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Chapter 2

Brief profile of Fisheries Sector in India: Growth and Sustainability

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2.1 INTRODUCTION

Working group on Fisheries, Planning Commission, Government of India, 2006 rightly said that "Fisheries is a sunrise sector of our economy". India's economy encompasses traditional village farming, modern agriculture, handicrafts, a wide range of modern industries and a multitude of support services. Fisheries sector in India has witnessed an impressive growth from a subsistence traditional activity to a well developed commercial and diversified enterprise. The fisheries sector has been playing an important role in the Indian economy by its contributions to employment generation, income augmentation, foreign exchange earnings, providing food and nutrition security. Over the last two decades, fisheries issues have emerged from being merely an obscure sectoral concern to an important growth sector with an expanding role in economic development and food security. Fishing as an occupation has been in vogue since time immemorial.

Till recently it was reckoned to be a supplementary enterprise practised by fishermen community on subsistence level with little external input (Krishnan *et al* 2000). But with the changing consumption pattern, emerging market forces and technological developments, fisheries sector in India is undergoing a transformation. In recent years, it has emerged as a vibrant sector and is being considered as a strategic sub-sector for promoting agricultural diversification. India is one of the major fish producing countries in the world with third position in fisheries and second in aquaculture.

2.2 FISHERY RESOURCES OF INDIA

India has abundant resources for fish production. In the case of marine fisheries, India has 20.2 lakh sq. km. of Exclusive Economic Zone, including 5.3 lakh sq. km of continental shelf and 8118km of coastline.

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The inland fisheries resources include a length of 195210 kilometers rivers and canals, 29.07 lakh ha of reservoir area, 24.14 lakh ha area of ponds and tanks and 7.98 lakh ha of beels, oxbow and derelict water. The brackish water area for fish production is estimated to be 12.40 lakh hectares. The inland resources however, have not been tapped fully. Only about 16 per cent of the fresh water area and 10 per cent of the brackish water area are being utilized for fish culture (Kumar, 2003). Table 2.2 & 2.3 shows the state wise distribution of marine fisheries resources and inland fisheries resources of India.

Table 2.1: Fisheries Resources of India

Resource	Unit	Quantity
Marine:		
Continental Shelf	000 sq. km.	530
Landing centre	Number	1376
Coastline	Km.	8118
Number of fishing villages	Numbers	3322
Inland:		
Rivers and canals	Km.	195210
Reservoirs	Lakh hectare	29.07
Tanks and ponds	Lakh hectare	24.14
Beels, oxbow and derelict water	Lakh hectare	7.98
Brackish water	Lakh hectare	12.40

Sources: Annual Report 2009-10, Department of Animal Husbandry, Dairying and Fisheries (DAHD&F), Government of India.

Table 2.2: State wise Marine Fisheries Resources of India

Sl. No.	State/ Union territory	Length of coast line (km)	Continental shelf('000 sq. km)
1	Andhra Pradesh	974	33
2	Goa	104	10
3	Gujarat	1600	184
4	Karnataka	300	27
5	Kerala	590	40
6	Maharashtra	720	112
7	Orissa	480	26
8	Tamil Nadu	1076	41
9	West Bengal	158	17
10	A&N Island	1912	35
11	Daman & Diu	27	NA
12	Lakshadweep	132	4
13	Pondicherry	45	1
Total		8118	530

Source: Report of the Working Group on Fisheries for 11th Five Year Plan, Planning Commission, 2006.

Table 2.3: State wise Inland Fisheries Resources of India

Sl. No.	States and UTs	Rivers and Canals (km)	Reservoirs (lakh ha)	Ponds & Tanks (lakh ha)	Beels, Oxbow, lake &Dereict water bodied (lakh ha)	Brackish water (lakh ha)
1	Andhra Pradesh	11514	2.3	5.2	-	0.6
2	Assam	4820	0.02	0.23	1.1	-
3	Bihar	3200	0.6	1	0.1	-
4	Goa	250	0.03	0.03	-	neg
5	Gujarat	3865	2.4	0.7	0.1	1

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6	Haryana	5000	neg	0.1	0.1	-
7	H.P.	3000	0.4	1.01		-
8	Jammu &K	27781	0.1	0.2	0.1	-
9	Karnataka	9000	4.4	2.9		0.1
10	Kerala	3092	0.3	0.3	2.4	2.4
11	M. P.	17088	2.3	0.6		-
12	Maharashtra	16000	2.8	0.6		0.1
13	Manipur	3360	0.01	0.1	0.04	-
14	Meghalaya	5600	0.1	0.02	neg	-
15	Nagaland	1600	0.2	0.5	neg	-
16	Orissa	4500	2.6	1.1	1.8	4.3
17	Punjab	15270	neg	0.1	-	-
18	Rajasthan	5290	1.2	1.8	-	-
19	Sikkim	900	-	-	0.03	-
20	Tamil Nadu	7420	5.7	0.6	0.1	0.6
21	Tripura	1200	0.05	0.13	-	-
22	Uttar Pradesh	28500	1.4	1.6	1.3	-
23	West Bengal	2526	0.2	2.8	0.4	2.1
24	A.P	2000	-	2.8	0.4	-
25	Mizoram	1395	-	0.02	-	-
26	A & N Islands	115	0.01	0.03	-	1.2
27	Chandigarh	2		neg	neg	-
28	Delhi	150	0.04	-	-	-
29	Lakshadweep	0		-	-	-
30	Pondicherry	247		neg	0.01	neg
31	D&N Haveli	54	0.1	-	-	-
32	Daman & Diu	12	-	neg	-	neg
33	Chhattisgarh	3573	0.8	0.6	-	-
34	Uttaranchal	2686	0.2	0.01	-	-
35	Jharkhand	4200	0.9	0.3	-	-
	Total	195210	29.16	25.38	7.98	12.4

Source: Report of the Working Group on Fisheries for 11th Five Year Plan, Planning commission, 2006.

2.3 FISH PRODUCTION

The fisheries production in India during 1950s was more pronounced in the marine fisheries and it remained the major contributor till early 1990s. Its share in the total fish production was more than 70 per cent in 1960s, but thereafter it started declining and came down to about 62 per cent in 1970s and to 59 per cent in 1980s. In the mid-nineties, the fisheries production witnessed a significant change. The share of inland fish production became almost half of the total fish production in 2000. It seems that marine fisheries production has reached a plateau and at best, it can register only a marginal increase in the near future. On the other hand, inland fish production was on constant rise and its share raised to 38 per cent in 1970s to 41 per cent in 1980s, 45 per cent in 1990s and jumped to over almost 58.93 percent in 2007-08. This rise in inland fish production is attributed to the development of aquaculture in our country. Changes in the structure of fish production in India are shown in Table 2.4.

Table 2.4: Changes in the structure of fish production in India

(in lakh tones)

Year	Marine	Inland	Total
2000-01	28.11 (49.70)	28.45 (50.30)	56.56
2001-02	28.3(47.56)	31.2 (52.44)	59.5
2002-03	29.9(48.23)	32.1 (51.77)	62
2003-04	29.41 (45.96)	34.58 (54.04)	63.99
2004-05	27.8 (44.13)	35.2 (55.87)	63
2005-06	28.16 (42.85)	37.55 (57.15)	65.71
2006-07	30.24 (44.02)	38.45 (55.98)	68.69
2007-08	29.2 (40.97)	42.07 (59.03)	71.27
2008-09	29.72 (39.06)	46.36 (60.94)	76.08

Figures in parentheses indicate percentage to total.

Source: Annual Report 2009-10, DAHD&F, Government of India.

Fish seed is the critical input for successful fish culture practices. The production increased from 409 million fry in 1073-74 to 10,332 million fry in 1990-91. In 2008-09, fish seed production reached to 31497 million fry from 24144 million in 2007-08 which shows a growth rate of 30.45%. There is a positive increased of fish seed in India. Trend of fish seed production in India is shown in Table 2.5.

Table 2.5: Fish seed production

Year	Production (in million fry)	Growth %
2000-01	15,608	-
2001-02	15,758	0.96
2002-03	16,333	3.65
2003-04	19,231	17.74
2004-05	20,791	8.11
2005-06	21,988	5.76
2006-07	23,643	7.53
2007-08	24,144	2.12
2008-09	31,497	30.45

Source: Annual Report, 2010, DAHD&F

2.4 GROWTH OF FISHERIES SECTOR IN INDIA

Fisheries sector plays an important role in the Indian economy. Share of agriculture and allied activities in the GDP is constantly declining. It has been observed that agriculture sector is gradually diversifying towards high value enterprises including fisheries. It is evident from the contribution of fisheries sector to the GDP, which has gone up from 0.46 per cent in 1950-51 to 1.16 per cent in 1999-00 (at current prices). The share of fisheries in Agricultural GDP (Ag.GDP) has increased more impressively during this period from mere 0.84 per cent to 4.19 per cent. This is largely due to a sustained annual growth rate of well over four per cent in the fisheries GDP during the last five decades. The fisheries sector has recorded faster growth as

compared to the agricultural sector in all the decades. The growing production of fish suggests that fisheries sector is booming and contributing to the economic growth of the nation. More than 6 million fishermen and fish farmers are totally dependent on fisheries for their livelihood in India. Contribution of fisheries sector to Gross Domestic Product in India is shown in Table 2.7.

Table 2.6: Fish Production over the Plan Periods

Plan Period	Production at the end of the period('000 tonnes)			Growth (%) during the Plan Period			Average Annual Growth Rate
	Marine	Inland	Total	Marine	Inland	Total	
Pre Plan period (1950-51)	534	218	752	-	-	-	-
1st Plan (1951-1956)	596	243	839	11.61	11.47	11.57	2.31
2nd Plan (1956-61)	880	280	1160	47.65	15.23	38.26	7.65
3rd Plan (1961-66)	824	507	1331	6.36	81.07	14.74	2.95
Annual Plans (1966-69)	904	622	1526	9.71	22.68	14.65	4.88
4th Plan (1969-74)	1210	748	1958	33.85	20.26	28.31	5.66
5th Plan (1974-79)	1490	816	2306	23.14	9.09	17.77	3.55
Annual Plan (1979-80)	1492	848	2340	0.13	3.92	1.47	1.47
6th Plan (1980-1985)	1698	1103	2801	13.81	30.07	19.7	3.94
7th Plan (1985-90)	2275	1402	3677	33.98	27.11	31.27	6.25
Annual Plan (1990-91)	2300	1536	3836	1.1	9.56	4.32	4.32
Annual Plan (1991-92)	2447	1710	4157	3.39	11.33	8.37	8.37
8th Plan (1992-97)	2967	2381	5348	30.42	69.83	45.44	6.49
9th Plan (1997-2002)	2830	3126	5956	4.62	31.29	11.37	2.27
10TH Plan (2002-2007)	3024	3845	6869	6.86	23	15.33	3.07

Source: Report of the Working Group on Fisheries for 11th Five Year Plan, Planning commission, 2006

Table 2.7: Contribution of fisheries sector in India

Year	Gross Domestic Product (₹ Crore)			% contribution	
	Agriculture and allied activities	Fishing	Total economic activities	GDP	Agriculture GDP
2000-01	286666	11406	1198592	0.95	3.98
2001-02	304666	12279	1267945	0.97	4.03
2002-03	283393	13179	1318362	1.00	4.65
2003-04	310611	13718	1430548	0.96	4.42
2004-05	560308	27435	2967599	0.92	4.90
2005-06	639990	30877	3402316	0.91	4.82
2006-07	714254	35365	3941865	0.90	4.95
2007-08	815399	38859	4540987	0.86	4.77
2008-09	898378	42436	5228650	0.81	4.72

Source: Central Statistical Organisation, National Account Statistics, 2009-10, Government of India

2.5 INDIAN STATUS IN GLOBAL FISHERIES

Globally, fish production from capture fisheries and aquaculture was about 1304 lakh tonnes in 2000 as compared to nearly 197 lakh tonnes in 1950. The production declined to 1179 lakh tonnes in 1998 and now recovered. Indian share in global production has reached 4.36% per cent with 9.92% in inland and 2.8% in marine in 2000. For inland sector India is ranked second after China. Thus compared to growth in global fish production, the growth in India is mainly due to increasing contribution from inland fish production. The trend of fish production in India as compared to the world production from 1950 to 2000 is given in Table 2.8.

Table 2.8: Contribution of India to World Fish Production

In lakh tonnes

Year	**World production**			**Contribution of India**			**India's share(%)**
	Total	Marine	Inland	Total	Marine	Inland	
1950	**197.55**	175.21	22.34	**7.30**	5.20	2.10	3.69
1960	**366.91**	326.65	40.26	**11.61**	8.80	2.81	3.16
1970	**672.79**	612.77	60.03	**17.59**	10.86	6.73	2.61
1980	**755.85**	679.53	76.33	**24.45**	15.55	8.90	3.24
1990	**1,035.90**	889.97	145.93	**38.75**	23.00	15.75	3.74
2000	**130 4.33**	1018.31	286.02	**56.89**	28.52	28.37	4.36
2001	**1310.00**	9960.00	314.00	**56.56**	28.11	28.45	4.32
2002	**1337.00**	1010.00	327.00	**59.5**	28.3	31.2	4.45
2003	**1332.00**	9880.00	344.00	**62**	29.9	32.1	4.65
2004	**1343.00**	1041.00	338.00	**63.99**	29.41	34.58	4.76
2005	**1364.00**	1031.00	362.00	**63**	27.8	35.2	4.62
2006	**1371.00**	986.00	385.00	**65.71**	28.16	37.55	4.79
2007	**1398.00**	992.00	406.00	**68.69**	30.24	38.45	4.91
2008	**1423.00**	991.00	43100	**71.27**	29.2	42.07	5.00
2009	**1451.00**	1000.00	45100	**76.08**	29.72	46.36	5.24

Source: Report of the Working Group on Fisheries for 11th Five Year Plan, Planning Commission, 2006.

2.6 EXPORT OF FISH

There has been a considerable increase both in the quantum and value of export of fish and fish products since 1960-61. In 1960-61, 0.02 million tonnes worth US $ 10 million were exported. It increased to 0.39 million tonnes (about 20 times) worth US $ 1180 million (more than 100 times) in 1999-00. The share of fish and fish products in total exports has increased from 0.74 per cent in 1960-61 to more than 3 per cent in 1999-00. There was a fall in export earning during 2003-04, but the earning have increased steadily till 2009-10. Trend of fish export is shown in Table 2.9.

Table 2.9: Development of India's Export of fisheries product

Year	Quantity (MT)	Value (US$ in million)	% growth rate in export earning
2002-03	467297	1424.9	-
2003-04	412017	1330.76	-6.61
2004-05	461329	1478.48	11.1
2005-06	512164	1644.21	11.21
2006-07	612641	1852.93	12.69
2007-08	541701	1899.09	2.49
2008-09	602835	1908.63	0.5
2009-10	678436	2132.84	11.75

Source: Export-import Data Bank, Ministry of Commerce and Industry, Government of India (2002-03 to 2009-10)

2.7 LIVELIHOOD AND EMPLOYMENT ISSUES

Fishery is one of the main sources of livelihood for the rural poor, particularly the fisher community. The country is endowed with enormous inland and marine waters, which provide immense livelihood and employment opportunities. In case of inland waters, fisheries in open waters (Rivers, Reservoirs, Floodplains and Estuaries) are, although, of subsistence type, yet, have high potentials for production enhancement. The fish catches from these waters contribute significantly to their food and nutritional security. Inland aquaculture has witnessed the highest growth rate and emerged as the most important and contributing activity to fisheries sector. The livelihood options exist for both the poor and large fish farmers through horizontal and vertical integration of the enterprise. Similarly, a marine fishery is a major source of livelihood for lakhs of people along the coast. While the inshore fishery has almost attained its potential, immense scope exists in deep sea fisheries, along with mariculture and post-harvest value addition.

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The fisheries sector in India is associated with the poor, illiterate and under nourished population belonging to one of the economically weakest sections of the society. The sector immensely caters to the country's protein requirements and registered highest export earnings growth rate among agriculture commodities. Freshwater aquaculture documented one of the highest growth rate in production, while fisheries is providing livelihood and food and nutritional security to the community and deserves greater support of the Government in the form of the incentives/concessions as in agriculture. It is a matter of concern that aquaculture is being treated as an industry and concessions available in agriculture are not extended to aqua-farmers. The assistance in form of: (i) Income Tax relief; (ii) Power and water supply at concessional rates; (iii) Loan facility on interest free/differential rate of interest; (iv) Insurance cover and drought and flood relief; (v) subsidy on inputs, transportation, etc. may be provided to the aqua-farmers.

The fisheries sector has been providing employment to over nine lakh full time and 11 lakh part time fishermen through fishing operations. The number of people involved in marine fisheries related activities included nearly four lakh in fish marketing, three lakh in repairs of fisheries requisites, around 50,000 in fish processing and four lakh in other ancillary activities. In all, an estimated 31.5 lakh people are engaged in fishing and farming operations directly or indirectly. (Annual Report, 2009-10, DAHD&F).

2.8 FISHERIES AND SUSTAINABILITY

Public-private partnerships, whether formal or informal, have contributed to success stories in agriculture over the years, but they are only a few in the marine sector. Most of the fish stocks in inland and marine sector have either been over-exploited or reached their maximum sustainable yields. For the stocks to recover and continue to provide production at an optimal level, collaboration between fishers and public sector institutions is needed in observing closed

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seasons, use of non-destructive craft and gear, establishment of marine protected areas/sanctuaries, etc. that will lead to community based fisheries management or co-management. Greater collaboration between the Government agencies and fishing/farming communities is required for the development and management of common property resources such as village/panchayat ponds/tanks, etc. There is ample scope for partnerships right from the stage of seed production, culture, post-harvest handling, processing and value addition, marketing, quality control, etc. Specific interventions by the Government in terms of infrastructure development and fishery estates for further operations by the private sector and tax concessions would be needed.

Sustainable fisheries can only be achieved through improvement of the quality, technical skills and management of human resource managing fisheries in the country, in consonance with the rapidly changing needs. Raising a cadre of officers at various levels to plan and execute fishery development programmes is critically important. For such an effort, adequate funding to strengthen and streamline organisations, infrastructure and manpower would be the basic requirement. Emphasis also needs to be laid on fisher-women cooperatives and self-help groups. Incentive schemes should be introduced to promote fisheries in the co-operative sector, so that the weaker sections are not deprived of their due earnings.

Fisheries and aquaculture enterprises are among the most profitable among agriculture and allied activities. Fisheries is primarily labour intensive with average benefit-cost ratio at 3.5 (CIFRI, 2005). Freshwater aquaculture, dominated by carps, has a high share in aquaculture. The average benefit cost ratio for carp grow-out system is 1.87, which is much higher than other farming practices.

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2.9 DEVELOPMENT PROGRAMMES AND INSTITUTIONAL SUPPORT

The development plans for India's fisheries sector were aimed at increasing the fish production, improving the welfare of fishermen, promoting export and providing food security. The first step towards developing the fishing as an industry was made in 1898, when the then Madras Presidency was advised to strengthen the fishery so that it could fight famine. It took almost 50 years to concretize this idea. After the independence, the first All India Fisheries Conference, held in 1948 in New Delhi, decided to seek foreign co-operation to create necessary infrastructure for modernizing the fisheries sector. In 1952, a tripartite technical co-operation agreement was signed between India, the USA and the United Nations for fisheries development and a year later, the Indo-Norwegian Project (INP) in Kerala was started. From then onwards the modernization of fisheries was initiated in the coastal states in India. Several programmes have been launched for both marine and inland fishery developments in the country, some of which are briefly described below:

2.9.1 Programmes for Development of Inland Fisheries and Aquaculture

In recognition of the increasing role of inland fisheries in overall fish production, the Government of India (GOI) has been implementing two important programmes in the inland freshwater sector since the Fifth/ Sixth Plans. These are the Fish Farmers' Development Agencies (FFDAs) and the National Programme for Fish Seed Development. Under the macro management approach, the scheme was launched under central assistance during the X Plan. The scheme had six components: (i) development of freshwater aquaculture, (ii) development of integrated coastal aquaculture, (iii) development of coldwater fisheries and aquaculture in hilly region, (iv) development of water logged areas into aquaculture estates, (v) utilization of inland

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saline/alkaline soils for aquaculture and (vi) inland capture fisheries (programme for augmenting productivity of reservoirs, rivers, etc.).

2.9.1.1 A network of about 429 FFDAs is functioning today covering all potential districts in the country. The water area brought under the intensive fish culture through the efforts of these FFDAs was 7.75 lakh hectare water area brought under scientific fish farming till 2008-09. The agencies have trained 9.39 lakh fish farmers/fishermen in improved practices and 13.19 lakh persons were benefited till 2008-09 under "Development of Freshwater Aquaculture". The expenditure towards developmental activities is being shared on 75:25 basis between the Government of India and State Governments. For UTs, Central Government provides cent percent funding assistance. During 2008-09, an additional area of 25,087 hectare was brought under fish culture and 36,805 fishers were trained in improved practices. The scheme has benefited about 40,073 persons. Due to introduction of improved technology of fish farming and the efforts of FFDAs, the national average productivity of ponds and tanks covered under the programme has reached a figure of 2600 kg/ha/annum (Annual Report 2009-10, DAHD&F)

2.9.1.2 With a view to provide technical, financial and extension support to shrimp farmers in the small scale sector, 39 Brackishwater Fish Farmers Development Agencies (BFDAs) have been sanctioned in all the coastal States and the UT of Andaman & Nicobar Islands. During 2008-09, additional area of about 2,317 ha. was brought under shrimp culture and 1,457 fishers were trained in improved practices. During 2008-09, additionally area of about 2317 ha has been developed for shrimp culture and 1,457 fishers were trained in improved practices. Since the inception of the scheme till 2008-09, about 38,517 ha. water area has been brought under shrimp culture and 33,824 shrimp farmers have been trained in improved practices of shrimp farming and the number of beneficiaries covered under the programme is about 27,211 numbers, while the productivity has

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reached to 1,200 kg/ha/annum. Some Brackishwater Fish Farmers Development Agencies (BFFDAs) have also been established in the coastal areas of the country; these provide a compact package of technical, financial and extension support to shrimp farmers. Under the national programme for fish seed production, more than 50 fish seed hatcheries have been commissioned. It has led to a marked improvement in the production of fish seed. Their production has increased from 409 million fry in 1973-74 to about 20000 million in 1999-2000 and increase to about 24144 million fry in 2007-08.

2.9.2 Programmes for Development of Marine Fisheries, Infrastucture and Post Harvest Operations

The programmes for development of marine fisheries as envisaged in different Five Year Plans include: (i) intensive surveys particularly of exclusive economic zone (EEZ), on marine fishery resource assessment, (ii) optimum exploitation of marine resources through a judicious mix of traditional country boats, mechanised boats and deep-sea fishing vessels, (iii) providing adequate landing and berthing facilities to fishing vessels by completing the ongoing construction of major and minor fishing harbours, (iv) intensifying efforts on processing, storage and transportation, (v) improving marketing particularly in the co-operative sector, and (vi) tapping the vast potential for export of marine products. During the Seventh Plan some selected villages were grouped for setting up “Fisheries Industrial Estates”. The major developments include construction of 30 minor fishing harbours and 130 fish landing centres apart from five major fishing harbours viz., Cochin, Chennai, Visakhapatnam, Roychowk and Paradip. They provide landing and berthing facilities to fishing crafts. The Government also provides subsidy to poor fishermen for motorizing their traditional craft which increases the fishing area and the frequency of operation with a consequent increase in catch and earnings of fishermen. About 33,000 traditional crafts were sanctioned for motorization up to 1997-98. Improved

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beach landing crafts are also being supplied to groups of fishermen. A scheme of re-imbursing Central excise duty on HSD oil used in fishing vessels below 20 m length is also in operation to help the small fishermen to reduce their operational cost.

2.9.3 Welfare Programmes for Traditional Fishermen

There are four important programmes for the welfare of traditional fishermen: (i) Group Accident Insurance Scheme for active fishermen, (ii) Development of Model Fishermen Village (iii) Saving-cum-Relief, and (iv) Training and Extension. Fishermen are insured for Rs 1,00,000 in case of death or permanent disability and for Rs 50,000 in case of partial disability. About 1.3 million fishermen were insured during 1998- 99 under this scheme. Under the programme of Development of Model Fishermen Villages, basic amenities such as housing, drinking water and community hall are provided to fishermen. About 30,000 houses were constructed up to 1998-99 under this programme.

The objective of Saving-cum-Relief is to provide financial assistance to fishermen during lean fishing season. Under this component, beneficiary has to contribute a part of the earnings during non-lean months. A contribution of Rs.600/- in 9 months of fishing period is being made by fisherman and Rs.1,200/- are being contributed by the Centre and the State on 50:50 basis. The total sum of Rs.1,800/- is distributed to fisherman @ Rs.600/- per month for three months of lean period. In case of UTs, entire governmental contribution of Rs. 1,200/- is met by the centre.

The main objective of Training and Extension is to provide training to fishery personnel so as to assist them in undertaking fisheries extension programmes effectively. The scheme provides assistance to fisher folk in upgrading their skills. To enhance training facilities, assistance is also provided for setting up/upgradation of training/awareness centres in states/union territories. From the year 1999-2000, this scheme is being operated with 80 per cent central

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assistance in case of States and 100 per cent central assistance in case of union territories and other organizations. Other components of the scheme are to publish manuals to provide adequate extension material, production of video films on the technologies and its publicity, to conduct meetings/workshops/seminars, etc. of national importance. The scheme has been merged with 'Welfare Programme for Fishermen' during 2005-06.

2.9.4 Strengthening of Database and Geographical Information System for Fisheries Sector

The Central Sector Scheme 'Strengthening of Database and Geographical Information System for Fisheries Sector', with an outlay of Rs.48.68 crore (Rupees forty eight crore and sixty eight lakh only) is being implemented with 100 per cent Central assistance during Eleventh Five Year Plan. The Scheme consists of following components:

(a) Sample survey for estimation of inland fishery resources and their potential and fish production.

(b) Census on marine fisheries

(c) Catch assessment survey for inland and marine fisheries

(d) Development of GIS

(e) Assessment of fish production potential in coastal areas

(f) Evaluation Studies/professional services

(g) Registration of fishing vessels

(h) Development of database of fisheries cooperative of India

(i) Mapping of smaller water bodies and development of GIS based fishery management system

(j) Strengthening of Statistical Unit at Headquarters

2.9.5 Assistance to Fisheries Institutes

Under CSS assistance has been provided to

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1) Central Institute of Fisheries, Nautical and Engineering Training (CIFNET), Kochi
2) National Institute of Fisheries Post Harvest, Technology & Training (NIFPHATT), Cochin.
3) Fishery Survey of India (FSI)
4) Central Institute of Coastal Engineering for Fishery (CICEF), Bangalore

2.9.6 National Fisheries Development Board (NFDB)

National Fisheries Development Board (NFDB) was set up in September, 2006, with its head quarter at Hyderabad to realize the untapped potential of fisheries sector in inland and marine fish capture, culture, processing & marketing of fish, and overall growth of fisheries sector with the application of modern tools of research & development including biotechnology for optimizing production and productivity form fisheries.

The activities of the Board are focused towards increasing the fish production of the country to a level of 10.3 million tonnes, to double the exports from Rs.7,000 crore to Rs.14,000 crore and provide employment 3.5 million persons by extending assistance to various agencies for implementation of activities under inland, brackish water and marine sectors. It will propagate a platform for public-private partnership for fisheries.

2.9.7 National Co-operatives Development Corporation (NCDC), New Delhi

Major thrust of NCDC activities is on promotion of programmes for weaker sections including scheduled castes and scheduled tribes. The Corporation started promotional and financial programmes in the field of dairy, poultry, fishery and handloom development in 1974. It adopted two-fold strategy:

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i) Strengthening of existing co-operatives by providing assistance on liberal pattern for expansion of their activities; and

ii) Development of potential areas by organising functional cooperatives in these sectors.

2.9.8 National Federation of Fishermen's Co-operatives Limited (FISHCOPFED), New Delhi

National Federation of Fishermen's Co-operatives Ltd. (FISHCOPFED) established in 1980, is the apex organization of fishermen cooperatives in the country. Its activities could be classified mainly into two categories: promotional and welfare. Promotional activities of FISHCOPFED include organization of conferences, supporting capacity building initiatives at various levels, transfer of technology to stakeholders, liaison with member organizations and agencies, etc. Welfare activities of the federation include implementation of the centrally sponsored Group Accident Insurance for Active Fishermen scheme, etc.

2.9.9 Indian Council of Agricultural Research, New Delhi

Indian Council of Agricultural Research is the apex body for research and education in all aspects of agriculture including for fisheries in the country. The thrust areas of fisheries research are: Stock assessment and monitoring of commercially important marine fishery resources, Development of fuel-efficient fishing crafts and gears for deep sea fishing, Prevention of post harvest losses, Development of value-added fishery products for domestic and export markets, Extraction, production and evaluation of bio-molecules from marine organisms and plants for industrial and pharmaceutical applications, Upgradation of fish processing technologies, Mariculture of fish and shellfish, Introduction of HACCP in seafood processing, Fishery resource inventory of inland waters on GIS format, Estimates of environmental flows in river systems, Environmental impact

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assessment (EIA) of open waters with regard to different developmental protocols, Utilization of inland saline water for aquaculture, Enhancement of fish productivity from reservoirs, Rural aquaculture and integrated fish farming, Development of vaccines for fish diseases, Brackishwater aquaculture, Aquatic Biodiversity and conservation of endangered fish species, Development of Coldwater fisheries, Organic fish farming and Genetic characterization of aquatic animals of commercial importance. These are being addressed by the ICAR through a network of eight resource-specific Fisheries Research Institutes, as follows (also with a number of other organisations in a network mode):

- *Central Marine Fisheries Research Institute (CMFRI), Kochi* conducts research on a marine fisheries resources and their exploitation, besides related training and extension programmes.
- *Central Inland Fisheries Research Institute (CIFRI), Barrackpore* has research, extension and training activities on inland open water systems (rivers, reservoirs, wetlands/lakes and estuaries).
- *Central Institute of Freshwater Aquaculture (CIFA), Bhubaneswar* deals with research, extension and training programmes on production and productivity in freshwater aquaculture.
- *Central Institute of Brackishwater Aquaculture (CIBA), Chennai* concentrates on research, extension and training programmes on brackish water aquaculture for shrimp and fish. · Central Institute of Fisheries Technology (CIFT), Kochi conducts R&D programmes on design of fishing crafts and gears, fishing technology, fish processing, preservation. It also helps in Quality Control certification for export of fishery products.
- *National Research Centre on Coldwater Fisheries (NRCCWF), Bhimtal* carries out research on coldwater fishery resources and biology, breeding and developing hatchery and aquaculture for indigenous and exotic coldwater fishes.
- *National Bureau of Fish Genetic Resources (NBFGR), Lucknow* conducts work on genetic characterization, gene-banking,

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biodiversity database and conservation of fish species. · Central Institute of Fisheries Education (CIFE), Mumbai, a 'Deemed University' undertakes fisheries education at postgraduate level and also conducts specialised training programmes.

2.9.10 Programmes with International Aid

Several international organizations, including the World Bank, UNDP, DANIDA, NORAD, ODA (UK and Japan) provide aid to India for the development of fisheries sector (Kumar Anjani, 2003). Under the Bay of Bengal Programme (BOBP), started in 1979, assistance is provided for the development of small-scale fisheries and enhancing the socio-economic conditions of the fishing communities. ODA (UK) has provided technical aid for the prevention of post-harvest losses in marine fisheries. Recently, FAO launched a scheme for providing technical assistance to implement Hazard Analysis Critical Control Points (HACCP) in seafood processing industries. A Shrimp and Fish Culture Project was started with the assistance of the World Bank in May 1992 and it continued for a period up to December 1999. The states of Andhra Pradesh, Bihar, Orissa, Uttar Pradesh and West Bengal were covered under this project. Six sites covering a brackish water area of 797 ha have been developed for shrimp culture operations. A total of 101 reservoirs and 22 oxbow lakes have been developed for fish culture.

2.9.11 Policies for Fisheries Development

At present, the fisheries sector does not have a separate policy of its own like the Science Policy, Technology Policy, Industrial Policy, Telecom Policy or Agricultural Policy. Only a passing reference has been made in the Agricultural Policy regarding the fisheries development in the country. However, the successive Five Year Plans of India have set up some broad policies with regard to the production in the fisheries sector and investment in it. Policy makers and planners visualize fisheries as an important sector for agricultural

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diversification, employment generation, export promotion and food security. The main objectives of fishery development policies through different plans have been: (a) enhancing the production of fish and the productivity of fishermen and the fishing industry; (b) generating employment and higher income in fisheries sector; (c) improving the socioeconomic conditions of traditional fisherfolk and fish farmers; (d) augmenting the export of marine, brackish and freshwater fin and shell-fishes and other aquatic species; (e) increasing the per capita availability and consumption of fish (present target is 11 kg per annum); (f) adopting an integrated approach to fisheries and aquaculture; and (g) conservation of aquatic resources and genetic diversity (Planning Commission, GOI). A glimpse at the strategies followed in different Five Year Plans reveals that up to third Five Year Plan the focus was mainly on enhancing the fish production with little attention on issues like marketing, storage, transportation etc. However, in subsequent Plans, measures were initiated to create more facilities for ice-cold storage, processing and canning. Moreover, in 1972, Marine Products Export Development Authority (MPEDA) was established in Cochin with branch offices in all the major centres of seafood production and export in India. It has the responsibility for the promotion and regulation of marine products export and it is the nodal agency for joint ventures in deep sea fishing. It also promotes brackish water shrimp farming. However, even after 50 years of planning, post-harvest infrastructure is grossly inadequate in India in both the marine and inland fisheries sector (Dehadrai 1996). The marketing, transportation, storage and processing of fin and shellfish are mostly handled by the private sector. This activity has witnessed a relatively slow growth and has lagged behind production trends. It is also a fact that the marine fisheries industry has given more attention towards export and adequate measures have not been made for the development of the domestic market.

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2.9.12 Trade Policy and Prospects of Fisheries Exports

The government policies regarding imports and exports play a significant role in influencing the trade structure of a country. Trade policies are in general categorised into two broad types: (i) export promotion oriented policies, and (ii) import substitution oriented policies. In the early stages of planned development during the 1950s, Indian development strategy was heavily oriented towards import substitution. It was only during the mid sixties that export promotion explicitly entered the policy frame (Panchmukhi, 1991). However, export orientation for the agricultural sector was not fostered effectively due to various reasons. Firstly, agricultural exports were perceived as a residual and it was generally felt that agricultural production should primarily meet the domestic demand of the Indian population. However, exports of plantation crops, such as tea and coffee, and cash crops, such as tobacco or spices, and later on fish and fish products has been an exception and important source of foreign exchange earnings. For these commodities, the open trade regime has continued from the beginning (Nayyar and Sen 1994). Under the new trade policy initiated in 1991, three major changes have been effected in agricultural trade. Firstly, the canalization of agricultural trade has been almost abandoned and the government does not determine now value or nature of the exports or imports, except for the export of onion and import of cereals, pulses and edible oils. Secondly, quantitative restrictions on agricultural trade flows have been dismantled completely w.e.f April 1, 2001. Thirdly, reductions in tariffs have been announced. The fish and fish products are exported under the open general license (OGL). As stated earlier, MPEDA is looking after the export promotion and regulation of marine products. The Export Inspection Agency was established in 1969 to ensure quality control of products for the export market. Standards for bacteria, virus, heavy metal contamination etc. are evolved in co-operation with MPEDA and the Indian Institute of Packaging.

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The provisions of the World Trade Organization (WTO) include Trade Related Intellectual Property Rights (TRIPS) and the imposition of patent regime, trade related investment measures, reduction in domestic and export subsidies, market access and provision of sanitary and phyto-sanitary measures, and removal of Quantitative Restrictions (QRs) on import. Under TRIPS, the signatories of the General Agreement on Tariffs and Trade (GATT) are obliged to adopt a patent system for microorganisms. However, the patenting of higher animal life forms was left unresolved, with countries having the option to use or not to use patents to protect such intellectual property rights. Under Trade Related Investment Measures (TRIMS), countries would have to treat foreign investors at par with the domestic ones. It allows foreign fishing fleets the same access to domestic waters that local people enjoy. This provision has made a deep impact on the global fishing industry, the conservation of fisheries resources and the communities depending upon them. As per the WTO agreement, developed countries would reduce subsidies and tariffs. Therefore, better overseas market would become available for Indian fish products. It is worth mentioning that the requirement of subsidies reduction under WTO is not applicable to India. Under the provisions of the SPS agreement, all member countries have the right to take sanitary and phyto-sanitary measures necessary for the protection of animal health or life. To challenge any possible threats under SPS measures, the Indian processing industry has to improve quality parameters by accepting Hazard Analysis Critical Control Points (HACCP), consistent with international standards. These SPS measures would provide protection to Indian industry from the policies of discrimination of developed nations and from disguised restrictions imposed on Indian fisheries exports. The removal of Quantitative Restrictions (QRs) on the last 714 items by India on April 1, 2001, has developed an atmosphere of anxiety over the entire spectrum of Indian trade, including the fisheries sector. Fish and fish products figured prominently in the list of items on which QR was

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removed. Fish and fish products figured prominently (60 items) in the list of 714 items on which QR has been removed. This has raised an alarm in the fisheries sector which provides employment to 6 million people directly and indirectly. Perceptions vary among different clientele like fishermen, exporters and consumers. Apprehensions of the fish farmers include crash in prices under large scale import. The exporters are expected to benefit with a regular supply of raw material, which would help processing plants in capacity utilization even during the lean season. The consumers will, by and large be benefited by the import of foreign fish products. At the moment the different stakeholders have conflicting opinions on the removal of QRs. India being a developing country should judiciously use the tariff provision to protect the domestic industry. In the changing global economic scenario it is not possible to prevent imports totally. The only probable solution now is to focus on the changed scenario and gear up to utilize it for full benefit. Moreover, India is quite competitive in fisheries export particularly in shrimp (Kumar et al. 2002) and the WTO compulsions can be converted into opportunities by vigorously pursuing the export of fish and fish products particularly the unexplored brackish water segment. This would be in the interest of the coastal fisherfolk also.

2.10 SUPPORT SYSTEMS FOR FISHERIES DEVELOPMENT

2.10.1 R&D in Fisheries sector

India has a huge network of institutions to carry out R&D in fisheries sector. These include: (i) Indian Council of Agricultural Research (ICAR) systems; (ii) Ministry of Agriculture; (iii) Ministry of Commerce; (iv) Ministry of Food Processing Industries; (v) Council of Scientific and Industrial Research (CSIR); and (vi) State Agricultural Universities. Many other organizations/ agencies also support/conduct R&D in fisheries; these include the Department of Ocean Development (DOD); Department of Science and Technology (DST); Department of Biotechnology (DBT); University Grants

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Commission (UGC); Indian Institutes of Technology (IITs); Indian Institutes of Management (IIMs) voluntary agencies/private industries. However, the multiplicity of institutes requires a high degree of co-ordination to avoid duplication and diffusion of efforts and paucity of funds. There are overlapping mandates between institutions even within the same system.

2.10.2 Credit Support System

The fisheries sector particularly the aquaculture is on a steady growth path. The fishermen, in general, are poor and practice traditional farming for want of financial resources. The need for credit support for facing the emerging market forces and harnessing the benefits of technological developments has been realized and some measures have been evolved to enhance the flow of credit to the fisheries sector. The National Bank for Agriculture and Rural Development (NABARD), as a refinance agency for commercial banks, co-operative banks and regional rural banks has been the measure facilitator of credit to the fisheries sector. The Bank has credit plans for: investment in marine (Motorisation of traditional crafts, introduction of mechanised vessels, introduction of item specific vessels), inland (renovation of existing ponds for fish farming, creation of new ponds for fish farming, carp hatcheries, freshwater Prawn farming, fresh water prawn hatcheries, integrated fish farming in the inland sector, ornamental fish breeding and rearing, reservoir fishing units), coastal aquaculture (shrimp farming, shrimp hatcheries and mariculture units) and others including processing and cold storage plants, feed mills and infrastructure development. In view of the brackish water aqua boom in the early 1990s, many financial institutions like Industrial Finance Corporation of India (IFCI), Industrial Development Bank of India (IDBI), Shipping Credit and Investment Company of India (SCICI), State Finance Corporations (SFCs) and National Co-operative Development Corporation (NCDC) also entered this sector to lend credit. Credit support from financial

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institutes is available for almost all the activities of fisheries and for creation of infrastructure. The credit disbursements for the fisheries sector witnessed an increasing trend till 1995-96 but thereafter there has been a decline in disbursements as well as in the number of sanctioned schemes. This could be partly due to the interim order of the Supreme Court of India banning shrimp farming in Coastal Regulation Zone, slow progress in mariculture, systematic changes in refinance policies and the environmental/disease problems faced by shrimp farming.

2.10.3 Other Infrastructure

The other infrastructure and support system as on 31.03.2000 include 394 freezing plants, 13 canning plants, 157 ice plants, 12 fish meal plants, 576 peeling sheds, 511conveyance, 479 cold storage units, 4 agar agar plant, 3 AFD plant and 5 surimi plants.

2.10.4 Training, extension and transfer of technology

Fisheries development is a state subject in India. However, the centre promotes fisheries development through state level programme planning and implementation units. At the national level, the Fisheries Division of the Ministry of Agriculture is the planning and policy making body for fisheries development. The training programmes in fisheries are mainly dealt with by the Fish Farmers' Development Agency and Brackishwater Fish Farmers' Development Agency. These also provide packages of assistance for popularizing aquaculture technologies. The research institutes and SAUs have also been taking training and extension work as part of their curriculum. The Department of Rural Development promotes fisheries through the Integrated Rural Development Programme. In the states, departments of fisheries have been established at the district level to take care of the fisheries development including training and extension. The first-line extension system of the ICAR, consisting of demonstration programmes, Lab-to-Land Programme, Operational Research Projects, Krishi Vigyan Kendras and Trainers' Training Centres play an

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important role in training and extension of fishery development. Technology assessment and refinement through Institution-Village-Linkage programme (IVLP) of the ICAR is a technology integration process fitting the requirements of the farmers suitably in a given farming situation.

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