

**BIMSTEC-Japan Comprehensive Economic Cooperation in Fisheries Sector:
Emerging Issues and Opportunities**

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BIMSTEC-Japan Comprehensive Economic Cooperation in Fisheries Sector: Emerging Issues and Opportunities

P.B Wijeyatilleke*

Abstract

Fisheries is an important sector for BIMSTEC nations. It is a natural source of a protein-rich food item, a source of livelihood for poor segments and also a means of earning valuable foreign exchange. BIMSTEC countries have adopted national policies at increasing fish production through such methods as motorization of fishing crafts modernization of equipment and the methods of extraction of fish as well as implementing programmes to develop the inland fisheries. Although these programmes have succeeded in raising production levels, yet there is very much untapped potential in the fisheries sector of the BIMSTEC countries. There are also problems such as over-exploitation of coastal fisheries in some countries, pollution, erosion and natural disasters like the recent tsunami which are impacting adversely on the sustainability of marine life and also high rate of waste due to poor technology and lack of knowledge in handling fish harvests. Japan which leads in the fisheries sector in the Asian region can help BIMSTEC to overcome these problems in the fisheries sectors of its member nations.

1. Introduction

Out of the seven nations those are partners to the BIMSTEC initiative, five, namely, Sri Lanka, Bangladesh, Thailand, India and Myanmar, have coastline, and, therefore, have access to the marine resources. Although the contribution of the fisheries sector to the GDP of these countries may not be very substantive, fishing has become important for their economies for several reasons. For example, fish is the most important animal-based protein food of the people of these countries, fishing industry provides employment and a livelihood to large numbers of people, and fishing industry is becoming an important earner of foreign exchange through the export of marine and aquatic products.

With the exception of Thailand, rest BIMSTEC countries have some common characteristics with regard to the fishing industries. One feature is that these countries have made serious attempts to develop their fishing industries in later 1970s and there exist a large number of small-scale fisheries. Attempts at increasing production, especially through motorization in the marine sub-sector and through the expansion programmes in the inland fisheries sub-sector, have generated spectacular results. However, in some countries, problems such as resource constraints, especially in inshore areas, conflicts between different fishing groups, escalation of production costs, especially due to increase in fuel costs, high rates of waste, etc. have been emerged.

Japan's industrial strategy, based on selective intervention and semi-protected markets, was adopted by the Asian "Tigers". This enabled them to develop their economies much ahead of other Asian nations. Japanese trade and investment have helped Malaysia, Thailand and Indonesia to fast catch up with the Asian "tigers". The fisheries sector Japan has superior technologies which are more suitable to the Asian conditions. Although South Asia has enjoyed relatively limited economic links with Japan, some countries in the region have had the opportunity of building up economic cooperation with Japan in many sectors including fisheries. The development so far achieved in the fisheries sector by these countries had the support of Japanese know-how and assistance as well.

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In the above context, it is relevant for the BIMSTEC to adopt fisheries sector as one of the areas in its programme and to explore possibilities of getting Japanese cooperation for its development. This paper provides a briefed account of the present position of the fisheries sectors in the five BIMSTEC countries with coastal borders and of the areas in their fisheries sectors where Japanese cooperation would be helpful to find solutions to the existing problems.

2. The Fisheries Sector in Sri Lanka

2.1 Historical Background

The island of Sri Lanka is situated in the Indian Ocean, south-east of India between latitudes 6-10 degrees north and longitudes 80-82 degrees east. The length of the Sri Lankan coast line is about 1,585 km. from which the Exclusive Economic Zone (EEZ) extends, 200 nautical miles. This is 67 times of the country's land area occupying 437,400 sq km. Coastal waters extend from the continental shelf to the other limits of the EEZ.

Coastal fishing takes place all around the island. It is concentrated primarily within the continental edge which is an area rarely extending beyond 32 km. In this area, there are good sources of pelagic and demersal species with around an annual potential yield of about 250,000 tons.

In the off-shore and deep-sea fisheries from the edge of the shelf to the boundary of Sri Lanka's EEZ, the fishes are mainly large migratory pelagic species. The magnitude of these resources is not accurately known, but on the basis of an assessment an annual sustainable yield of 150,000 tons has been estimated.

Sri Lanka has around 2905 sq. km. of inland water bodies and about 190524 ha. of brackish water resources. While several attempts have been made to enhance fish breeding in the inland water bodies - especially with the introduction of exotic varieties of fresh water fish, brackish water areas are being utilized for breeding commercially valuable fish varieties such as prawns and lobsters.

Although access to fishery resources is open to anybody, historically coastal fishing has become the monopoly of certain social groupings. They are believed to be descendants of migrants from India nearly 1000 years ago. The non-entry of outsiders coupled with the building up of regulatory customs within the fishing communities themselves is a unique character of Sri Lankan coastal fishing industry which prevents to a large extent "the tragedy of the commons" as stipulated by G. Hardin in 1968 – namely the competitive and destructive fishing practices adopted due to unregulated open access to fishing resources in many other countries.

Extraction of fish from inland water bodies for consumption was also practiced in the past. There are many references in the literary works of the distant past to varieties of fish and the methods adopted in catching. However, inland fishery was not reckoned as an economic resource that had to be developed like paddy cultivation. The religious feelings of the majority of rulers and the ruled based on Buddhism which prohibited killing would have discouraged fishing as a livelihood.

Prior to the early 1950s, the state policy was one of regulating and assisting the extraction of fishing resources by the traditional fish communities. However, the collapse of the "Korean Boom" severely curtailed the availability of foreign exchange, and as a result import substitution with local products assumed considerable importance. In the mid 1950s only about 1/3rd of the total consumption of fish was met from the domestic fisheries sector whilst the rest was imported as cured and processed fish. In the context of foreign exchange scarcity raising domestic catch levels became urgent.

There were several other considerations as well. The need to maintain an adequate protein-level in the people's diet in the face of a rapidly increasing population and declining fish imports was another factor. The fishing industry was considered to have considerable potential for providing employment as well. It also had a potential as a foreign-exchange earner through the export of fish and fish products. Another consideration was that the people engaged or had connections with the fishing industry were an articulate and influential segment of the population.

In the Six Year Programme of Investment (1954/55-1959/60) the policy objective in the fisheries sector was declared as the maximization of the aggregate catch level through state intervention to (i) mechanize existing crafts (by providing engines) and introduce new mechanized boats, and (ii) popularize improved fishing techniques. The Government's policy framework prior to 1977 was oriented towards state involvement in economic development. The Ceylon Fisheries Corporation was established to implement many of the development interventions in the fisheries sector as well as to directly involve in the catch and sale of fish.

The strategy adopted in the fisheries sector by the new Government that came into power in 1977 was based on its overall economic and social policies. They were (i) private sector involvement to play a major role, (ii) the role of the public sector institutions as fish producers to be discouraged. Hence there were to be no major expansion of the fishing operations of the Ceylon Fisheries Corporation, (iii) the cooperative ownership of vessels to be converted to private ownership, (iv) most of the developmental activities to take place in the coastal fishing as there was abundance of unexploited resources in this area, (v) in the off-shore and in particular in the deep sea sector resource exploitation to be encouraged on the basis of foreign collaboration, and (vi) in the inland fisheries sector emphasis will be placed on developing the production of the major freshwater tanks and reservoirs.

2.2 The Current Policy and Management

(a) State Policy

- Promotion of the principles of "responsible fishing" by awareness programmes among fishers, management initiatives, strengthening the existing laws and their stringent enforcement, creating a volunteer marine resource protection force of fishers to undertake surveillance and provide information.
- Strategies to promote fishing and reduce costs
- Intensification of the surveillance of the EEZ in collaboration with an organization possessing modern marine surveillance system.
- Organization of fishers to facilitate consultation with them when decisions are taken.
- Activate the Ceylon Fisheries Corporation to buy fish at competitive prices to save fishers from middlemen.
- Encourage local and foreign private sector to enter into partnerships with the state agencies in the fisheries sector for implementing projects in fishing, fish processing, marketing, infrastructure development, boat building etc. State assets in the fisheries sector will not be sold or privatized.
- Provide greater social and economic opportunities for women in fisher families to play an active role in improving household incomes and fostering thrift and savings.

(b) Legal Framework

The Fisheries and Aquatic Resources Act No. 2 of 1996 which has replaced the Fisheries Ordinance and several other legal instruments pertaining to aquatic resources, provides for the following:

- an advisory council to advise the Minister on matters pertaining to the management conservation and development of fisheries and aquatic resources,
- preparation of a plan for the management, conservation and development of fisheries and aquatic resources in consultation with the advisory council,
- issue of licence to engage in fishing activities,
- registration of fishing vessels,
- protection of fish and other aquatic resources by prohibiting certain practices, declaring fisheries management areas, setting up fisheries committees among fishers in such fishery management areas,
- declaration of closed seasons for fishing,
- declaration of certain areas as fishery conservation areas,
- grant of state lands for aquaculture,
- settlement of disputes, and
- machinery for the implementation of the provisions of the Act

The Founa and Flora Protection Ordinance and subsequent amendments protect threatened and endangered wildlife including sea turtles and their nesting habitats. A nature reserve has been declared under this law. A number of regulations made under the Fisheries Ordinance and the present law prohibit certain practices which undermine the sustainability of fisheries resources. The Coast Conservation Act has vested administration, control, custody and management of the coastal zone in the state and a coastal zone management plan has been approved by the Parliament. The Coast Conservation Amendment Act which came into effect in 1988 bans the mining, collection, possession storage, burning and transportation of coral and the possession of limestone kilns. The provisions of the Forest Ordinance are applicable for the protection of mangroves.

(c) Institutional Structure

The subject of fisheries and ocean resources is under the charge of a separate Ministry. The Department of Fisheries and Aquatic Resources, the Department of Coast Conservation, the Ceylon Fisheries Corporation, the Ceylon Fisheries Harbour Corporation, the National Aquatic Resources Research and Development Authority and National Aquaculture Development Authority are the institutions that function under the Ministry of Fisheries and Aquatic Resources. There are also provincial authorities vested with some functions in the fisheries sector, mainly with regard to the coastal fisheries and inland fisheries in their provincial areas.

2.3. Socio-Economic Importance of the Fisheries Sector

(a) As a Source of Food

Fish contributes 65% of the animal protein intake of Sri Lankans. As the protein intake through the food items produced in the local agricultural sector is marginal fish protein has become important. The share of locally produced fish in the total consumption of fish products is around 83%. The rest is imported. The share of wet fish in the local consumption is around 73%. The balance is processed fish both imported and local. Table 1 gives the quantities of fishery products imported in the year 2002.

(b) As a Source of Livelihood

The Sector currently provides direct and indirect livelihood to about 250,000 persons out of a total national workforce of 8 million while around 1 million persons depend on the sector. The share of the

fisheries sector in the GDP is 2.7% and the foreign exchange earned in 2003 through export of fish and marine products amounted to US\$ 100m.

Table 1: Imports of Fish and Fishery Products 2002*

Description	Qty (MT)
Maldives Fish	6,133
Dried Fish	44,488
Canned Fish	20,166
Others	749
Total	71,536

*Provisional

Source: Ministry of Fisheries and Aquatic Resources, Dept of Sri Lanka Customs

The importance of fisheries sector as a source of food nutrients and a source of livelihood for the poor has been well recognized. The policy followed by the state is indicative of this recognition. Thus even under the policies adopted to increase fish production through such schemes as mechanization the interests of the traditional poor fishers were looked after through subsidies. There are also welfare schemes such as the provision of housing, sanitary facilities etc. targeted to the poor segments.

Table 2: Fish Production by Different Sub-Sectors (1985-2004) (Mt)

Year	Marine Fish Catch		Inland and Aquaculture
	Off-shore	Coastal	
1985	2,400	140,270	32,740
1986	3,400	144,270	35,390
1987	4,260	149,270	36,470
1988	4,430	155,100	38,010
1989	8,160	157,410	39,720
1990	11,670	134,130	38,190
1991	15,080	159,150	23,830
1992	22,000	163,170	21,000
1993	33,000	169,900	18,000
1994	37,500	174,500	12,000
1995	60,000	157,500	18,250
1996	57,000	149,500	22,250
1997	62,000	152,750	27,250
1998	73,250	166,700	29,900
1999	76,500	171,950	31,450
2000	84,400	183,280	36,700
2001	87,360	167,530	29,870
2002	98,510	176,250	28,130
2003	90,830	163,850	30,280
2004	98,720	154,470	33,180

Source: Ministry of Fisheries and Aquatic Resources

2.4. Present Production Levels

Excepting the very limited role played by the state sector organizations such as the Ceylon Fisheries Corporation, the Sri Lanka fisheries industry is in private hands. The data regarding the annual production during the last two decades are given in Table 2. While there is a significant and steady increase of production in the off-shore sub-sector, the increase in the other two sub-sectors is insignificant. However, the production from the coastal sub-sector still leads the sum total of the other two sub-sectors occupying 54% of the total in 2004.

The state policy towards the development of the inland fisheries was vacillating during the recent past due to objections by certain religious lobbies. However, the establishment of a separate state authority – the National Aquaculture Development Authority - and the programme of development that is being followed are indicative of the fact that the importance of developing this sub-sector has been realized. While the estimated potential production of inland and aquaculture fisheries is around 100,000 mt., the present annual production is only around 33,000 mt.

Ornamental Fish Production

This sub-sector has a very good potential as a foreign exchange earner. At present, Sri Lanka accounts for only 1% of the global ornamental fish industry. There is a high demand for ornamental fish from Japan, USA and Europe.

Table 3: Earnings from the Export of Ornamental Fish

Year	Earnings (Million Rs.)
2000	593
2001	545
2002	529
2003	623

Source: Central Bank Annual Reports

2.5. Infrastructure Facilities: Internal and External

Fishing Crafts

The position of fishing crafts in operation in 2002 is given in Table 4. Modernization of the marine fisheries industry was started in 1950s with the introduction of engines under a loan scheme. A tendency that is observed is that in the coastal and lagoon fishery sub-sectors the use of motorized fibre reinforced plastic (FRP) boats has increased in recent times along with the non-motorized traditional craft.

Table 4: Fishing Crafts in Operation in 2002

Category	Type	Number
In boarded Engines	Multiday boats	1614
	One day boats	1112
Out board Engines	Fibre glass boats	9033
	Traditional boats	776
Non Motorized		15,600
	Total	28,135

Source: Ministry of Fisheries and Aquatic Resources

Fishing Gear

Beach seine which was extensively used in coastal fishing has declined with the motorization. Beach seine fishing was the traditional system which was a group activity in which the participants got their share of the catch. It has been claimed that with the use of motorized boats in coastal fishing the catch by beach seine has got reduced in some areas and the fishers who were engaged in beach seine methods gradually shifted to new technologies. The fishing gears being used are various types of surrounding nets, trawl nets, gill nets and long lines.

External Facilities

The status of the current infrastructure facilities is as follows:

- Fishery Harbours - 15 (3 are inoperative)
- Anchorages - 19
- Landing Sites - 71
- Ice plants - 60 (total capacity 1200 tons)
- Boat yards - 50
- Gear Factories - 07

2.6. Sustainability of Fisheries Resources

The policy followed during the period beginning with the introduction of motorization of fishing vessels was one of increasing the production. Incentives such as subsidies were given to encourage motorization and the use of modern methods of catch. Motorization was considered necessary to extend the fishing industry beyond the coastal zone. Compared to the pre-motorization period, the fish production increased substantially when the motorization started to gain ground. However, motorization boats have started to operate in coastal fisheries thus competing with primary fishermen for the same source. This competition increased after 1973 due to increase in fuel costs.

It has been argued that Sri Lanka's marine fisheries sector, especially in the coastal fishery sub-sector, the competitive and destructive fishing practices did not take place as marine fishing was confined to certain social groupings and the non-entry of outsiders coupled with the eventual building up of regulatory customs within the fishing communities. These customs have been upheld even by the fisheries administrators in the settlement of disputes. The new fisheries law of 1996 which replaced some of the enactments that were in force till then contains provisions aimed at conserving marine resources. Provisions in the Coast Conservation Act and several other Ordinances and Acts referred to in this paper also have sustainability of ecosystem as prime objectives.

However, the efficient management of the marine resource sector which is considered a common property and benefits the community at large, but no individual takes responsibility for its wellbeing, can not be sustained by enacting laws and regulations alone. Awareness and participation of all stakeholders in its management are central to its sustainability. Rapid industrialization in the coastal areas, tourism related activities, emissions from rapidly increasing fleets of motorized boats, destruction of mangroves and estuaries, coral mining, etc. have been identified as some issues that impact on the sustainability of marine resources.

2.7. Future Prospects

Compared with the fisheries industries of some other countries, Sri Lanka's fisheries sector is still underdeveloped. Its contribution to the economy is low and the per capita fish supply is also low. The labour productivity in the agricultural and fisheries sector is much less than either in the industrial or services sector. While the labour productivity in 2004 in the industrial sector was Rs. 161,700 and in the services sector Rs. 169,700 in the agricultural and fisheries sector it was only Rs. 69,700.

Although resource protection has been accepted as a key principle its implementation is on a low key. Lack of scientific data and know-how, lack of resources, variations in policies when ruling parties change and also political patronage are some of the reasons for this state of affairs.

Therefore, given the necessary political commitment and the degree of professionalism on the part of the executive there is much scope for the development in the Sri Lankan fisheries sector. Following are some of the key areas that should receive attention. Foreign collaboration and assistance may be necessary in these tasks:

- Accelerating the rehabilitation and reconstruction of the fisheries infrastructure affected by the tsunami
- Increase the production in the off-shore and deep sea sub-sector. At present the annual catch from this sub-sector is less than 100,000 Mt. There is scope for further increase. In an effort to increase production in this sub-sector, an important factor that needs consideration is the costs - especially the cost of fuel for which Sri Lanka depends entirely on the world market. Sri Lanka may need foreign assistance to evolve methods to reduce costs. It may need foreign investments in modern technologies. Personnel may have to be trained in these technologies. Can Sri Lanka find suitable youth for such training from among the traditional fishing communities? If not how to attract educated youth from other areas?
- Development of the inland fisheries sub-sector. At present the annual production is around 33,000 Mt. The potential has been estimated as 100,000 Mt.
- Development of the ornamental fish industry which has a very good export potential. At present Sri Lanka's share is only 1% of the global market.
- Brackish water aquaculture, especially the prawn farming, held good promise. Competition due to high profitability, lack of training and experience and also laxity in environmental controls led to the creation of environmental problems as well as the spread of diseases which resulted in a fall of production. As there is a large extent of brackish water bodies this sub-sector could be developed with scientific management.
- Reduction of waste and processing of fish are two other areas that need attention. Central Bank Annual Report in the year 2000 has referred to the large-scale post-harvest losses through spoilage due to poor handling. The estimated loss is around 25% of the catch. With increase in catch-levels processing fish is an activity that has to be developed through the introduction of modern scientific methods. The present low demand for freshwater fish in its raw form could be increased through processing. Another advantage is that the distribution of processed fish is more cost-effective than that of raw fish.
- The need to mitigate hazards that affect sustainability of marine resources not only by those who have a stake in them but also by other sectors such as tourism etc.

To raise the Sri Lankan fisheries sector to the level of a well-developed industry in the national economy it needs inputs by way of capital investments, modern technology, training and research. The country in its present level of savings cannot mobilize the financial resources needed for the investment. In this context the exploration of areas for economic cooperation between BIMSTEC and Japan provides a good

opportunity for Sri Lanka. Japan being a country in Asia with a modern fisheries sector and modern technology will be helpful for Sri Lanka in developing its fisheries sector.

3. Fisheries Sector in Bangladesh

Fisheries sector in Bangladesh contributes 3.3% to GDP and 11% to export earnings. Fish provides 80% of animal protein intake and 7% of total protein supplies to the population. In Bangladesh, fishery products rank 4th among all export commodities, next to garments, jute and leather. Shrimp represents 90% of fish exports. Fishers represent one of the poorest segments of the population. In 2001, there were 1.3 million people directly engaged in fisheries sector whereas 11 million were involved indirectly.

In Bangladesh, marine fisheries represents 28% of total production of the sub-sector, whereas inland open water capture fisheries shares 49.6% and inland closed water culture fisheries (ponds, brackish water aquaculture, etc.) contributes 22.4% to total production. Inland fisheries production comes from natural water bodies such as rivers, canals, flood plains lakes, etc.

Major river systems provide a base for subsistence fishing activities. Flood plains are low-lying areas flooded during monsoons. Expansion of fish stocks take place in these plains which are connected to river systems. These plains are food rich breeding, nursery and growth areas.

Over the years, due to flood control measures, drainage, and irrigation systems, a decline in inland fish production has been observed. Attempts are being made to arrest the decline in rivers by improving resource-management, establishing sanctuaries and enforcing regulations. Lack of financial resources and trained personnel are some of the constraints.

3.1 Marine Fisheries

Bangladesh has an extensive continental shelf. The total area is estimated at 67,000 sq. km. of which an estimated 37,000 sq. km. area of less than 50 meter depth. This is exploited by small-scale fishers. Over 67,000 boats of different sizes are used. About 6000 boats are said to be motorised. About 90% of marine fish catches are taken by artisanal fishers.

The off shore industrial trawl fishing is relatively new. Most of the trawlers are privately-owned and concentrate on shrimp catching. Exploitation of off-shore and deep sea pelagic stocks of tuna, shark, etc. are not resorted to very much due to the lack of knowledge of fish resources or the means of exploitation. Due to rough seas on account of South-West Monsoon from April to August fishing operations get considerably reduced.

World Bank (1991) indicated that marine fish production could be increased between 300,000 to 325,000 tons by 2010. This could be realized through the improvement in fishing technologies for pelagic fisheries. The stock of Hilsa which breeds both in marine and inland waters could also be increased through rehabilitation and conservation.

3.2 Aquaculture

(a) Fresh water aquaculture

Pond fishery is an important component of Bangladesh fisheries. In most areas almost every home has one or more ponds. There are nearly 1.3 million ponds, where about 50% fish production takes place. Under traditional methods, production varies from 350 to 500 kg./ha. per year. New technologies and improved methods introduced have achieved much higher rates of production ranging over 1000 kg./ha.

per year. The World Bank (1991) has indicated that by 2010 production from this sub-sector in Bangladesh could be doubled.

(b) Coastal Aquaculture

This sub-sector consists of primarily brackish water shrimp farming. Bangladesh has extremely favourable resources and conditions for shrimp farming. The areas suitable have been estimated at 200,000 ha. Out of this, nearly 110,000 ha. had been utilized by 1993 for brackish water shrimp culture. The new shrimp farming systems have opened up employment opportunities in rural areas, especially for women.

3.3 Strategies Followed to Improve the Fishing Industry

- Large-scale of stocking inland waters and enforcing management systems
- Intensification of aquaculture practices to increase production per unit area
- Identification of new fishing grounds in marine waters through surveys
- Policy support to improve the quality of fish and fish products
- Development of infrastructure to support planned shrimp culture.
- Land and water policy to avoid wasteful resources conflicts, dumping of industrial and other wastes into open systems etc.
- Manpower training, research development of technologies.

3.4 Future Prospects

Poverty has been a persistent problem in fishing communities. Socio-Economic constraints arise from over population of the coastal zone, low income, low social, educational and economic status of the fishermen. There are constraints for the implementation of the strategies designed by the state due to lack of capital, poor man-power resources and low capacity in research and technology.

4. Fisheries Sector in Thailand

The fisheries sector in Thailand contributes about 1.9% to GDP (1999) and earned about US\$ 4.1 billion from exports in 1999. Per capita fish consumption in Thailand is about 28 kg. per year. Fish accounts for 3/5th of protein in the national diet. This proportion is even higher among the rural poor. In 1997, the estimated employment in the fisheries sector was 530,400 in primary sector and about 200,000 in secondary sector. Marine fisheries contribute about 79% in total production of fisheries sector in 2000, whereas inland and aquaculture fisheries share about 5.4% and 15.6% respectively. Table 5 shows the current profile of available infrastructure in Thailand in fisheries sector.

Table 5: Available Infrastructure Facilities in Fisheries Sector in Thailand in 1999

Particulars	Number
Cold storage plants	144
Fish canneries	50
Fish fermenting plants	159
Fish steaming plants	81
Fish Smoking plants	28

4.1 Marine Fisheries

Thailand is the 3rd largest marine fishing nation in Asia after Japan and China. In 1996, the production from marine capture fisheries was about 2.8 million tons. The composition of the marine catch was as follows: (i) food fish -52.3%, (ii) trash fish - 31.0%, (iii) squid and cuttle fish - 6.2%, (iv) shrimp - 4.8%, (v) shell fish - 2.6%, and (vi) crabs and others -1.1%.

In 1995, there were 53,112 fishery establishments with 161,667 fishers engaged in marine fisheries. The total fleet of fishing craft was 54,538 of which only 5.2% was un-powered 66.8% had outboard motors while 28% had inboard engines. To carry out fishing in Thai waters, a licence is required from the Department of Fisheries. The total fishing gear registered in 1995 was 17,950 units.

4.2 Inland Fisheries

The production from inland capture fisheries in 1996 was around 208400 tons. It has continued to increase despite habitat degradation, increased pollution from industrial wastes and siltation due to forest destruction, etc. Rivers, flood plains, lakes, swamps and reservoirs are important breeding grounds.

4.3 Aquaculture

Production from this sub-sector reached 555,000 tons in 1996. Coastal aquaculture production was 326,000 tons while freshwater aquaculture production was 228700 tons. Thailand is a major producer of marine shrimp. In 1996 there were 23,413 shrimp farms with a total area of 72,663 ha. In the fresh-water aquaculture sub-sector there were 154,003 farms in 1996. Thailand ranks as the world's leading producer and exporter of shrimp products. It earned US\$ 1.27 billion from international sales in 1999. The yield from the culture shrimp farms is nearly 70% of the total shrimp production.

4.4 Future Prospects

Sustainable development of fisheries is highlighted in the National Fishery Development Plan of Thailand. In the marine sector measures introduced include barring of certain fishing gear, restrictions of fishing during certain seasons and in certain areas, increasing artificial fish spawning and nursing grounds, prohibiting destructive fishing practices, regulating mesh sizes, introducing responsible fishing operations, improving post-harvest technology and strengthening institutional and legal frameworks. In aquaculture the government has launched a village fish pond programme as a part of its rural development strategy. A number of initiatives have been taken to increase environment friendly shrimp production. These include development of aquaculture techniques, registration of shrimp farms, controlling the use of agrochemicals, etc.

5. Fisheries Sector in India

India ranks fourth in the world fish production with an annual growth of 6%. In inland aquaculture production India occupies the second position in the world. Fish production has increased from 7.52 lakh MT in 1950/51 to about 52.90 lakh MT. in 1998/99. Similarly, the exports also increased steadily over the same period from 0.22 lakh MT to 3.12 lakh MT. With the increase in the production levels India's proportion of fish exports to production also increased significantly. In 1950-51, the export of fish was only 2.9%, and by 1998-99, it increased to 5.9%. In the total marine product exports frozen shrimp occupies a leading position. In 1998/99 the total quantity of shrimp exported was 111,407 MT. Japan imported the major share of 37.9%. In the total export quantities of shrimp and prawn their shares are 95% and 5% respectively. Of the total of 5,638 MT of prawns exported in 1998/99, the largest quantity

went to Japan. Thus, fish plays an important role in India's economy in augmenting food supply, generating employment, raising nutritional levels and earning foreign exchange.

Table 5: Trends in Production and Export of Fish from India

Year	Production of fish	Export of fish	Per cent Exports to production
	(Lakh MT)		(%)
1950-51	7.52	0.22	2.90
1960-61	11.29	0.17	1.50
1970-71	16.96	0.60	3.53
1980-81	25.44	1.08	4.25
1990-91	38.20	1.86	4.87
1991-92	39.79	2.01	5.01
1992-93	41.44	2.11	5.10
1993-94	43.16	2.55	5.91
1994-95	44.95	2.50	5.56
1995-96	46.82	3.10	6.62
1996-97	48.76	2.90	5.95
1997-98	50.78	3.00	5.91
1998-99	52.90	3.12	5.90

5.1 Capture Fisheries

India has a long sea coast. States of Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Orissa and West Bengal have sea coast where people are engaged in capturing, processing and marketing fish and fish products.

Inshore: A large part of the total marine capture fisheries is in the inshore area. Estimates indicate that there is a decline in the marine landings. Prawns catches also have shown stagnant or declining trends. Inshore areas along the coastline are significantly over-fished. There are disputes between non-motorized vessel owners and those using motorized vessels; particularly shrimp trawlers.

Offshore: The potential yield from the coast has been estimated at 4.5 million tons. Based on this potential a number of research institutes have conducted studies to develop this sub-sector.

Inland: India has nearly 29,000 km of rivers that could be used for fishing and 1.45 mil. ha. of reservoirs. A study done in early 90s by the World Bank has revealed that at that time the produce from these sources was around 75,000 tons. Some impediments for further development were identified as insufficient supplies of seed for stocking, pollution, the use of water bodies for irrigation and other purposes not compatible with fish breeding and ineffective enforcement of regulations.

5.2 Culture Fisheries

Fresh Water Aquaculture: There were over 185,000 ha. of water area under this programme indicating a production of 290,000 tons of fish per year in early 1990s. It was estimated that this area could be increased to 250,000 ha. and the production raised four fold. The primary requirement to achieve this was considered as the raising of the extension work and technology transfer. Inland fishery has made rapid progress during the last four decades. It is progressing faster than the marine fishery. The contribution of inland fishery to the total fish production has gone up from 29% to 42% in recent years. Inland fishery is

carried out in almost all the states of India including those states which have a sea coast. The State of Maharashtra occupies the first position in freshwater fishery.

Brackish Water Aquaculture: A total of 900,000 ha. was estimated as potentially suitable for brackish water aquaculture – especially shrimp culture. In the culture fisheries sub-sector there are several schemes such as “the Development of Fresh Water Aquaculture Scheme”, “Fisheries Training and Extension Scheme”, “Development of Brackish water Aquaculture Scheme”, “Cold Water Fisheries and Aquaculture Scheme”, Development of water-logged areas”, “Productive Utilization of Saline/Alcaline water for Aquaculture” and “Inland Capture Fisheries (Reservoirs and Rivers)” etc. implemented at the State-level. A certain percentage of the expenditure of these schemes is met by the Union Government.

Thus, under these programmes subsidies are given for construction of ponds, renovation and reclamation of tanks, starting fish culturing in running water in hilly areas as well as plain areas, fresh water seed hatcheries, feed making units, training of fish farmers and several other activities for the promotion of fish breeding.

Under training and extension, projects such as the establishment of training centres, publication of hand books and training and extension manuals, organization of workshops, production of documentary films etc. are carried out by the states with subsidies from the Union government. Under these schemes training is imparted to fishers of all categories on the latest culture practices, fish catching, net weaving and repairing and boat sailing etc. Studies are also arranged in neighbouring states. Financial assistance by way of subsidies and soft loans are also given to encourage the culture fisheries under cooperatives.

5.3 Future Prospects

Unlike some other BIMSTEC nations, such as Sri Lanka, Bangladesh or Myanmar, India has gone far ahead in the development of its fisheries sector. The production as well as export of fish has gone up. From 1950s to the end of 1990s the compound growth rate has been 4.27%. The rapid technological changes in the production methods and the policies followed by the state governments to develop the inland fisheries sub-sectors have contributed to this development.

Like in the case of others BIMSTEC countries, India too has problems in the fisheries sector. In the coastal sub-sector, over-fishing in some areas has caused problems such as conflicts and problems affecting sustainability. Pollution of coastal areas is also impacting on marine life. Wastage due to poor transportation facilities, cold storage, lack of knowledge in scientific handling, etc. is high.

6. Fisheries Sector in Myanmar

The potential sustainable yield from the marine sub-sector has been estimated as 1.05 million metric tons, whereas the yield in the year 2001-02 was 1,029,000 metric tons. Marine fisheries include (a) inshore fishery and (b) off-shore fishery. In the year 2001-02, there were 72,502 acres of fish ponds and 101791 acres of shrimp ponds. The yield in 2001-02 was 445,000 metric tons in fresh water sub-sector. The value of fish and shrimp exports in the year 2001-02 was US\$ 251.5 million. Only 14% of the production is exported at present due to insufficient number of processing facilities, ice plants, cold stores, etc.

Territorial Sea and Maritime Law of 1977 in Myanmar has defined the baselines. The territorial sea extends 12 nautical miles from these baselines while the continental shelf extends 200 nautical miles from the baselines. Myanmar has a coastline of 2832 km.

Mainly in the nature of flood fisheries made possible by vast river systems and heavy rainfall. Fish culture operations are undertaken also in ponds, lakes and reservoirs. There are over 90,000 acres of fishponds at present.

Production, processing and marketing of all fishery/fishery related activities are carried out by the private sector. There are several legal enactments for the regulation and management of the fisheries sector. The Ministry of Live stock and Fisheries administers these laws. Steps have been taken to prevent the degradation of habitats, contamination and pollution, and over exploitation of resources.

There is much scope for further development both in the marine and in the inland fisheries sub-sectors. The infrastructure facilities such as ice plants, cold storages, processing factories also have to be improved.

7. Impact of Asian Tsunami on Fisheries Sector in Sri Lanka

Among the events that caused heavy socio-economic destruction in the BIMSTEC countries in recent times was the Asian tsunami that hit the coastal areas of these countries on December 26, 2004. In Sri Lanka around 80% of marine fishing areas were destroyed. It is the sector that suffered most. 85% of those displaced due to the tsunami belong to the fisheries sector and 23% of those who lost their lives belonged to the fishing community. Table 6 provides the damages to boats/crafts due to Tsunami.

Table 6: Damages to Boats/Crafts due to Tsunami in Sri Lanka

	Damaged	Destroyed	Total
Multi day boats	697	186	883
In board 1 day	667	372	1039
Out board FRP	3257	4359	7616
Out board – traditional	737	1623	2360
Canoes/Theppam/Vallam	2246	9976	12222
Other	79	576	655
Total	7683	17092	24775

Source: Ministry of Fisheries and Aquatic Resources, Sri Lanka

If the total fleet of vessels, both motorized and non-motorised, is taken as 28,000, as shown in Table 7, over 24,000 or around 86% was either damaged or destroyed.

Table 7: Value of Equipment Damaged due to Tsunami in Sri Lanka

	Value (Rs. '000)
Fishing Boats	8,046,620
Engines	196,468
Fishing Gear	2,780,714
Diver's Equipment	672,266
Total	11,696,068

Source: Ministry of Fisheries and Aquatic Resources, Sri Lanka

In the case of India, Bangladesh, Thailand and Myanmar too the damage caused to the coastal fisheries sub-sectors was considerable. However, out of all the BIMSTEC countries, the highest damage was sustained by Sri Lanka, namely due to its situation as an island with a sea coast right round the country.

8. Conclusions

The foregoing brief analysis shows that the fisheries sectors in selected BIMSTEC countries are in various stages of development. In countries like Sri Lanka, Bangladesh, Myanmar, the fisheries sector is in a state of underdevelopment considering the available potential, Thailand and India have made much headway occupying the 3rd and 4th places respectively in the region.

Japan is the Asian leader not only in the fisheries industry but also in many other areas like automobile and electronic industries. Japan has contributed in a big way in Asian development. The East Asian “tigers” have emulated much of the Japanese experience in their drive towards industrialization. The Newly industrialized countries such as Malaysia, Indonesia and Thailand have been able to bolster up their economies with Japanese trade and investment.

The policies and official declarations of these nations indicate that they are much interested in upgrading their fisheries industries. Separate Ministries, Departments and other authorities have been set up for the purpose. As a source of food nutrition, a source of earning foreign exchange and as an avenue of providing employment and a source of income for the poor, the importance of this sector has been well recognized. Therefore, examining the prospects of getting Japan’s Cooperation to develop the fisheries sectors of BIMSTEC member nations is an important and relevant exercise.

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