

INDIAN MARINE FISHERY RESOURCES - PRESENT STATUS

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India being a tropical country is blessed with highly diverse nature of marine fishery resources in its 2.02 million square kilometer Exclusive Economic Zone with an estimated annual harvestable potential of 4.414 million metric tonnes. The marine fisheries sector provide livelihood to nearly 4.0 million people of India and meets the food and nutritional requirements of a significant proportion of the population. Also, it contributes to export earnings of the country. Sustainable harvest of the marine fishery resources are necessary as over-exploitation of the resources is likely to harm the diversity and cause reduction in the availability of some of the resources. Monitoring of the harvest of the diverse marine fishery resources of the country is being carried out regularly by CMFRI since its inception through a scientific data collection and estimation system from all along the Indian coast leading to fish stock assessment for deriving management measures to keep the harvest of the resources at sustainable levels.

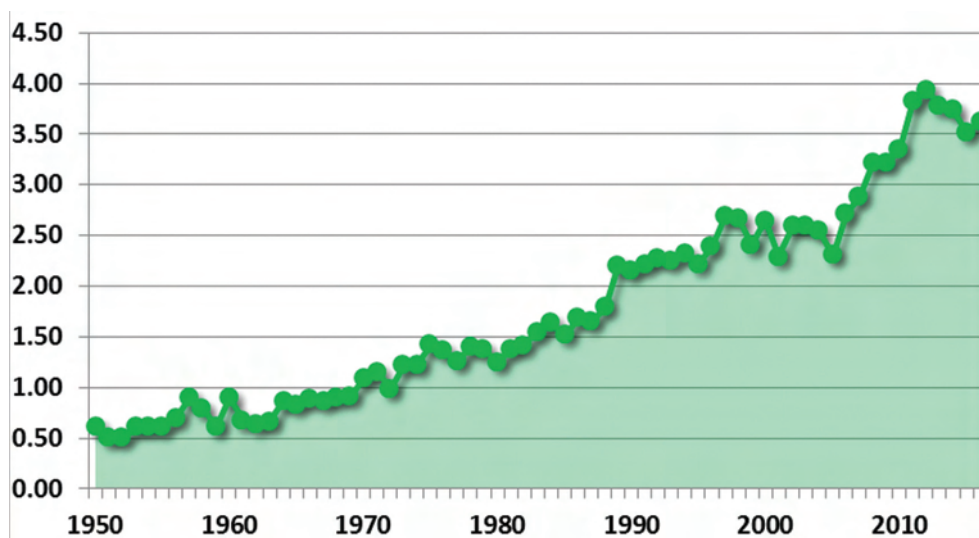
Marine fisheries is an important source of food, nutrition, employment and income generation. In India, four million people depend for their livelihood on marine fisheries sector which provides employment to nearly one million fishermen and contributes significantly to the export earnings of the country and balance of trade. The sector contributes to an economic wealth valued at nearly Rs. 65,000 crores annually. The marine fisheries of the country consist of small-scale and artisanal fishers belonging mechanized, motorized and non-mechanized sectors and a range of other stakeholders, including governmental and non-governmental agencies. The marine fisheries resources are not inexhaustive and over-exploitation would lead to loss of biodiversity and reduced availability of resources for our future generations. Uncontrolled harvest will result in depletion of the resources. Management and regulations are necessary for sustainable harvest of marine fishery resources.

India is one among the top marine fish producing countries of the world and at present the country is at 7th position in global marine capture fish production after China, Indonesia, USA, Russia, Japan and Peru. The global marine fish catch remains almost stagnant after 1990 whereas the marine fish production in India showed a steady increase from 2.3 million tonnes in 1990 to 3.94 million tonnes in 2012.

Many of the world's fisheries have experienced series of environmental shifts in recent decades involving collapse or fluctuations in the dominant fish assemblages and as a result,



many fisheries-dependent human communities have lost majority of their population, while the respective countries in general were growing (Hamilton and Otterstand, 1998). In a tropical country like India, wherein the marine fisheries is supported by multispecies assemblages, severe collapses in fishery are unlikely and the marine fish production of the country has been increasing from a meager of 0.05 million t to 3.94 million tonnes over the last 62 years. This is imperative, as the marine fisheries sector in India is characterised by the dominance of small scale subsistence based fishery. In many of the societies, small-scale fishermen suffer the greatest deprivations as they have low social status, low incomes, poor living conditions and little political influence (Pomeroy and Williams, 1994). Implementation of regulations in the fishery for the sustained production from the sector has to take into account its impact on the livelihood of the considerably poor fisher population. The information necessary for such inference are generated through census.



Time series plot of marine fish landings in India from 1950 to 2016 (in million tonnes)

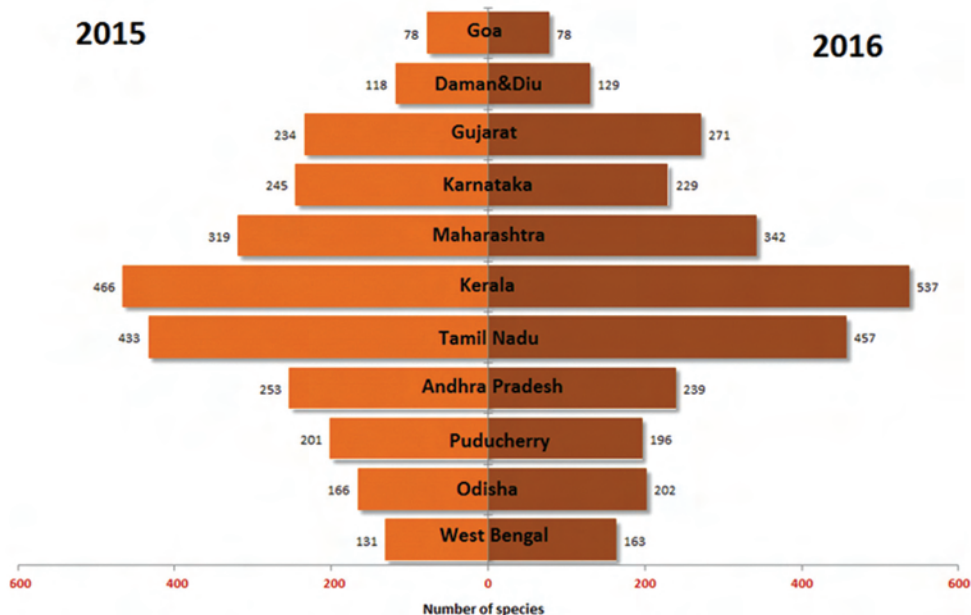
The estimate of landings of marine fish resources along the coast in the main land of India for the year 2016 is 3.63 million metric tonnes. The contribution by the maritime states West Bengal, Odisha, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Goa, Maharashtra, Gujarat, union territories of Puducherry and Damen & Diu towards the total landings (in lakh tonnes) are 2.72 (7.5%), 1.17 (3.2%), 1.92 (5.3%), 7.07(19.5%), 5.23 (14.4%), 5.30 (14.6%), 0.61 (1.7%), 2.92 (8.1%), 7.74 (21.3%), 0.45 (1.2%), 1.17 (3.2%) respectively. The increase in landings in 2016 is mainly due to increase in marine fish landings along the coasts of West Bengal by 1.53 lakh tonnes, Karnataka by 86,000 tonnes, Gujarat by 53,000 tonnes, Kerala



by 40,000 tonnes, Damen & Diu by 35,000 tonnes and Maharashtra by 27,000 tonnes. There is reduction in landings in Andhra Pradesh by 1.03 lakh tonnes, Puducherry by 34,000 tonnes, Odisha by 24,000 tonnes, Goa by 7,000 tonnes and Tamil Nadu by 2,000 tonnes.

When examined at the resource level contribution, Indian mackerel had the maximum with 2.49 lakh tonnes (6.8% of total landings) followed by oil sardine 2.45 lakh tonnes (6.7%), ribbonfishes 2.20 lakh tonnes (6.0%), penaeid prawns 2.01 lakh tonnes (5.5%) and lesser sardines 1.95 lakh tonnes (5.4%). The resources showed increased landings in 2016 are Perches by about 77,000 tonnes (81%), Hilsa shad 73,000 tonnes (354%), Ribbon fishes 43,000 tonnes (24%), Bombayduck 35,000 tonnes (31%), Squids 22,000 tonnes (24%) and Non-penaeid prawns 21,000 tonnes (14%). The resources with significant reduction in landings are Lesser sardines 61,000 tonnes (24%) and oil sardine 21,000 tonnes (8%).

Among the three sectors there was 81% contribution from mechanized sector towards the total landings, motorized sector contributed 17% and the contribution from the traditional non-mechanized sector was only 2%. Mechanized trawlnets accounted for 58% of the total marine fish landings whereas mechanized gillnets and outboard ringseines contributed 8% each. The total number of species found in the landings along the Indian coast during 2016 is 817 where as it was 730 in 2015. Number of species landed in different maritime states in 2016 and 2015 are shown in the following diagram. Though Gujarat had maximum landings among all the maritime states species diversity is less compared to Kerala and Tamil Nadu.





India is one among few countries where a system based on sampling theory is used to collect marine fish catch statistics. The sampling design was developed by CMFRI in association with the Indian Agricultural Statistics Research Institute by conducting preliminary surveys. The sampling design adopted is stratified multistage random sampling, stratification being done over space and time.

Fish landings takes place at numerous locations all along the coastline in all seasons during day and night. Sampling and estimation are performed for geographical area referred as fishing zone. There are 75 fishing zones covering 9 maritime states and two coastal union territories. All the 1,511 landing centres are covered under the sample design and data collection is by qualified and trained field staff stationed at 25 locations across all maritime states. The overall operation is coordinated by the Fishery Resources Assessment Division of CMFRI.

Fish is a natural resource with capacity to rebuild. If not monitored and managed over-exploitation will lead to stock depletion and some may become extinct. Harvest of this resource needs to be maintained at sustainable level through monitoring and control. The primary objective of fish stock assessment is to provide advice on the optimum exploitation of aquatic living resources. Fish stock assessment can be described as the search for the exploitation level that in the long run gives maximum yield from the fishery. The aim of fish stock assessment is for a fishing strategy that gives the highest steady yield year after year.

The basic goal of fishery management is to estimate the amount of fish that can be removed safely while keeping the fish population healthy. These estimates may be modified by political, economic, and social considerations to arrive at an optimum yield. Overly conservative management can result in wasted fisheries production due to under-harvesting, while too liberal or no management may result in over-harvesting and severely reduced populations. Fisheries Management draws on fisheries science in order to find ways to protect fishery resources so that sustainable exploitation is possible. Fisheries Management is the integrated process of information gathering, data analysis, planning, consultation, decision making, allocation of the resources and implementation of regulations or rules to govern fishing activities with enforcement as and when necessary to ensure steady and sustainable harvest of the resources. Fisheries Management is not about managing fish but about managing people and related businesses. Fish populations are managed by regulating the actions of people. These management regulations should also consider its implications on the stakeholders.

