

ISSUES AND CHALLENGES OF 21ST CENTURY, FOCUS ON AQUATIC SOURCES TO COPE UP THE NEED OF COMMON MAN

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Abstract

Fisheries is an important sector in India and plays an imperative role for livelihood security and socio-economic development of the country by supplementing family income, generating gainful employment and providing nutritional food to millions of rural poor. Developing a strategy to ensure the sustainable use of living resources and their environment was only one aspect of man's relationship with the biosphere addressed at the UN conference on Environment and Sustainable Development. This paper tries to present a brief overview of sustainable growth of fishery. There a need to integrate sustainable development considerations with policy analysis of national governments and International organizations such as regional fisheries management organizations and FAO devote considerable resources trying to ensure the sustainability of fish resources. Common method for assessing sustainability is to monitor the abundance of fish stocks-high abundance is sustainable, low abundance is not. If the fishing pressure is so high as to threaten the long term productivity of the resources, then the production benefits to society cannot be sustained. The most key elements in a sustainable fisheries Development is the ability to development change in the state of the resource, ability to take effective action to respond to the change.



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World Fisheries and Aquaculture:

The earth is a water planet as >70% of the area is occupied by the ocean with 1370.323 million km³ of water. Water bodies hold 90% of world living biomass containing 80% of world protein, and the adjacent coastal area form the component of the global life support system. Fisheries and aquaculture remain important sources of food, nutrition, income and livelihoods for hundreds of millions of people around the world. Moreover, fish continues to be one of the most-traded food commodities worldwide with more than half of fish exports by value originating in developing countries. Recent reports by high-level experts, international organizations, industry and civil society representatives all highlight the tremendous potential of the oceans and inland waters now, and even more so in the future, to contribute significantly to food security and adequate nutrition for a global population expected to reach 9.7 billion by 2050(FAO, 2016).

Fish Consumption:

World per capita apparent fish consumption increased from an average of 9.9 kg in the 1960s to 14.4 kg in the 1990s and 19.7 kg in 2013, with preliminary estimates for 2014 and 2015 pointing towards further growth beyond 20 kg.

Fish protein& Nutrients:

The significant growth in fish consumption has enhanced people's diets . Fish is usually high in unsaturated fats and provides health benefits in protection against cardiovascular diseases.

Global marine capture fisheries production:

Total capture production in marine waters was 81.5 million tonnes in 2014;a slight increase on the previous two years (FAO, 2016).

World inland waters capture production:

World catches in inland waters about 11.9 million tons in 2014, continuing a positive trend that has resulted in a 37 % increase in the past decade. The bulk of global production is concentrated in only 16 countries, which have annual inland water catches exceeding 200 000 tonnes and together represent 80 % of the world total (FAO, 2016).

World Aquaculture production:

Total aquaculture production volume in 2014, fish harvested from aquaculture amounted to 73.8 million tonnes, which is consisting of 49.8 million tonnes of finfish, 16.1 million tonnes of mollusks, 6.9 million tonnes of crustaceans and 7.3 million tonnes of other aquatic animals including frogs(FAO,2016).

World Fishers and Farmers:

Many millions of people around the world find a source of income and livelihood in the fisheries and aquaculture sector. The most recent estimates indicate that 56.6 million people were engaged in the primary sector of capture fisheries and aquaculture in 2014. Of this total, 36 % were engaged full time, 23 % part time, and the remainder were either occasional fishers or unspecified status (FAO, 2016).

World Fisheries and Aquaculture production and utilization (FAO, 2016):

Year	2009	2010	2011	2012	2013	2014
Production (in Million tonnes)						
Capture						
Inland	10.5	11.3	11.1	11.6	11.7	11.9
Marine	79.7	77.9	82.6	79.7	81.0	81.5
Total Capture	90.2	89.1	93.7	91.3	92.7	93.4
Aquaculture						
Inland	24.3	36.9	38.6	42.0	44.8	47.1
Marine	21.4	22.1	23.2	24.4	25.5	26.7
TotalAquaculture	55.7	59.0	61.8	66.5	70.3	73.8
Total (Capture&Aquaculture)	145.9	148.1	155.5	157.8	162.9	167.2
Utilization(P)*						
Human consumption	123.8	128.1	130.8	136.9	141.5	146.3
Non-food uses	22.0	20.0	24.7	20.9	21.4	20.9
Population(billions)	6.8	6.9	7.0	7.1	7.2	7.3
Per capita food fish supply(kg)	18.1	18.5	18.6	19.3	19.7	20.1

*Provisional estimates for 2014.

Sustainable Development and Management:

Defining sustainability:

The sustainability of fisheries production is crucial to the livelihoods, food security and nutrition of billions of people. The United Nations (UN) defines “Three Pillars” of sustainability: Social, Economic and environmental. There is general agreement that sustainability is about continuing to produce the benefits to society that natural systems provide in the long term. Actions that decrease the ability of systems to do so are not sustainable. However the clear emphasis is on producing benefits to society; in terms of fisheries, there are primarily food, employment, income and nutrition. In addition to these, the social aspects of sustainability include maintenance of fishing communities, equity in income and gender, and basic human rights. Thus, the first aspect of sustainability is benefits to society amongst SAARC countries.

A common method for assessing sustainability is to monitor the abundance of fish stocks – high abundance is sustainable, low abundance is not. However, fish stocks fluctuate naturally, often dramatically, and even under the best management system a stock may drop to

abundance levels often classified as “not sustainable”. The idea that a fishery under the same management system could be judged sustainable one year but not the next, because of poor recruitment to the population, is incorrect and counterproductive.

A second measure of sustainability is the intensity of fishing pressure. If fishing pressure is so high as to threaten the long-term productivity of the resources, then the production of benefits to society cannot be sustained.

Another approach to measuring sustainability is to evaluate the process of management. Sustainable benefits to society arise from the interaction of the management system and the natural system. However, as only the management system can be controlled, the sustainability of a fishery should be judged by whether the management system can provide the benefits the natural system can potentially provide.

Key elements in a sustainable fisheries management system are the ability to monitor changes in the state of the resource, and the ability to take effective action to respond to those changes (FAO, 2016).

Indian Fisheries and Sustainable Development:

Marine fisheries:

The peninsular India has a coast line of about 8118 km. Consequent to the declaration of the Exclusive Economic Zone (EEZ) in 1976, the area available exclusively to India for Exploration and utilization of the marine wealth is 2.02 million sq.km, comprising 0.86 million sq.km on the east coast 0.56 million sq.km on the west coast and 0.60 million sq.km around the Andaman and Nicobar islands.

Indian Fishery 2015, CMFRI:

The total marine fish landings from the mainland of India during the year 2015 were estimated as 3.40 million tonnes registering a 5.3% decline compared to 3.59 million tonnes in 2014. Oil sardine, the major single species fishery along the Indian coast witnessed a drastic decline in its landings. The west coast showed a decrease of 67% while the east coast recorded 27% increase in its production. (CMFRI Annual Report, 2015-16).

Fisheries Production(Annual Report, Ministry of Agri. and Farmers welfare, 2015-16):

As per the estimates of CSO, the value of output from fisheries sector during 2014-15 was Rs. 1,22,775crore which is about 4.8% of the value of output from agricultural and allied sector at current prices(Annual Report, Ministry of Agri. and Farmers welfare, 2015-16)

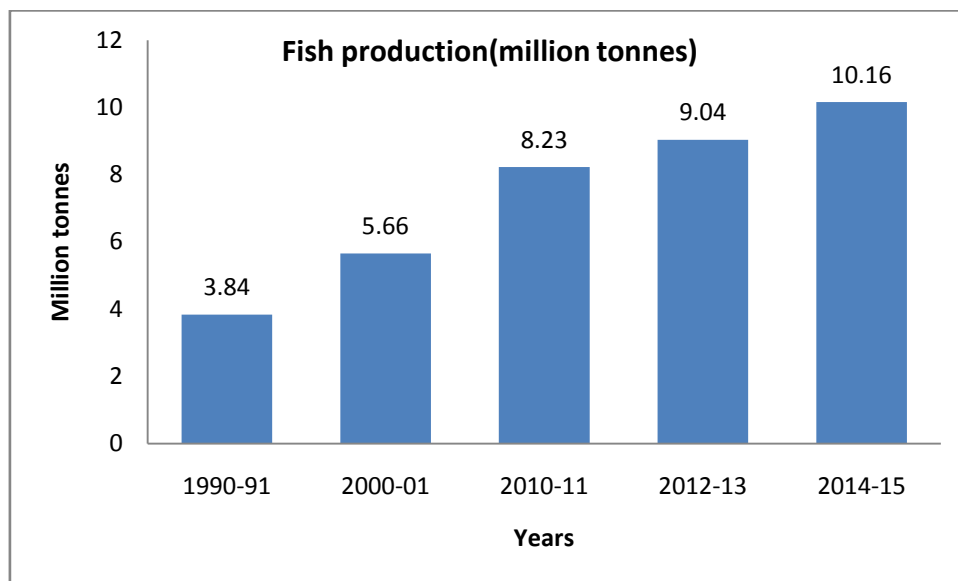
.India is the second largest producer of fish and also second largest producer of fresh water
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fish in the world. Fish production has increased from 41.57 lakh tonnes(24.47 lakh tonnes for marine and 17.10 lakh tonnes for inland fisheries)

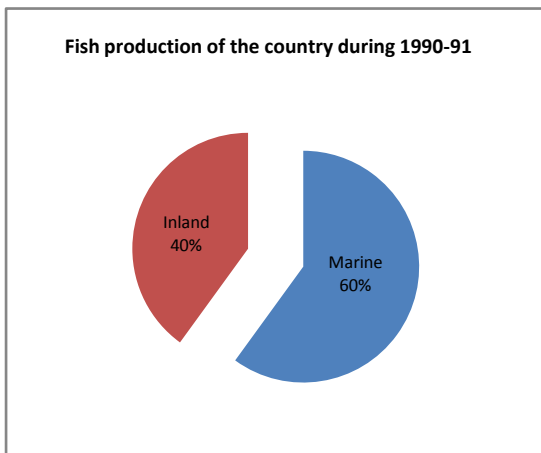
Over view of Indian fisheries:

Fisheries are a sunrise sector with varied resources and potential, engaging over 14.50 million people at the primary level and many more along the value chain. Transformation of the fisheries sector from traditional to commercial scale has led to an increase in fish production from 7.5 lakh tonnes in 1950-51 to 101.64 lakh tonnes(provisional) during 2014-15, while the export earnings from the sector registered at Rs. 33,441.61 crore in 2014-15(US D 5.51 billion). The sector contributed about 0.9% to the National Gross Domestic Product(GDP) and 5.17% to the Agricultural GDP(2014-15).

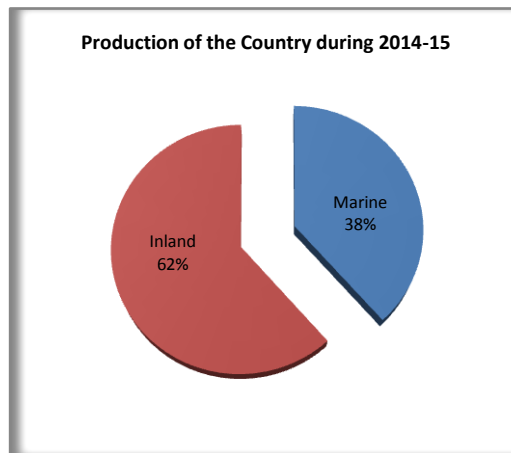
The historical scenario of Indian fisheries reveals a paradigm shift from marine dominated fisheries to a scenario where inland fisheries has emerged as a major contributor to the overall fish production in the country.



Source: MOA&FW, 2015-16



Source: MOA & FW, 2015-16



Source: MOA & FW, 2015-16

Fisheries sector in India rapidly developed during recent years, its role in increasing food supply, generating job opportunities, raising nutritional level and earning foreign exchange has been continuously increasing.

Deep sea fishing:

Deep sea fishing means “Fishing activities beyond 12 nautical miles from the shore line (Territorial water)”. As the Indian deep sea fishing industry has not been fully equipped in terms of technology and finance. The Ministry of Agriculture and Farmers welfare has paying due attention in the past decades to the development of deep sea fishery in the country. The Govt. revised this policy during 1986 and to rectify the deficiencies noticed during its operation and to make it more beneficial to the country (MPEDA, 2016).

The Potential Yield estimation for Marine Fishery Resources in the Indian EEZ:

The Potential Yield (PY) of the Indian EEZ is revalidated as 4.41 million tonnes by the present working group of experts. Of this, the pelagic resources account for 2.13 million tonnes, the Demersal resources account for 2.07 million tonnes and the oceanic resources would be 0.22 million tonnes.

Of the contribution by different groups of pelagic fish, the potential yield of oil sardines was 0.51 million tonnes followed by the Ribbon fish (0.23 million t) and the Indian mackerel (0.2 million t). Among the Demersal groups, Penaeid shrimps topped with a share of 0.24 million t followed by Croakers 0.22 million t and Non-Penaeid shrimps 0.21 million tonnes.

The estimates of fishery potential for Indian EEZ from primary production and secondary production were of 3.605 and 3.322 million tonnes respectively, the average being 3.463

million tonnes. The potential from benthic production was 0.855 million t. thus the maximum sustainable yield (MSY) of fish from the Indian EEZ works out to 4.318 million t.

Scope of Marine Fishery:

Utilization of living resources of the Indian seas would ensure fish production to meet protein demands of the Indian people, improve Socio-economic conditions of fishermen, generate employment and create a fishery for domestic and export needs and increase the foreign exchange earnings.

Indian Fisheries (NFDB, 2016):

Global position	2 nd in Fisheries and Aquaculture
Contribution of Fisheries to GDP(%)	1.07
Contribution of Agricultural GDP(%)	5.15
Per capita fish availability (kg)	9.0
Annual Export earnings (Rs. In crore)	33,441.61
Employment in sector (million)	14.0

Fishery Resources (NFDB, 2016)

Coastal line	8129 km
Exclusive Economic Zone	2.02 million Sq.km
Continental shelf	0.506 million Sq.km
Rivers and Canals	1,91,024 km
Reservoirs	3.15 million ha
Ponds and Tanks	2.35 million ha
Oxbow lakes and derelict waters	1.3 million ha
Brackish waters	1.24 million ha
Estuaries	0.29 million ha

Some facts (NFDB, 2016)

Present fish production	6.4 mmt
Inland	3.4 mmt
Marine	3.0 mmt
Potential fish production	8.4 mmt
Fish seed production	21,000 million fry
Hatcheries	1,070
FFDA	422

The challenges in the fisheries sector are many. Our immediate task to analyze the cause for all the formidable hurdles and workout a new system for sustainable fisheries development towards food and nutritional security of the fast increasing human population of India.

Fisheries development in India is hampered due to several hurdles and some of them are dealt in this paper. The natural productivity potential of the ocean and the present estimated on fishery potential are quoted for a new dimension of thinking to re-estimate the potential of the country. The need for public awareness on importance of fishery in human nutrition is highlighted. Issue like disease in aquaculture, introduction of exotic species and shortage of freshwater are brought to light. Recognition of fisheries as a giant sector with due legal protection for aquaculture is justified(Sakthivel, 2001).

In India, the estimates of fisheries potential is based mostly on the fish landing statistics. These statistics rely on unregulated and unsustainable method of fishing without allowing the natural living resources to recoup.

Maximum sustainable yield (MSY) is calculated only for known selected food fishes caught from known fishing grounds. Unexploited and underexploited resources are not adequately represented in the estimates.

Water bodies are far more productive than land on earth. The seawater is a rich medium with a lot of unique properties to support 90% of world living biomass on earth. Comparatively the freshwater ecosystem are quite limited, covering only about 1% of the earth's surface and contributing 7.0 m t i.e., 6% of the world fish catch(Sakthivel, 1999).

Sustainable Aquaculture Development:

Coastal aquaculture in India is mainly carried out by small and marginal farmers, located in the remote villages of maritime states. To improve access of farmers to sustainable and eco-friendly farming methods and its contribution to national economy, effective extension work is essential and prerequisite from the concerned agencies. Although several Central and State agencies are involved and extending technical assistance through their extension network, it has been possible to reach a major chunk of these farmers due to their sheer numbers and remote locations (MPEDA, 2016).

Traditional fishing and commercial fishing:

Aquaculture in general and shrimp culture in particular, has confronted many developmental problems in the past relating to production, trade restrictions, over capitalization and on concerns over the environmental impacts in the coastal areas. Spectacular advances have been achieved in recent times to make coastal aquaculture development a responsible, sustainable and eco-friendly activity (CAA, 2016).

Sustainable development agencies:

Development Agencies (FFDAs) and 39 brackish water Fish Farms Development Agencies (BFDAs) for promoting freshwater and coastal aquaculture. The annual carp seed production is to be tune of 25 billion and that of shrimp about 12 billion, with increasing diversification in the recent past. Along with food fish culture, ornamental fish culture and high value fish farming are gaining importance in the recent past. With over 2.4 lakh fishing crafts operating in the coast, six major fishing harbors, 62 minor fishing harbors and 1511 landing centers are functioning to cater to the needs of over 3.9 million fisher folk(NFDB,2016).

Fish and fish products have presently emerged as the largest group in agricultural exports of India, with 10.51 lakh tones in terms of quantity and Rs. 33,442 crores in value.

Sustainable development

Various definitions have been proposed for this new environmentally more appropriate approach to development. The definition of sustainable development adopted by the world commission on environment and development in 1987(Anon, 1987) is perhaps the simplest.

A more explicit definition for aquatic and terrestrial systems adopted by the 94th FAO Committee on fisheries in 1991(COFI 1991) is:

“Sustainable development is the management and conservation of the natural resource base and the orientation of technological and institutional change in such manner as to ensure the attainment and contained satisfaction of human needs for present and factor generations. Such development conserves land, water, plant and genetic resources is environmentally non-degradable technology appropriate economically viable and socially acceptable”.

Technical advances in fishing gear and fishing:

Very often lead to a breakdown of traditional management systems for which modern management systems have not successfully substituted. The need for appropriate allocation of marine space and resources, with direct community participation in the decision making is vital to the achievement of sustainable development.

Code of Conduct for Responsible Fisheries (CCRF):

The concept of responsible fishing is closely related to sustainability. The Code is the most widely accepted set of guidelines on how to manage fisheries. Its role is defined thus: “Thus Code sets out principles and international standards of behavior for responsible practices with a view to ensuring the effective conservation, management and development of living aquatic resources, with due respect for the ecosystem and biodiversity. The code describes

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characteristics of a responsible management system. If those characteristics are implemented, then the outcome is more likely to be a sustainable fishery. In short responsible fishing leads to sustainability.

Conclusion:

Blue revolution (Growth):

Blue revolution called the Blue growth initiative; it is trying to contain three missions: Food security, poverty alleviation; and sustainable resources development. India has been pursuing a Blue Revolution, through technologies and investments, though much more diversification and intensification are needed and possible.. New science and innovations, deployment of players, along the community living with the seas since times immemorial, in a value chain approach, are the present needs (Ayyappan, 2016) with aquaculture possibilities; input management has been the key discussion across stakeholders. Quality seed and feed, oft-repeated requirements; infrastructure from 'seed to market'; incentives for production of fish, being a perishable; governance of the sector, come up in these discussions. Blue Revolution for both the producer and the consumer is the gist of 'Fish for All'. Given the opportunities and the partnerships, it is poised to play an important role in the Blue Economy in India.

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