Policy Research – Implications of Liberalization of Fish Trade for Developing Countries

A Case Study for Bangladesh

Fish Trade Liberalization in Bangladesh: *Implications of SPS Measures and Eco-Labelling for the Export-Oriented Shrimp Sector*

by

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This report forms part of a wider study on “Policy Research – Implications of Liberalization of Fish Trade for Developing Countries”, comprising five trade issues background papers and five country case studies.

The trade issues background papers are dealing with the following topics:

- Sanitary and Phyto-Sanitary (SPS) Measures and Technical Barriers to Trade (TBT)
- Ethical/Social/Eco Certification, Labelling and Guidelines
- The Impact of Subsidies on Trade in Fisheries Products
- The Impact of Dumping on Trade in Fisheries Products
- Fiscal Reforms and Trade in Fisheries Products

The case studies cover the following countries:

- Bangladesh
- Guinea
- India
- Uganda
- Vietnam

For a synthesis of the entire study including policy recommendations, see:

Copies of the various reports are available on the following websites:

- www.onefish.org/id/225570
- www.nri.org/projects/projects/htm

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ABBREVIATIONS
BBS  Bangladesh Bureau of Statistics
BSTI  Bangladesh Standards and Testing Institute
bln  Billion
CB  Capacity Building
CCRF  Code of Conduct for Responsible Fisheries
CPD  Centre for Policy Dialogue
DOE  Department of Environment
DOF  Department of Fisheries
ECC  Environmental Clearance Certificate
EPB  Export Promotion Bureau
EPZ  Export Processing Zone
EU  European Union
FAO  Food and Agriculture Organisation
FDI  Foreign Direct Investment
FY  Financial Year
GATT  General Agreement on Tariffs and Trade
GDP  Gross Domestic Product
GOB  Government of Bangladesh
ha  Hectare
HACCP  Hazard Analysis Critical Control Point
HDI  Human Development Index
HDR  Human Development Report
HP  Horse Power
IEE  Initial Environmental Examination
IOE  International Office of Epizootics
ISO  International Organisation for Standardisation
IUCN  International Union for Conservation of Nature and Natural Resources
kg  Kilogramme
km  Kilometre
LDC  Least Developed Country
LPG  Liquidified Petroleum Gas
Mha  Million Hectare
MOC  Ministry of Commerce
MOA  Ministry of Agriculture
MOEF  Ministry of Environment and Forest
MOFL  Ministry of Fisheries and Livestock
MOL  Ministry of Land
mln  Million
MSY  Maximum Sustainable Yield
mt  Metric Tonne
NFMP  National Fisheries Management Policy
NGO  Non-Government Organisation
NRI  Natural Resources Institute
ODA  Overseas Development Assistance
PPM  Process and Production Method
ppp  Purchasing Power Parity
<table>
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<tr>
<td>RMG</td>
<td>Ready Made Garments</td>
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<tr>
<td>SAP</td>
<td>Structural Adjustment Programme</td>
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<tr>
<td>S &amp; D</td>
<td>Special and Differential</td>
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<tr>
<td>SSOQ</td>
<td>Shrimp Seal of Quality</td>
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<td>SPS</td>
<td>Sanitary and Phytosanitary Measure</td>
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<tr>
<td>sq</td>
<td>Square Kilometre</td>
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<td>TA</td>
<td>Technical Assistance</td>
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<td>TBT</td>
<td>Technical Barriers to Trade</td>
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<td>Taka</td>
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<td>UNEP</td>
<td>United Nations Environment Programme</td>
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<tr>
<td>USA</td>
<td>United States of America</td>
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<tr>
<td>VAT</td>
<td>Value Added Tax</td>
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<td>WTO</td>
<td>World Trade Organisation</td>
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**EXECUTIVE SUMMARY**
Trade Liberalization Policy in Bangladesh

Since the 1990s the economy of Bangladesh is integrating with the global economy at a fast pace. As part of the structural adjustment programmes of the late 1980s and early 1990s Bangladesh undertook a number of initiatives towards trade liberalisation and trade promotion to stimulate exports and encourage investment in export-oriented activities. The major objective of these reforms was removal of anti-export bias, introduction of incentives for exports and facilitation of participation in global labour market. The policies of trade liberalization were implemented through reduction of tariff rates, elimination of quantitative restrictions and reduction of tariff dispersion. The export policy during the 1990s has introduced important structural shifts in the export pattern of the country in terms of both products and markets. Liberalization of trade has contributed to significant growth in the export sector of Bangladesh. Over the last decade real growth of the export sector was about 14 percent, which was about three times the average real GDP growth rate over the same period.

The share of non-traditional exports, such as readymade garments, frozen foods, shrimp and leather products has increased compared to the traditional exports such as raw jute, jute products, bulk tea and raw leather.

Importance of Shrimp Sector

Shrimp production is the second largest export sector of Bangladesh after ready made garments with a share of about 5 percent in Bangladesh's total exports in the 1990s. In FY2003 shrimp exports amounted to US$ 297.04 million which was 4.54 percent of total exports. The share of shrimp export in total export income from fish and fish products is almost 90 percent (2003). More than 2 million people are engaged in upstream and downstream activities related to shrimp industry in the country - in harvesting, culture, processing, exporting and other ancillary activities.

The EU, the USA and Japan are the major importers of shrimp from Bangladesh accounting for more than 95 percent of total fish exports. The EU alone accounts for about 52 percent of the total market which implies that any disruption in this market is bound to have severe and important implications for this export-oriented sector of the country, and negative multiplier impact for the national economy.

SPS Measures and Eco-Labelling: Issues of Concern for Bangladesh

With the growing importance of shrimp as one of the important export items from Bangladesh, it is important to carefully maintain the quality of the exported item through appropriate quality control measures and internalising the environmental costs arising from the production process.

In this respect one of the major concerns of Bangladesh is that some of the trade measures constrain Bangladesh’s market access capacity in developed countries. Lack of adequate resources inhibits market access capacity of these countries resulting in lower exports and income, and makes it difficult to comply with the required standards which in turn have negative impact on livelihood concerns.
Bangladesh is a good example of the constraints faced as a result of SPS measures. The shrimp export from Bangladesh experienced a setback in 1997 when the European Union imposed a ban on frozen food imports from Bangladesh. The ban was imposed due to failure of Bangladeshi shrimp to meet the stringent provisions of the Hazard Analysis Critical Control Point (HACCP) regulations which regulate the food market in the EU. After the shock the Government of Bangladesh undertook necessary measures as required by the HACCP regulations towards improvement of the quality of shrimp processing in Bangladesh.

Parallel to this, an increasing interest in terms of eco-labelling is also emerging in the global market in the context of growing awareness about environmental issues and concerns both at producers’ and consumers’ end. The inability or unwillingness of Bangladesh to adopt eco-labelling may lead to weakening of her competitive strength and erosion of her global market share. However, such initiatives will also have implications for production and processing practices in Bangladesh with varying impact on the people involved in the production chain and on their livelihoods.

**Impact of SPS Measures on the Stakeholders of Shrimp Sector**

The present study observed that Bangladesh experienced short term and medium term impact from the actions undertaken to comply with the SPS measures. From the economic point of view, though it left a recoverable shock in the export earnings system, the impact it had on the individual contributors of this sector is far more appealing.

**Farmers**

The immediate impact was on the producer in terms of low price of shrimp. Following the ban the international price of shrimp declined very sharply which forced the farmers to sell fish at a lower price without any profit which put them into financial crisis and sometimes force them to be a defaulter to their creditors. When a farmer becomes a defaulter, it becomes difficult for him to get loan again to start the business. Others, such as the exporters in the chain get support from the government but farmers are always left alone. So any shock such as a ban on the export leaves an unrecoverable impact on the people who are at the initial stage of the chain such as the farmers.

**Transporters**

Transporters had to incur financial loss due to frequent change of policy regarding containers. Following the EU ban, they were asked to use plastic containers to prevent possible fungus infection which may be produced from the bamboo containers. The transporters invested their capital to buy new containers. However, after a while they were asked to change the container and to use plastic barrels as the previously prescribed containers were found unsafe as it contains dirt in the holes. Absence of a sustainable policy of the Department of Fisheries (DOF) makes the poor transporters misuse their limited capital. Such frequent changes made the poor transporters invest within a short span of time through difficulty.

**Processing Firms**

The processing firms were affected in the medium term when they found it difficult to make more investment for upgradation to be HACCP compliant. Though they received
financial support from the government the amount was not enough for many factories who had to spend more money for renovation. As a result a number of smaller plants could not withstand the shock and had to stop their operation. Some took loan from informal channels like relatives, friends and local moneylenders. The number of such factories which could not survive due to lack of raw materials and bank loan is 78. This meant loss of jobs and reduction in employment opportunities. During the period factories could not get the permission to export to the EU countries and counted loss on their balance sheet.

**Male Processing Workers**
The closure of the factories which were unable to comply with HACCP measures had a livelihood implication for the workers in the factories as well as for the people in the region as a whole since the workers who lost their jobs had to be accommodated in the job market which created a pressure on the small employment market in the region. A few could be absorbed in other big factories, some found a place as agricultural labourers or other wage labourers but many could not get a regular source of income for several months.

**Female Processing Workers**
The HACCP regulation made it compulsory to process shrimps in highly sanitized rooms in the factory. Thus shrimp processing has shifted from the rural depots to the urban factories. This has impacted the lives of women workers in three ways.

1. **Disruption of Families:** The HACCP regulation made a shocking impact on the rural families by splitting the women workers from their families. Women who could maintain a family while working in nearby depots had to move from their home to the cities. These women workers now work in the factories situated in the town and live either in the factory hostels if there is any or in the nearby rented houses leaving their family behind in the villages.

2. **Change in the Household Economy:** The shift of labor following the shift of job affected the household economy in the villages. Women who used to work in the depots also look after the cattle and home side plantations which did bring some extra money for the family. However, women who left their houses for jobs in the city factories informed that now there is no one to look after those cattle or plants. Therefore they either had to sell their cows before leaving the village or leave them with the neighbours or relatives in exchange of giving a share from their income or benefit.

3. **Increased Living Expense:** The migration has increased the living expenses too as the workers now have to travel once or twice a month between their families in the village and their work place. Moreover, some workers who maintain families in the village mentioned that the living cost has increased too as they now maintain two households.

**Export Income**
In terms of export income Bangladesh lost about US$ 65.1 million due to the EU ban on shrimp exports from Bangladesh. The cost of upgrading the facilities and equipment, and
training the staff and workers for achieving acceptable sanitary and technical standards was about US$ 18.0 million. The annual cost of maintaining the HACCP programme was estimated to be US $2.4 million. Some of the plants did indeed succeed in diverting a large part of their intended shipment to the USA and Japan and, thereby, were able to cut down the losses. In spite of such efforts, the estimated net loss was equivalent to about US$ 14.7 million. These were evidently short-term losses. The medium to long-term losses stemming from loss of the sector's momentum, market diversions, erosion in price offered to exporters were, in all probability, much higher. The GOB and the shrimp entrepreneurs made substantial investment to ensure HACCP compliance in the export-oriented shrimp sector of the country.

**Possible Impact of Eco-Labelling**

As in the case of SPS measures, in the short term the direct impact of eco-labelling will be on the exporters in terms of increased investment to be equipped for being environment friendly, to get a certificate from an accreditation agency and to give training to the staffs. In the process some of the factories may close down if financial assistance is not provided by the government which will imply that the workers in the factories and in the whole production chain will lose their jobs. This will create a pressure on the already crowded labour market in the rural areas which will have serious livelihood implications for the poor people thrown out of the industry. While the factory owners will be able to survive from their savings and other investments the poor processing and other ancillary workers such as transporters will have to bear the brunt of poverty and destitution. It is likely that some will be able to diversify in other professions but many will not, particularly those whose livelihoods depend only on the shrimp processing factories.

**Conclusions and Recommendations**

1. **Assessment of the Sector:** A complete assessment of the sector has to be made to have a full overview of the production, yield, capacity utilization, production method, effort level and economic contribution. It is essential in order to formulate a policy for the sector. Information on the number of players of the sector and their activities should be comprehensive. A clear understanding of the role of various stakeholders, their economic and social background, their role, their demand and priorities is also important for the policy makers to suggest a useful and practical strategy.

2. **Monitoring of Shrimp Farms:** Being the most profitable economic activity shrimp farming is a lucrative profession for many in the coastal region. In the absence of any policy shrimp farming are taking place in an unplanned way causing economic, environmental and social problems. Strict supervision and monitoring system is needed to stop further conversion of agricultural land into shrimp farming. Imposition of strict environmental regulation is also required in order to protect the ecological balance of the area.
3. **Increase Yield and Capacity Utilisation:** As shrimp processing firms are operating at the below capacity level it is important that shrimp farmers increase their yield. Since land is scarce resource in Bangladesh yield should be increased by better management practice by the shrimp farms. If shrimp farms could double their yield per acre of land, shrimp processors could increase their processing capacity up to 50 percent without bringing new land under shrimp farming (IUCN, 2004). However, to be able to do that shrimp farmers need training on better management of their ponds and should have access to information on various rules and regulations.

4. **Close Supervision of Quality Control:** In order to ensure the market access the quality control of shrimp at every stage in the export chain is a must. Inspection by the concerned government official from time to time and giving guidance and training on a continuous basis on the developments of relevant rules and regulations should be a regular practice for all the licensed shrimp processing plants. The EU regulations have forced the shrimp sector to undertake certain measures which have improved the processing standards at the exporting plants. However, quality control at other points of the production system, such as landing and procurement centres is equally important for the industry to be competitive in the global market.

5. **Access to Information:** Clear knowledge on the requirements under various rules and regulations of the WTO is the pre-requisite for compliance. At the current multilateral trade regime rules are being changed and evolved continuously. It is difficult for the shrimp exporters of Bangladesh to follow and understand all the relevant developments right away due to lack of information. Therefore, information should be shared through training on the requirements of the buyers. The Ministry of Commerce (MOC) may help in giving training on the rules and regulation related to shrimp exports. The Ministry can also share information through its WTO cell on the relevant issues.

6. **Awareness Building:** The consequences of being non-compliant should be taken into cognisance by all concerned. In case of shrimp exports, the EU had been giving signals to Bangladesh for quite sometime before the imposition of the ban but there was lack of awareness of the actual meaning of such indication by the importers both at the government level and among the private processing plants.

7. **Market Diversification:** Bangladesh should also do marketing in other countries including Asia to promote its shrimp export. The share of export to Japan and Australia may be increased since these countries are less stringent on HACCP rules. The country will be able to expand its market for shrimp through advocacy and active initiative as Bangladeshi shrimps are produced in a natural process.

8. **Coordination of Activities:** The production and export of shrimp involve various activities and its management has many cross-cutting issues which means that the development of the sector depends on coordinated actions of a number of
organizations including ministries, departments, agencies, private sector and NGOs. The ministries which have a role include Ministry of Fisheries and Livestock, Ministry of Environment and Forest, Ministry of Agriculture, Ministry of Land and Ministry of Commerce. Coordination among so many ministries is a big challenge. Private sector has taken up activities such as hatchery and processing of shrimps since long. The private sector can also take part in quality assurance, certification, marketing and extension to increase the production efficiency and quality. NGOs should be involved as management partners of the government for the shrimp cultivating areas. This will help reduce social tensions among various groups in the cultivating areas and ensure participation of the poor communities in all activities including decision making process.

9. **Financial Support:** Farmers, depot owners, small boat owners and transporters suffer from lack of capital to perform fishing activities. They have to rely on informal sources such as middlemen and traders for credit at a very high cost. Access to the formal channels of credit may be considered for these participants of the shrimp cultivation.

10. **Infrastructural Development:** In case of shrimp farming many of the depots have tube wells and do not have the facility of running water. Therefore, it is very difficult to perform cleaning and washing activities. The availability of ice is not adequate and the shrimp transporting vans are not well equipped with proper freezing facilities. The cleanliness of the ice cannot be ensured always since the quality of water used for making ice is poor. For the marine sector a cold storage near the landing centre is an urgent need as the quality of fish deteriorates by the time it is taken to nearest factories. Uninterrupted power supply in the ice factories and in the processing factories is also crucial for maintaining the freshness of the fish and for fetching a higher value in the international market.

11. **Ensuring Security and Reducing Tensions:** There are several incidences of robbery, abuse and violence in the shrimp farms. Tensions prevail between the local people and the non-resident shrimp farm owners who are considered to be outsiders by the local people. The local poor feel that they have a right on the farms while the outside farm owners employ local musclemen to take care of their ponds and to tackle any unexpected situation. There are also complaints that the processing workers are deprived of getting the right amount of payment for their work. If they demand or protest they are thrown out of the jobs. A central monitoring cell should be established to oversee and solve such problems. The local NGOs can play an important role in reducing tensions among various groups as they are familiar with the locality. The village leaders, and educated and respected persons in the community may be involved in it.

12. **Capacity Building in Trade Issues:** Lack of proper knowledge and awareness, poor access to information on the requirements, lack of expertise and trained people to examine compliance requirements, lack of technological capacity, and weak implementation and monitoring capacity had been major constraints in
participating in the trade negotiations effectively. As regards the SPS measures Bangladesh did face similar constraints to deal with the compliance issues due to which the country suffered a deceleration in export earnings from the shrimp sector. Eco-labelling may become another obstacle for the country’s shrimp export. However, awareness on the issue is almost non-existent among the concerned sections of the people. In order to understand the trade issues, particularly the market restricting ones and to understand their implications on the economy of Bangladesh the country needs technical assistance (TA) and capacity building (CB). TA and CB are needed for the development of national standardisation bodies, conformity assessment services and accreditation agencies. These programmes should be available for officials of all the relevant ministries as mentioned above. All members in the export chain of shrimp production, members of the civil society institutions, academia, NGOs, private sector, business community and consumers should also be included for CB programmes.

13. Mainstreaming of Fisheries Sector: The livelihood concerns of fishermen should be reflected in the poverty reduction strategy paper (PRSP) of the country. A balanced strategy has to incorporate the issue of food security and equal opportunities for all the participants of the sector. Especially, poor fishermen and the marginalised women who have been the losers of the EU ban should be provided with credit for alternative source of income.

14. Playing a Proactive Role at the International Level: In view of the experience that Bangladesh had in dealing with the SPS issue it is important for Bangladesh to play a proactive role in the standard setting process at the global level. It should emphasise that regional conditions should be considered if there is an issue of harmonisation of standards arise.

15. Full Implementation of S & D Provisions: Bangladesh should take advantage of the S & D provisions and negotiate for their full implementation in situations such as the ban on shrimp exports. Considering the socio-economic and technological situation importing countries should give adequate time for taking preparatory measures before taking any stern action such as the imposition of ban on exports. Being an LDC Bangladesh should bargain for adequate financial and technical assistance for conformance with SPS and TBT requirements.

I. INTRODUCTION

The case study on the shrimp sector of Bangladesh has been implemented as part of the FAO commissioned study on Policy Research–Implications of Fish Trade Liberalization
The specific objectives are to:

- present an overview of the fishery sector including policies for the sector to understand issues related to the production and export of fish;
- map the export chain of shrimp production in Bangladesh to show the role of various stakeholders in the sector;
- rank the participants in the chain according to their poverty status and describe their economic condition;
- examine the extent of impact of SPS measures and eco-labelling on various sections in the production chain;
- understand the impact of SPS measures and eco-labelling on the livelihoods of the poor fishermen and on the environment;
- make policy recommendations as regards the improvement of the sector in general and of the livelihoods of the poor fishermen in particular.

The reason for choosing SPS measures and eco-labelling is that for the fish export sector in Bangladesh these are the most important issues at the moment to be dealt with in an appropriate fashion to increase or even maintain the present level of export. Bangladesh exports frozen shark fish, salmon, tuna, shrimp and some other live fish to the world market. The study has focused on the shrimp sector simply because of the fact that almost 90 percent of the total fish exports from Bangladesh consists of shrimp.

1.1 Structure of the Report

In Section I, the methodology of the study, sources of data, study area and the type of informants are discussed. Some background information on three shrimp cultivating districts visited by the study team are also provided in Section I. An overview of the fisheries sector, trade related policies in Bangladesh are also presented in Section II. This section elaborately describes the shrimp sector including production, area and number of fish farms, employment, income, export performance, participants in the production chain, institutional management for shrimp production and poverty assessment of the participants in the commodity chain. This section also provides a brief literature review of relevant studies undertaken in Bangladesh on this issue. A discussion on SPS measures and eco-labelling in the international trade and their relevance for Bangladesh is presented in Section III. Major features of the SPS and TBT agreements are also discussed in this section. Section IV discusses the impact of the European Union’s (EU) ban on shrimp exports from Bangladesh in 1997 and the subsequent measures undertaken by the government of Bangladesh (GOB) in order to comply with the EU requirements. The possible impact of eco-labelling has been discussed in Section V in terms of benefits.
and costs of such measure. The impact of trade liberalization on poverty and livelihood situation of the people engaged in the sector, and on the environment is also discussed in Section V. Finally, Section VI makes a number of recommendations for the overall development of shrimp sector during the evolving multilateral trading regime.

1.2 Methodology and Approach of the Study
The approach of the study is both descriptive and analytical while the methodology used for collecting information in the study is a participatory one with debriefing of the important stakeholders in discussions and meetings at various phases of the study. The descriptive part includes a discussion of the fisheries sector in Bangladesh, evolution of relevant policies and the institutional context. The analytical approach focuses on the interpretation of the evidences gathered from primary and secondary sources.

The study has analysed the implications of the findings from field level survey in order to suggest appropriate policies to ensure compliance with SPS measures and to meet the requirements for the livelihoods of the poor engaged in the sector. The possible impact of using eco-labelling has also been examined on the basis of discussions with concerned persons.

Therefore, field research approach of the present study involved the following steps:

1. Focus group discussion (FGD) with primary stakeholders
2. Individual case study
3. Personal observation at the farm, depot, landing, jetty and processing centres
4. Meeting with secondary stakeholders

Information on SPS measures were easier to collect since it is already in practice in Bangladesh and people are aware of it. However, eco-labelling is still an unknown and vague issue to most of the people in the industry, particularly among the workers. Therefore, the present study is only an indicative of the probable impact of eco-labelling on the basis of secondary information.

The Sustainable Livelihood Approach (SLA) was used to analyse the livelihood systems of fishing communities and the impact of trade liberalization on the livelihood of various stakeholders in the fisheries sector. The analysis of livelihoods system of the shrimp sector includes poverty ranking of the stakeholders involved in shrimp farming and shrimp capture, their asset base and vulnerability context. Linkages among various operators in the export supply chain and implications on their livelihoods have been analysed within the framework of sustainable livelihoods. The rationale for using SLA in the study is that it is a way to understand and identify the requirements of and opportunities for the poor from a broader perspective since SLA looks at livelihoods beyond income generation activities. It is the livelihood which enables people to cope with and recover from shocks and maintain and enhance their capabilities and assets both now and in the future (Ashley and Carney, 1999). With the participation of the stakeholders in FGD at the filed level it has been easier to identify factors affecting their livelihoods. The key elements of the SLA which have been examined in the study are: (i) Livelihood assets (ii) Vulnerability (iii) Livelihood strategies.
1.3 Sources of Data
Data have been collected both from primary and secondary sources. Primary data have been collected mostly by focus group discussions with various groups in the production chain from three major shrimp producing areas of Bangladesh, namely, Khulna, Bagerhat and Chittagong. Information have also been gathered through discussions with the government officials, NGO activists, entrepreneurs, fishermen and other stakeholders. Secondary data have been collected from various organizations as well as from published documents and reports. The organizations consulted include the Department of Fisheries (DOF), Department of Environment (DOE), Bangladesh Frozen Foods Exporters Association (BFFEA), Bangladesh Standard and Testing Institute (BSTI), Bangladesh Shrimp Farmers Association, Shrimp Foundation, Shrimp Seal of Quality (SSOQ), the European Union (EU), Export Promotion Bureau (EPB), International Union for Conservation of Nature and Natural Resources (IUCN) and two private frozen food export companies (Apex Food and Coastal Sea Food Ltd). Though there was no structured questionnaire for collecting information comprehensive checklists were used as guidelines to discuss issues and solicit information from various categories of people both in the field and in the offices.

1.4 Study Area
To study the impact of trade liberalization, the study team visited several places of Khulna, Bagerhat and Chittagong districts, which are the major shrimp growing districts in Bangladesh. The areas are best suited for shrimp cultivation because of its climate and soil structure. The team visited and consulted with different stakeholder groups involved in the shrimp cultivation and processing in the region. In case of inland shrimp they include the shrimp farmers, middlemen, depot owners, processing workers, managers and owners of different processing and exporting factories. In the marine shrimp sector the captain and crew of the boat, fishermen, processing workers, boat owners, middlemen and other labourers were interviewed. Before presenting a description on the type of informants in the next section, a brief background on the districts where the field visits took place is given below.

Bagerhat District
Bagerhat district comprises an area of 3959 square kilometre (sq. km), and situated in the southwest region of Bangladesh. The district has a population of about 1.4 million (mln) of which, 51.8 percent are male and 48.2 percent are female. The main occupation of the people is agriculture which comprises 36.2 percent of the population. About 3.1 percent are engaged in fishing, 18.3 percent in agricultural labour, 6.7 percent in wage labour, 12.9 percent in commercial activity, 2.3 percent in transport, 7.6 percent in service sector and 12.9 percent in other occupations. There are a number of factories in the district, such as 39 ice factories, 2258 rice mills, 25 wheat mills, 2 cement industries, 1 LPG plant, and 68 saw mills. There are also a good number of cottage industries in the area. Main exports from the district are paddy, shrimp, coconut, betel nut, betel leaf and honey.

Shrimp industry plays a significant role in the economy of the district. There are 12,563 shrimp farms in the district, which comprises an area of 47,710 hectares (ha) of land. The
Gross Domestic Product (GDP) of the fishery sector was taka 5167 mln in 1999-2000 at current market prices, which was 17.8 percent of the total GDP (BBS, 2001).

**Khulna District**
With an area of 4394 sq. km., Khulna is situated in the southwest corner of Bangladesh. The district has a population of about 2.3 mln of which 51.9 percent are male and 48.1 percent are female. A large number of population, 25.1 percent is engaged in agriculture. Of total population in Khulna the number of agricultural labour is 11.3 percent. Others include 1.7 percent in fishing, 7.2 percent as wage labourers, 16.4 percent as industry workers, 4.1 percent in transport, 1.5 percent in construction, 18.9 percent in service sector and 12.2 percent in other activities. There are a number of factories in the district such as paper mill, hard board mill, textile mill, match factory, shipyard, steel mill, cable mill, rice mill, flour mill, ice factory, press mill, saw mill etc., and a number of cottage industries such as handloom, bamboo work, goldsmith, potteries, carpenter and tailoring. Main exports from the district are paddy, rice, jute, sesame, betel nut, gur, mango, jackfruit and prawn.

Fishing sector is an important sector of the economy. The GDP of the fishery sector was taka 15509 mln in 1999-2000 at current market prices, which was 13.1 percent of the total GDP of the district. There are 3,409 shrimp farms in the district and the area under shrimp farm is 29,551 hectares.

**Chittagong District**
Situated in the southeast part of Bangladesh, Chittagong district has an area of 5282 sq. km. The population of the district is about 6.5 mln of which 52.2 percent are male and 47.8 percent are female. Of the total population 18.7 percent are engaged in agriculture, 1.2 percent in fishing, 12.1 percent in agricultural labour, 3.5 percent as wage labourer, 1.7 percent in industry, 16.6 percent in commercial activity, 4.5 percent in transport, 1.4 percent in construction, 24.1 percent in service sector and 16.1 percent in other occupations. Major factories in the district include Eastern Refinery, Pahartali Railway Workshop, Jamuna Oil Company, Glaxo Wellcome, Lever Brothers, etc. Main exports from the district are tea, leather, dried fish and readymade garments.

The GDP of the fishery sector of the district in 1999-2000 was taka 14670 mln at current market prices, which was 6.6 percent of the total GDP of the district. There are 7 hatcheries in the district and 807 hectares of land are under the shrimp farms. Chittagong is also the source of marine fish since the Bay of Bengal flows by the district.

1.5 Types of Informants

1.5.1 Factories
To understand the impact of SPS measures, the team emphasized on those factories which were visited by the EU missions before the ban on shrimp exports from
Bangladesh in 1997 and those who renovated their factories to comply with the Hazard Analysis Critical Control Point (HACCP) guidelines as required by the EU. The factories visited include Sigma Sea Foods Ltd, Lockpur Fish Processing Co. Ltd., Bionic Fish Processing Ltd., International Shrimps Export (Pvt.) Ltd, Salam Sea Foods Ltd. and Modern Sea Food Industries Ltd. These are located in Khulna and Bagerhat. In Chittagong the study team visited Sagarika road where several shrimp processing factories are situated. The factories visited are Orion Fishing Ltd., International Sea Food Ltd., Coastal Seafood Ltd., and Shrimp and Fish Processing Plant Ltd.

1.5.2 Farmers
The team visited several shrimp cultivating areas and consulted with the farmers and workers of those areas. Detailed discussions were made with the help of an owner of shrimp Gher (farms) in Botiaghata, Dumuria and Baghmara of Khulna, Mongla and Rampal of Bagerhat, and Shagarika road of Chittagong district which are extensive shrimp cultivating areas and where the processing factories are located.

1.5.3 Middlemen
There are three types of people who work as middlemen at various stages of shrimp cultivation. They are fish fry collectors, depot owners and moneylenders (locally called dadon daars). Consultations were held with these groups in all three study areas.

1.5.4 Women Workers
Women workers are involved in the fish processing. The study team consulted them with the help of a woman worker from each factory. About 15 workers from each factory were present during the consultation sessions. Women workers are involved in the processing of inland culture shrimp only and not in the processing of marine capture shrimp.

1.5.5 Boat Owners and Fishing Crews
In order to know the processing process of the marine shrimp the study team visited the Sadarghat Jetty where boats land after catching fish from the sea. The team visited several boats and spoke to various people involved in marine shrimp catch including captain and crews, fishermen and processing workers.

Table 1
Study Area and Informants

<table>
<thead>
<tr>
<th>Districts</th>
<th>Places</th>
<th>Categories of Informants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khulna, situated in the</td>
<td>Botiaghata; Dumuria; Baghmara</td>
<td>Hatchery operators, hatchery workers,</td>
</tr>
<tr>
<td>southeast of Bangladesh</td>
<td></td>
<td>farmers, ice plant workers, exporters,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>processors, women workers, middlemen</td>
</tr>
<tr>
<td>Location</td>
<td>Area of Operation</td>
<td>Sector Activity</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Bagerhat</strong>, situated in the southeast of Bangladesh</td>
<td>Mongla; Rampal</td>
<td>Hatchery operators, hatchery workers, farmers, ice plant workers, exporters, processors, women workers, middlemen</td>
</tr>
<tr>
<td><strong>Chittagong</strong>, situated in the southwest of Bangladesh</td>
<td>Shagarika Road; Sadarghat Jetty (landing centre)</td>
<td>Boat owners, fishing crews, artisanal fishermen, processors, middlemen</td>
</tr>
</tbody>
</table>
Map 1: Shrimp Cultivation Area of Bangladesh

Shrimp area as % of total thana area

- Less Than 1
- 1.1-5
- 5.1-10
- 10.1-15
- 15.1-20
- 20+

Legend:

- 30
- 0
- 30
- 60 Kilometers
II. OVERVIEW OF FISHERIES SECTOR AND TRADE POLICIES IN BANGLADESH

2.1 Background Information on Bangladesh

2.1.1 Area and Climate
Bangladesh is a tropical country covering a land area of 147 thousand sq. km. The country is situated on the north-eastern side of South Asia and bounded by India on the west, north and east, by Mayanmar on the east and by the Bay of Bengal on the south. The limits of territorial waters of Bangladesh are 12 nautical miles and the area of the high seas extending to 200 nautical miles measured from the base lines constitutes the economic zone of the country. Except the hilly regions in the north-east and the south-east, the country consists of low, flat and fertile land. The country encompasses a wide range of ecosystems and is home to a large variety of flora and fauna.

In Bangladesh nearly 50 percent of the total land surface is composed of wetland. There are about 230 rivers which are tributaries and branches of three big rivers (the Padma, the Meghna and the Jamuna). Rivers have extensive floodplain along both banks of their courses. The floodplain water area is about 2.8 million hectares (Mha) which is 57.57 percent of total inland open water (DOF, 2002). Floodplains remain inundated with flood water during monsoon (June - September) season. The country also has deep depressions (locally termed as beels), oxbow lakes (local name is baor), a number of man-made ponds and a man-made lake called Kaptai Lake having an area of 68,800 hectares (ha). The coastline of the country is about 480 km long (DOF, 2002). About 35 percent of the total area in Bangladesh is under water almost 5-6 months a year.

2.1.2 Population and Sources of Income
Bangladesh is a densely populated country with a total population of 123 mln, and with a population density of 839 per sq. km. Some 95 million people or 77 percent of the population reside in rural areas. The main source of income is agriculture which is comprised of crop, forestry, fisheries and livestock. Other important sources of employment are manufacturing, transport and services. Many of the raw materials for industries are provided by agriculture. Agriculture contributes 23.5 percent of GDP, and of the total labour force 62.3 percent are engaged in agriculture. Land, water, forest, fisheries and natural gas are the important natural resources in Bangladesh which contribute to the national economy in various ways. The majority of the population who lives in the rural area depends on the primary sector for their livelihood. However, the contribution of the primary sector to GDP has declined from 31.7 percent in 1980 to 23.5 percent in 2001, while that of the tertiary sector (services) has grown from 47.4 percent to 50.9 percent during the same period - a process that may have intensified during the post-liberalization period characterized by denationalization and privatisation, credit control and fiscal discipline, reduction of subsidies, financial reform, import liberalization and tariff rationalisation, flexible exchange rate and provision of export incentives.
2.1.3 Poverty and Quality of Life
Bangladesh is a least developed country with per capita income of US$ 389. Though the incidence of poverty in the country has declined satisfactorily from 62.6 percent in 1983-84 to 44.3 percent in 2000 the country still ranks 72 in Human Poverty Index (HPI) of UNDP. In terms of Human Development Index (HDI), the position of Bangladesh is even worse - 139th among 175 countries (UNDP, 2003) (Table A1 in the Annex). There has been a considerable improvement in the access to basic facilities such as safe drinking water and sanitary latrines which were 95.4 percent and 41.2 percent respectively in 2000. However, the access to health services is still inadequate. There is only one registered physician per 3,866 persons and one hospital bed per 4109 persons. The infant mortality rate is 58 (per 1000 live birth below 1 year of age). This is a gloomy picture of the health sector of the country which is also interrelated with the poverty situation. The quality of life is also reflected in the consumption expenditure of the people. In the rural areas the average monthly consumption expenditure of a household is $77 of which the major share is spent on food and beverages (76.9 percent) implying that only a small portion of the expenditure is left for other necessities of life. On the other hand the monthly consumption expenditure in the urban area is $141.6 of which 31.5 percent is spent on food and beverages (Table A3 in the Annex).

2.2 Overview of Fisheries Sector in Bangladesh

2.2.1 Water Area
The water body in Bangladesh is suited for the production of fish, the most important resource of the freshwater ecosystem. Bangladesh ranks third among the world’s largest inland fish producing countries after China and India. Fish is the major source of animal protein consumption in Bangladesh contributing to about 60 percent of the per capita animal intake in the diet of the people of Bangladesh. Total water area under inland fisheries is about 5.3 Mha where 92.27 percent is inland open water, 7.73 percent is inland closed water. Table A4 in the Annex shows water area under different fisheries in Bangladesh.

2.2.2 Types of Fisheries
There are about 260 species of fish in Bangladesh which can broadly be grouped into five broad categories - hilsha, carp, catfish, prawn and others. During monsoon floods, population of all fish and prawn species increase both in numbers and in biomass. They occupy all the available niches in the expanded aquatic habitat produced by the monsoon floods. Fisheries in Bangladesh fall broadly into four categories: (i) inland capture (open water), (ii) inland culture (closed water), (iii) marine industrial or trawl fishing, and (iv) marine artisanal or small scale fishing.

2.2.3 Production and Yield
The inland fishery is the main source of fish production which comprises about 78 percent of total fish production. In 2002 the area under total inland fisheries was 5.3 Mha and total catch was 1475 thousand metric tonnes (mt), implying a yield of 278 kg per hectare. Within the inland fishery, the contribution of the closed culture water is higher than that of the open water capture. Inland open water fisheries are natural systems. The
biological cycle of these fish depends on the nature and there is no human intervention in the reproduction cycle and growth of fish. Total production in the inland open water fishery in 2002 was 688 thousand tonnes (DOF, 2002) which was 46.64 percent of total inland fish production and 36.4 percent of total fish production (inland plus marine).

Ponds, oxbow lakes and shrimp farm fall into the category of the inland closed water fishery. The pond fishery and the coastal aquaculture are main sources of the inland closed water fishery. The coastal aquaculture consists primarily of brackish water shrimp farming. An area of 141,353 hectares is under shrimp culture in the southern part of Bangladesh. Total area under the inland closed water fishery is 413,341 hectares (7.73 percent of total inland fisheries). In 2002 total capture in the inland closed water fishery was 787 thousand tonnes which was 53.36 percent of total inland fish catch and 41.64 percent of total (inland plus marine) fish production (Table A5 in the Annex).

The quantity of fish produced in the marine sector is 415 thousand mt which is 21.95 percent of the total fish production (2002). The share of trawl fishery is very small: only 6.4 percent in total marine fisheries and 1.3 percent in total fish production (2002). Main production in the marine sector is performed by mechanised and non-mechanised small boats. Table A5 shows the production of fish from different sources.

2.2.4 Income and Employment
The fishery sector is a source of income and employment to a large number of people particularly in the rural areas of Bangladesh. Four types of fishermen are involved in fishing: (i) professional fishermen: who earn their livelihood entirely from fishing (ii) part-time fishermen: who fish for only part of the year to supplement their income; they are engaged in other employment, for example, in agriculture for the rest of the period (iii) subsistence fishermen: who fish occasionally for subsistence rather than income, and (iv) fish farmers: who own ponds and operate fishing activities. About 2 million people are employed in fisheries sector on a full-time basis which is 7 percent of the total employment of Bangladesh (DOF, 2002).

2.2.5 Contribution to the Economy
Total income from the fishery sector increased from taka 65.82 billion (bln) in 1994 to taka 137.49 bln in 2002. The percentage share of value added by fisheries sector in total GDP has gone up to 5.24 percent in 2002 from 5.04 in 1994. Table A6 shows the trend of growth of fishery income over time.

Fish exports have emerged as one of the important sources of foreign exchange earnings in Bangladesh. Among the non-traditional items fish and fish products rank first in terms of export earnings. Though the share of export earning from fisheries sector has declined from 6.91 percent in 1991 to 4.76 percent in 2002, the quantity of fish exported has almost been doubled (41,482 mt) in 2002 from 22,080 in 1992. Major export items of fish are frozen shrimp, frozen frog legs and frozen fish (Table A8).
2.3 Shrimp Sector in Bangladesh
2.3.1 Area under Shrimp Cultivation

Within the fisheries sector the contribution of shrimp is the highest in terms of foreign exchange earnings and employment generation. Shrimp is cultivated in the brackish water of the coastal areas of Bangladesh which are situated in the coastal districts of Chittagong, Khulna, Bagerhat and Shatkhira (Map 1). Two types of shrimp are cultured in Bangladesh (i) bagda which is cultivated in brackish water, and (ii) golda which are sweat water shrimp and can be cultivated in any region. Currently about 37,397 farms are cultivating bagda with an average farm size of 4.5 hectares. About 60 hatcheries are in operation, most of which are located in Cox’s Bazar. Golda shrimp is produced in an area of 30,000 hectares and its average farm size is only 0.28 hectare. Area under golda is expanding at the rate of 10-20 percent per year, in an unplanned way though. The number of golda farms is 105,000, mostly located in the Khulna division.

According to BFFEA there are 128 shrimp processing factories located in Khulna, Bagerhat, Satkhira and Chittagong out of which 61 has license from the government to export, 44 has the permission to export to the EU (BFFEA, 2004).

About 33 percent of shrimps grown in Bangladesh are exported. As shrimp has become an important source of export earnings in Bangladesh the area under shrimp cultivation has also undergone significant expansion. During 1990s the area under shrimp cultivation increased by three fold. At present the total area under shrimp cultivation is about 141,353 hectares which is about 1 percent of the total land area of Bangladesh. The method of shrimp cultivation in Bangladesh is extensive with low input, little or no nutritional inputs and with little or no mechanization.

2.3.2 Yield and Capacity Utilisation

Although land under shrimp production is increasing, the yield rate of bagda is declining. The present yield of bagda is 150-160 kilogramme (kg) per hectare which was 230 kg per hectare in 1995-96 (Aftab, 2004). However, the under production of bagda shrimp is being compensated by golda shrimp. One of the reasons for the decline of bagda shrimp is that during the mid 1990s there was an epidemic due to the virus attack, which forced many shrimp farms to close down. On the other hand poorly managed ponds and farms, lack of infrastructure, especially adequate water reserve and lack of pure water sources were also responsible for the epidemic during the period.

Processing factories are usually equipped with cleaning, washing, processing and freezing facilities and these require huge investment. However, the capacity utilization of the shrimp processing firms is less than 50 percent. Most of the firms are operating at only 13 percent of their processing capacity (IUCN, 2004). These firms can increase their capacity up to 50 percent without bringing any new land under shrimp cultivation but simply by doubling their yield per acre.

2.3.3 Export of Shrimp

Shrimp sector is the second largest export sector of Bangladesh after ready made garments (RMG) with a share of about 5 percent in Bangladesh's total exports in the 1990s. In FY2003 shrimp exports amounted to US$ 297.04 mln which was 4.54 percent
of total exports. In terms of contribution to the GDP the share was 0.48 percent in 2003 compared to 0.36 percent in 1993. The share of shrimp export in total export income from fish and fish products is 89.98 percent in 2003 (Table A10 in the Annex). Its importance is highlighted by the fact that it constitutes more than 70 percent of the export of primary products from Bangladesh. Its share in FY 2000 was higher than the combined share of Bangladesh's exports of raw jute and jute goods (5.8 percent of total exports). Directly and indirectly more than 2 mln people are engaged in upstream and downstream activities related to shrimp industry in the country - in harvesting, culture, processing and exporting (Aftab, 2004). Majority of the processing workers are women.

The EU, the USA and Japan are the major importers of shrimp from Bangladesh accounting for more than 95 percent of total fish exports. The rest is exported to countries in the Southeast Asia and Middle East. In 2003 shrimp export to the EU accounted for 52.1 percent of the total market while the share of the USA was 38.6 percent and of Japan for another 4.5 percent (Table A11 in the Annex). Evidently, the importance of the EU market for this particular export sector of Bangladesh is very high. Any disruption in this market is bound to have severe and important implications for this export-oriented sector of the country, and negative multiplier impact for the national economy.

The export income from shrimp has increased from an amount of US$ 2.9 mln in FY 1972-73 to US$ 297 mln in FY 2002-03. Total volume exported was 25,670 mt in 2003 (Table 12). The share of shrimp export in total export earning has increased to 4.5 percent in FY 2002-03 compared to less than 1 percent in FY 1972-73. After the export oriented RMG sector shrimp has emerged as the fastest growing export sector. To a large extent the trade policy reforms carried out in the country in recent years has played a crucial role to this change (discussed in Section 2.9).
2.4 Institutional Arrangements and Policies for the Fisheries Sector
Proper management of fishery is important for various reasons: (i) provision of cheap protein (ii) poverty alleviation through employment creation and income generation (iii) maximisation of economic yield (iv) maintaining the quality of fish export (v) efficient and equitable distribution of benefits among the fishing community. The Five Year Plans of Bangladesh consider fisheries as a priority sector to generate additional employment opportunities and to alleviate rural poverty (GOB, Five Year Plans). However, the share for fisheries development in the national plans of the country has been constantly declining. During the First Five Year Plan (1973-78) the share was 6.73 percent which has dropped to 0.30 percent in the Fifth Five year Plan (1997-2002) (Table A13).

The New Fisheries Management Policy (NFMP) was introduced by the GOB in 1986 to deliver the maximum benefits to the actual fishermen and to overcome problems of overexploitation of resources (GOB, 1998). Under NFMP access to fishing rights is given only to genuine fishermen directly through a process of selection and issuing fishing license to listed fishermen for one or more years. For large water bodies license is given to cooperatives and associations of fishermen.

In 1998 the National Fisheries Policy (NFP) was adopted with a view to develop and increase production of fish resources and create self-employment in order to improve the socio-economic condition of the fishermen. The NFP addresses the development of the sector through activities and inputs such as the provision of credit and aims to increase exports through increased production. The policy emphasises the importance of maintaining ecological balance and bio-diversity.

The marine fishery sector lacks proper management policy for conservation of the marine fishery resources. The Marine Fisheries Ordinance 1983 (GOB, 1983) made provisions for the management, conservation and development of marine fisheries only for water deeper than 50 metres. All trawlers are required to obtain a fishing license to fish in the sea within the territory of Bangladesh (Bay of Bengal) for a year on payment of requisite fees. Each trawler has to take pre-sailing permission for each and every voyage from the Directorate of Fisheries. The area of the sea up to 50 metres depth are reserved for small scale fishing. There is no specific regulation on small scale fishing in the Bay of Bengal.

The other policies relevant to fisheries are the National Water Policy 1999 (GOB, 1999), Environmental Policy 1992 (GOB, 1992), Land Use Policy 2001 (GOB, 2001a) and the New Agricultural Extension Policy 1996 (GOB, 1996), all of which focus on the fisheries resource management as part of their overall management of the natural resources.

Since shrimp holds a special position in the economy of Bangladesh the GOB has a policy for the shrimp sector as well within the NFP. The policy aims to undertake the following measures in order to develop the shrimp sector.

- There will be committees at the national and local level. These committees will operate according to government policy and work for the development of shrimp cultivation. In this respect the committees will take necessary steps
and will formulate required rules and regulations for solving various problems.

- To maintain the eco-balance of the coastal area necessary steps will be taken to coordinate fish cultivation, shrimp cultivation and rice cultivation.
- Arrangements will be made for eco-balance in future construction of polder and barrage, and opportunity will be created for cultivation of shrimp, rice and fish in these polder and barrage areas.
- Advanced but traditional method of shrimp cultivation would be emphasized. Shrimp cultivation will also be encouraged in potential areas. On the other hand, shrimp cultivation will be prohibited in such cases where it may destroy the mangrove forest. To maintain natural balance, plantation of appropriate trees around the shrimp farms will be made mandatory for the owners of shrimp farms.
- Shrimp exhibition farms will be established and training for shrimp farmers would be arranged under private initiative with assistance from the government.
- Equal status and incentives will be given to shrimp industry as an export industry like other export industries.
- Necessary arrangements will be made for modern training so that while collecting shrimp larvae from natural resources other fish larvae are not destroyed. Proper physical infrastructure will be created so that shrimp larvae are not damaged while carrying them from one place to another.
- Private sector will be encouraged to establish hatchery to reduce pressure on natural sources for shrimp larvae.
- During the regeneration period shrimp collection from the sea will be prohibited. Some areas of the sea will be declared safe area for shrimp regeneration.
- Private sector will be encouraged to establish hatchery for producing bagda shrimp.
- Initiatives will be taken by the government to build proper infrastructure in the existing shrimp farms and also in potential areas, and proper security system will be created during the selling and distribution period.
- To increase the production of shrimp, special emphasis will be given on the use of appropriate technology. Farm owners will be encouraged to establish small farms and to divide big farms into a number of small farms so that it can easily be managed.
- Steps will be taken to provide food for shrimp from indigenous sources and if necessary some types of shrimp foods like fish meal, vitamin and mineral primicose, food binder etc., will be imported.
- Hygiene will be ensured throughout the period of shrimp cultivation to shrimp processing. Proper infrastructure and proper training will be provided to ensure the health and quality of the collected shrimp.
- To ensure export market for the shrimp, marketing system will be strengthened.
- Quality control laboratory institutes will be expanded and modernized to ensure the quality of fish and shrimp products.
• The Central Shrimp Cell created for providing shrimp cultivation related services, will be extended at the grass roots level. To strengthen these shrimp cells more manpower and benefits will be provided.

• For cultivation of shrimp, some coastal areas will be marked so that the eco-balance could be preserved. In this regard the DOF will collaborate with the Ministry of Environment and Forest (MOEF).

• For environment friendly shrimp cultivation foreign investors with higher technological capacity will be encouraged for joint venture with local investors.

• Insurance system for fish and shrimp production will be initiated.

2.5 Regulatory Framework for Shrimp Production and Export

2.5.1 National Regulations

The institutional setup of shrimp culture in Bangladesh is quite large since it involves a number of ministries, directorates and institutions due to the cross-cutting nature of issues related to the sector. Though the Ministry of Fisheries and Livestock is in charge of overall administration, management, extension, production, research and training other ministries also have some responsibilities. Table 2 presents a summary of institutional setup of shrimp culture in Bangladesh.
The current regulatory framework for shrimp production is weak and biased towards the educated elites. The implementation of the policies in the NFP 1998 as listed above is yet to be observed. The DOF is responsible for policy and planning issues on shrimp, and a national shrimp coordination unit called “Shrimp Cell” is located at the DOF. The capacity of DOF to oversee and coordinate shrimp sector developments is, however, limited. A greater coordination among various departments and organizations as well as private sector and civil society organizations is essential for its successful implementation.

### Table 2

#### Institutional Setup of Shrimp Culture in Bangladesh

<table>
<thead>
<tr>
<th>Ministry/Institutions</th>
<th>Activities</th>
</tr>
</thead>
</table>
| **Ministry of Fisheries and Livestock**  
• Directorate of Fisheries  
• Bangladesh Fisheries Development Corporation  
• Fisheries Research Institute | • Administrative, Management, Development, Extension and Training  
• Training, Production and Development  
• Research and Training |
| **Ministry of Local Government, Rural Development and Cooperative**  
• Rural Development Board  
• Directorate of Cooperatives  
• Bangladesh Jatioy Matsyajibi Samabaya Samity Ltd.  
• Bangladesh Samabaya Bank Ltd.  
• Upazilla Administration | • Fisheries component of integrated rural development  
• Registration and Supervision of fisheries cooperatives  
• Development of fisheries cooperative, Operation of ice plant and import of gear  
• Financing fisherman cooperatives  
• Management of water bodies less than 20 ha |
| **Ministry of Land**  
• Land Administration and Land Reform Division | • Leasing of public water bodies |
| **Ministry of Irrigation, Water Management and Flood Control**  
Bangladesh Water Development Board | Leasing of reservoir and irrigation canals |
| **Ministry of Commerce**  
• Department of Commerce  
• Export Promotion Bureau | • Leasing of fish processing plant  
• Export promotion of shrimp, fish and fish products |
| **Ministry of Industry**  
Bangladesh Sugar and Food Industries Corporation | Processing of shrimp and fish |
| **Ministry of Shipping**  
Mercantile Marine Department | Registration of fishing boat |
| **Ministry of Planning**  
Fisheries Section | Planning and overall coordination of all development activities on fisheries |
| **Ministry of Foreign Affairs** | Negotiation of Exclusive Economic Zone |
In order to export shrimp the quality control licenses issued by the Bangladesh Standards and Testing Institutes (BSTI) are required. The source of legitimacy of monitoring environmental impacts of economic activities including shrimp production is the Bangladesh Environment Act 1992 and Bangladesh Environmental Regulation 1997. The government is bound to ensure sustainable use of resources under the Environment Policy 1992. Therefore, shrimp processing firms have to follow environmental regulations though it is not under the control of DOE. The processing firms are required to complete Initial Environmental Examination (IEE) before their establishment. They are also required to submit an effluent treatment plan and an environment management plan to the Department of Environment (DOE) in order to obtain the Environmental Clearance Certification (ECC).

2.5.2 International Rules
At the international level there are two important agreements, SPS, and TBT under the WTO which are related to fish trade and quality. Since these are discussed in Chapter III this Section concentrates only on FAO and other relevant rules. The FAO Code of Conduct for Responsible Fisheries (CCRF) provides technical guidelines for improved fisheries management which are relevant to fish trade. Article 11 of FAO CCRF states that countries should promote responsible fish trade in such a manner and in such environment that is hygienically acceptable, safe and that meets quality requirements. Article 6.7 and 6.14 are also relevant for fish trade. Recognising the problem of developing countries Article 5 of the FAO CCRF calls for financial and technical assistance, technology transfer, training and scientific cooperation for developing countries (FAO, 1995).

The Codex Alimentarius, also known as a food code has become the global reference point for consumers, food producers and processors, national food control agencies and the international food trade. It provides a unique opportunity for all countries to join the international community in formulating and harmonizing food standards and ensuring their global implementation (FAO/WHO, 1999).

The eleventh session of the conference of FAO in 1961 and the sixteenth World Health Assembly in 1963 passed resolutions to establish the Codex Alimentarius Commission. Codex standards were considered a vital component in promoting food control systems designed to protect consumer health, including issues related to international trade and the agreements on the SPS and on TBT of the World Trade Organization (WTO). With a view to respond to the concerns of consumers and governments in importing countries as regards contamination of traded fish Codex Alimentarius Commission has recommended for the adoption of HACCP as an instrument for food safety management in 1993 (Delgado et al, 2003).

2.6 Supply Chain of Shrimp Production and Export in Bangladesh
Shrimp production involves a very complex system where at least six groups are in action. An adult shrimp moves from one hand to another through this production chain before it reaches the factory for final processing and packaging (Figures 5, 6 and 7). In the process the role of the middlemen is omnipresent at every stage. As there are two
types of shrimp in Bangladesh, i.e. inland culture and marine capture, the supply chain of the two production system is also different from each other.

2.6.1 Inland Culture Shrimp
There are three types of shrimp farmers in Bangladesh: (1) those who cultivate shrimp in their own land (2) those who cultivate in leased or rented land, and (3) those who cultivate in government owned land. Farmers collect shrimp post larvae (PL) from various sources. About 90 percent of the shrimp farmers buy shrimp fry from local villagers who collect them from nearby rivers and creeks. Farmers also buy PL from hatcheries. However, hatchery fries have a shorter life than local fries, therefore are sold at a cheaper price than that of the natural fries. There are about 450,000 fry collectors in the coastal zones of Bangladesh.

In most cases farmers face financial crisis and cannot buy shrimp larvae with their own money. So they borrow money from a group of people who actually work as middlemen and are collectors of shrimp. They give loan to farmers mostly without any interest on condition that the farmers will have to sell shrimp to them at a lower price than actual market price.

The middlemen transport shrimps usually in a van from the farmlands to the urban depots which are mostly situated near the factories. During the field visit, it was found that many shrimp collectors/middlemen also take loan from the depot owners to give loan to the farmers or to buy shrimp from the farmers and thus is bound to sell shrimp to a particular depot owner. At the depots, some pre-processing activities such as washing, be-heading, icing and packaging are done before it goes to the factories for final processing. When the depot receives shrimp from different collectors, they immediately supply those either directly to the factories or deliver it to the moneylenders who take the responsibility to supply shrimp to the factories. Whichever way it is, the depot owners are not paid by the factories but by the moneylenders.

Most of the factories have a rule that the shrimp supplier of their factory should have a handsome amount of deposit in the bank, (about taka 10-20 lacs) so that the supplier can deliver the required amount of shrimps on an emergency basis even if the factory fails to pay them on time. As most of the depots do not have such deposits, they depend on the middlemen or moneylenders. The depot owners take loan from these lenders at the beginning of the shrimp cultivation year, and as mentioned above, they repay the money throughout the year by supplying shrimp to them at a lower price than the actual rate. So, in such situations depot owners deliver shrimp to factories, but they take the payment from the lenders who take the payment from the factories.

There are also a number of other players in the supply chain whose livelihoods depend on the sector as they are indirectly involved in the chain. They are ice sellers, ice factory owners, plastic box and sheet manufacturer, van operators, van owners, truck drivers and truck owners.
Thus a simple route from the hatchery to the factories takes a complicated and lengthy form of chain where the interest of a number of people is served. In the process it is probably the farmer who looses out most while the middlemen, even not being involved in the mainstream receive a dividend higher than the farmers. The long chain of interdependence observed in the shrimp cultivation and processing in Bangladesh is likely to create a chain reaction when any shock affects the sector.

2.6.2 Marine Capture Shrimp
In case of capture shrimp the supply chain is slightly different. Fishing is generally performed in three ways - by trawlers, mechanised and non-mechanised boats. The engine capacity of the trawlers ranges between 250 to 1250 horsepower (HP) while of mechanised boats it is up to 40 HP. Currently 67 trawlers, 21,830 mechanised and 28,707 non-mechanised boats are engaged in marine fishing (GOB, 2001a). Non-mechanised boats go for fishing for a day and fish caught by these boats are for the local market only.

There is a government regulation that no boat can stay in the sea for more than 30 days. Trawlers make a trip for 25-30 days at a time with about 20-25 people on board which include captain, crews, fishermen, processing workers and other labourers. All of them share fishing activities particularly during processing they cooperate with each other and work as processing workers. Shrimp processing is performed inside the trawler. Processed shrimp is packed with ice and is preserved inside the refrigerator within the boat. When trawlers land the shrimps are then supplied to the buyers.

Small mechanised boats can accommodate 12 to 15 people on board. They go out into the sea for a shorter period, usually for 15-20 days. These boats do not have processing facilities so they preserve the unprocessed shrimp with ice cube inside the boat. The owners of these boats do not have enough money to finance their journey to the sea. They have to borrow from the moneylenders and the loan system is the same as the culture shrimp production. When these boats land on the shore the boat owners had to sell shrimps to the moneylenders or local traders at a lower price to make up for the interest on the borrowed money. The traders then sell the shrimp to the processing factories. And the processing factories after processing the shrimp sell it to the buyers who then export them. Sometimes shrimps go through the depot owners. The moneylenders sell shrimp to the depot owners who then sell them to the processing factories. The supply chain of various shrimp production is shown in the following Figures.
Figure 5
Supply Chain of *Culture* Shrimp Production in Bangladesh

- **Shrimp Fry Collectors; Hatchery Operators/Owners**
  - Villagers collect shrimp fries from rivers and canals. Hatchery owners supply shrimp larvae to farmers. Farmers grow them up and sell adult shrimps.

- **Farmers (Larvae collectors)**
  - Farmers sell adult shrimp to middlemen. In many cases farmers take loan from them and are bound to sell shrimps to them.

- **Middleman (Shrimp Collectors; Moneylenders)**
  - Middlemen collect shrimps from different farmers and sell them to depots.

- **Fish Depot Owners/Preprocessing Centres**
  - Washing, be-heading, icing and packaging are performed at these pre-processing centres. Fish depot owners sell shrimp to the middlemen/moneylenders.

- **Middleman (Shrimp supplying agent or money lender/ procurement staff from the factories)**
  - Finally moneylenders sell shrimps to processing factories.

- **Transporters**
  - Transport in insulated vans from depot to the processing factory.

- **Exporters/Processing Factory**
  - Chilling, processing, storage.

- **Consignment for shipment**
Figure 6
Supply Chain of *Capture* Shrimp Production (Trawling Boats)

- **Fishing boat owners; Fishing crews**
  - Boat owners take loan from local traders or middlemen on condition to sell shrimp at a cheaper price. Fishing crews and workers perform be-heading of shrimp and use ice to preserve shrimp. Fishing crews take loan from the boat owners. Labourers take shrimp from boats to the depots as soon as they land.

- **Workers**

- **Middlemen/Traders/Agents**
  - Middlemen give loan to boat owners

- **Transporters**
  - Transport shrimp in insulated vans from the depots/landing centres to the processing centres

- **Processing Factories**
  - Exporters process shrimp either in their own processing plants or in rented plants. Processing, freezing and storage are done at this stage

- **Exported**
Figure 7
Supply Chain of Capture Shrimp in Bangladesh (Small Mechanised Boats)

Boat owners/fishing crews

These boats are small and do not have the processing facility. After catch unprocessed shrimps are preserved with ice cube.

Middleman/traders

When landed shrimps are sold to the middlemen; sometimes middlemen sell the shrimp to the depot owners and depot owners sell them to the processing factory; sometimes middlemen sell shrimps to the factories directly.

Depot/pre-processing centres

Shrimps transported to processing factories

Transporters

Processing Factory

Processing, freezing and storing

Exported
2.7 Poverty Situation in the Export Supply Chain

Defining poverty through a rapid rural appraisal or focus group discussion is difficult as there are several players in the sector and such an exercise will require an in-depth and detail interview with each of the players in the industry. Within the limited scope of the present study a primary assessment was made through discussion with the participants in the industry and also through observations during the field visit.

Shrimp farming is considered to be a profitable venture and most of the people involved in the sector are not so poor compared to others in the non-shrimp sectors in the villages of Bangladesh. In Khulna and Bagerhat districts many people are engaged in crop farming and forest resource harvesting (Sunderban mangrove forest being situated nearby). However many of them are also eager to take up shrimp farming as their primary occupation as they find it financially lucrative.

Classification of poverty is usually done by land ownership, daily calorie per capita intake or by income per day. Such categorization is neither suitable for the shrimp sector due to different nature of economic activity nor feasible due to time and resource constraints. Hence a simple and convenient category of poverty has been made for this study which include extreme poor, poor, moderate poor and not poor. These categories have been defined mainly by land ownership, access to basic needs of life, monthly income, savings and share in the shrimp caught.

Extreme poor and poor households do not own any land or own only a small piece of homestead land. Extreme poor often live on government land with the possibility of being evicted any time. The level of income of this group of people fluctuates from time to time depending on the availability of work and there may be periods when they can afford very little food for their family. For the poor families meeting the basic necessities of life is difficult. The moderate families own some agricultural land and have small capital. The not poor group is well off with the ownership of own land, big capital and other assets. They are rich to the extent that they own several acres of land, more than one fishing boats, big shrimp pond, a few cattle for agricultural production. They live in brick-built houses with proper facilities of cooking, can afford medical treatment at home or even abroad and wear good clothes.

The poverty ranking done through the FGD shows that fry collectors, hatchery workers, depot workers and processing workers are the poorest in the chain having a modest income to maintain their livelihood. These people do not have a piece of land of their own or any other assets, and access to other facilities of life such as health care and education is limited. Though children are supposed to be in government run schools which are free of cost many times they prefer to work as fry collectors or as day labourers to earn extra income for the family. Their houses are made of mud, bamboo and paddy straws with only one room in most cases. Cooking is done in open space or in shared kitchen with leaves, twigs and wood. The source of dinking water is shared tube well while cooking is performed with pond water. Semi-structured toilets made of mud, leaves and bamboo are not hygienic. Income from shrimp is the main source of their livelihood.
though they also take part as agricultural labour during the lean season (during October-December).

Among the processing workers women workers, particularly who are the main or only income earning members of the family are in the most abject situation. Older, widows and divorced are the economically vulnerable groups while unmarried girls and divorced or separated young women are both economically and socially vulnerable as they cannot negotiate on the amount of payment due to the apprehension of being abused or fired.

Fishing crews, ice van operators and artisanal fishermen who fish with non-mechanised small boats are also poor and live in a modest manner. Their income is not sufficient to meet up all the necessities of life. Other members of the family including women have to work to supplement the family income.

Though shrimp farming is a profitable industry, income of shrimp farmers are not so rewarding for everyone involved in farming. Income of shrimp farmers ranges between taka 1,500 to 30,000 depending on land ownership, size of pond and amount of investment made. Most of the shrimp farmers have education up to the primary level and a good number has studied up to higher secondary level also. The poor farmers without own land are mostly illiterate. Shrimp farmers are not extreme poor though some may be categorised as moderate poor with less than adequate income to run the family but many are quite well off and can maintain a good standard of living.

Fishing crews of the small mechanised boats and owners of non-mechanised boats belong to the ‘poor’ category as they find it difficult to run the family with the income received from fishing. Fishing crews of the trawling boats are slightly better off and do not have to face so much hardship to make their living out of the income.

Hatchery owners, depot owners, processing plant owners, ice factory owners, trawling boat owners, mechanized boat owners, middlemen, traders are also well off and have enough income to save and invest in other activities. These people are engaged in the industry for long and many of them have to face the risks and uncertainties in the industry and get affected directly.

Table 3 shows the poverty ranking and economic situation of the participants in the shrimp sector. This ranking is a tentative one and the economic condition described is only a general overview rather than an accurate account.
Table 3

Poverty Ranking and Economic Condition in the Supply Chain

<table>
<thead>
<tr>
<th>Stakeholder group</th>
<th>Wealth Rank (1-4)*</th>
<th>Economic Situation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fry Collector</td>
<td>1</td>
<td>Owns no asset, involved in other occupations; employment is not regular; subsistence living; no savings; woman members and children also involved in income earning activities; education and healthcare are beyond means; children also collect fries</td>
</tr>
<tr>
<td>Hatchery owner</td>
<td>4</td>
<td>Owns production asset; shrimp is the main source of income; earns a good income; employs workers; owns house; children go to school; has limited ability for medicare</td>
</tr>
<tr>
<td>Hatchery worker</td>
<td>1</td>
<td>Owns no asset; subsistence living; works as agricultural wage labourer during non-shrimp season; seasonal unemployment; other members of the family including woman also work for maintaining family; access to education and health care limited</td>
</tr>
<tr>
<td>Farmers</td>
<td>3 – 4</td>
<td>Income varies; some are educated; loan from informal sources; shrimp is the main source of income; other investment is made; children go to school; can afford health care facilities; woman members also work in some cases</td>
</tr>
<tr>
<td>Middlemen/local trader</td>
<td>4</td>
<td>Lending money is main occupation; involved in other activities; buys fish at low price and sell to the processors; sells a portion in the local market also; children go to school; able to afford health care facilities</td>
</tr>
<tr>
<td>Depot owner</td>
<td>4</td>
<td>Employs worker; other investments; loan from informal sources; shrimp processing major source of income; children go to school; able to afford health care facilities</td>
</tr>
<tr>
<td>Depot worker</td>
<td>1</td>
<td>No production assets; employment not regular, work as agricultural wage laborers during non-shrimp season; difficult to afford basic needs of life; other members of the family also work</td>
</tr>
<tr>
<td>Processing plant owner</td>
<td>4</td>
<td>Rich; made big investment; loan from formal and informal sources; shrimp is the main source of income; good living condition</td>
</tr>
<tr>
<td>Processing worker – woman</td>
<td>1</td>
<td>No production asset; low wages; no alternative employment; seasonal unemployment; sometimes only earning member; difficult to make a living with income</td>
</tr>
<tr>
<td>Processing worker – man</td>
<td>1</td>
<td>No production assets; low wages; employed in other activities during lean season; woman and other members of the family also work; low standard of living</td>
</tr>
<tr>
<td>Processing worker at the landing centre</td>
<td>1</td>
<td>Seasonal employment; difficult to get alternate employment; subsistence living; other members of the family work; cannot afford basis facilities of life</td>
</tr>
<tr>
<td>Ice van operator</td>
<td>2</td>
<td>Some are owners of the vans, some do not own and are paid van operators; seeks employment in...</td>
</tr>
<tr>
<td>Role</td>
<td>Vulnerability</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------------------------------</td>
<td>---------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Ice factory owner</td>
<td>4</td>
<td>Investment made; sells ice for various purposes including shrimp; loan from formal and informal sources; employs van operators; sometimes also owns van, has other sources of income</td>
</tr>
<tr>
<td>Small mechanized boat owner</td>
<td>4</td>
<td>Loan from informal source for the boat; fishing is the main occupation; high scale of operation; employs poor workers as fishing crew and other activities</td>
</tr>
<tr>
<td>Fishing crew - small mechanised boats</td>
<td>2</td>
<td>Income not sufficient to run the family; employment not regular; seeks other employment during non-fishing season; depends on informal loans for living</td>
</tr>
<tr>
<td>Trawler owner</td>
<td>4</td>
<td>Big investment and savings; loan from formal and informal sources; other investments and activities; scale of operation is high; employs staffs and workers; high standard of living</td>
</tr>
<tr>
<td>Fishing crew – trawl</td>
<td>3</td>
<td>Better off than small mechanised boat crew but no production assets; gets a share of fish; main income earner in the family</td>
</tr>
<tr>
<td>Non-mechanised boat owners</td>
<td>2</td>
<td>Irregular income; depends on informal source of credit; needs financial help from formal sources; subsistence living; woman members also work outside home</td>
</tr>
<tr>
<td>Procurement staffs/agents of processing plants</td>
<td>3</td>
<td>Fixed income paid by companies; comfortable living; access to basic needs no difficult</td>
</tr>
<tr>
<td>Exporter</td>
<td>4</td>
<td>Employs farmers, processing plant owners; makes big investment; credit available from formal and informal sources; receives export incentives from the GOB; involved in other activities; high standard of living; woman members may or may not work</td>
</tr>
</tbody>
</table>

* 1 = Extreme poor; 2 = Poor; 3 = Moderate poor; 4 = Not poor

### 2.8 Vulnerability: Shocks, Seasonality and Risks

In Bangladesh cyclone, flood and drought are perennial problems which have devastating impact on the lives, properties and natural resources. Fish resources are vulnerable to cyclone and flood since fish fries, fishing gears and fishing boats are damaged and lost during such natural shocks. Damages to infrastructures such as roads, culverts and bridges make it difficult to transport fish to the market and therefore, poor fishermen are forced to sell them at a cheaper price. Employment and livelihood situation of those involved in the sector is disrupted which leads to loss of income, and access to education and health care also becomes difficult for them during such shocks.

Fishing is a seasonal activity and cannot provide income for the whole year but usually for six to eight months. In Khulna the shrimp cultivating season is between January to September when people have a stable source of income. During the lean season fishing communities have to look for alternative employment which is also difficult due to pressure on the labour market. Many work as day labourers while many remain...
unemployed. In Chittagong where fishing is done in the sea the amount of catch varies from time to time due to non-availability of fish, particularly during April to July and salinity of water.

The sector suffers from various types of risks including the imposition of stringent regulations which is difficult to be implemented due to financial and technological constraints, and ban on imports by the importing countries which leads to wastages of resources and huge loss of income. Within the sector different groups of people face different types of risks due to various uncertainties. For example, small fishermen suffer from lack of cash when traders delay in making payment to them for the fish bought from fishermen or when they cannot get loan from the middlemen. This may delay in the preparation of fish cultivation.

The social risk associated with the sector is no less important. Women who never worked outside their homesteads are now work in the ‘ghers’, in shrimp depots and in the processing centres at low wages. Women have become more vulnerable to sexual harassment by employers as well as by their male co-workers.

Children of this area suffer from malnutrition and are compelled to become wage earners through shrimp fry collection at an early age. Women and children collect shrimp fry from the rivers and canals of the region. Exposed to cash income at an early age, Children have become unruly and rowdy, showing the tendency of anti-social behaviour.

The growth has occurred in an unplanned and uncontrolled manner in the southwest part of Bangladesh where a considerable amount of agricultural land have been converted to shrimp cultivation which led to the narrowing of livelihood opportunities of the rural poor. Agricultural labourer and sharecroppers have lost their jobs. Due to lack of capital these people are not even able to take a place in shrimp farming, processing or trading. Such process of marginalisation has been contributing to widening the gap between the rich and poor in the shrimp cultivating area. Socially vulnerable groups such as women and children suffer the most due to increased poverty.

2.9 Trade Liberalisation Policy in Bangladesh

2.9.1 Salient Features of Trade Policy
Since the 1990s the economy of Bangladesh is integrating with the global economy at a fast pace. As part of the structural adjustment programmes of the late 1980s and early 1990s Bangladesh undertook a number of initiatives towards trade liberalisation and trade promotion to stimulate exports and encourage investment in export-oriented activities. The major objective of these reforms was removal of anti-export bias, introduction of incentives for exports and facilitation of participation in global labour market. The policies of trade liberalisation were implemented through reduction of tariff rates, elimination of quantitative restrictions and reduction of tariff dispersion. Average tariff rates fell from 85 percent in 1991/92 to about 17 percent in 2000/01, and the number of commodities under quota restrictions shrunk from about 620 to 100. This has resulted in the following developments: (i) increased market access of foreign products through
reduction in tariff rates; (ii) accelerated growth of exports from the country; (iii) increased volume of foreign direct investment (FDI); and (iv) participation of a growing number of Bangladeshi workers in the global labour market. The export policy during the 1990s had introduced important structural shifts in the export pattern of the country in terms of both products and markets. The share of non-traditional exports, such as readymade garments, frozen foods, shrimp and leather products has increased compared to the traditional exports such as raw jute, jute products, bulk tea and raw leather. The ratio between traditional and non-traditional exports has changed dramatically from 40:60 to 10:90 between 1991 and 2001. Liberalization of trade has contributed to significant growth in the export sector of Bangladesh. Over the last decade real growth of the export sector was about 14 percent, which was about three times the average real GDP growth rate over the same period (Rahman, 2002).

The emergence of the export sector as a dominant factor in the economy has transformed Bangladesh from a traditional aid dependent country to a trading nation. The share of overseas development assistance (ODA) in total export earnings has dropped to 24.2 percent in FY03 from 158.1 percent in FY81. Similarly, the amount of ODA as percentage of total imports has come down to 15.8 percent in FY03 from 58.6 percent in FY81 (Bhattacharya, 2004). Table A14 in the Annex shows the trend in detail.

2.9.2 Trade Related Policies for the Fisheries Sector
Export of fish has been playing an important role in the export sector performance of Bangladesh in recent times. Frozen shrimp, dry fish, shark-fin, fish maw, crabs, tortoise and turtles are the export items in the category of frozen food, the export of which has reached US$ 330.13 mln in 2003 from US$ 147.6 mln in 1991. However, there is no separate trade policy for the export sector except for a value added tax (VAT) refund on fuel at the rate of taka 12.67 per litre (1998 prices) subsequent to the export (GOB, 2001b). The general incentives given to other sectors of the economy to boost up exports are also applicable to the fisheries sector. These include duty-free imports of capital machinery and raw materials, fiscal incentives for export, income-tax rebates, duty drawback facilities, fast customs clearance and subsidised credit.

2.10 Literature Review
Though the impact of trade reforms in the expansion of export oriented shrimp cultivation has been well documented in case of Bangladesh, work remains to be done in terms of studying the various issues related to investigating the implications of export bans through SPS measures and eco-labelling on the shrimp sector in Bangladesh.

The most cited study on the impact of SPS on the shrimp export from Bangladesh is the one done by Cato and Santos (2000). This study estimated that the cost of the EU ban on Bangladesh was US$65.1 mln based on a simulation exercise. According to the study Bangladesh suffered a net loss of US$14.7 mln during the period of the ban. Based on a survey of 19 shrimp processing plants in Bangladesh during April 1998 the authors estimated that the annual cost of maintaining the HACCP compliance programme was US$2.4 mln.
The issue of market access implications of SPS and TBT has been discussed in Rahman (2000). Referring to the study of Cato and Santos (2000) the study attempts to identify problems emanating from the provisions in these agreements which impact on market access capacity of Bangladesh and makes a number of propositions to address difficulties faced by Bangladesh.

A recent study has analysed the impact of SPS on the shrimp farming in Bangladesh through a survey at the farm level and at the farmer and worker level. According to the study to comply with the rules and regulations under HACCP, the frozen food exporters of Bangladesh spends about US$ 2.2 million per year and the GOB spends on an average US$ 225 thousands to maintain a HACCP monitoring programme. The estimated total cost to upgrade the existing facilities would be US$ 17.6 mln (IUCN, 2004).

A study on environmental impacts of trade liberalization policies on the shrimp farming industry in Bangladesh examined the environmental impacts of trade-related structural adjustment programmes (SAP) in the shrimp cultural industry on the basis of cost-benefit analysis. It was estimated that the total cost of shrimp cultivation (opportunity cost of land degradation, health costs in terms of mortality and morbidity, cost of mangrove destruction) varies from 0.23 to 0.33 percent of GDP of the country while the benefit (income of the industry received through the export of processed shrimp) is 1.1 percent, thus giving a cost-benefit ratio of 0.21 to 0.30 (UNEP, 1999).

Another study on fisheries subsidies and marine resource management in Bangladesh examined the impact of trade related policies on the marine fisheries sector using a bio-economic model. The study reveals that trade liberalization programme in Bangladesh has not had any detrimental effects on the fishing capacity or fishing practices as the actual yield of marine fisheries is below the maximum sustainable yield (MSY) (Khatun, Rahman and Bhattacharya, 2004).

None of the above studies, however, has addressed the issue of poverty and livelihood of the workers engaged in the fisheries sector and the impact of trade liberalisation policies on the poor workers and farmers in the industry. This study is the first one of its kind to analyse the relevant issues on the basis of field level survey.
III. SPS MEASURES AND ECO-LABELLING IN INTERNATIONAL TRADE AND THEIR RELEVANCE FOR BANGLADESH

3.1 WTO Regime and Bangladesh
Trade issues are of critical importance to Bangladesh due to its contribution to GDP, employment rate, and investment generation. With the decline in foreign aid received by the country, Bangladesh has to rely more on trade for the generation of foreign exchange. At present Bangladesh’s annual earnings from foreign trade is four times greater than the aid distributed by the developed countries. Therefore, Bangladesh has an active interest in the market access agreements negotiated at the WTO and the GATT Uruguay Round.

One of the major achievements of the GATT Uruguay Round was the inclusion of trade in agriculture and agricultural products through the global Agreement on Agriculture (AoA) since there has been a decline of tariff barriers on trade in tropical agricultural products through this agreement. But this has caused a rise in non-tariff barriers (NTBs) in the global trading system which has been unfavorable to the interests of developing countries and LDCs. Since about a third of the GDP of developing countries and LDCs are dependent on agriculture, the non-tariff barriers cause a potentially negative effect on the global trading capabilities of these countries.

So the potential opportunities rising from the AoA and other agreements of the WTO may be restricted because of the provisions of the Agreements on SPS and Technical Barriers to Trade (TBT), though they are intended to stimulate trade among countries. The Agreements on SPS and TBT are integral parts of the WTO and all member countries are expected to adhere to the underlying rational and provisions set by the SPS and TBT agreements.

As one of the founding members of the WTO Bangladesh was a signatory to the declaration of the Uruguay Round of the GATT which required that the country is bound to follow certain regulations under the multilateral trade regime. It also meant that Bangladesh would enjoy the benefit from the opportunities created by various agreements. However, lack of proper knowledge and awareness, poor access to information on the requirements, lack of expertise and trained people to examine compliance requirements, lack of technological capacity, and weak implementation and monitoring capacity had been major constraints in participating in the negotiations effectively. As regards the SPS measures Bangladesh did face similar constraints to deal with the compliance issues. The country suffered a deceleration in export earnings from the shrimp sector due to non-compliance under the SPS provisions.

The basis of the concept of the SPS measure is the General Agreement on Tariffs and Trade (GATT) article XX(b). At the time of establishment of GATT in 1947 it was specified that countries could take measures to protect human, animal or plant life or health as long as these did not discriminate between countries where the same conditions prevailed or were not a trade restriction in disguise. Under the SPS Agreement countries are encouraged to adopt international standards issued by international standard setting organizations, such as International Organization for Standardization (ISO) for product and product standards for manufacturing goods, the Codex Alimentations Commission.
for food safety, the International Office of Epizootics (IOE) for animal health and the Secretariat of the International Plant Protection Convention for plant protection.

The Agreement on TBT addresses eco-labeling. The objective of TBT is to ensure that product specifications and testing procedures do not create unnecessary obstacles to trade. It is intended to reduce the extent to which technical regulations and standards operate as barriers to market access, primarily encouraging the development of international standards.

Though labeling is less trade restrictive than many other regulatory measures, it can still have impact on trade on the basis of its content, scope and nature. Poorly designed labeling measures, whether voluntary or mandatory could have market access effects on all countries, particularly on developing and least developed countries (Laces). Labeling requirements to indicate the country of origin or geographical indicators can also affect trade and implicate intellectual property rights provisions in trade agreements. Since labeling requirements vary from market to market, producers may face difficulties to comply with such requirements, particularly in developing countries and Laces.

3.2 Major Features of the Agreement on SPS
The main objective of the SPS measures is to safeguard consumer interest in the member countries, while at the same time ensuring that such measures would not create unnecessary obstacles to international trade. Basic rules serve as guidelines regarding food safety, animal and plant health issues for both producers and exporters.

According to the Agreement, SPS measure is intended to protect: (I) human or animal life from food-borne risks which arise from the use of additives, contaminants, toxins and disease causing organisms; (ii) human health from animal or plant-carried diseases, and (iii) animals and plants from pests and diseases.

SPS measure focuses on: (a) setting certain standards and ensuring that the food supply is “safe” in accordance with standards that each country considers to be appropriate, provided that the standards are based on scientific facts; (b) international standards, guidelines and recommendations should form the basis of SPS measures if and when such standards exist; (c) the Agreement recognizes the possibility of diversity in standard settings and thus the members are expected to implement their respective measures based on internationally developed and accepted standards and take initiatives towards harmonization of standards.

The member countries may impose higher regulations than the prevailing international standards if the regulations are based on adequate risk assessment. When there is revision of current standards, and appropriate standards for particular products are absent, the member countries are required to:

- Justify why international standards do not satisfy the level of protection that the countries would like to ensure;
- They will need to make the risk assessment available to other member countries in the WTO in order to lend credibility and transparency to the standard setting process.
These are done to avoid level of standards that may result in obstacles to trade or discrimination between members with similar prevailing conditions.

Theoretically, SPS measures provide WTO member countries an opportunity to safeguard their interest in crucial areas of health and hygiene. However, proposed and endorsed by developed countries including the USA, the EU and Japan it faced objections from developing countries as they saw it acting as non-tariff barriers to trade, and suggested for international harmonization of such standards so that there was no scope for developed countries to impose arbitrarily strict standards. Though these positions were incorporated later during the Uruguay Round apprehension remained among Laces on the ground that there are certain provisions in the Agreement on the application of SPS measures, which act as border protection instruments. There are concerns that the incremental benefits of liberalization of trade under the Ana could, in effect, be undermined by protectionist use of SPS measures. Such protections may not necessarily be aimed at safeguarding the interest of domestic industries, but also the interest of favored trading partners, and developed country entrepreneurs investing abroad. More specifically, it is feared that if special safeguard clauses are not brought into play, including implementation of transfer of technology provisions in the SPS Agreement, access of Laces to developed country markets may be subjected to uncertainty and, thus, seriously constrained. Such uncertainties lead to volatility in key export sectors in Laces and consequently, undermine their export potentials and developmental prospects.

3.3 Major Features of the Agreement on TBT
The Agreement on TBT is related to international rules to product standards in the trade of goods. The five principles that guide TBT regulations are: (I) non-discrimination; (ii) harmonization; (iii) least trade restrictive measures; (iv) equivalence, and (v) transparency. The technical regulations are implemented by governments to attain certain objectives: (a) prevention of deception practices; (b) protection of human and animal health, and (c) protection of environment.

The TBT encourages countries to participate in various international standard-setting organizations and to develop their own national standards when there is an absence of standards or the existing standards are inappropriate. Under the TBT agreement governments are not bound to use international standards if it is deemed inappropriate due to, for instance, technological or geographical reasons.

3.4 Special and Differential Provisions under SPS and TB Agreements
The Special and Differential (S&D) provisions in the Agreements of SPS and TBT recognised the following five issues regarding developing countries and LDCs:

- That compliance with SPS and TBT measures would entail commitment of substantive financial resources on the part of developing countries and LDCs;
- That there is a danger that these measures may potentially be used as restrictive instruments;
- That these agreements leave wide space for interpretive ambiguities which will need to be resolved through the dispute settlement mechanism in the WTO;
- That the global community will need to come up with resources to enable developing countries and LDCs to comply with the various provisions of the SPS and TBT and
- That the grey and emerging areas in these agreements will need to be addressed through continuing negotiations.

Despite such S&D provisions SPS and TBT measures have been considered to have negative impact on the exports from developing countries and LDCs. Due to resource and technological constraints these countries lack complete information on the measures and their impact on their exports. They are also unaware of measures which are consistent with SPS agreement and which are not (Zarrilli, 1999). SPS requirements are based on international standards, particularly on developed country standards which are difficult to implement by LDCs.
IV. IMPACT OF SPS MEASURES ON THE SHRIMP INDUSTRY IN BANGLADESH

4.1 Application of SPS Measures: EU Ban on Imports of Bangladesh Shrimp
The sanitary issue related to fisheries products and fish trade is dealt through the Agreement on SPS measures of the WTO. The case of the EU ban on imports of shrimp from Bangladesh in 1997, imposed on the ground of health safety and hygiene, is a case in point which encapsulates many of the concerns related to SPS measures.

In July 1997 the EU imposed a ban on imports of shrimp products from Bangladesh into the EU on the ground that exports of this commodity did not meet the stringent provisions of EU’s HACCP regulations. The ban originated from (a) concerns as regards standards in areas related to health safeguards, quality control, infrastructure and hygiene in the processing units, and (b) lack of trust in the efficiency of the controlling measures carried out by designated authorities in Bangladesh, in this particular case, the DOF. Thus, both firms and the GOB were put on the dock. The ban put the country's shrimp export industry under severe strain, and led to serious market disruptions from which the country is still trying to recover.

Shrimp processed for global markets has to comply with the international standards specified by Codex Alimentarius Commission provisions and has to meet buyer specifications as well as the regulatory requirements of the importing country. Unfortunately, as in many other LDCs, Bangladesh has difficulty in meeting with the required safety standards and quality requirements. Problems with quality compliance arise at a pre-processing phase at the stage of handling of raw shrimp (harvesting, sorting by size and colour, removal of heads and peeling which are often carried out under conditions and facilities that are unsuitable from hygiene perspective) and also at the processing stage (absence of high quality water and ice, irregular electricity supply, poor infrastructure and transportation facility) which seriously constrain Bangladeshi firms' ability to pursue modern sanitary practices. As is the case in other LDCs, Bangladeshi plants do not have sufficient funds to invest in expensive mechanical equipment, fishing boats, quality control measures and training staffs. The GOB's governance capacity to design, implement and monitor quality and safety compliance is also very weak. Thus, whilst the EU’s concern about quality and safety compliance by Bangladeshi plants was reasonably justified, and in principle, conformed to the SPS provisions of the WTO, the underlying causes of the country's lack of capacity to address the EU concerns must also need to be factored-in into the equation.

The ban was imposed following the EU’s inspection of Bangladesh's seafood processing plants in July 1997 which raised questions as regards compliance with HACCP regulations in the processing plants in Bangladesh. The visiting team also expressed its doubt with respect to reliability and efficiency of the controlling function of the GOB inspectors. The EU determined that consuming fishery products processed in Bangladesh posed a significant risk to public health in the EU member countries.
4.2 Impact of SPS Measures on Poverty and Livelihoods
Bangladesh experienced short term and medium term impact from the actions undertaken to comply with the SPS measures. From the economic point of view, though it left a recoverable shock in the export earnings system, the impact it had on the individual contributors of these sectors is more important. From the experience of field visits in the major shrimp production and processing areas (Khulna, Bagerhat and Chittagong) of the country, it is found that the qualitative impact on the rural economy and on the livelihood is more appealing than any quantitative macro-economic impact.

The shrimp processing factories faced the short term effects as they dealt with the initial ban and had to renovate the factory and the whole processing process according to the SPS regulations. In the medium term the workers had to face various economic and social problems as can be understood from the following discussion.

It should be noted that in case of the marine shrimp HACCP regulations are not applied yet since the EU does not buy marine shrimps. The major market for marine shrimp is Japan since it does not require any HACCP compliance measure. Therefore, there is no impact of such measure on the livelihood of the marine shrimp producers as yet.

4.2.1 Farmers
When any shock such as the decline in international prices of shrimps occurs, it affects all the members in the chain as a chain-reaction. But each member of the chain has an opportunity to pass it to the immediate next group by collecting shrimp at lower prices. The farmers on the other hand do not have any such group to pass the burden since they bought larvae from hatchery. The farmer easily becomes a defaulter due to chain reaction. They do not get the required profit since they have to sell their products at lower prices. When a farmer becomes a defaulter, it becomes difficult for him to get loan again to start the business. Others in the chain get support from the government but farmers are always left alone. So any shock such as a ban on the export leaves an unrecoverable impact on the people who are at the initial stage of the chain such as the farmers.

4.2.2 Transporters
To comply with the SPS measures, the transporters of shrimps are in a dilemma with the repeated change in government decisions. In Bangladesh very few factories have their own refrigerated transportation vehicles while others depend on tracks, scooters and non-engine vans. The transporters store the shrimp in a cane or bamboo made container and use cubic ice to preserve the shrimps. Following the EU ban, they were asked to use plastic containers to prevent possible fungus infection which may be produced from the bamboo containers. The transporters invested their capital to buy new containers. However, after a while they were asked to change the container and to use plastic barrels as the previously prescribed containers were found unsafe as it contains dirt in the holes. Absence of a sustainable policy of the DOF makes the poor transporters misuse their limited capital. Such frequent changes made the poor transporters invest within a short span of time through difficulty.
4.2.3 Processing Factories
Processing firms are affected in the medium term when they found it difficult to make more investment for upgradation to be HACCP compliant. Investment became the prime concern for most of the processing factories when they were asked to spend a large amount of money to renovate their factories. The government took a very supportive initiative and asked the banking sector to provide interest free loan to the factories for an amount of taka 40 to 50 lacs. The government paid the interest on behalf of the exporters while the loan was adjusted from the factories’ export earnings. However, the amount was not enough for many factories who had to spend more money for renovation. Some took loan from informal channels like relatives, friends and local moneylenders. During the period factories could not get the permission to export to the EU countries and counted loss on their balance sheet.

Following the EU ban, the international price of shrimp declined very sharply which put the vulnerable companies into more trouble. The companies who bought the unprocessed shrimp from the local market with a higher price had incurred loss on export due to low international price. Then the shrimp exporters association took a decision to buy the unprocessed shrimp at a cheaper price which only passed the problem on to the lower group of the business chain i.e. to the farmers who was deprived of the actual price. However, the farmers cannot divert the problem to any other groups in the chain but to carry it on their shoulder.

However, the factories managed to overcome the difficulties and according to some factory managers, the renovation process helped them to increase their export to the EU countries. But the smaller plants could not withstand the shock and had to stop their operation. The number of such factories which could not survive because of raw materials and bank loan is 78. This meant loss of jobs and reduction in employment opportunities.

4.2.4 Male Processing Workers
The closure of the factories which were unable to comply with HACCP measures had a livelihood implication for the workers in the factories as well as for the people in the region as a whole since the workers who lost their jobs had to be accommodated in the job market which created a pressure on the small employment market in the region. A few could be absorbed in other big factories, some found a place as agricultural labourers or other wage labourers but many could not get a regular source of income for several months. Being placed at the bottom of the poverty line they did not have any savings to live on during the period of unemployment. Therefore, they had to borrow from relatives and moneylenders at a high interest rate. These workers still live in abject poverty and are deprived of the basic needs of life.
Case Study 1
A Male Processing Worker Who Lost His Job

*Anwar Hussein*, 35 is an agricultural labourer now. He lives in a village in Botiaghata upazilla, an extensive shrimp cultivating area, 10 km from the Khulna city. He is married with 3 children – two daughters and 1 son and his wife. He does not have any land for agricultural activity. He used to work in a processing factory for six years. In 1997 he lost his job for a reason unknown to him during that time. Later he got to know from various sources about HACCP. When he lost his job he could not find any work immediately and had to rely on his wife’s earning who used to work in a rich household as a domestic help. After a month or so he tried to collect larvae from the river and ponds but could not continue this as he was not adept in it. He then started to work as an agricultural labourer in exchange of taka 50 per day and food. Now he earns about taka 70 daily. He sends two of his children to schools but does not know whether he can send them for higher studies when they finish their primary school since he has to spend money for secondary education. When asked if he wants to go back to shrimp processing firms if opportunities arise he replied in the positive since he was involved there for so long. Moreover his employment in agriculture is seasonal and there is hardly any scope for other activities during the period when he does not have any work. But when he was in the processing firms he could work as an agricultural labourer during the lean season in the shrimp industry.

4.2.5 Female Processing Workers

Before the EU ban in 1997, the factories in most cases used to collect head-less shrimps from the depots. The depot owners collected shrimps from the local traders/middlemen and used rural people, especially women to be-head shrimps. It was a good source of earning for many women living in the shrimp cultivating villages. As the villagers were engaged in this process many processing depots were situated near the villages. The HACCP regulation made it compulsory to process shrimps in highly sanitized rooms in the factory. Thus shrimp processing has shifted from the rural depots to the urban factories. It has also moved women workers from their home to the cities. The workers now work in the factories and live either in the factory hostels if there is any or in the nearby rental houses leaving their family behind in the villages.

This puts a very shocking impact on the rural livelihood system. During the field visit to several factory-hostels and rental houses, discussions were made with the workers who previously worked in the village depots and now work in urban factories. As described by the women processing workers impacts of being SPS compliant are as follows.

a. Disruption of Families

The women who could maintain a family while working in nearby depots mentioned that some of them had to sacrifice their family life when they migrated to the city for their job. One worker, named *Razia* informed that she has been divorced for almost ten years and used to live in the village with her youngest daughter. Now that she had to move to city, she left her youngest daughter at her eldest daughter’s (the married one, whose husband is a day labourer) house and no one now lives at her house in the village. Another woman called *Sufia*, told that her husband lives in the village with her sons and work in a shrimp cultivating farm. But she had to move away as there is no suitable job for women in the cultivation process and the only thing she could do is processing of adult shrimps which is now being shifted to the factory area. Thus the HACCP regulation made a shocking impact on the rural families by splitting the women workers from their families.

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b. Change in the Household Economy
The shift of labor following the shift of job affected the household economy in the villages. Women who used to work in the depots also did look after the cattle and home side plantations which did bring some extra money for the family. Women who left their houses for jobs in the city factories informed that now there is no one to look after those cattle or plants. Therefore they either had to sell their cow before leaving the village or leave them with the neighbours or relative in exchange of giving a share from their income or benefit.

c. Increased Living Expense
The migration has increased the living expenses too as the workers now have to travel once or twice a month between their families in the village and their work place. Moreover, some workers who maintain families in the village mentioned that the living cost has increased too as they now maintain two households.

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**Case Study 2**
**Tale of A Woman Processing Worker**
Amina is a woman processing worker in her thirties and married with a son. She used to live in a village in Dumuria upazilla of Khulna district. Her husband is a shrimp cultivation worker who works in a shrimp Gher (farm). She used to work in a processing depot nearby her village. Processing depots were mostly situated near the villages so that women workers could easily come and work there. Now after the introduction of HACCP measures, the processing has shifted to urban factories. Since Amina was a processing worker and there was no suitable job for her in the shrimp cultivation, she too had to shift from her village to the town where factories are situated. Now she is working in Sigma Sea Foods Ltd., and lives in a hostel of the factory with other workers. It was a bit difficult for her to make such arrangements since she had to leave her family behind. This change has created structural inconveniences and economic problems. First, she is now detached from her family and is deprived of a regular family life. Second, her cost of living has increased as she has to manage two families now one her own in the town and the other in the village. Moreover, she has to travel once or twice a month to her village home to meet her family, which involves a cost. She has to spend about 300 taka (US$ 5) for each travel to her village. Third, there is a peak and off-peak season in shrimp industry. When she used to live in the village she was involved in a number of activities like rearing cattles, poultry, homestead plantations etc., which are mostly managed by women in the villages of Bangladesh. These brought some extra money during the off-peak season. But after the shift to the urban factory there is no one to look after her poultry, cattle or plants. So in the off-peak season she faces a financial crisis since she cannot earn any extra income now. One positive impact of HACCP is that Amina can concentrate more on her work which was a bit difficult earlier due to her responsibility towards the family. Now she can work longer and thus gets more money. However, as mentioned earlier the increased living cost and loss of income from homestead activity due to the change in family structure cannot be made up by this extra income from slightly long working hours.

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4.3 Impact on Foreign Exchange Earnings
Cato and Santos (2000) made an in-depth study of the negative impact of the EU ban on import of shrimp from Bangladesh. The ban remained effective for five months, between August and December 1997 and caused serious injury to this export-oriented sector. Export of frozen shrimp from Bangladesh to the EU between August and December was zero. The aforementioned study carried out simulation exercises based on with and without ban scenarios and arrived at an estimate of about US$ 65.1 million as the cost of the EU ban for Bangladesh (Table A15 in the Annex). Some of the plants did indeed
succeed in diverting a large part of their intended shipment to the USA and Japan and, thereby, were able to cut down the losses. In spite of such efforts, the estimated net loss was equivalent to about US$ 14.7 million. These were evidently short-term losses. The medium to long-term losses stemming from loss of the sector's momentum, market diversions, erosion in price offered to exporters were, in all probability, much higher.

Subsequently, the GOB and the shrimp entrepreneurs made substantial investment to ensure HACCP compliance in the export-oriented shrimp sector of the country. Special credit programmes were designed and support of a number of global organisations were sought. Cato and Santos estimated that the total cost of upgrading the facilities and equipment, and training the staff and workers for achieving acceptable sanitary and technical standards was about US$ 18.0 million (Table A16 in the Annex). The annual cost of maintaining the HACCP programme was estimated to be US$2.4 million. Initiatives included processing upgradation to match HACCP requirements, implementation of quality control measures, ensuring that HACCP compliance is monitored on a continuing basis and providing training to the GOB staff in the DOF and at the firm level in terms of HACCP compliance (with support from the FAO).

When the ban was gradually lifted and Bangladeshi plants were allowed to export to the EU in a phased manner, export of shrimp to the EU, from its initial setback due to the ban, began to pick up. Shrimp exports to the EU had earlier come down from US$128.9 million in FY1997 to US$48.2 million in FY1998. In FY1999 exports had gone up to US$ 89.3 million and in FY2000 to US$ 124.9 million. Evidently, Bangladesh shrimp industry was able to address the emergency situation consequent upon the ban, and did recover a large part of the lost ground. However, obviously the momentum was lost, and Bangladesh's export of shrimp is still to attain the pre-crisis level of FY1997. The risk of similar punitive measures continue to haunt Bangladesh, and not only in the shrimp sector. Such concerns continue to reincarnate in the shrimp turtle debate in the shrimp sector, the child labour and the azodye use debate in the RMG sector, and the trade union debate in the export processing zones (EPZs).

4.4 Impact of Shrimp Culture on the Environment
The impact of shrimp culture on the environment is not related to the EU ban but to the overall practice of shrimp culture in Bangladesh. Therefore, even with high profitability and great export potential the sector brings along a number of problems and risks for the environment. Environmental impacts in terms of salinisation of the soil, reduction in agricultural production, decrease in cattle production and destruction of mangrove forests have been the reason for concerns for the habitants of the region as well as for the policy makers. Shrimp cultivation is also blamed to have negative impact on bio-diversity. Saline water has destroyed trees and grasses of the area. Shrimp farmers have also killed crab population.

The method of shrimp fry collection is harmful for other fish species. Shrimp fries are collected from open waters and fries of other fish are destroyed during shrimp fry collection. Though there is a ban from the GOB on shrimp fry collection from open waters it has never been enforced strictly.
It is reported that there has been a decline in the cultivation of agricultural crops and destruction of grazing land due to salinity which has generated a fodder crisis. Most of the farmers have sold off their cattle due to lack of adequate fodder for cattle except for a few farmers who need cattle for agricultural activities. Decline in the number of cattle has decreased the supply of milk leaving a negative impact on the nutritional status of the people of this region. Salinity had impact on the vegetation in the region which means that people have to rely on firewood instead of leaves and twigs. This may put pressure on the trees of the Sundarban forests.

Agricultural farmers have lost the opportunity to produce multiple crops on their lands. Even the production of the one crop they are allowed to cultivate has been greatly reduced because of the shrimp farmers’ insistence that no chemical fertiliser or pesticide can be used on those lands.

In the marine sector fishing performed by the engine boats pollute the water and the surrounding environment by burning diesel. This is harmful for marine resources.
V. POSSIBLE IMPACT OF ECOLABELLING ON THE SHRIMP SECTOR OF BANGLADESH

5.1 Issues and Concerns of Eco-Labelling

Labelling is providing information to producers and consumers on the health and environmental impact of products. It enables consumers to be informed about characteristics of the product or its conditions of production. Eco-labels are seals of approval given to a product that are supposed to have little impact on the environment than functionally or competitively similar products (OECD, 1991). In the context of fisheries labels are used to distinguish fish that are caught using sustainable method from fish that are not. Eco-labels rely on the life cycle assessment (LCA) to determine the environmental impact of a product ‘from cradle to grave’ (Staaffin, 1996).

At the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, Brazil governments agreed through Agenda 21 to “encourage expansion of environmental labelling and other environmentally related product information programmes designed to assist consumers to make informed choices” (UNDP, 1992). Agenda 21 also encourages the LCA. The World Summit on Sustainable Development (WSSD) in 2002 recognised the importance of consumer information related to sustainable consumption and explicitly noted the need to continue work in this area (UNDP, 2002). Eco-labelling was one of the ten items of the work programme of the CTE’s agenda on trade and environment. The Committee on Trade and Environment (CTE) of the WTO is given the mandate to steer debate on the issue of eco-labelling through paragraph 32 of the Doha Ministerial Declaration (WT/MIN/(01)/DEC/W/1, 2001).

Increasing awareness of environmental issues has led to a situation where environmental characteristics of products have become increasingly important to consumers resulting in a growing market in developed countries for what are called “green products”. Eco-labels that highlight their environmental attributes are placed on these products. In order to protect consumers’ interests, governments and non-governmental organisations have organised, adopted and verified eco-labelling programmes. Thousands of products in more than 25 countries are covered by these eco-labelling schemes, which have different names in their respective countries such as Germany’s Blue Angel Mark, Taiwan’s Green Mark, Canada’s TerraChoice and Japan’s EcoMark. The International Organisation for Standardisation (ISO) has taken initiatives to develop international standards within the ISO 14000 series for eco-labelling.

Eco-labelling can help better management of natural resources which is essential for conservation and sustainable use of bio-diversity. Through consumer preferences for resources which are derived in an environmentally friendly way it is possible to improve environmental management and raise environmental standards. There is a potential for growth in the market share of eco-labelled products since interest for eco-labelling in the fisheries sector is increasing. If fisheries management improves due to efforts undertaken to comply with certification criteria, the potential benefits to fisheries will be much higher than revenue.
Eco-labelling is seen as an important tool in gaining access to ‘green’ markets. For the producers who are willing and able to meet the requirements, eco-labelling offers an opportunity to add value to existing products, reach further into existing markets and maintain market share in a competitive market (UNCTAD, 1994). The effectiveness of eco-labelling depends on the awareness of the consumers about environmental matters. Though the intention of eco-labelling is not to discriminate between products, nevertheless differentiation between products take place in order to identify the environmentally preferred products. Eco-labelling is an opportunity to benefit from the use of environmentally friendly production method (Downes and Van Dyke, 1998).

It is now being recognized that eco-labelling could provide much needed incentives for better long-term stewardship and availability of natural resources important for national economic welfare. Eco-labelling can also be a helpful tool in helping countries to fulfill commitments made under international agreements on important environmental imperatives. It could also provide new opportunities for attracting capital investments and joint ventures in developing countries. The importance of eco-labelling is becoming apparent due to the current WTO negotiations on environmental goods and developing countries should find strategic trade interests within this sector.

Eco-labelling scheme has been criticised in view of a number of issues raised by many governments and civil society.

- There are criticisms for lack of transparency and participation opportunities in the development of product standards such as those that might play a role in assessment of sustainability.
- Eco-labelling may cause discriminatory effects. Labels may be based on domestic environmental priorities and technologies in the importing country and may overlook acceptable products and manufacturing processes in the country of production.
- The financial cost of eco-labelling may be quite high. There are two aspects to this (a) the cost of adjusting production processes to ensure that the product will receive the relevant eco-labels, and (b) the expense to subscribing to and maintaining participation in the eco-labelling programme.
- Voluntary schemes may indirectly affect trade due to institutional factors in producing countries. Institutional factors could include difficulties faced by producers in some countries in obtaining adequate supplies of materials, environmentally friendly technologies and other materials, which are acceptable for use in, or necessary to comply with standards for eco-labelled products.
- Eco-labelling schemes could create a situation where both consumers and retailers prefer to buy and stock only labelled products and so some producers may have difficulty in finding buyers for their unlabeled products.
5.2 Possible Impact of Eco-Labelling
The global market for shrimp is becoming increasingly demanding in terms of environmental requirements in the context of growing awareness about environmental issues and concerns both at producers’ and consumers’ end. Maintenance of requisite standards is becoming a key factor in global marketing of shrimp products. An increasing interest in terms of eco-labelling is therefore, emerging in the global market. Though eco-labelling is considered to be an informal international environment-promoting tool and in most cases these are voluntary in nature its introduction in shrimp exports from Bangladesh need to be actively considered since many developed countries have already adopted eco-labelling schemes. The inability or unwillingness of Bangladesh to do this may lead to weakening of her competitive strength and erosion of her global market share. However, eco-labelling involves costly process and technology modifications in order to make the product environmentally friendly. On the other hand, this cost may be compensated to some extent by market expansion for a more environment friendly product and through movements of the value chain into the relatively higher quality segment of the global market. Such initiatives towards eco-labelling will also have implications for production and processing practices in Bangladesh with varying impact on the people involved in the production chain and on their livelihoods.

Bangladesh may turn the eco-labelling requirements to its advantage by improving the quality of shrimp exported from the country and by achieving environmentally sustainable shrimp production. However, there are several challenges in doing so: (a) how to implement such measures without affecting the livelihoods of the stakeholders in the industry, (b) how to achieve the capacity to obtain certification which may amount to 50 percent of total production costs in some cases, and (c) how to internalise social costs associated with WTO rules. Therefore, it is apprehended that the possible negative effects may outweigh the benefits of being compliant.

In Bangladesh eco-labelling has not been implemented as yet. During the field visit of this study it was observed that unlike HACCP neither the exporters nor the farmers are aware of eco-labelling. When the issue was explained to them most of them thought that it was another barrier to export of their shrimp from Bangladesh.

If environmentally sustainable shrimp production practice can be ensured it is believed that the country will benefit not only environmentally but also economically though such achievements are not without costs. Since eco-labelling schemes have not been adopted in Bangladesh as yet only a theoretical discussion is done here with the help of the matrix of possible benefits and costs associated with eco-labelling process at the farm and national level (as presented in Table 4).
Table 4
A Matrix on the Benefit and Cost of Eco-labelling

<table>
<thead>
<tr>
<th>BENEFIT</th>
<th>At the Farm Level</th>
<th>At the National Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indicators</strong></td>
<td><strong>Environmental performance</strong></td>
<td>Through eco-labels factories can help countries to fulfill commitments made under various international agreements on important environmental imperatives such as responsible fisheries and sustainable use of bio-diversity</td>
</tr>
</tbody>
</table>
| **Economic benefit and trade consideration** | - Eco-labelling may increase export competitiveness and strengthen market positions  
- A compelling business choice for potential growth in the market share through green products  
- An opportunity to add value to existing products;  
- A way to increase export earning through product differentiation by doing eco-labels  
- May induce innovation of more environment friendly production method | - May provide opportunities for capital investment and joint ventures with fishing enterprises from other countries  
- Increased foreign exchange reserve |
| **Corporate Image** | Eco-labels may help achieve corporate image of companies among regulators, customers and the public | Improve the image of the exporting country at the international market |

<table>
<thead>
<tr>
<th>COST</th>
<th>At the Farm Level</th>
<th>At the National Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost of upgradation</strong></td>
<td>May involve installation of equipments and upgradation of management system. Costs vary from factory to factory depending on whether they already have a formal management system or whether they are compliant with existing environmental regulations</td>
<td>Development of environmental infrastructure, setting up environment friendly technology</td>
</tr>
</tbody>
</table>
| **Cost of certification** | Cost of acquiring information on certification and standards may be high for small suppliers | - Improvement of the quality and quantity of data on fisheries required for certification  
- Development of certification and eco-labelling infrastructure |
| **Cost of training** | Hiring consultants for training the farmers and all categories of factory workers | Hire expensive foreign consultants in absence of certification and eco-labelling infrastructure |
5.3 Tentative Estimation of Benefit and Costs of Eco-labelling

In the absence of actual information on the impact of eco-labelling a tentative estimation of cost and benefit is done to understand the outcome of eco-labelling schemes in Bangladesh. Because of its negative image in the international market Bangladesh gets a lower price for its shrimp though it is produced in natural way. It has been observed that it gets at least 10 percent lower than the price received by Thailand which implies that Bangladesh is incurring a loss of about $30 mln or taka 1.74 bln per year. This is about 0.05 percent of total GDP of the country. If Bangladesh can improve its position by complying with the international market demand and also by implementing environmental measures such as eco-labelling. It has been estimated in an earlier study that the cost of shrimp cultivation due to land degradation, loss of livestock, health impact and mangrove destruction is taka 35 mln in 1994 prices. Adjusting with the GDP deflator the current (2003) cost is estimated to be taka 49.6 mln. This cost is actually the benefit lost due to shrimp cultivation which is not environmentally sustainable. Therefore, total forgone income because of environmental non-compliance is taka 1.79 bln (1.74 bln + 0.049 bln).

The benefit cannot be compared with the cost since it is difficult to estimate the cost of upgradation, certification and training for eco-labelling without any information on these. Moreover some of the costs are fixed which are not comparable with the yearly gains from the shrimp sector.

However, SSOQ has estimated the cost of introducing a Seal Of Quality to be in the range of US$500,000 to 2,000,000 with its yearly operating costs of around US$300,000 to 500,000. The potential costs for establishing a hatchery certification scheme are equivalent to US$500,000 per annum, excluding the costs for setting up laboratories (US$265,000) (GOB, 2002).

5.4 Initiative for Environment Friendly Shrimp Production in Bangladesh

There has been an initiative to address the issue of eco-labelling along with other compliance issues through giving Seal of Quality on the shrimp exported from Bangladesh. The SSOQ has prepared the Code of Conduct pertaining to food safety, traceability, environmental sustainability, and human rights in the Bangladesh shrimp industry. SSOQ will certify hatcheries, farms, and processors who comply with these Codes of Conduct. SSOQ monitors and verifies implementation of the recommended management practices that are recommended by SSOQ for improving productivity.

These Codes of Conduct will enable the Bangladesh shrimp industry to progress towards safe, traceable, environmentally sustainable, and ethical production. SSOQ has developed these codes in consultation with a range of stakeholders from the shrimp industry and civil society. The codes are based on a review of international and national standards as well as an understanding of the economic, social, and environmental issues facing the Bangladesh shrimp industry.

These codes will apply to all participants in the shrimp production chain, including shrimp hatcheries, farms, transport, and processing plants who are certified by SSOQ. These codes are voluntary and have no legal status; no penalty can be applied to any
participant for failing to follow the code of practice and compliance does not offer any exemption from legal or regulatory requirements under Bangladeshi law.

For environmental sustainability SSOQ sets the following requirements to be fulfilled by the producers.

- Only hatchery produced seed shall be used
- There shall be no import or cultivation of non-indigenous shrimp species
- The Food Conservation Ratio for commercial feed shall not exceed two to one
- Only surface water shall be used in shrimp cultivation; no ground water may be used
- Daily water exchange from shrimp farms shall not exceed five percent
- Shrimp production and processing facilities shall not divert or obstruct public water flows
- Mangrove ecosystems shall not be used for new shrimp farm development
- Efforts should be made to maintain and restore natural habitat, vegetative buffer zones, and habitat corridors
- Earthen structures, such as dikes and canals shall be constructed, and water movement managed, in a manner to minimize erosion and seepage
- All water shall meet SSOQ Effluent Discharge Standards before discharge
- Effluents and solid wastes shall be disposed of in an environmentally sustainable manner
- Internationally banned antibiotics, drugs and other chemical compounds, as listed in SSOQ’s Banned Compound List, shall not be used.

5.5 Impact on the Poverty and Livelihood
As in the case of HACCP, in the short term the direct impact of eco-labelling will be on the exporters in terms of increased investment to be equipped for environment friendly, to get a certificate from an accreditation agency and to give training to the staffs. In the process some of the factories may close down if financial assistance is not provided by the government which will imply that the workers in the factories and in the whole production chain will lose their jobs. This will create a pressure on the already crowded labour market in the rural areas which will have serious livelihood implications for the poor people thrown out of the industry. While the factory owners will be able to survive from their savings and other investments the poor processing and other ancillary workers such as transporters will have to bear the brunt of poverty and destitution. It is likely that some will be able to diversify in other professions but many will not, particularly those whose livelihoods depend only on the shrimp processing factories.
VI. CONCLUSIONS AND RECOMMENDATIONS

The shrimp sector has been geared to export oriented expansion which has resulted in huge export earnings at the national level and large number of employment generation in the coastal areas of Bangladesh. However, the achievement is not impressive on all counts. Therefore, with the growing importance of shrimp as one of the important export items from Bangladesh, it is important to efficiently utilize the capacity of shrimp farms and processing plants, carefully maintain the quality of the exported item through appropriate quality control measures and internalise the environmental costs arising from the production process. In order to perform these an appropriate policy and a sectoral strategy are required as the sector suffers from both policy and institutional failure. As has been mentioned that the NFP 1998 has announced a policy for the shrimp sector. The policy, however, does not focus on livelihood aspects of the poor involved in the sector and does not ensure access to resources by the poor communities and their participation in the decision making process. It also lacks vision for dealing with some of the trade measures which constrain the market access capacity of Bangladesh in the developed countries.

In view of the inadequacies in the shrimp policy to tackle the emerging issues and the challenge to deal with the emerging compliance regulations at the global level a number of recommendations may be made for the shrimp industry in Bangladesh.

1. **Assessment of the Sector:** A complete assessment of the sector has to be made to have a full overview of the production, yield, capacity utilization, production method, effort level and economic contribution. It is essential in order to formulate a policy for the sector. Information on the number of players of the sector and their activities should be comprehensive. A clear understanding of the role of various stakeholders, their economic and social background, their role, their demand and priorities is also important for the policy makers to suggest a useful and practical strategy.

2. **Monitoring of Shrimp Farms:** Being the most profitable economic activity shrimp farming is a lucrative profession for many in the coastal region. In the absence of any policy shrimp farming are taking place in an unplanned way causing economic, environmental and social problems. Strict supervision and monitoring system is needed to stop further conversion of agricultural land into shrimp farming. Imposition of strict environmental regulation is also required in order to protect the ecological balance of the area.

3. **Increase Yield and Capacity Utilisation:** As shrimp processing firms are operating at the below capacity level it is important that shrimp farmers increase their yield. Since land is scarce resource in Bangladesh yield should be increased by better management practice by the shrimp farms. If shrimp farms could double their yield per acre of land, shrimp processors could increase their processing capacity up to 50 percent without bringing new land under shrimp farming (IUCN, 2004). However, to be able to do that shrimp farmers need training on better
management of their ponds and should have access to information on various rules and regulations.

4. **Close Supervision of Quality Control**: In order to ensure the market access the quality control of shrimp at every stage in the export chain is a must. Inspection by the concerned government official from time to time and giving guidance and training on a continuous basis on the developments of relevant rules and regulations should be a regular practice for all the licensed shrimp processing plants. The EU regulations have forced the shrimp sector to undertake certain measures which have improved the processing standards at the exporting plants. However, quality control at other points of the production system, such as landing and procurement centres is equally important for the industry to be competitive in the global market.

5. **Access to Information**: Clear knowledge on the requirements under various rules and regulations of the WTO is the pre-requisite for compliance. At the current multilateral trade regime rules are being changed and evolved continuously. It is difficult for the shrimp exporters of Bangladesh to follow and understand all the relevant developments right away due to lack of information. Therefore, information should be shared through training on the requirements of the buyers. The Ministry of Commerce (MOC) may help in giving training on the rules and regulation related to shrimp exports. The Ministry can also share information through its WTO cell on the relevant issues.

6. **Awareness Building**: The consequences of being non-compliant should be taken into cognisance by all concerned. In case of shrimp exports, the EU had been giving signals to Bangladesh for quite sometime before the imposition of the ban but there was lack of awareness of the actual meaning of such indication by the importers both at the government level and among the private processing plants.

7. **Market Diversification**: Bangladesh should also do marketing in other countries including Asia to promote its shrimp export. The share of export to Japan and Australia may be increased since these countries are less stringent on HACCP rules. The country will be able to expand its market for shrimp through advocacy and active initiative as Bangladeshi shrimps are produced in a natural process.

8. **Coordination of Activities**: The production and export of shrimp involve various activities and its management has many cross-cutting issues which means that the development of the sector depends on coordinated actions of a number of organizations including ministries, departments, agencies, private sector and NGOs. The ministries which have a role include MOFL, MOEF, MOA, MOL and MOC. Coordination among so many ministries is a big challenge. Private sector has taken up activities such as hatchery and processing of shrimps since long. The private sector can also take part in quality assurance, certification, marketing and extension to increase the production efficiency and quality. NGOs should be involved as management partners of the government for the shrimp cultivating
areas. This will help reduce social tensions among various groups in the cultivating areas and ensure participation of the poor communities in all activities including decision making process.

9. **Financial Support:** Farmers, depot owners, small boat owners and transporters suffer from lack of capital to perform fishing activities. They have to rely on informal sources such as middlemen and traders for credit at a very high cost. Access to the formal channels of credit may be considered for these participants of the shrimp cultivation.

10. **Infrastructural Development:** In case of shrimp farming many of the depots have tube wells and do not have the facility of running water. Therefore, it is very difficult to perform cleaning and washing activities. The availability of ice is not adequate and the shrimp transporting vans are not well equipped with proper freezing facilities. The cleanliness of the ice cannot be ensured always since the quality of water used for making ice is poor. For the marine sector a cold storage near the landing centre is an urgent need as the quality of fish deteriorates by the time it is taken to nearest factories. Uninterrupted power supply in the ice factories and in the processing factories is also crucial for maintaining the freshness of the fish and for fetching a higher value in the international market.

11. **Ensuring Security and Reducing Tensions:** There are several incidences of robbery, abuse and violence in the shrimp farms. Tensions prevail between the local people and the non-resident shrimp farm owners who are considered to be outsiders by the local people. The local poor feel that they have a right on the farms while the outside farm owners employ local musclemen to take care of their ponds and to tackle any unexpected situation. There are also complaints that the processing workers are deprived of getting the right amount of payment for their work. If they demand or protest they are thrown out of the jobs. A central monitoring cell should be established to oversee and solve such problems. The local NGOs can play an important role in reducing tensions among various groups as they are familiar with the locality. The village leaders, and educated and respected persons in the community may be involved in it.

12. **Capacity Building in Trade Issues:** Lack of proper knowledge and awareness, poor access to information on the requirements, lack of expertise and trained people to examine compliance requirements, lack of technological capacity, and weak implementation and monitoring capacity had been major constraints in participating in the trade negotiations effectively. As regards the SPS measures Bangladesh did face similar constraints to deal with the compliance issues due to which the country suffered a deceleration in export earnings from the shrimp sector. Eco-labelling may become another obstacle for the country’s shrimp export. However, awareness on the issue is almost non-existent among the concerned sections of the people. In order to understand the trade issues, particularly the market restricting ones and to understand their implications on the economy of Bangladesh the country needs technical assistance (TA) and capacity
building (CB). TA and CB are needed for the development of national standardisation bodies, conformity assessment services and accreditation agencies. These programmes should be available for officials of the MOFL, MOC, MOA and MOEF. All members in the export chain of shrimp production, members of the civil society institutions, academia, NGOs, private sector, business community and consumers should also be included for CB programmes.

13. **Mainstreaming of Fisheries Sector:** The livelihood concerns of fishermen should be reflected in the poverty reduction strategy (PRSP) of the country. A balanced strategy has to incorporate the issue of food security and equal opportunities for all the participants of the sector. Especially, poor fishermen and the marginalised women who have been the losers of the EU ban should be provided with credit for alternative source of income.

14. **Playing a Proactive Role at the International Level:** In view of the experience that Bangladesh had in dealing with the SPS issue it is important for Bangladesh to play a proactive role in the standard setting process at the global level. It should emphasise that regional conditions should be considered if there is an issue of harmonisation of standards arise.

15. **Full Implementation of S & D Provisions:** Bangladesh should take advantage of the S & D provisions and negotiate for their full implementation in situations such as the ban on shrimp exports. Considering the socio-economic and technological situation importing countries should give adequate time for taking preparatory measures before taking any stern action such as the imposition of ban on exports. Being an LDC Bangladesh should bargain for adequate financial and technical assistance for conformance with SPS and TBT requirements.
REFERENCES


BBS, Statistical Yearbook of Bangladesh, Various Issues.


SSOQ, (2003) “Codes of Conduct for Shrimp Production in Bangladesh”, Shrimp Seal of
Quality, Dhaka, Bangladesh.


**ANNEX TABLES**

**Table A1**

<table>
<thead>
<tr>
<th>Year</th>
<th>HDI Value</th>
<th>HDI Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>0.365</td>
<td>143</td>
</tr>
<tr>
<td>1996</td>
<td>0.371</td>
<td>147</td>
</tr>
<tr>
<td>1997</td>
<td>0.440</td>
<td>150</td>
</tr>
<tr>
<td>1998</td>
<td>0.461</td>
<td>146</td>
</tr>
<tr>
<td>1999</td>
<td>0.470</td>
<td>132</td>
</tr>
<tr>
<td>2000</td>
<td>0.478</td>
<td>145</td>
</tr>
<tr>
<td>2001</td>
<td>0.502</td>
<td>139</td>
</tr>
<tr>
<td>2002</td>
<td>0.509</td>
<td>138</td>
</tr>
</tbody>
</table>

*Source: UNDP, HDR Reports.*

**Table A2**

<table>
<thead>
<tr>
<th>Country</th>
<th>Life expectancy at birth</th>
<th>Adult literacy</th>
<th>GDP per capita (ppp US$)</th>
<th>Life expectancy index</th>
<th>Education index</th>
<th>GDP index</th>
<th>HDI (Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>60.5</td>
<td>40.6</td>
<td>1610</td>
<td>0.59</td>
<td>0.45</td>
<td>0.46</td>
<td>0.502</td>
</tr>
<tr>
<td>India</td>
<td>63.3</td>
<td>58.0</td>
<td>2840</td>
<td>0.64</td>
<td>0.57</td>
<td>0.56</td>
<td>0.590</td>
</tr>
<tr>
<td>Pakistan</td>
<td>60.4</td>
<td>44.0</td>
<td>1890</td>
<td>0.59</td>
<td>0.41</td>
<td>0.49</td>
<td>0.499</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>72.3</td>
<td>91.9</td>
<td>3180</td>
<td>0.79</td>
<td>0.82</td>
<td>0.58</td>
<td>0.730</td>
</tr>
<tr>
<td>Nepal</td>
<td>59.1</td>
<td>42.9</td>
<td>1310</td>
<td>0.57</td>
<td>0.50</td>
<td>0.43</td>
<td>0.499</td>
</tr>
</tbody>
</table>

*Source: UNDP, 2003.*

**Table A3**

<table>
<thead>
<tr>
<th>Area</th>
<th>Average Monthly Consumption Expenditure</th>
<th>Food and Beverage</th>
<th>Clothing and Footwear</th>
<th>Housing and House Rent</th>
<th>Fuel and Lighting</th>
<th>Household Effects</th>
<th>Miscellaneous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>90.14</td>
<td>54.60</td>
<td>6.28</td>
<td>9.00</td>
<td>6.81</td>
<td>1.41</td>
<td>20.31</td>
</tr>
<tr>
<td>Rural</td>
<td>77.07</td>
<td>59.29</td>
<td>6.53</td>
<td>5.70</td>
<td>7.19</td>
<td>1.22</td>
<td>18.22</td>
</tr>
<tr>
<td>Urban</td>
<td>141.6</td>
<td>44.55</td>
<td>5.73</td>
<td>16.05</td>
<td>6.00</td>
<td>1.81</td>
<td>24.79</td>
</tr>
</tbody>
</table>

*Source: BBS, 2001.*
Table A4
Water Area under Different Fisheries in Bangladesh

<table>
<thead>
<tr>
<th>Source</th>
<th>Water Area (ha)</th>
<th>Fish Production (000 mt), 2002</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. INLAND WATER</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) Inland Open Water (Capture)</td>
<td>4,920,316 (92.27 % of total inland)</td>
<td>688 (46.64 % of total fish production)</td>
</tr>
<tr>
<td>(1) River and Estuaries</td>
<td>1,031,563</td>
<td></td>
</tr>
<tr>
<td>(2) Beel</td>
<td>114,161</td>
<td></td>
</tr>
<tr>
<td>(3) Kaptai Lake</td>
<td>68,800</td>
<td></td>
</tr>
<tr>
<td>(4) Flood Plain</td>
<td>2,832,792</td>
<td></td>
</tr>
<tr>
<td>(5) Polder/Encloser</td>
<td>873,000</td>
<td></td>
</tr>
<tr>
<td>(b) Inland Close Water (Culture)</td>
<td>412,341 (7.73 % of total inland)</td>
<td>787 (53.35 % of total fish production)</td>
</tr>
<tr>
<td>(1) Pond and Ditches</td>
<td>265,500</td>
<td></td>
</tr>
<tr>
<td>(2) Oxbow Lake</td>
<td>5,488</td>
<td></td>
</tr>
<tr>
<td>(3) Shrimp Farm</td>
<td>141,353</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>5,332,657 (ha)</td>
<td>1475</td>
</tr>
<tr>
<td><strong>B. MARINE FISHERIES WATER</strong> (sq. miles)</td>
<td></td>
<td>415</td>
</tr>
<tr>
<td>(a) Territorial Water (up to 12 nautical miles from the base line)</td>
<td>2,640</td>
<td></td>
</tr>
<tr>
<td>(b) Exclusive Economic Zone (200 nautical miles from the base line)</td>
<td>41,040</td>
<td></td>
</tr>
<tr>
<td>(c) Continental Shelf (up to 40 fathom depth) Excluding Internal and Territorial Water</td>
<td>24,800</td>
<td></td>
</tr>
<tr>
<td>(d) Coast Line</td>
<td>710</td>
<td></td>
</tr>
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</table>

*Source: DOF, 2002.*
### Table A5

**Fish Production from Various Sources (000 mt)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Inland Capture</th>
<th>Inland Culture</th>
<th>Total Inland</th>
<th>Marine Trawl</th>
<th>Marine Artisanal</th>
<th>Total Marine</th>
<th>Total (Inland plus Marine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>573</td>
<td>264</td>
<td>837</td>
<td>12</td>
<td>241</td>
<td>253</td>
<td>1091</td>
</tr>
<tr>
<td>1995</td>
<td>591</td>
<td>317</td>
<td>908</td>
<td>11</td>
<td>253</td>
<td>264</td>
<td>1173</td>
</tr>
<tr>
<td>1996</td>
<td>609</td>
<td>379</td>
<td>988</td>
<td>12</td>
<td>258</td>
<td>270</td>
<td>1258</td>
</tr>
<tr>
<td>1997</td>
<td>599</td>
<td>486</td>
<td>1085</td>
<td>13</td>
<td>261</td>
<td>274</td>
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<td>575</td>
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<td>15</td>
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<td>273</td>
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<td>593</td>
<td>1242</td>
<td>16</td>
<td>294</td>
<td>310</td>
<td>1552</td>
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<td>657</td>
<td>1327</td>
<td>16</td>
<td>317</td>
<td>333</td>
<td>1661</td>
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<td>2001</td>
<td>689</td>
<td>712</td>
<td>1401</td>
<td>23</td>
<td>356</td>
<td>379</td>
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<td>787</td>
<td>1475</td>
<td>25</td>
<td>390</td>
<td>415</td>
<td>1890</td>
</tr>
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</table>

*Source: DOF, 2003.*

### Table A6

**Value Added by Fisheries Sector**

<table>
<thead>
<tr>
<th>Year</th>
<th>Inland (bln taka)</th>
<th>Marine (bln taka)</th>
<th>Fishery GDP (bln taka)</th>
<th>% of fishery in total GDP</th>
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</thead>
<tbody>
<tr>
<td>1994</td>
<td>55.62</td>
<td>10.20</td>
<td>65.82</td>
<td>5.04</td>
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<tr>
<td>1995</td>
<td>65.38</td>
<td>10.93</td>
<td>76.31</td>
<td>5.21</td>
</tr>
<tr>
<td>1996</td>
<td>73.67</td>
<td>11.83</td>
<td>85.50</td>
<td>5.36</td>
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<tr>
<td>1997</td>
<td>82.59</td>
<td>13.82</td>
<td>96.42</td>
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<tr>
<td>1998</td>
<td>92.30</td>
<td>16.44</td>
<td>108.74</td>
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<tr>
<td>1999</td>
<td>106.72</td>
<td>18.13</td>
<td>124.85</td>
<td>5.89</td>
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<tr>
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<td>117.30</td>
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<td>136.74</td>
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<td>2001</td>
<td>111.51</td>
<td>22.55</td>
<td>134.06</td>
<td>5.47</td>
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<tr>
<td>2002</td>
<td></td>
<td></td>
<td>137.49</td>
<td>5.24</td>
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</table>

*Source: BBS, 2001.*
### Table A7
Export of Fish and Fish Products, and its Share in Total Export Earnings

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Fish Exports (mt)</th>
<th>Value (taka mln)</th>
<th>Value ($ mln)</th>
<th>Percentage if total export earnings</th>
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</thead>
<tbody>
<tr>
<td>1992</td>
<td>22080</td>
<td>5243.4</td>
<td>137.44</td>
<td>6.91</td>
</tr>
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<td>1993</td>
<td>26607</td>
<td>7002.9</td>
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<td>7.57</td>
</tr>
<tr>
<td>1994</td>
<td>31835</td>
<td>9209.6</td>
<td>230.24</td>
<td>9.12</td>
</tr>
<tr>
<td>1995</td>
<td>41686</td>
<td>13069.4</td>
<td>325.10</td>
<td>9.38</td>
</tr>
<tr>
<td>1996</td>
<td>38929</td>
<td>13409.4</td>
<td>328.34</td>
<td>8.44</td>
</tr>
<tr>
<td>1997</td>
<td>41549</td>
<td>14574.1</td>
<td>341.31</td>
<td>7.75</td>
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<td>1998</td>
<td>30158</td>
<td>13878.1</td>
<td>305.28</td>
<td>5.93</td>
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<td>1999</td>
<td>28477</td>
<td>13793.3</td>
<td>287.00</td>
<td>5.41</td>
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<tr>
<td>2000</td>
<td>35134</td>
<td>17813.2</td>
<td>354.07</td>
<td>6.28</td>
</tr>
<tr>
<td>2001</td>
<td>38988</td>
<td>20328.0</td>
<td>376.72</td>
<td>5.77</td>
</tr>
<tr>
<td>2002</td>
<td>41482</td>
<td>16371.0</td>
<td>303.39</td>
<td>4.76</td>
</tr>
</tbody>
</table>

*Source: Department of Fisheries, GOB, Various Issues.*

### Table A8
Types of Fish and Fish Products Exported from Bangladesh

*(Value in 000 taka)*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Live fish</td>
<td></td>
<td></td>
<td></td>
<td>1881</td>
<td>3261</td>
</tr>
<tr>
<td>2. Frozen Fish (Pacific Salmon, Tunas and other)</td>
<td>1477316</td>
<td>709820</td>
<td>928257</td>
<td>927046</td>
<td>725318</td>
</tr>
<tr>
<td>3. Fish fillet/other meat fish</td>
<td>18944</td>
<td>41244</td>
<td>2761</td>
<td>17127</td>
<td></td>
</tr>
<tr>
<td>4. Dried Fish, Salted Fish, Sharkfins, Smoked/Salted Fish, Fish Maws, Unsalted Dry Fish and other</td>
<td>338942</td>
<td>352393</td>
<td>440819</td>
<td>495888</td>
<td>438012</td>
</tr>
<tr>
<td>5. Frozen Lobsters, Frozen Shrimps, Frozen Prawns, Fresh Shrimps,</td>
<td>10800742</td>
<td>11825327</td>
<td>12132687</td>
<td>14774580</td>
<td>18015097</td>
</tr>
</tbody>
</table>

| Total in Taka | 12,635,944 | 12,928,784 | 13,501,763 | 16,202,156 | 19,198,815 |
| Total in US $ | 295.85      | 284.40      | 280.88      | 321.92      | 355.80     |

Table A9
Shrimp Production in Bangladesh and its Share in Total Fish Production

<table>
<thead>
<tr>
<th>Year</th>
<th>Total fish production (mt)</th>
<th>Inland (mt.)</th>
<th>Marine (mt.)</th>
<th>Shrimp (mt)</th>
<th>% of shrimp in total fish production</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992-1993</td>
<td>1020654</td>
<td>770162</td>
<td>250492</td>
<td>23530</td>
<td>2.31</td>
</tr>
<tr>
<td>1993-1994</td>
<td>1090610</td>
<td>837566</td>
<td>253044</td>
<td>28302</td>
<td>2.60</td>
</tr>
<tr>
<td>1994-1995</td>
<td>1172868</td>
<td>908218</td>
<td>264650</td>
<td>34030</td>
<td>2.90</td>
</tr>
<tr>
<td>1995-1996</td>
<td>1257940</td>
<td>988238</td>
<td>269702</td>
<td>46223</td>
<td>3.67</td>
</tr>
<tr>
<td>1996-1997</td>
<td>1360468</td>
<td>1085764</td>
<td>274704</td>
<td>52272</td>
<td>3.84</td>
</tr>
<tr>
<td>1997-1998</td>
<td>1463579</td>
<td>1190761</td>
<td>272818</td>
<td>62167</td>
<td>4.25</td>
</tr>
<tr>
<td>1998-1999</td>
<td>1552417</td>
<td>1242620</td>
<td>309797</td>
<td>63164</td>
<td>4.07</td>
</tr>
<tr>
<td>1999-2000</td>
<td>1661384</td>
<td>1327585</td>
<td>333799</td>
<td>64647</td>
<td>3.89</td>
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<tr>
<td>2000-2001</td>
<td>1781057</td>
<td>1401560</td>
<td>379497</td>
<td>64970</td>
<td>3.65</td>
</tr>
<tr>
<td>2001-2002</td>
<td>1890459</td>
<td>1475039</td>
<td>415420</td>
<td>65579</td>
<td>3.47</td>
</tr>
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</table>

Source: BBS, Various Issues.

Table A10
Export of Shrimp and its Share in GDP

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Export ($ mln)</th>
<th>Total Fish Export ($ mln)</th>
<th>Total Shrimp Export ($ mln)</th>
<th>% of shrimp in total export</th>
<th>% of shrimp in total fish export</th>
<th>Total GDP ($ mln)</th>
<th>% share of shrimp in GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>2382.89</td>
<td>178.91</td>
<td>155.48</td>
<td>6.52</td>
<td>86.90</td>
<td>32862.3</td>
<td>0.36</td>
</tr>
<tr>
<td>1994</td>
<td>2533.90</td>
<td>230.24</td>
<td>197.67</td>
<td>7.80</td>
<td>85.85</td>
<td>34588.1</td>
<td>0.45</td>
</tr>
<tr>
<td>1995</td>
<td>3472.56</td>
<td>325.10</td>
<td>260.70</td>
<td>7.51</td>
<td>80.19</td>
<td>38119.9</td>
<td>0.52</td>
</tr>
<tr>
<td>1996</td>
<td>3882.42</td>
<td>328.34</td>
<td>270.51</td>
<td>6.97</td>
<td>82.39</td>
<td>41374.1</td>
<td>0.63</td>
</tr>
<tr>
<td>1997</td>
<td>4418.28</td>
<td>341.31</td>
<td>279.22</td>
<td>6.32</td>
<td>81.81</td>
<td>44235.3</td>
<td>0.61</td>
</tr>
<tr>
<td>1998</td>
<td>5161.20</td>
<td>305.28</td>
<td>260.41</td>
<td>5.05</td>
<td>85.30</td>
<td>46868.8</td>
<td>0.60</td>
</tr>
<tr>
<td>1999</td>
<td>5312.86</td>
<td>287.00</td>
<td>242.23</td>
<td>4.56</td>
<td>84.40</td>
<td>48327.2</td>
<td>0.54</td>
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<tr>
<td>2000</td>
<td>5752.20</td>
<td>354.07</td>
<td>322.43</td>
<td>5.61</td>
<td>91.06</td>
<td>49320.9</td>
<td>0.49</td>
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<tr>
<td>2001</td>
<td>6467.30</td>
<td>376.72</td>
<td>349.75</td>
<td>5.41</td>
<td>92.84</td>
<td>50376.8</td>
<td>0.64</td>
</tr>
<tr>
<td>2002</td>
<td>5986.09</td>
<td>303.39</td>
<td>252.18</td>
<td>4.21</td>
<td>83.12</td>
<td>50630.3</td>
<td>0.69</td>
</tr>
<tr>
<td>2003</td>
<td>6548.44</td>
<td>330.13</td>
<td>297.04</td>
<td>4.54</td>
<td>89.98</td>
<td>52303.7</td>
<td>0.48</td>
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### Table A11

**Major Markets for Bangladeshi Frozen Shrimps**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Value ($ mln)</td>
<td>% of total fish export</td>
<td>Value ($ mln)</td>
<td>% of total fish export</td>
</tr>
<tr>
<td>USA</td>
<td>9.53</td>
<td>39.33</td>
<td>12.59</td>
<td>39.06</td>
</tr>
<tr>
<td>UK</td>
<td>2.87</td>
<td>11.87</td>
<td>4.57</td>
<td>14.18</td>
</tr>
<tr>
<td>Japan</td>
<td>3.22</td>
<td>13.28</td>
<td>3.62</td>
<td>11.24</td>
</tr>
<tr>
<td>Belgium</td>
<td>2.67</td>
<td>11.03</td>
<td>2.69</td>
<td>8.35</td>
</tr>
<tr>
<td>Netherlands</td>
<td>1.17</td>
<td>7.04</td>
<td>2.65</td>
<td>8.21</td>
</tr>
<tr>
<td>Thailand</td>
<td>1.63</td>
<td>6.75</td>
<td>2.23</td>
<td>6.92</td>
</tr>
<tr>
<td>Germany</td>
<td>1.2</td>
<td>4.94</td>
<td>1.99</td>
<td>6.19</td>
</tr>
<tr>
<td>China</td>
<td>0.31</td>
<td>1.26</td>
<td>0.45</td>
<td>1.4</td>
</tr>
<tr>
<td>France</td>
<td>0.24</td>
<td>0.99</td>
<td>0.56</td>
<td>1.73</td>
</tr>
<tr>
<td>Canada</td>
<td>0.27</td>
<td>1.12</td>
<td>0.29</td>
<td>0.89</td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td></td>
<td>0.20</td>
<td>0.62</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td></td>
<td>0.01</td>
<td>0.11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>23.11</td>
<td>97.62</td>
<td>31.95</td>
<td>99.12</td>
</tr>
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</table>

*Source: Export Promotion Bureau, GOB.*

### Table A12

**Total Export and Average Unit Price of Frozen Shrimp of Bangladesh**

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Export ($ mln)</td>
<td>260.41</td>
<td>242.23</td>
<td>322.43</td>
<td>349.75</td>
<td>252.18</td>
<td>297.04</td>
</tr>
<tr>
<td>Total Volume (kg mln)</td>
<td>18.67</td>
<td>20.13</td>
<td>28.13</td>
<td>29.71</td>
<td>30.2</td>
<td>25.67</td>
</tr>
<tr>
<td>Price per kg. in $</td>
<td>13.95</td>
<td>12.03</td>
<td>11.31</td>
<td>11.77</td>
<td>8.35</td>
<td>11.59</td>
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</table>

*Source: Computed from EPB.*
Table A13
National Fishery Plans

<table>
<thead>
<tr>
<th>Long-term Plans</th>
<th>Production Target (lac tonnes)</th>
<th>Achieved Production (lac tonnes)</th>
<th>Fisheries Development Budget (taka crore)</th>
<th>Total Plan Size</th>
<th>% of Total Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>First FYP (1973-78)</td>
<td>10.24</td>
<td>6.43</td>
<td>3000</td>
<td>44550</td>
<td>6.73</td>
</tr>
<tr>
<td>Two Year Plan (1978-80)</td>
<td>8.08</td>
<td>6.45</td>
<td>440</td>
<td>38610</td>
<td>1.14</td>
</tr>
<tr>
<td>Second FYP (1980-85)</td>
<td>13.34</td>
<td>7.74</td>
<td>3100</td>
<td>172000</td>
<td>1.80</td>
</tr>
<tr>
<td>Third FYP (1985-90)</td>
<td>10</td>
<td>8.47</td>
<td></td>
<td>386000</td>
<td></td>
</tr>
<tr>
<td>Fourth FYP (1990-95)</td>
<td>12</td>
<td>11.7</td>
<td>7490</td>
<td>620000</td>
<td>1.21</td>
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<tr>
<td>Fifth FYP (1997-2002)</td>
<td>20.75</td>
<td></td>
<td>5861.8</td>
<td>1959521</td>
<td>0.30</td>
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</table>

Source: Five Year Plans, GOB.

Table A14
Graduation of Bangladesh from an Aid Dependent to a Trading Nation

<table>
<thead>
<tr>
<th>ODA as % of</th>
<th>FY81</th>
<th>FY 91</th>
<th>FY 01</th>
<th>FY 03</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>5.8</td>
<td>5.6</td>
<td>2.9</td>
<td>2.8</td>
</tr>
<tr>
<td>Import</td>
<td>58.6</td>
<td>49.9</td>
<td>14.7</td>
<td>15.8</td>
</tr>
<tr>
<td>Export</td>
<td>158.1</td>
<td>100.9</td>
<td>22.8</td>
<td>24.2</td>
</tr>
<tr>
<td>Remittance</td>
<td>-</td>
<td>225.6</td>
<td>72.7</td>
<td>51.8</td>
</tr>
<tr>
<td>Revenue Receipt</td>
<td>106.2</td>
<td>79.0</td>
<td>30.6</td>
<td>26.8</td>
</tr>
<tr>
<td>ADP Financing</td>
<td>-</td>
<td>87.0</td>
<td>46.0</td>
<td>42.0</td>
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<tr>
<td>Fiscal Deficit</td>
<td>-</td>
<td>66.9</td>
<td>50.1</td>
<td>52.5</td>
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Table A15
Estimates of the Net effect on the Bangladesh Frozen Shrimp Exporting Industry and the Major Importing Markets due to the EU Ban on Bangladesh Seafood Exports in Mid 1997

<table>
<thead>
<tr>
<th>Importing Region</th>
<th>Without Ban</th>
<th>With Ban</th>
<th>Net Effect*</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>73.5</td>
<td>102.2</td>
<td>28.7</td>
</tr>
<tr>
<td>European Union</td>
<td>65.1</td>
<td>0</td>
<td>-65.1</td>
</tr>
<tr>
<td>Japan</td>
<td>22.7</td>
<td>26.1</td>
<td>3.4</td>
</tr>
<tr>
<td>All others</td>
<td>7.5</td>
<td>25.8</td>
<td>18.3</td>
</tr>
<tr>
<td>Total (to Bangladesh)</td>
<td>168.8</td>
<td>154.1</td>
<td>-14.7</td>
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</table>

Note: * From August to December 1997. Values are in $ mln.
Source: Cato and Santos (2000).
Table A16
GOB Investment for Upgradation of Seafood Inspection Facilities

<table>
<thead>
<tr>
<th>Items</th>
<th>Cost of Upgradation of Government Facilities</th>
<th>Expected Annual Expenditure for HACCP Monitoring Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Equipments</td>
<td>104.6</td>
<td>34.3</td>
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<tr>
<td>New Laboratories</td>
<td>86.1</td>
<td>11.4</td>
</tr>
<tr>
<td>Employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New</td>
<td>8.0</td>
<td>97.3</td>
</tr>
<tr>
<td>Training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New employees</td>
<td>0</td>
<td>3.4</td>
</tr>
<tr>
<td>Existing</td>
<td>1.8</td>
<td>2.3</td>
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<tr>
<td>Quality Inputs</td>
<td>1.0</td>
<td>32.0</td>
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<td><strong>Total</strong></td>
<td><strong>201.5</strong></td>
<td><strong>180.7</strong></td>
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</table>

Source: Cato and Santos (2000).

Table A17
Cost of Ensuring HACCP Conformity in Shrimp Processing Plants of Bangladesh

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Cost to Upgrade Plant to Adequate Technical Sanitary Standards</th>
<th>Expected Annual Cost to Maintain HACCP Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost to Date</td>
<td>Additional Cost Anticipated</td>
</tr>
<tr>
<td>Technical Advice</td>
<td>3.6</td>
<td>0.2</td>
</tr>
<tr>
<td>Employee Training</td>
<td>1.8</td>
<td>0.2</td>
</tr>
<tr>
<td>Sanitation Audits</td>
<td>6.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Plant Repair/Modifications</td>
<td>165.9</td>
<td>27</td>
</tr>
<tr>
<td>Added Equipment Cleaning</td>
<td>25.5</td>
<td>3.5</td>
</tr>
<tr>
<td>Rejected Product</td>
<td>2.5</td>
<td>0.3</td>
</tr>
<tr>
<td>Lab Installation</td>
<td>30.9</td>
<td>5.4</td>
</tr>
<tr>
<td>All Other</td>
<td>3.1</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>239.6</strong></td>
<td><strong>37.6</strong></td>
</tr>
</tbody>
</table>

Source: Cato and Santos (2000).
<table>
<thead>
<tr>
<th>Name of the Organisations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh Frozen Foods Exporters Association (BFFEA)</td>
</tr>
<tr>
<td>Bangladesh Shrimp Farmers Association (BSFA)</td>
</tr>
<tr>
<td>Department of Fisheries, Government of Bangladesh</td>
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<tr>
<td>Shrimp Foundation</td>
</tr>
<tr>
<td>APEX Food</td>
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<tr>
<td>Coastal Sea Food Ltd</td>
</tr>
<tr>
<td>Shrimp Seal of Quality (SSOQ)</td>
</tr>
<tr>
<td>IUCN Bangladesh</td>
</tr>
<tr>
<td>The European Union</td>
</tr>
<tr>
<td>Export Promotion Bureau (EPB)</td>
</tr>
<tr>
<td>The World Fish Centre</td>
</tr>
<tr>
<td>Bangladesh Standards and Testing Institute</td>
</tr>
</tbody>
</table>