and Environment
BFFDA	Brackishwater Fish Farmers Development Agency
BFSc	Bachelor of Fisheries Science
BNHS	Bombay Natural History Society
BOBP	Bay of Bengal Programme
BSI	Botanical Survey of India
CBA	Capture-based aquaculture
CBD	Convention on Biological Diversity
CCMB	Centre for Cellular and Molecular Biology
CDRI	Central Drug Research Institute
CIBA	Central Institute of Brackishwater Aquaculture
CIFA	Central Institute of Freshwater Aquaculture
CIFE	Central Institute of Fisheries Education
CIFNET	Central Institute of Fisheries Nautical & Engineering Training
CIFRI	Central Inland Fisheries Research Institute
CIFT	Central Institute of Fisheries Technology
CITES	Convention on International Trade in Endangered Species
CMFRI	Central Marine Fisheries Research Institute
CMP	Coastal Marine Policy
CoE	Center of Excellence
COMAPS	Coastal Ocean Monitoring and Prediction System
CoML	Census of Marine Life
CRZ	Coastal Regulation Zone
CSIR	Council of Scientific and Industrial Research

CSMCRI	Central Salt and Marine Chemicals Research Institute
CZR	Coastal Zone Regulation
DAHD&F	Department of Animal Husbandry, Dairying and Fisheries
DBT	Department of Biotechnology
DML	Data Manipulation Language
DNA	De-oxyribonucleic acid
DO	Dissolved Oxygen
DOD	Department of Ocean Development
DoS	Department of Space
DSL	Deep Scattering Layer
dsRNA	double-stranded RNAs
DST	Department of Science and Technology
EBFM	Ecosystem Based Fisheries Management
ECCO	Estimating the Circulation and Climate of the Ocean
EEC	European Economic Community
EEZ	Exclusive Economic Zone
ELEFAN	Electronic length Frequency Analysis
ENSO	<i>El Niño</i> Southern Oscillation
ES	Embryonic stem
EU	European Union
FADs	Fish Aggregating Devices
FAO	Food and Agricultural Organization
FCR	Food Conversion Ratio
FEED	Fisheries Economics and Extension Division
FFDA	Fish Farmers Development Agency
FIPCE	First Indian Pearl Congress and Exposition
FRP	Fiberglass Reinforced Plastic
FSI	Fishery Survey of India
GBCO	General Bathymetric Chart of the Oceans
GCOS	Global Climate Observing System
GDP	Gross Domestic Product
GES	Goddard Earth Sciences
GIDM	Globally-Indexed Distributed Memory

Giovanni	GES-DISC interactive online visualization and analysis infrastructure
GIS	Geographical Information System
GMO	Genetically Modified Organisms
GODAE	Global Ocean Data Assimilation Experiment
GOMBR	Gulf of Mannar Marine Biosphere Reserve
GOOS	Global Ocean Observing System
GPS	Global Positioning System
GSI	Geological Survey of India
GTOS	Global Terrestrial Observing System
GTSP	Global Temperature and Salinity Profile Programme
HACCP	Hazard Analysis and Critical Control Points
HIV	Human Immunodeficiency Viruses
hp	horse power
HRD	Human Resource Development
ICAR	Indian Council of Agricultural Research
ICICI	Industrial Credit and Investment Corporation of India
ICOMM	International Census of Marine Microbes
ICRMN	Indian Coral Reef Monitoring Network
ICT	Information Communication Technology
IGBP	International Geosphere/Biosphere Program
IHNV	Increased resistance against Hematopoietic Necrovirus
IIOE	International Indian Ocean Expedition
IKMT	Issac Kild Midwater Trawl
INCOIS	Indian National Centre for Ocean Information Services
INDEX	Indian Ocean Experiment
INP	Indo Norwegian Project
IOC	Intergovernmental Oceanographic Commission
IOTC	Indian Ocean Tuna Commission
IPR	Intellectual Property Rights
IPTP	Indo-Pacific Tuna Development Management Programme
IQF	Individual Quick Frozen
IRS	Internal Revenue Service
ISRO	Indian Space Research Organisation

ITKs	Indigenous Knowledge System
IUCN	International Union on Conservation of Natural Resources
IVLP	Institute Village Linkage Programme
IWC	International Whaling Commission
JGOFS	Joint Global Ocean Flux Study
JME	John Murray Expedition
KVK	Krishi Vigyan Kendra
LAN	Local-Area Network
LFSA	Length-based Fish Stock Assessment
LME	Large Marine Ecosystem
LOICZ	Land Ocean Interactions in the Coastal Zone
MAA	Mycosporine Amino Acid
MARPOL	International Convention for the Prevention of Pollution from ships
MAS	Marker Assisted Selection
MBV	monodon baculovirus
MCBT	Madras Crocodile Bank Trust
MFRA	Marine Fishing Regulation Act
mha	million ha
MLS	Minimum Legal Size
MLW	Minimum Legal Weight
MODIS	Moderate Resolution Imaging Spectroradiometer
MoEF	Ministry of Environment and Forests
MoES	Ministry of Earth Science
MOS	Mannan-oligosaccharides
MPAs	Marine Protected Areas
MPEDA	Marine Products Export Development Authority
MPPTC	Marine Products Processing Training Centre
MSC	Marine Stewardship Council
MSE	Mean Square Error
MSP	Multi Stakeholder Processes
MSSRF	M.S. Swaminathan Research Foundation
MSY	Maximum Sustainable Yield
mt	million tonne

MtDNA	mitochondrial DNA
NABARD	National Bank for Agriculture & Rural Development
NATP	National Agriculture Technology Project
NBDB	National Bioresource Development Board
NBF	National Board of Fisheries
NBFGR	National Bureau of Fish Genetic Resources
NBRI	National Botanical Research Institute
NBSAP	National Biodiversity Strategy and Action Plan
NBTB	National Biotechnology Board
NCAAH	National Centre for Aquatic Animal Health
NCBI	National Center for Biotechnology Information
NCDC	National Climatic Data Center
NCL	National Chemical Laboratory
NDDB	National Dairy Development Board
NFDB	National Fisheries Development Board
NGOs	Non-Governmental Organisation
NIO	National Institute of Oceanography
NIOT	National Institute of Ocean Technology
NMLRDC	National Marine Living Resource Data Centre
NNRMS	National Natural Resource Management Systems
NPCL	Narakkal Prawn Culture Laboratory
NRSA	National Remote Sensing Agency
OAL	Overall Length
OBIS	Ocean Biogeographic Information System
OCM	Ocean Colour Monitor
OECD	Organisation for Economic Cooperation and Development
OSPAK	Orissa Shrimp Seed Production and Research Centre
PCR	Polymerase Chain Reaction
PFZ	Potential Fishing Zones
PG	Post-graduate
PTD	Participatory Technology Development
PY	Potential Yield
QRs	Quantitative Restrictions
QTL	Quantitative Trait Loci

RAPD	Random Amplified Polymorphic DNA
RFEM	Responsible Fisheries Extension Module
RFLP	Restriction Fragment Length Polymorphism
RNAi	RNA interference
SAC	Space Application Centre
SANE	Save Andaman and Nicobar Ecology
SAUs	State Agricultural Universities
SCICI	Shipping Credit and Investment Corporation of India
SCZ	Special Conditions Zone
SDFC	Standardized Discriminant Function Coefficient
SEETTD	Socio Economic Evaluation and Technology Transfer Division
SEZ	Special Economic Zone
SGR	Specific Growth Rate
SHG	Self Help Groups
SIL	Special Import License
SLA	Sustainable Livelihood Approach
SNS	smaller naupliar size
SPF	Small Pelagic Fishery
SPIC	Society for Promotion of Information Technology
SPS	Sanitary and Phytosanitary Measures
SSB	Single-sideband modulation
SST	Sea surface temperature
SWOT	Strengths, Weaknesses, Opportunities and Threats analysis
TASPARK	Andhra Pradesh shrimp seed production and supply centre
TBT	Technical Barriers to Trade
TED	Turtle Excluder Device
TOGA	Tropical Ocean Global Atmosphere
TOT	Transfer of Technology
UG	Under graduate
UGC	University Grants Commission
UNCLOS	United Nations Convention on the Law of the Sea
UNESCO	United Nations Educational Scientific and Cultural Organization
VHS	hemorrhagic septicemia virus

WCRP	World Climate Research Programme
WMO	World Metereological Organization
WOCE	World Ocean Circulation Experiment
WOLE	Web of Life Enterprise
WPCP	Water Prevention and Control of Pollution
WPSI	Wildlife Protection Society of India
WSSV	White Spot Syndrome Virus
WTO	World Trade Organization
WWF	World Wild life Fund
ZSI	Zoological Survey of India

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