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CHALLENGES IN FOOD SECURITY: THE FISHERIES AND AQUACULTURE POLICY PERSPECTIVES IN INDIA

Shyam S. Salim,[1*] Pramod Kiran, R.B.,[2] Nisha Elizabeth Joshua[3] and Biju Kumar, A.[2]

[1]Socio-Economic Evaluation and Technology Transfer Division, Central Marine Fisheries Research Institute, Cochin, Kerala, India
[2]Dept. of Aquatic Biology & Fisheries, University of Kerala, Trivandrum, Kerala, India- 695581
[3]Fisheries Economics Extension and Statistics Division, Central Institute of Fisheries Education, Mumbai, India- 400061
** Corresponding author: shyam.icar@gmail.com*

Abstract: Food, shelter and clothing are the basic necessities of the life and among them, food plays a pivotal role in the social and economic development of the country. Demographic pressures abating the arable lands as well as the declining factor productivity in major agriculture based cropping system leaves no options with the primary stakeholders than to find an alternative to traditional agricultural activity. Indian fisheries sector contributes to nutritional security, provides gainful employment and earns forex earnings. The sector produces 9.3 million tonnes of fish to the food basket generating an economic value of 81,400 crores (0.82 percent) of the total GDP as per the current market prices of 2011. The forex earnings during 2011 in terms of quantity and value are 8.70 lakh tonnes and around 3.5 billion US$ crores respectively. Eventhough capture sector is on the rise with around 3.94 million tonnes, the sector is grappled with numerous policy bottlenecks in the value chain. Thus it becomes important to harvest alternative and non-traditional sources of fisheries. Aquaculture is the fastest growing food sector in the world and there is immense scope of improving it in terms of horizontal integrations by harnessing more and more area into aquaculture in addition to the numerous policy constraints and elements required for the sustainable development of the fisheries sector to feed the ever growing population.

Key words: Demand Supply analysis, Scenario Analysis, Sustainable aquaculture, Policy elements, Policy deficiency tree, Supply-Demand gap

INTRODUCTION

Fisheries has been recognized as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries, and is a source of cheap and nutritious food besides being a foreign exchange earner. The present fish production is 9.3 million tonnes with a contribution of 3.93 million tonnes from marine sector and 5.46 million tonnes from inland sector. The fisheries contribution to GDP is 81400 crores contributing to around 0.82 per cent of the total GDP. The sector contributes around 7.3 per cent of the agriculture GDP. In terms of resources the country possesses a huge resource profile with an Exclusive Economic Zone of 2.02 million square km and a coastline of 8129 kms. In order to address the food security concerns of the country it is important to harness its fisheries resources.

The comprehensive development of agriculture, health, nutrition, education, literacy, etc. would

alone lead to enduring solution to the problem of food insecurity, poverty alleviations, unemployment and social tension in the region (Vijay and Shyam, 2001).There has been a gradual shift (Fig. 1) in the production scenario from marine to inland fisheries in recent years. In the figure it can be seen that marine sector contribution reduced from 58.86 per cent in 1991 to 38.84 per cent in 2010 whereas inland sector contribution increased from 41.14 per cent in 1991 to 61.16 per cent in 2011 (FAO, 2007, 2005-13 and CMFRI, 2012).

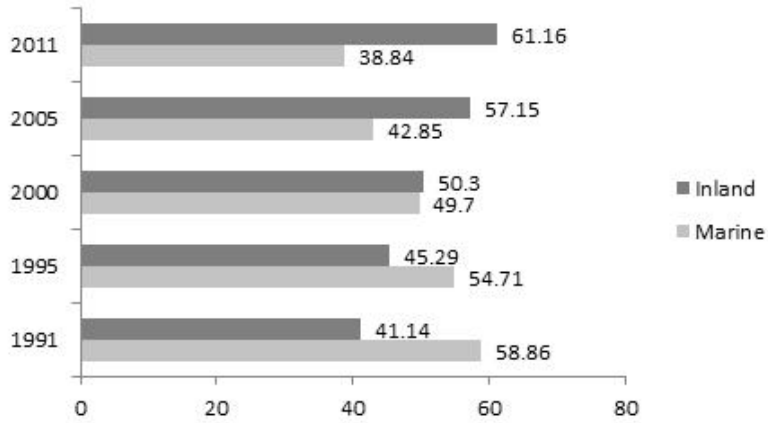

Fig. 1. Sectoral contribution of marine and inland fisheries over the years

FOOD SECURITY CHALLENGES IN INDIA

The need for food security arises primarily due to the fluctuations in food plan and non-availability of sufficient food from domestic sources. In October 2011 the world population reached seven billion people and by 2050 it is expected to reach 9 billion. Due to the increasing concerns of global warming and financial crisis, 'food' is becoming costlier every day. In order to feed this population, it is estimated that global food production will need to increase by 70% (The Guardian, 2012). Inorder to analyse the food fish requirement the demand and supply analysis was done and is given in Table 1.

It can be seen that the available supply from marine resources, inland resources, imports and that excluding exports/Industrial/Processing purposes in India for the year 2015 will be 7.44 mt whereas the same forecasted for the years 2020, 2025 and 2030 is found to be 7.93, 8.45 and 9.10 mt respectively. If the population is assumed to be 1.28 billion in the year 2015, with 60% comprising offish eating population and the per capita consumption at 12 kg, the demand forecasted on the same year is found to be 9.22 mt. The demand-supply deficit for the years 2013, 2015, 2020, 2025 and 2030 is forecasted in Tables 1&2.

Table 1. Estimated Fish Supply Analysis

Sector*	Years				
	2013	2015	2020	2025	2030
Marine	3.94	4.1	4.3	4.51	4.74
Inland	5.36	5.72	6.07	6.43	6.82
Total supply	9.3	9.82	10.4	10.9	11.6
Imports	0.05	0.1	0.21	0.33	0.58
Exports/ Industrial/ Processing	2.34	2.48	2.64	2.82	3.03
Available Supply	7.01	7.44	7.93	8.45	9.1

· *Production in million tonnes*

Table 2. Estimated Fish Demand Analysis

Years	2013	2015	2020	2025	2030
Population	1.21	1.28	1.36	1.45	1.53
Fish eaters (% of population)	60	60	65	70	70
Fish eaters (billion)	0.73	0.77	0.88	1.02	1.07
Per capita(ICMR recommendation)	12	12	12	12	12
Demand (million tonnes)	8.71	9.22	10.6	12.2	12.9
Demand –Supply gap (million tonnes)	1.7	1.78	2.67	3.73	3.75

· *Value in billion rupees*

DECOMPOSITION OF FISHERIES OUTPUT IN INDIA

The decomposition of fisheries output in Indiain terms of quantity and value for the year 2012 is shown in Figure 2. The decomposition of fisheries output for the year 2012 for marine capture is 3.91million tonnes (42%) and271.43billion rupees (39%). For, aquaculture the same is found to be 3.93 million tonnes (42%) and 360 billion rupees (51%) ; 0.25million tonnes (3%) and 16.13 billion rupees (2%) for mariculture and 1.21(13%) million tonnes and 58.5 (8%) billion rupees for inland sector.

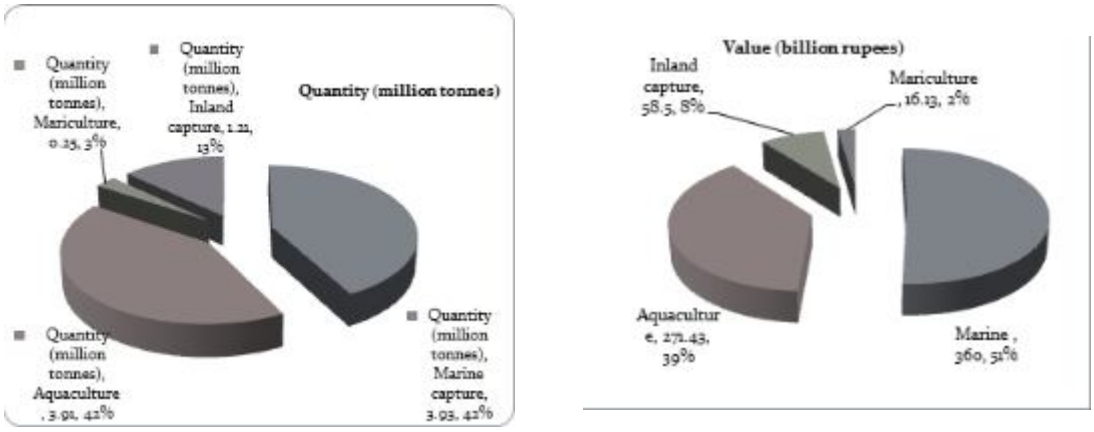

Fig. 2. Fisheries output in India (Quantity and Value)

FISH FOOD SECURITY CHALLENGES

The food security concerns in bridging the demand and supply of food fish depend upon the performance of the capture and culture sector. Among these the marinecapture sector is grappled with numerous policy hurdles in the value chain extending from resources to the consumption sector which are indicated in Table 3. The table suggests that the sector even though not showing a declining trend in landings would saturate at a level of 4.5 million tonnes as per the revalidation of the potential harvestable yield from the coastal waters of India.

Thus the inland sector appears to be the most important sector which will be able to bridge the demand and supply gap. The growth of the inland sector especially the riverine, reservoir, estuarine fisheries never hold huge promises on account of low productivities in the sector. The present percentage utilization of brackish water resources is 18 per cent whereas for ponds and tanks the same is found to be 35 per cent. The huge untapped aquaculture field shows a great promise for meeting the food security of the country.

Thus aquaculture sector appears to be the most important sector showing an impressive growth rate of around 6-8 per cent. The aquaculture sector includes fresh water aquaculture, brackish water aquaculture and capture based aquaculture (mariculture). However the sector contains numerous constraints and policy elements which are indicated in Table 4.

Table 3. Policy hurdles in marine capture fisheries

Resource	Harvest	Post-harvest	Resource	Consumption
Over exploitation	Over capitalization and excess fleet capacity	Trade impediments and infrastructure development	Marginalization and inter sectoral disparities	Rise in prices and less market research
Targeted fishing	Increase in number of multiday fishing boats	Post-harvest losses (both qualitative and quantitative) due to improper handling, packaging, transportation and storage	Debt trap and lack of institutional credit	Noncompliance with food safety guidelines
	Harvesting capacity of fishing fleets exceeds the estimated biological sustainability of most commercial fishing stocks	Importance of Post-harvest technology needs to be more realized among various stakeholders in order to make more nutritive food items from raw commodities by proper processing and fortification	Mobility/ Migration towards alternate livelihood opportunities	Value addition is to be encouraged to meet the increasing food demand
Common property with free and open access				
	Large amounts of by catch along with landings	Lack of information on the type of fish loss that occurs and the extent and effects post-harvest fish losses have on people's livelihoods	Less returns to the farmers due to post harvest loses and inadequate raw material supply	Protocols for sanitation, hygiene and quality control is not strictly followed
India's territorial deep-sea waters remain untapped				
	Eco-friendly and responsible fishing techniques is not practiced in many areas		Addressing issues related to safety at sea for fishers both in terms of policy and support is minimal	Quality Management steps like HACCP is not followed in many places to ensure food security
	Juvenile catch and catch of low value fishes and economic loss			
Lack of enforceable property rights regime			Non modernization of the existing harbours and inadequate cold storage facilities and factory vessels	

Table 4. Constraints and policy elements in freshwater aquaculture, brackish water aquaculture and mariculture

Freshwater aquaculture		Brackish water aquaculture		Mariculture	
Constraints	**Policy Elements**	**Constraints**	**Policy Elements**	**Constraints**	**Policy Elements**
Less area developed under aqua farming	A major policy support is needed to release large tracts of unproductive or non-remunerative agricultural lands for development of aquaculture	Inadequate supply of wild spawners	Develop infrastructure (hatcheries) for additional seed production	Improper Leasing policy	Comprehensive long term (five years or more) fishing rights is necessary
Provision of low level of supplementary feed	Ensure provision of superior quality feeds having high FCR through indigenous feed technology	Disease Outbreak - White Spot Virus disease	Establish and enforce quality standards and certification mechanisms through Seeds Acts and regulatory measures by the states concerned	Lack of coherence among social groups	Organise technology extension programs like melas, festivals etc and development of rural infrastructure like hatchery, processing and training centres
Non availability of fingerlings of desired size and species	Promote establishment of hatcheries and provide support through providing adequate infrastructure. Uniform and comprehensive certification systems for fish seed shall be in place, preferably evolved by the Centre for adoption by the States	Exorbitant feed cost	Encourage use of superior quality indigenous raw materials in adequate proportions	Issue of free rides among the commons	Collective wisdom has to be enthused

Lack of diversification of aquaculture practices	Encourage use of faster growing indigenous species and culture technologies suitable for the area	Lack of availability of quality feed and chemicals	Establish certification and implementation mechanisms through regulatory authorities	Problem of mute participation	Encourage Public Private Partnership
Lack of standardized technology	Use modern technologies for sustainable production of resources	Non standardization of culture techniques	Location specific regulations for establishing new farms be made based on the carrying capacity of the water source	Less social commitment	Exchange of information by several methods through village information network of NIC, radio, TV and other media may be encouraged
Non development of location specific culture technology	Validation of technology should be carried out by the experts in the DoF	Destruction of mangroves to construct new shrimp ponds	Proper enforcement of laws with active participation and cooperation of local communities	Revenue sharing system	Policy should be framed in such a way that the one who invest more and work hard will be getting majority of the profit
Low production levels of different aquaculture systems	Improve low average productivity through sustainable intensification of production, adopting improved scientific technologies, diversification of species, integration of culture systems, superior quality feed, seed , quarantine mechanism etc.	Extension services did not get parity with the growth of aquaculture sector	Strengthen the extension paraphernalia in the States and Union Territories, to educate aqua farmers in Better Management Practices	Resource ownership issues	Primary stakeholders should be given priority

Non availability of credit facilities and aquaculture insurance schemes	Policy support for encouraging credit and insurance agencies in extending adequate lending and insurance coverage to the sector	Lack of comprehensive environmental management	Environmental legislation focusing on protecting biodiversity, regulating introduced species, controlling pesticides and establishing protected areas is essential	Less species diversification	Encourage diversification by bringing more potential fin / shellfish species
Lack of proper data base	Policy directions for country-wide major program for land mapping and assessment trough RS and GIS and nodal centres for the data base should be established	Less Species Diversification	Bring more potential fin/ shellfish species	Lesser developed infrastructure for post-harvest operations	Requires improved fish handling on board, processing, preservation, and transportation
Low attention of Human Resource Development and service delivery system	Bring in professional management of the sector, appointing technical heads in state departments and capacity building of their officers	Intensification & up gradation of existing practices	Farm productivity must be improved through a combination of forward-looking policies, better management practices and technological improvements	Less focus on comprehensive environmental management	Environmental legislation focusing on protecting biodiversity, regulating introduced species, establishing protected areas is essential
Insufficiency of R & D support and linkages	Encourage research in the field for development of innovative technologies using indigenous knowledge according to the information needs of farmers	Development of Genetically improved fish breeds	Greater emphasis is required in the areas of dissemination of the improved stock to farmers	Extension services need to be improved	Substantial investment in training, demonstration and infrastructure development is necessary to improve efficiency of extension service

SUSTAINABLE AQUACULTURE

In the context of improving productivity and addressing food security concerns the environmental and biodiversity issues also needed to be considered. Sustainable aquaculture development is the management and conservation of aqua farmingresources, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for the present and future generations. Sustainable aquaculture aims at developing location specific, environment friendly, technically adept culture practices coupled with economically viable, culturally compatible, socially acceptable, ecologically sound, indigenous input driven culture technologies contribute to equitable development and ultimately sustainable development of aquaculture. Achieving sustainability requires adhering to a full set of measures and cannot be reached through simply implementing one or two. Figure 4 depictingsustainable aquaculture is shown below.

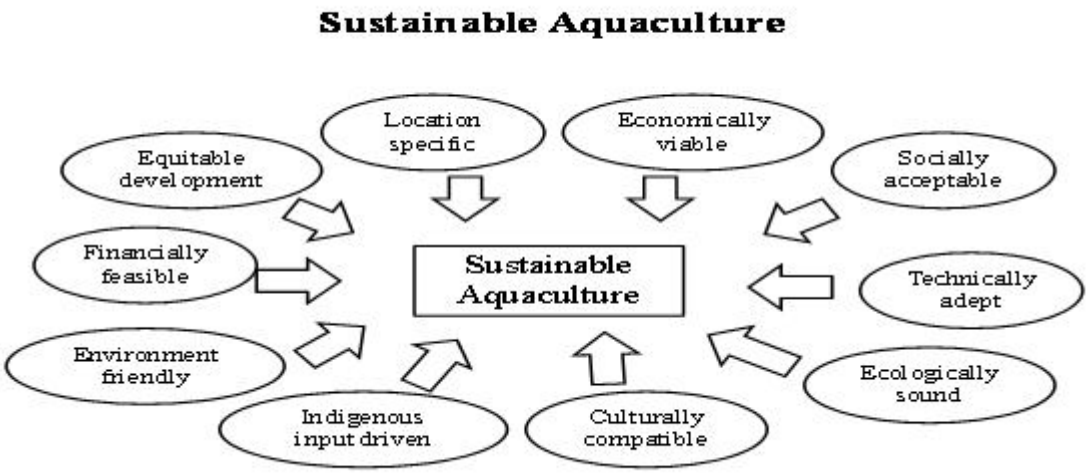

Fig. 4. Sustainable Aquaculture

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