SHRIMP SUB-STRATEGY

Department of Fisheries

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January 2006

Table of contents

Summary

A. Introduction

The export of shrimp and prawn is an important contributor to economic growth in Bangladesh generating more than US$300 million annually. In the interim Poverty Reduction Strategy Paper (iPRSP), shrimp sector development is emphasised as an important means of reducing poverty and boosting pro-poor growth through increasing exports and improving export performance and competitiveness. The sector is currently the second largest source of export earnings, selling to major markets in the United States, Japan, United Kingdom, Netherlands, Belgium and France.. There is considerable potential for increasing export earnings further but this requires that existing deficiencies are addressed and the industry positions itself more effectively to respond to market demands and the changing international trading environment.

This document outlines a strategy for the shrimp sub-sector based on wide consultations with stakeholders and existing analyses of the sector. The shrimp sector sub-strategy is one of seven sub-sector strategies that are being developed as part of the National Fisheries Strategy to provide a framework for implementing the National Fisheries Policy. The strategy adopts a comprehensive approach covering many areas and sets out a series of objectives and targets. Within the strategy document several policy and sectoral concerns are set out based on the priorities identified by the stakeholders during the consultations and analysis of the issues. These are addressed through a series of specific objectives developed within the context of a regulatory framework and measures to support the private sector. The strategy also outlines the changes needed to develop an effective institutional mechanism to co-ordinate sector development, monitor progress and provide regular and timely feed back to articulate actions needed to achieve the proposed targets. The strategy is further elaborated on in the main sections of this document and a detailed Action Plan will be prepared once the strategy is finalised.

B. The strategy

The overall mission statement for the shrimp sector sub-strategy is shown below.

A shrimp sector recognised internationally for its high quality shrimp produced using socially responsible and environmentally sustainable production methods, with support to all stakeholders to ensure its development to its full potential.

Within the strategy, a series of specific objectives have been developed relating to: a proposed regulatory framework; support measures for industry; collaboration and participation of stakeholders; structures, staffing and resources; and planning, monitoring and evaluation.

Regulatory framework

The rationale for developing a more comprehensive and updated regulatory framework is threefold; to ensure that Bangladesh positions itself proactively to meet current and forthcoming international standards on food safety and traceability, that the industry is economically and environmentally

sustainable, and that all aspects of the supply chain operate in a socially responsible manner ensuring benefits to all local community members.

The regulatory framework therefore provides a set of standards, legal and administrative procedures which will foster good management of shrimp production in Bangladesh in order to maximize the economic development for the country whilst ensuring an equitable distribution of benefits and sustainable use of natural resources. The regulatory framework deals with all areas of shrimp sector development including: production, quality control, marketing and export, environment and social aspects, and for effective management, requires strong interaction and coordination involving several GoB organisations. The regulatory framework is not just a government set of laws and rules, but an industry lead set of guidelines to determine good practice.

The overall goal of the **regulatory framework** is:

In support of the Private Sector ensure the development and implementation, by all stakeholders, of a legal and regulatory framework that will lead to sustainable and equitable development of the shrimp sub-sector.

The regulatory framework comprises 7 specific objectives:

1	Shrimp Production	To put in place the regulations to ensure the sustainable increase in the supply and value of shrimp from culture systems enhancing earnings for farmers, improving the socio-economic conditions of local communities in shrimp farming areas and increasing foreign exchange earnings.
2	Area Development and Zonation	To ensure that shrimp production takes place only in areas where the prevailing agro-ecological conditions are suitable and that it does not adversely affect the interests of other land and water user groups or cause environmental harm. This is applicable for both the freshwater and the coastal shrimps
3	Wild Post Larval Collection	To develop a management plan that regulates the collection of wild fry to conserve the resource whilst balancing the needs for livelihood protection of shrimp fry collectors.
4	Hatchery Certification and Registration	To establish a sustainable hatchery sector which through registration and certification ensures quality management of the hatchery process and ensure adequate production of post larvae which meets, and is responsive to, the growers' demands for quality (with assurance of health and viability), without causing detriment to the environment.
5	Brood Stock Collection	To develop a sustainable management plan for brood stock collection that ensures hatcheries are able to produce quality post larvae to meet the needs of the sector without causing detriment to the environment or wild stocks.
6	Marine Shrimp Harvesting	To regulate and stabilise the marine shrimp trawling efforts to sustain its viability whilst ensuring that marine resources are conserved through compliance of regulations and the control of artisanal ESBN fishing.

7	Quality Control	To raise export earnings by improving the quality of shrimp products to ensure that shrimp is produced in compliance with the food safety or HACCP rules, Bio-Terrorism act of USA, SPS measures of the WTO, the Human Rights and Labour rules and environmental codes as well as, improving the traceability of shrimp products at all points of the value chain from hatchery through to farm, marketing, and processing factory. The strategy will also look for adoption of the measures to remove the Nitro furan and Chloramphenicol from our shrimps.
7.1	Quality control and certification	To establish a quality control system for the industry that combines the authority of Department of Fisheries in quality assurance together with the need for self-regulation and quality control by the private sector.
7.2	Food Safety	To provide effective Government quality control procedures that will guarantee shrimp produce placed on the market is safe to human health and exported shrimp produce complies with the relevant food laws in importing countries.
7.3	Export Licensing	To upgrade and maintain an export licensing system that ensures exported shrimp products fully comply with international food laws.
7.4	Traceability	To provide a national license and registration system for all shrimp operators from hatcheries through to farmers, processors and exporters to ensure traceability within Bangladesh shrimp supply chains.

Support to industry

The industry is controlled by the private sector, and its growth can only be directed through support and the regulation of its activities. This can either be by the industry itself or by support and controls provided to the industry by the government and other support services such as educational institutes and the NGO sector. The overall goal of **supporting the industry** is:

In support of the Private Sector, provide the services that will lead to a sustainable and equitable development of the shrimp sub-sector.

More broadly the aim of shrimp culture production is to: To sustainably increase the supply and value of shrimp from culture systems enhancing earnings for farmers, improving the socio-economic conditions of local communities in shrimp farming areas and increasing foreign exchange earnings.

Within the support strategy there are 8 specific objectives

1	Extension	To form an effective two way flow of knowledge and information that will enable all stakeholders to develop the sector through the prudent application of knowledge and create a pool of fisheries technicians like health technicians and the Block Supervisors of DAE, to cater to the needs of the sector

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2	Research	To ensure the relevance of research to the needs of the sector and to develop mechanisms which will improve the uptake and application of key findings.
3	Education	To ensure that the development of the sector is supported by suitably qualified human resources who are equipped with the necessary skills and expertise.
4	Infrastructure development	To support the establishment of infrastructure, in areas identified and demarcated for production of shrimp, enabling improved water management and marketing of shrimp.
5	Input support	To ensure high quality inputs at affordable prices are readily available at every stage of the shrimp supply chain.
6	Marketing	To improve the overall position of the Bangladesh shrimp industry in a competitive global market, increasing market share and revenue from shrimp production.
7	Disease Monitoring and Prevention	To develop an effective disease surveillance, notification and control system to reduce the spread of disease and improve the management of outbreaks of disease.
8	Biodiversity and Environmental Conservation	To preserve the biodiversity and environment of coastal aquatic habitats while not depriving people of the right to make a living in those areas.

Collaboration and participation

The overall goal of promoting **collaboration and participation** is:

To ensure the participation of all stakeholders who, through their collaboration and clear understanding of their role, will contribute to a sustainable and equitable development of the shrimp sub-sector.

The complexity of the shrimp sector dictates that its development requires effective collaboration and co-operation of many Government departments, private sector organisations and civil society. The regionalised spread of shrimp operations means also that the approach adopted should be based on decentralisation of the decision making process.

The Department of Fisheries has the broadest mandate to support the sector. Its role in regulating the industry from brood collection, hatcheries, production and processing and its support role establish it as the institution best placed to coordinate the sector. Regular interaction and co-ordination with other Government agencies including Ministry of Water Resources and Bangladesh Water Development Board, Ministry of Land, Ministry of Commerce, and Local Government as well as with NGOs and private sector bodies and trade associations is also required.

Participation of all stakeholders is particularly important to ensure all resource user groups are represented during the planning and implementation of sector development activities especially coastal land zonation and infrastructure development.

Structures, Staffing and Resources

The overall goal of the structure, staff and resources strategy is to:

Develop and utilise the staff resources in the most effective fashion to support the services and regulatory enforcement required to develop the sector in a sustainable and equitable way.

The Department of Fisheries does not have the required strength and capabilities to carry out all the functions required of it. There is a need to strengthen and reorganise the Department of Fisheries to support the policy and provide the field level support required to guide development of the shrimp sector.

To effectively discharge the functions required to co-ordinate the implementation of the strategy, the Department of Fisheries Shrimp Wing should be reorganised in order to focus on key strategic areas. This new focus will require the Wing to perform a variety of functions including supporting and co-ordinating with private sector and NGOs, developing the necessary legal framework to regulate the shrimp sector; co-ordinating with other line ministries and advising on key issues (such as land zonation, food safety, taxation and fiscal measures, environmental and social protection); monitoring private sector shrimp related activities to track the economic, environmental and social status and supporting participatory land use planning; assisting the development of a disease prevention, surveillance and control system for the industry; supporting the hatchery sector in developing quality, disease free fry; and advising the Shrimp *Mohal* Management Policy committees.

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This will require that the Shrimp Wing is supported by key individuals at Headquarters and at field level to plan, execute and monitor shrimp sector activities. The Wing's capacity to address the social aspects of brackish water production also needs to be increased and better linkages established with the NGOs which have experience of these issues.

The Shrimp Wing in the headquarters will be restructured, headed by a Director, under the control of the Director General. It will be responsible for planning, execution, monitoring of shrimp sector activities and for providing support and coordination to the private sector for sustainable development of country's shrimp sector. The Director will head a Committee comprising concerned Deputy Directors, Regional Officers, and District Fishery Officers. The committee will identify shrimp sector issues, suggest measures for addressing the issues, co-ordinate and establish linkage with private sector organizations and provide support to agencies involved in the sector.

The headquarters activities will be supported by the Monitoring, Evaluation and Planning wing proposed under the Monitoring and Evaluation Strategy. The Regional Shrimp Officer (re-designated), Cox's Bazaar and Kulna shall be responsible for supervision and monitoring of all shrimp unit activities in the two regions including those of the private sector hatcheries, nurseries, fry collection and processing plants. The Extension Units in both the regions shall be headed by the

DFOs and supported by SUFO/UFO. Due to their overlap, staff supporting the Marine sector, Quality Control and Aquaculture Extension will also help implement aspects of this strategy.

Planning, Monitoring and Evaluation

Collecting and evaluating information requires a high degree of co-operation from all stakeholders; from the private sector, who dominate the sector; to the poor, who are involved at the periphery. Currently, information is collected from a range of sources and varies in accuracy. The quality of information needs to be improved to ensure that the sector can develop through sound planning and management. The overall goal of planning, monitoring and evaluation is:

To ensure that the objectives of the sector are being met and that management and planning of the sector is based on sound information collected and evaluated from all stakeholders.

Collecting information through a range of different sources enables planners to build crosschecks into the information thus improving its reliability. The most accurate information is thought to come from statistics of shrimp exported for each of the different production systems. This, however, only relates to exports and does not cover local sales and consumption. Information on production levels from the different systems and areas is not accurate as there is no accurate baseline of resources allocated to shrimp production. This, as in other sub-sectors of fisheries production, needs to be a priority so that development can be accurately assessed.

One of the major concerns of the industry is the image projected to the buyers abroad. In order to improve this, reliable information must be available on issues of social equity and environmental status. This should be used constructively to address issues of concern or provide importers and buyers of the true status of the sector and refute and prevent the spread of false information.

The Planning, Monitoring and Evaluation of the sector are tied in closely with the strategy advocated under the Planning, Monitoring and Evaluation strategy already formulated. This recognises the different sources of information, and also focuses on the required capacity to utilise the information for effective management. The specific objectives of planning, monitoring and evaluating the sector are shown below.

- Establish a baseline of the industry, on all aspects from fry production, collection, and production, processing facilities.
- Assess improvements in production levels under different production system and benefits from different management systems including economic assessment of merits of different systems and risks associated with intensification.
- Assess the impact of extension and advisory services including developments in organisation and implementation of extension.
- Determine the type of ownership of industry and production units and evaluate the impact of *gher* licensing.
- Monitor economic generation from the export of shrimps and export statistics including monitoring the value added through processing.

- Establish the biodiversity and environmental status of resource and the impact of developments. Monitor the impact of regulations on environmental pollution and loss of biodiversity.
- Monitor and evaluate the distribution of benefits from the sector
- Monitor the impact of regulations on quality, numbers of shipments accepted or rejected and economic impact of rejected shipments.
- Monitor disease levels and the impact on production.
- Evaluate the impact of support to the industry by government initiatives

C. Development targets

The objective of the strategy is to set the long-term focus for the sector. In this process a series of targets have been defined to guide the development of the sector.

	Current	***Target 2010***
Farm yields kg/ha per year[1]	Bagda: 200 kgs ave. Golda: 375 kgs ave White and Brown:53 kgs ave	Bagda: 400 kgs Golda: 500kgs White and Brown:53 kgs ave
Area under Cultivation ha[2]	Bagda: 170,000 ha Golda: 40,000 ha	Bagda: 190,000 ha[3] (May rise slowly as part of a rice/bagda rotation). Golda: 80,000 ha
Average gher Size ha[4]	Bagda: 4.5ha (on downward trend), Golda: 0.3 ha (ranging from 0.15-2ha)	Bagda: 2 ha Golda: 0.3 ha
Annual production volume tons[5]	Bagda: 34,000 tons Golda: 15,000 tons } for export White/Brown 9,000 Shrimp trawler: 3,186 tons –for export	Bagda:76,000 tons Golda: 40,000 tons White/brown: 10,000 tons Shrimp trawler: 3,500 tons
Artisinal Capture Domestic consumption	(DoF statistics) Total: 84,773 tons Inland: 55,965 tons Artisanal: 28,808 tons	Capture Total: 60,000 tons Inland: 40,000 tons Artisanal: 20,000 tons
Export Earnings	Total EPB 2002-2003: Tk17,199 million (US$297 million) Bagda: US$233,million for 23,409 tonnes Golda:: US$54 million for 6,688 tons White and Brown US$10 million for 3,344 tons	Total US$ 1,000 million for 73,000 tons Bagda: US$685 million[6] for 50,000 tons Golda: US$300 million[7] for 18,000 tons White and Brown US$15 million for 5,000 tons
Mean	Bagda: Tk81,519 (includes finfish and mud crab)	Bagda: Tk160,000[9]

[1] Source: Fisheries Sector Review 2003.
[2] Source: Fisheries Sector Review 2003.
[3] 2% increase per annum
[4] Source: Fisheries Sector Review 2003.
[5] Source: DOF 2003
[6] from production gains and value addition with improved post harvest handling and processing
[7] from production gains, doubling of land under cultivation and value addition from improved post harvest handling and processing and sales to niche (organic) markets.

	Current	*Target 2010*
revenue per hectare[8]	Net revenue per hectare: Tk37,567 Golda: Tk110,000 (includes finfish). Net revenue per hectare: Tk75,000	Net revenue per hectare: Tk100,000[10] Golda: Tk220,000[11] Net revenue per hectare: Tk180,000[12]
Employment Full Time Equivalents[13] **Employment by sector**	Total employed persons 600,000 Full time equivalent 156,000 Bagda: 94,342 Golda: 58,333 Marine: 3,000 Others: 10,265 Total: 165,904 Fry Collectors: 185,000	Total employed persons 1,000,000 Full time equivalent 313,000 Bagda: 190,000 Golda: 120,000 Marine: 3,000 Others: 15,000 Total: 328,000[14] Fry Collectors: 100,000
Hatchery production capacity PL/year[15]	Bagda: Hatcheries: 55 Capacity: 10,000m Production 2004: 5,000M Market demand at 2004 utilisation rates: 5,000M PL. Wild PL: 2,000 M Golda: Hatcheries: 30 Capacity: 50M Production 2004: 50M Market demand at 2004 utilisation rates: 500M PL	Bagda: Hatcheries: 35 Capacity: 7,000m Production: 6,000m Wild 1,000m Golda: Hatcheries 500 Capacity: 5,000M Production: 5,000m
Processing plant capacity tons[16]	165,000 tons Only 18-20% of total factory capacity utilised.	130,000 tons Capacity should be slightly more than production.

D. Road map for strategy implementation

Three important elements are considered necessary in transforming the Government's current approach to shrimp sector development into an effective strategy: (i) continuous and effective interaction and consultations with all stakeholders to make it 'dynamic' with capability to address on-going development and emerging priorities along with consensus to guide the development efforts of all actors including the Government, NGOs, civil society and development partners in an integrated manner; (ii) devising and implementing a time-bound action plan to support the strategic thrust of the strategy; and (iii) installing an effective institutional mechanism to monitor the progress and provide regular and timely feed back to articulate actions needed to achieve the proposed targets.

[8] Source: Fisheries Sector Review 2003.
[9] From production gains
[10] From production gains, reduced input costs and improved management techniques
[11] From production gains
[12] From production gains, reduced input costs and improved management techniques
[13] Full time equivalent employment: Bagda farms(94,342), Golda farms(58,333), Processing factories(3,260), Post harvest Farias(2,205), Depot operators(1,812), Hatchery fry traders(746), Bagda hatcheries(536), Golda hatcheries(231), Commission agents(167), Feed factories(115). Source: Fisheries Sector Review 2003.
[14] Job creation through increased no of Golda farms, post harvest trading opportunities, hatchery fry trading, golda hatcheries and feed factories.
[15] Source: Fisheries Sector Review 2003.
[16] Source: Fisheries Sector Review 2003.

E. Supporting information

Status of shrimp production in Bangladesh

There are three sources of shrimp products in Bangladesh: the marine capture fishery, brackish water aquaculture and fresh water aquaculture. Most of the production (62%) derives from brackish water cultivation of the Tiger Shrimp on 170,000ha land in the coastal zone with yields averaging 150-200kg/ha. However, production of the other main commercial species, the Giant Freshwater Prawn, has increased dramatically over the last 10 years: the cultivation of this species accounts for 23% of the production from 30,000ha of land in low-lying floodplain areas mainly in the south west region (with yields averaging 250-340kg/ha) but is expanding rapidly to other areas. Production from the marine fishery accounts for around 6.25% of the total exportable production, this figure has stabilised and is unlikely to increase substantially in the near future. Shrimp farming, particularly of the freshwater species where there is significant scope for further horizontal expansion, represents the greatest potential for increasing shrimp production in Bangladesh.

Farming shrimp and prawn can be highly profitable compared to other livelihoods options available in rural areas of Bangladesh but it is associated with high levels of risk due to fluctuations in the international market (non-tariff barriers and price changes), disease and climatic conditions (mainly flooding). The culture systems in Bangladesh use low-input, extensive methods and often integrate shrimp and prawn production with other crops such as rice, vegetables, finfish and salt depending on the local agro-ecological conditions. This reduces farmers' exposure to risks due to changing conditions in the market place, extreme climatic events and disease. These systems also tend to be more environmentally benign than more intensive operations and provide an important income for poor rural households in remote areas where alternative livelihood options are limited. However, production efficiencies are low due to high mortality rates of stocked fry (the most expensive input), poor management techniques and a lack of infrastructure in coastal areas. Given the existing production inefficiencies, the potential to boost economic growth through increased production from improved extensive farming systems is considered to be high. It is interesting to note here that fiscal policy has provided incentives to the processing and hatchery (*bagda*) sectors to the extent that they now operate at over-capacity yet the production from the farming sector is stagnating due to limited institutional support and poor infrastructure.

Supply of fry for shrimp cultivation

The majority of fry for brackish water farms are now sourced from hatcheries though a residual demand for wild fry exists due to perceived lower levels of viability and prevalence of disease in hatchery fry. The catching of shrimp fry or post larvae is currently banned under the Protection and Conservation of Fish Rules but the ban is not widely enforced. Despite the expansion in hatchery capacity, the emphasis has been on producing fry for brackish water shrimp farms while hatchery production of fry for freshwater prawn cultivation fulfils only 10% of the current demand resulting in a heavy reliance of these farms on the supply of wild fry. However, new hatcheries are being developed to meet this demand and it is anticipated that the wild fry fishery will eventually decline to marginal levels.

The bagda hatcheries rely on the supply of broodstock collected from the marine fishery. Currently, the methods used to collect broodstock are believed to result in high levels of stress on the shrimp which are associated with high mortality rates and high levels of white spot viral disease. A lack of

quarantine procedures and disease screening along with inadequate labelling of hatchery products mean farmers have no way of discriminating for healthy fry.

Improved production and expansion of shrimp culture.

Present production levels are some of the lowest to be found and the opportunities for converting land into bagda shrimp estates remains extremely limited. If production is to be increased then it must be done using existing land resources by integrating shrimp into existing cropping systems and by improving the management so that yields can be raised.

The promotion of a rice shrimp rotation has lead to improved unit area production with both crops benefiting. This has in part been due to the identification of new rice varieties that are more tolerant to saline conditions, but also due to improved fertility of the rice fields and better water management. The shrimp have benefited through better water management and reduced incidences of disease.

The expansion of *gher* areas under *golda* is expected to increase rapidly as this does not displace the rice crop, but increases the returns that the farmers can make from the land. This has proved especially beneficial to small land owners who have seen this as a way of escaping poverty.

Post harvest and processing of shrimp

The post harvest chain consists of numerous intermediaries and because production is structured around thousands of small-scale farms, the product is aggregated at several levels before reaching the processing plant. This often results in a deterioration of product quality leading to lower returns on investment than could be achieved with higher standards of post harvest handling, transport and marketing between the farm and the processing plant.

The processing sector operates at 80% over-capacity due to fiscal and financial support provided by the Government[17] which encouraged processing plant construction. The over capacity is also as a result of a shortage of raw product. The supply of shrimp products to processing plants is tightly controlled by traders with many plants competing for a limited amount of product. Vertical linkages within the long supply chains are limited and the transmission of market signals from the buyer and processors to the farmers is therefore weak. As a result, the production sector is slow to respond to changes in market conditions. Moreover, poor law and order in shrimp producing areas constrains the development of stronger linkages between farmers and processors and raises the transaction costs for business operators engaged in the input and product market chains.

The over capacity can be tackled in two ways by a) increasing the quantity of shrimp available to processors which is a major aim, but also by b) ensuring that the processing sector develops at rate linked to production and not due to unrealistic incentives. These unrealistic incentives need to be removed leaving behind a core of processors with the best interests of the sector in mind.

An increase in vertical integration must take place so that quality can be improved by reducing harvesting to processing times. This will also enable improved traceability of the product which will be a prerequisite for future trading.

[17] The iPRSP mentions a reduction in these types of tax exemptions as a priority.

Trends in international markets and implications for the shrimp industry in Bangladesh

As a globally traded commodity, shrimp products from Bangladesh and the conditions under which they are produced must comply with international standards which are changing to adapt to new issues of bioterrorism, food safety and traceability. Growing concerns over food safety have prompted the introduction of international Codex[18] standards and mandatory HACCP[19] requirements to improve quality. The shrimp industry must also comply with international standards arising from the World Trade Organisation Agreement on Sanitary and Phytosanitary Measures (SPS)[20]. Trade restrictions are appearing in the form of antibiotic residue limits and the filing of anti-dumping law suits by the US shrimp trawling industry. At the same time, NGOs are calling for tighter controls on environmental and social issues resulting in increased consumer awareness of these issues in importing countries and there is growing pressure for the shrimp industry to attain higher standards of sustainable and equitable shrimp production. This will intensify with the introduction of eco-labelling schemes. Shrimp producers elsewhere are increasingly undertaking voluntary certification (ISO 9000) and registering with Codes of Conduct schemes.

Shrimp farming is now the target of several private certification schemes which are intended to respond to consumer and buyer demand for a sustainably produced high quality product. However, there are significant costs involved in complying with these codes and small-scale producers operating low input farms may face difficulties in participating in such market chains. This is further constrained by a lack of organisation within the smallholder sector, weak forward linkages to processors and a limited capacity to comply with emerging standards.

In responding to these emerging global trends the sector needs to transform from a fragmented industry into a more co-ordinated and integrated industry to improve traceability of supply chains. Increasing backward and forward linkages in supply chains is a key element to this (mentioned as a priority area for action in the iPRSP) and also has the advantage of increasing the flow of technical information throughout supply chains to improve management practices.

Policy environment

There are a multitude of policies which guide the development of the sector. The National Fisheries Policy and the National Water Policy are the two most relevant policies. However, though the policies were introduced in 1998, they are not yet fully operationalised through laws, regulations, and strategic and action plans.

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[18] The codex Alimentarius Commission has developed standards, guidelines and recommendations for food additives, veterinary drugs and pesticide residues, contaminants, methods of sampling and analysis and hygiene codes and guidelines.

[19] Hazard Analysis Critical Control Point identifies specific hazards and measures for their control to ensure food safety. The system sets out principles and key hygiene controls at each stages of the food chain from primary production through to final consumption.

[20] The WTO Agreement on Sanitary and Phytosanitary Measures allows countries to restrict trade in order to protect human, animal and plant life and prevent the transmission of diseases.

The National Fisheries Policy emphasises production and utilisation of fisheries resources; poverty alleviation and employment generation; fulfilling animal protein demand and ensuring public health; economic growth; and biodiversity conservation. The policy formulates a series of guidelines (Clause 7), to increase the shrimp production and export emphasising: coordination of shrimp and paddy cultivation; advanced traditional modes of shrimp production; the role of the private sector; hatchery technology; wild fry collection; infrastructure; and hygiene and quality control. Emphasis is also given to management of the sector, including the expansion of the Central Shrimp Cell of the Ministry of Fisheries and Livestock to field levels, and coordination with the ministries of Environment and Forest.

The National Water Policy is relevant to the shrimp sector as it strongly recommends integrated and balanced development of the water resources of the country to meet the requirements for economic development, poverty alleviation, food self-sufficiency, public heath and security, improved living and protection of the natural ecosystem and biodiversity.

The Shrimp *Mohal* Management Policy (1992) provides for the identification and declaration of *khas* land as shrimp estate. However, there is a conflict with a number of other Government policies including: the Private Fisheries Protection Act 1899 law which protects the rights of landowners who don't like to lend their land for shrimp farming and the Environment Policy which aims to prevent salinity increases in land. There is also a conflict with the iPRSP which emphasises the effective distribution of *khas* lands to landless families and the National Land Use Policy (2001) which provides for the allocation of land for shrimp culture and land zoning on the basis of land topography, tidal inundation, water salinity, soil quality and other environmental factors, with the active participation of local people.

Other relevant policies include the Industrial Policy (1999) which declared the frozen food industry a "thrust sector" and the Export Policy (1997-2002) which provides for the promotion of shrimp export. The National Environment Policy (1995) is also relevant since it seeks to protect the environment and emphasises the need for appropriate environment and development of fisheries whilst ensuring that fisheries development activities do not create any adverse impact on the mangrove forests and other ecosystems.

The capture fishery for shrimp is regulated under the Marine Fisheries Ordinance (1983). The government has declared four places in the Bay of Bengal as marine reserve areas to ensure the safe breeding of fish and shrimp.

1 Status of the Sector

1.1 Introduction

Over the last 30 years the significance of the shrimp sector has grown rapidly in importance. It is now the second biggest foreign exchange earner for the country and could, if managed properly, be the most significant. At present Bangladesh produces around 2.5% of the global shrimp trade earning US$297 million in 2003-2004.

These figures, however, are achieved at some of the lowest yield levels found internationally, caused in part by a very extensive, low-input, production system that operates with little development of infrastructure or technology in the field. There is good potential to increase yields through improved infrastructure and farm management practices. Conversely the hatchery production and the processing side have excess capacity, with good infrastructure, though are not operating efficiently.

The sector is complex in that it covers three differing methods of production, marine capture, brackish water aquaculture and fresh water aquaculture. The marine capture increased rapidly with the introduction of large mechanised trawlers, but has now reached a peak and is in fact switching to alternative species due to the decline in tiger shrimp (*Penaeus monodon*); the commercial aquaculture production of brackish water *bagda* (also *Penaeus monodon*) expanded quickly and is still expanding, but is limited by suitable land and disease; and the fresh water prawn or *golda* (*macrobrachium rosenbergii*) which perhaps offers the best options for expansion due to its integration in the rice cropping system, low incidence of disease and its accessibility by many poor producers.

The marketing of this production is affected by the fluctuations in international markets making it extremely vulnerable to many elements beyond its control. The continued growth of the sector, however, is more dependent on external factors controlled by the markets that Bangladesh wants to sell the shrimps to. From the buyers there is an increasing range of conditions being imposed on the producers, which if not met could see this industry loose the market for its product. These conditions are based on three main points; quality (and food safety), environmental impact and social justice. These form the basis of the image of the world wide industry, which recently has come in for severe criticism.

The main criteria for marketability has been and continues to be the quality of the product. The issue of quality has been growing in importance and has had its most important impact on the industry in 1997 when the first major rejections of consignments were made and the subsequent ban by the EU. Recently, the standards set for quality and food safety have become stricter, with a demand to ensure traceability of the product through the supply chain stemming from bio-terrorism concerns in the US. This places an increased strain on the sector which is very fragmented and supported by an array of institutions which are not co-ordinated or well resourced. This particularly affects the small producers who are not well informed or positioned to respond to tightening international standards (mainly due to economies of scale which make it more cost effective for larger businesses to make the necessary investment in upgrading their operations).

The image of the shrimp farming industry has also been damaged by allegations of destruction of mangroves and increased salination of farm land. It also has a tarnished social image with the poor being dispossessed of land and deprived of access and control over common property and private

resources. The production sector is also beset with problems of extortion and criminal activities which constrain its growth and development as well as growing degrees of corruption which hamper the implementation of quality standards and subvert existing regulations. The corruption and extortion have also led to high transaction costs for businesses involved in shrimp production and trade. This is part of a general country wide trend noted as a major constraint on poverty reduction in the iPRSP, "the emergence of *mastanocracy* (local terrorism) imposing considerable transaction costs on normal economic activity has been singled out as a major barrier to private investment and socially secure life".

To add to these problems recent legal cases have been brought against some shrimp producers from several countries including Thailand, Vietnam and China by the US shrimp trawling industry. These so-called anti-dumping law suits are based on claims that imported shrimp are being subsidised and constitute unfair competition for the domestic shrimp industry. Bangladesh has so far escaped any legal action due to the low volumes it exports to the US compared with other countries.

Within the industry in Bangladesh there is growing appreciation of the impact of the poor image that the industry has to overcome. Some of these issues are more relevant to Bangladesh than others, but it is important to demonstrate that the concerns are being addressed and that the consumers can have a confidence in the industry and the shrimp products exported from Bangladesh.

In summary, substantial efforts are needed to promote productivity gains through increased efficiency in production, post harvest and marketing segments. Although the challenges faced by the sector are immense, through a co-ordinated determined effort, they can be overcome and shrimp can become an increasingly important part of the national economy.

1.2 The role of shrimp sector development in boosting pro-poor growth

Shrimp is the most traded seafood product in the world and though Bangladesh does not have a particularly large share of the international market, exports generated more than US$297 million for the economy in 2003-2004. The sector provides varying degrees of employment for around 600,000 people. In particular, the integration of rice farms into small-scale, low input, extensive prawn/ rice farms has increased household incomes for thousands of rural poor and provides a supply of subsistence food. The Government of Bangladesh has highlighted the need to expand the export growth of the shrimp sector in its iPRSP which emphasises that "shrimp production and exports should be increased by enforcing effective regulations on land and water use, adopting sanitary and phytosanitary measures, and strengthening infrastructure facilities and information dissemination."

There is significant potential to couple shrimp sector development more effectively to poverty reduction particularly through a special emphasis on industry segments associated with pro-poor growth such as the freshwater prawn sector (this type of production has proven benefits to the poor and accounts for the majority of smallholders). However, existing Government support for the sector has tended to favour the processing and hatchery sectors where the potential for pro-poor growth is most limited. The Government has introduced a number of incentives and policies which favour the growth of large–scale exporters with little fiscal and financial support for smaller scale enterprises in the export supply chain which provide employment and income for many of the rural poor. In order for these initiatives to be pro-poor, there is a need to remove these policy biases and increase backward linkages to ensure that the small businesses in the supply chain fully benefit from the concessions and incentives afforded to the large exporters.

The existing production inefficiencies in the farming sector also provide an opportunity to boost pro-poor growth. Measures could include providing farmers with technical support to increase productivity, organisational strengthening to create opportunities for collective purchasing and selling of products, and strengthening vertical linkages to input suppliers and post harvest operations.

In the brackish-water sector, there are a number of social issues that require attention if pro-poor growth is to occur. In Bangladesh, there is widespread non-compliance with existing laws especially relating to the abuse of leasing agreements and land grabbing in shrimp farming areas. There are significant barriers that block the entry of poorer entrepreneurs. Failure to address these barriers and continuing human rights abuses will not only restrain pro-poor growth but is also likely to adversely affect export earnings for the whole sector. This is an area that requires interaction and cooperation between Government, civil society organisations and industry.

1.3 Shrimp production in Bangladesh

The sector, not only covers the production of brackish water shrimp *Bagda*, but also the marine captured shrimp and the production of fresh water shrimp *Golda.* The production of finfish in shrimp polders is also increasing and is included though currently its status is not as important.

	Marine Capture	*Bagda*	*Golda*
Current Production.	3,200 tons	38,000 tons	12,000 tons
Growth Potential	Limited unless better management	Mainly through intensification leading to increased unit yields	Through expanded area and increased yields (good)
Stakeholders	Large boat owners and processors	Large to medium land owners although farm sizes are steadily declining	Medium to small land owners
Limitations	Target species	Suitable area for expansion, disease, social problems	Supply of post larvae, feed
Poverty Alleviation	Will generate little additional employment	Limited opportunities and job loss through hatchery post larvae	Many small producers, but limited future opportunities in post larvae
Environment and Biodiversity	Catch changed from tiger to brown shrimp	Issues of loss of biodiversity (post larvae), increased salinity	Issues of encroachment into *khas* land, loss of wetlands and drainage blockages

1.3.1 Marine Shrimp

The capture of marine shrimp was facilitated by the introduction of commercial trawlers in the late 70's. However due to the high cost of the trawlers all of these are owned by large business men and not by fishermen.

Initially the target species was tiger shrimp (*bagda*), but due to over fishing of *bagda* the trawlers have now targeted brown shrimp which are more abundant, but less commercially attractive. The change has also brought the shrimpers into conflict with other smaller fishermen as they undertake a lot of their activities in shallow water. They are supposed to be limited to operate in waters beyond the 40 metres depth mark.

The commercial trawlers have the capacity to freeze their catch on board, but have only limited storage capacity. This raises another problem as they do not have the capacity to store fish caught incidentally which are then often dumped as it is more economical to do this than bring them to port. This waste has led to complaints by environmentalists and other anti-shrimp lobbyists.

Marine shrimp trawling has also been blamed for destroying breeding grounds through its damage of the sea floor, from destructive trawl practices. This has gone on in areas that have even been assigned as marine sanctuaries. There is also concern that because of the impact of trawlers, the brood stocks necessary for land based production of shrimp are being rapidly depleted and might constrain further development of this sector.

The use of trawlers to collect brood for the shore based hatcheries for *bagda* also causes concern as anecdotal information suggests that the numbers of brood are in decline and the quality of those caught is also declining. This is thought to be due to the stress that the trawling places on the brood. Alternative means for collecting brood will need to be researched.

The activities of the artisanal sector on the marine catch is also estimated to be significant. Up to 13,000 tons of juveniles are caught by ESBN fishers every year which substantially reduces the potential harvest of adults and is also likely to have an impact on brood availability as well.

Quality is not seen as an issue for marine shrimp, but much of the shrimp is sold as block frozen with little value added which limits the returns from this sector.

The principal problems associated with the marine shrimp sector are: no clear understanding of the impact of trawling on the sustainability of the marine shrimp fishery, intrusion of trawlers into areas assigned to smaller mechanised boats, the impact of brood collection on their availability and sustainability of collection, the impact of trawling on the by catch and the limited returns by selling the product in its basic form (i.e. block frozen).

1.3.2 Brackish Water Tiger shrimp

The majority of export earnings from shrimp derive from the cultivation of the Tiger Shrimp (*Panaeus monodon*, locally known as *Bagda)* on the saline coastal floodplains of Khulna, Satkhira and Bagerhat. There are approximately 38,000 farms cultivating Tiger Shrimp with an average farm size of 4.5 hectares, although more than 50% of farms are now less than 1 hectare (FFP, 2003). Tiger shrimp production has increased by 20% per annum in the last fifteen years, twenty-five thousand tons were produced in 2001. Sales from *bagda* farms in 2001 were around Tk 13,864M (US$ 243M). The total production area is estimated to be around 170,000 ha (135,000 ha in Khulna, Satkhira and Bagerhat districts and 35,000 ha in Cox's Bazaar District of the Chittagong region).

The production of Tiger Shrimp rose dramatically in the 80s and 90s as the market for farmed shrimp expanded especially in Europe and America. The initial production was carried out using wild caught post larvae in extensive ponds with little management. It was seen as an easy option and so encouraged many large investors to lease in land, often from small farmers. The practice raised concern with human rights groups, as much of the land acquired from small landowners was

under duress rather than by consent. Conflict also arose over non-payment of dues and refusal to hand back the land at the end of July (a legal obligation for the lessee) so that the owners could cultivate rice during the rainy season.

However, the system was not without risks and in attempts to intensify production, infection from the White Spot Syndrome Virus (WSSV) became a major limitation, drastically reducing yields. This caused many of the larger investors to pull out allowing small farmers to regain control over their resource who through improved management could limit some of the stress related factors which allows for WSSV to become a problem.

Production now is still predominantly undertaken on an unimproved extensive scale. Some progressive farmers are trying to improve production through the development of infrastructure and improved management of their *ghers*. If this part of the industry is to expand, this must be the principal route as access to additional land will be restricted, but it must be done carefully as the risks of failure are high. The potential for environmental pollution also needs to be assessed.

The production of *bagda* has developed through an increase in the number of local hatcheries able to produce vast numbers of post larvae. The availability of hatchery produced post larvae has now increased to a level beyond saturation and faces serious marketing problems. This is compounded by some farmers' preference for wild post larvae due to their alleged vigour. This over capacity is largely due to a fiscal policy which has provided cheap loans and tax breaks.

Most of *bagda* post larvae are produced by hatcheries located on the south east coast in Cox's Bazaar and are transported by air to the main grow out regions in the south western Khulna region of Bangladesh. This is expensive and attempts to reduce costs are being examined. One option is to relocate the hatcheries closer to the grow out areas but this runs into problems due to the lower salinity levels prevailing in this region compared with Cox's Bazaar. Another option under consideration is to produce naupli (1st stage immediately after hatching) which are then shipped to the grow-out areas and reared to the required post larvae size.

The principal problems that have to be tackled through this strategy are; combating the issues that have led to the poor image of the industry, regulating brood capture, improving the quality of hatchery post larvae, improving the production and marketing system, reducing the incidence of disease, regulating the processing industry, raising the value of the end product, ensuring that the quality of the exported shrimp meets the requirements of the buyers and revising the fiscal policy to lead to more balanced development of the sector.

1.3.3 Fresh Water Prawn

In recent years, production of the Giant Freshwater Prawn (*Macrobrachium rosenbergii*, locally known as *Golda*) has expanded at a rate of 20% per annum. Export sales of *Macrobrachium* during 2001-2002 were US$58 million and net profits in the sector are around 68% (of turnover or US$1.20/kg). The current area under cultivation is estimated to be around 30,000 ha. This figure is expected to rise with increasing expansion of freshwater cultivation into new areas of low-lying floodplain. *Golda* now accounts for almost a third of all shrimp products exported from Bangladesh but still receives little recognition for its potential.

More than 100,000 households depend on freshwater prawn farming in Bangladesh and the sector has brought significant socio-economic benefits to many poverty stricken areas of rural Bangladesh. The average farm size for freshwater cultivation of *Macrobrachium* is quite small, around 0.28 ha

with yields averaging around 336kg/ha. The harvesting starts in August and continues until November and December. The size of prawn at harvest is usually around 150-200g.

The growth in production is due to an abundance of low-lying floodplain land suitable for cultivating *golda* combined with management techniques that combine its production with finfish, rice and vegetables in a modified rice field (known locally as a *gher*). Integrated rice cum prawn and fish culture systems have higher levels of productivity and profits compared with mono-crop systems and reduce the vulnerability of poor and marginal households. Most of the farms are found in the south west although the technology is spreading rapidly to other coastal and inland areas. The total area under cultivation is estimated to be around 30,000 ha (compared with 170,000 ha used for growing *Penaeus monodon*).

The rapid expansion has, however, caused some concern, as wetlands are being increasingly encroached to develop *golda gher*s. These encroachments have cut off natural drainage of wetlands and allowed for commonly owned land *(khas)* to be appropriated by individuals, often wealthy elites.

Development has been constrained by the reliance on post larvae from the wild though this is changing with the recent development of *golda* hatcheries and their improved management. Other constraints found in the *bagda* sector where infrastructure is required for water management do not affect the *golda* sector because the farming system relies heavily on rain water rather than saline water brought in by canal.

The negative image of the shrimp industry is largely due to social problems found in brackish water shrimp farming areas, but *golda* has been tarnished by the same brush. It therefore has the task of trying to differentiate itself and sell to a different niche market as a more environmentally friendly, pro-poor system that does not have the same issues of social injustice prejudicing it.

1.4 Post harvest marketing and processing

There are around 6915 workers employed in the post harvest supply chains (of both *Penaeus* and *Macrobrachium*). The supply chain from the hatchery through to the farms, depots and processing plant features numerous intermediary traders. The shrimp are taken from the farms to depots by van or rickshaw where they are graded. There are around 5,000 depots employing around 35,000 people and it normally takes 24-36 hours between harvest and delivery to the processing plant. The prices are fixed by the commission agents. All trade in shrimp product takes place through the agents, direct linkages between the farms and the processing plants are rare. The lack of proper handling and failure to use ice in many of the local depots during harvest and transport of the prawn to the processing plant causes contamination and leads to spoilage and decomposition resulting in lower sales prices for shrimp exported from Bangladesh and a poor international reputation.

There are around 124 processing factories in Bangladesh mostly found in Khulna and Chittagong with a collective production capacity of 165,000 tonnes but less than 20% of the capacity is utilised due to a lack of product from the farms. Of the 124 listed factories, 73 are operational while 51 have either closed down or are awaiting approval of a quality inspection licence.

1.5 International perspectives

The domestic market for the two main commercial species, *bagda* and *golda,* is miniscule compared to the export market. The major market for Bangladesh shrimp is the US (40% of exports) followed by the EU (mainly the United Kingdom which imports 14% of Bangladesh's exported shrimp) and Japan (11%). Bangladesh currently benefits from duty free access to the EU unlike Thai shrimp for which there is a 10% tariff. The United Kingdom, Netherlands, Belgium and France have a high demand for *macrobrachium*. The average price of shrimp increased by around 13% between 1991 and 1998 and in 2001-2002, Bangladesh achieved its ever-highest export earnings from the fisheries sector (Tk 18,851M or US$ 325M) by exporting almost 30,000 tons of shrimps (accounting for 90% of the frozen fish exported).

Bangladesh shrimps are cultured using extensive culture methods without any use of chemicals such as antibiotics and are of high quality in terms of size, colour and muscle texture and highly in demand on the international market. However, post-harvest care and quality control are lacking in many supply chains and the EU banned the import of shrimp from Bangladesh in 1997 due to food safety concerns. Drastic measures were introduced to improve quality in compliance with HACCP standards which enabled the industry to regain access to this important international market by 2000.

The reliance of the sector on international markets presents a number of challenges for Bangladesh. The industry must comply with the conditions set by the buyers or face loosing out to other suppliers. This risk is growing as the number of alternative suppliers to the international market grows and their ability to conform to the requirements develops, through active support from their governments and associations. Bangladesh shrimp is easily substituted by shrimp products from competing countries because it has a low share of the global market, is considered to be an average quality product, and because it does not occupy any niche market.

The conditions set are affected not only by quality concerns, but also by demands from pressure groups for environmentally sustainable and socially responsible development in shrimp farming areas. Bangladesh must identify and use its comparative advantage to become more competitive with other producing countries. Bangladesh's inherent advantage over its competitors lies in improving the productivity of its low-input, extensive production system and more effective marketing. Bangladesh does not have a comparative advantage in moving towards intensive farming practices as shown by a NACA analysis which calculated resource cost ratios[21] for EU, Japanese and US markets to be 1.15, 1.09 and 0.97 respectively. Furthermore, in the current economic climate, when global shrimp prices are low it would not be prudent for shrimp farmers to shift to semi-intensive methods. Well planned, small-scale, extensive, freshwater farming is environmentally sustainable and brings economic and social development to traditionally poor rural, areas in Bangladesh.

Concerns are also being raised about the possibilities of bio terrorism. In order to counter these, stricter quality controls are being instituted by the United States Food and Drugs Agency via the Bioterrorism Act (see Box 2). These also demand that the point of origin of the shrimps can be traced. It is likely that the European Union the other major buyer will follow suite (see Box 3).

[21] This ratio is based on foreign exchange rates, prices of shrimp in foreign markets and the opportunity cost of producing shrimp in Bangladesh. If the Resource Cost Ratio is less than 1 then there is a comparative advantage to producing and exporting a particular commodity.

Box 2: The US Bioterrorism Act

This was signed into US law on 12 June 2002 and will be implemented on 12 December 2003. The law has 4 major provisions designed to give FDA additional information about the food intended for consumption in the US and the facilities that handle food. The rules requires that:

1. All domestic and foreign facilities that manufacture, process, pack or hold food for human or animal consumption in the US must register with the FDA by 12 December. Applies to shrimp farms, suppliers, processing and packaging plants and exporters.
2. US importers or purchasers must submit to the FDA prior notice before imported food arrives at the US port of arrival.
3. Authorises FDA to detain any article of food for which there is credible evidence or information that the article poses a threat of serious adverse consequences or death to humans or animals.
4. Requires manufacturers, processors, packers, transporters, distributors, receivers, holders and importers of food to keep records identifying the immediate previous source from which they receive food as well as the immediate subsequent recipient to whom they sent food.

Box 3: The EU Farm to Fork Policy

The European Commission has identified food safety as one of its top priorities. The White Paper on Food Safety of January 12, 2000 sets out the plans for a proactive new food policy: modernising legislation into a coherent and transparent set of rules, reinforcing controls from the farm to the table and increasing the capability of the scientific advice system, so as to guarantee a high level of human health and consumer protection. The Strategic Priorities of the White Paper are:

- to create a European Food Safety Authority
- to consistently implement a farm to table approach in food legislation
- to establish the principle that feed and food operators have primary responsibility for food safety; that Member States need to ensure surveillance and control of these operators; that the Commission shall test the performance of Member States' control capacities and capabilities through audits and inspections.

1.6 Private Sector

In developing this strategy, a clear recognition is needed that the principal stakeholders in the industry are the private sector. Their roles and responsibilities determine the development of the sector and affect the way in which rules and regulations will be accepted. It is therefore important to clearly identify what are their roles and how, through collaboration with them, they can establish norms that are required to regulate the sector and what support is required from them, other stakeholders, and the government and its service institutions. Though the government played an important role in supporting the growth of the sector during its development phase, the private sector is increasingly assuming a more active role in developing and shaping the industry. The private sector is now driving the growth of most segments of the industry including:

- Hatcheries
- Supply of brood
- Wild post larvae collection
- Nurseries
- Post larvae distribution
- Shrimp (*Bagda* and *Golda*) production
- Marine capture
- Importation and use of chemicals

- Importation and manufacture of shrimp feed
- Transportation
- Manufacturing of ice
- Processing
- Marketing
- Exporting

In future, the Government will need to change its mode of operation in order to create a facilitating environment that promotes a strong and competitive private sector as emphasised in the iPRSP.

1.7 Constraints in shrimp sector development

Trends

- deteriorating tendencies in parts of the production chain, including reduced availability of wild fries and an increased incidence of shrimp farm diseases;
- social problems related to a highly skewed distribution of the profits made in the sector, and high levels of crime and human right violations in shrimp polders;
- production resources are controlled by a few elite members of the community;
- expansion of shrimp farming into areas that are not ideal for shrimp production and conflicts with other land uses.
- uncertain developments of the world economy and corresponding shrimp prices;
- difficulties in meeting tightening international standards; and
- a poor industry image due to perceptions of environmental destruction, social injustice and in equity and poor quality control leading to rejections at ports of destination.

Operational

- lack of co-ordination mechanism for the stimulus and control of an industry which is spread over many agencies;
- inadequate enforcement of existing rules and regulations;
- lack of transparent shrimp land zoning procedure which leads to development of shrimp farming in unsuitable areas and local conflicts;
- difficulty in developing and enforcing national standards to ensure compliance with emerging international standards (lack of a reliable quality control against product contamination and the failure of the government's quality assurance enforcement system);
- lack of monitoring data and information; and
- an inadequate mechanism for equitable distribution of profit through taxation.

Fiscal support to certain sectors of the industry though important in the early stages has continued for too long contributing to an inefficient use of resources and has distorted local markets. Today we are left with an industry comprising:

- an over supply of *bagda* post larvae from hatcheries with constant closures and renewals, and
- excess processing capacity with many processing plants remaining idle.

1.8 Strategy development

The strategy has been prepared to examine how we can overcome these problems and control them through support and regulation and establish where we hope the shrimp sector will be in ten years time and what we have to do support it so that we can get there. This strategy document is based on wide consultation with stakeholders and existing analyses of the sector.

2 Policy Environment

The direction, management and control of the sector take place through a number of policies, ordinances and acts that have been drawn up by different departments and ministries over the years. These however are poorly coordinated and merely reflect a wish list with little real ability to implement them. The most relevant ones to the shrimp sector are:

- National Fisheries Policy (1998)

For commercial fisheries:

- Marine Fisheries Ordinance 1983
- FAO Code of Conduct for Responsible Fisheries (Marine)

For production / land management:

- National Rural Development Policy (2001)
- National Land Use Policy (2002)
- National Agricultural Policy (1999)
- Shrimp Estate (*Mohal*) Management Policy (SEMP), 1992
- Land Management Manual (LMM), 1990
- FAO Code of Conduct for Responsible Fisheries (Aquaculture)
- Coastal Zone Policy (Draft 2003)

For water management

- The National Water Policy (NWP), 1999

For industry development

- Industry Act ,1991

For quality assurance

- The Fish and Fish Products (Inspection and Quality Control) Ordinance, 1983 (as amended 1997)

For Environmental Protection

- Embankment and Drainage Act 1953
- Environmental Policy and Implementation Plan (1992)

The formulation of most of these policies was done largely in isolation from other stakeholders. However in recent years this isolationist approach has been changing and recent policies offer a more holistic approach. Despite this there is still little coordination and many conflicts exist between policies which confuse areas of responsibility for implementing the management of the resource.

Recently the acceptance of the Shrimp Action Plan in support of the post larvae sector has provided useful guidance for the development of the post larvae supply side of the industry.

2.1 Policy support

The two principal supporting policies are the National Fisheries Policy and the National Water Policy.

2.1.1 National Fisheries Policy

The National Fisheries Policy supports the production of shrimp, whilst realising concerns about biodiversity and risks from using intensive cultivation. It advocates for the role of the private sector in developing hatcheries and in promoting improved production through demonstrations.

The policy also acknowledges the need for defining zones where shrimp should be considered in conjunction with the MoE.

Full details of the issues advocated under the National Fisheries Policy can be seen under section 7 of the policy.

2.1.2 National Water Policy

In the National Water Policy there are several objectives that clearly demonstrate the increased need to ensure that all users' interests are considered. They also start to reflect the need for special consideration to be given for brackish shrimp production stating that:

- Fisheries and wildlife will receive due emphasis in water resource planning in areas where their social impact is high.
- Water resource projects, as far as possible are developed as multipurpose projects with an integrated multidisciplinary approach from planning to implementation to monitoring.
- Brackish aquaculture will be confined to specific zones designated by the Government for this purpose

2.2 Policy conflict

The range of issues involved in the production of shrimp both in the marine environment and in the coastal brackish waters and fresh waters means that there are many government stakeholders involved. Some of these are governed by policies that contradict the objectives set in other policies.

2.2.1 Resource Allocation /Land Use Policy

There are two policies dealing with land management. The Land Management Manual[22] (LMM) dealing with the allocation of unused *khas* land to the landless on a permanent or temporary basis, and the Shrimp (*Mohal*) Estate Management Policy (SEMP), which deals with the allocation of *khas* land designated as land suitable for shrimp production. The allocation of land covered by the LMM requires the endorsement of the District Commissioner. The DC is often reluctant to endorse land settlement for the landless and is susceptible to influence from the local elites. There are cases where the landless have been displaced from areas. It would appear therefore that the LMM is not functioning in the manner that was intended. The allocation of land designated for shrimp (SEMP) favours the wealthy (those able to finance investment) and those with technical knowledge. Consequently, it is often the influential groups that obtain access to *khas* land and not the poor.

[22] Linked to the *Khas* Land Settlement Act?

2.2.2 Water usage and salination of land

The National Water Management Plan has historically been focused on the promotion of irrigation schemes for agriculture, with little focus to date on water management for shrimp aquaculture with brackish water. The largest single constraint to *bagda* cultivation is access to and release of water – the need for inflow and outflow canals. This in itself is a conflict as the primary rational for construction of the embankments around the polders was to prevent salt water entering and now BWDB have been given the task of improving the regulated flow of salt water into the polders.

In the revised National Water Policy recognition of the need to define areas for brackish water shrimp has been made, but no mechanisms have been defined to declare areas for shrimp production. There are however changes to the BWDB organisation which identify the need for increased investment in canals (albeit that it is not stated in the NWP), and there are also signs of increased interaction between BWDB at local level and stakeholders, including shrimp farmers.

2.2.3 Environment

Many farms use water that is passed on from other farm outflows and the issue of contaminated discharge is potentially a serious issue if production systems become intensified. However, under the current system the BAU found no significant difference between inflows and outflows in terms of nutrient levels. The main issue is one of disease transfer. In some cases, inflow canals might be intercepted and illegal levies charged to other farmers by landlords claiming exclusive access to the canal systems.

The Embankment and Drainage Act 1953 is the only mechanism by which environmental protection from shrimp farming can be enforced. The Act allows for impacted farmers to prosecute shrimp farmers if the land becomes contaminated by seawater. Apart from this area, there are no other environmental support measures and no requirements for Environmental Impact Assessments, nor any form of monitoring of existing holdings (Code of Conduct for Responsible Fisheries).

2.2.4 Financial and Fiscal Support

Financial and fiscal support is provided in a variety of manners and under a variety of organisations. Hatcheries are supported with incentives such as easy loans and reduced tax rates, similar incentives are offered to the processors. These have resulted in over capacities of both sectors often squeezing early investors, whose support window has closed, and who helped pioneer the sector. In contrast financial support for production, post harvest care/handling and marketing is limited despite this being crucial for survival and growth of the sector. Financial support for infrastructure development in polders is provided through donor loans and is co-ordinated by BWDB and Department of Fisheries, but concerns over equity have slowed these disbursements. The sector is able to take advantage of significant tax incentives. These have led to a significant increase in expansion, most of which is now redundant. A number of special conditions and incentives[23] exist for the shrimp sector which are primarily of benefit to the hatchery and processing companies.

Direct Taxes

- *Tax Holiday* (5 years for those activities located in Chittagong Division and for 7 years for those located in Khulna and Barisal Division. The period of the tax holiday is calculated from the month of the commencement of commercial production)

[23] These incentives also apply to hatcheries

- *Accelerated Depreciation* in lieu of a tax holiday is allowed at a rate of 80% for businesses located in Chittagong division, and of 100% for units operating in Khulna and Barisal Division. This applies to the actual cost of machinery or plant from the year the business starts commercial production, with 20% and 0% depreciation allowed for the following year for the two respective areas.

- *Advance Income Tax* is collected on exports at a rate of 0.25% instead of the normal rate of 3%. For shrimp hatcheries and processing plants, there is a complete exemption from advanced income tax.

- *Other Exemptions*

    1. Exemption of income tax on interest of foreign loans
    2. Exemption of tax on royalty, technical know-how and technical assistance fees etc.
    3. Income tax exemptions on foreign technicians employed in shrimp businesses for a period of 3 years
    4. Remittance of 50% of the salary of foreign nationals employed in approved industries.

Indirect Taxes

- *No import duty*, VAT or any type of tax is applicable for shrimp plants exporting 100% of their products. A 5% import duty is to be paid if a shrimp business fails to export a minimum of 70% of its total production.

- *Special incentives* are provided to encourage non-resident Bangladeshis to invest in the shrimp sector. Non-resident Bangladeshis investors enjoy facilities similar to those of foreign investors. Moreover, they can buy newly issued shares/debentures of Bangladeshi companies, and can maintain foreign currency deposits in the Non-resident Foreign Currency deposit (NFCD) account.

- Shrimp exporters are allowed to *retain 40% of export earnings for miscellaneous purposes*, and exporters consider this an incentive.

- *No Excise duty or VAT* while exporting shrimp products.

- *Government Land* has been leased to shrimp entrepreneurs in the past at a leased land cost of only Tk 6,000 per acre in contrast to commercial rates for similar land of as much as Tk 50,000 per acre. This equates to an implicit subsidy of 88%, but it is not known how widespread this practice is, and how many, or what proportion of shrimp entrepreneurs have benefited.

- *Loans and Interest Rates* are provided with working capital loans from the country's banking system at interest rates of 9-11% in contrast to usual commercial lending rates of 15-16%. The implicit subsidy is around 40%.

- Processing plants were provided with a special loan of Tk 4M in 1997, at the concessionary interest rate of 9%, for purpose *upgrading their plants to meet the European Union HACCP standards*. Long-term credit facilities are also allowed on liberal debt-equity ratios by the country's banking sector.

- *Interest exemptions* to the tune of 80% of working capital loans on shrimp exporting companies were waived for 1997 and 1998 by the nationalised banks (40%) and the Government (40%), to compensate for the damage of flood and cyclones affecting the sector. The Government has also recently committed to providing financial assistance to processing companies due to low international prices that have affected profitability, but it is not yet known what format this Government assistance will take.

(Fisheries Sector Review, 2003).

Tax exemptions have been a detriment to the sector rather than a help, creating significant over-capacity. There is considerable evidence throughout the world that subsidies of this nature lead to a failure to optimise resources. If tax exemptions are to apply, then they should be directed more towards companies facilitating post harvest initiatives. Fiscal incentives should only be provided to processors adding value to products and increasing traceability with producers.

2.3 Policy Implementation, Act Enforcement and Regulation

Although as described by the policies and acts, it would appear that there is a good framework for the management and regulations of the sector, in practice this is not the case.

- The GoB has capacity limitations to enforce the MFO. The fisheries sector does not comply with the restrictions – shrimp fry ban, closed seasons, prohibition for trawlers fishing inside 40 metre depths.
- The General guidelines for land management (FAO Conduct for Responsible Fisheries (Aquaculture) are not being adhered to. There are no measures adopted to control disease, nor to protect the livelihoods of those negatively affected by aquaculture. There is no environmental monitoring system, nor the capacity to enforce it. In fact, the whole issue of land utilisation and guidelines for adoption of appropriate systems has no management structure applied to it at all.
- The regulations to ensure the quality of exported shrimp are not adhered to strictly due to shortages in skilled staff and resources to implement as decreed.
- An unbalanced system of financial and fiscal support has stimulated/fostered excess capacity in the hatchery and processing sectors, and has not addressed a critical shortage of product from the production sector.

3 The Shrimp Sub-sector Strategy

A shrimp sector recognised internationally for its high quality shrimp, produced using socially responsible and environmentally sustainable production methods, with support to all stakeholders to ensure its development to its full potential.

The strategy adopts a comprehensive approach covering many areas and sets out a series of targets. An important task is to spell out appropriate prioritization and sequencing of actions needed to ensure sustainable development of the shrimp sector and achieve the proposed targets. Within the strategy document several policy and sectoral concerns are set out based on the priorities identified by the stakeholders during the consultations and analysis of the issues. These are addressed through a series of specific objectives shown below. The strategy is further elaborated on in the following sections of this document and a detailed Action Plan will be prepared once the strategy is finalised.

3.1 Specific objectives

1. Regulatory Framework

In support of the Private Sector ensure the co-ordination, support and provision of a legal and regulatory framework that will lead to sustainable and equitable development of the shrimp sub-sector.

1.1	Shrimp Culture Production	To put in place the regulations to ensure the sustainable increase in the supply and value of shrimp from culture systems enhancing earnings for farmers, improving the socio-economic conditions of local communities in shrimp farming areas and increasing foreign exchange earnings.
1.2	Area Development and Zonation	To ensure that shrimp production takes place only in areas where the prevailing agro-ecological conditions are suitable and that it does not adversely affect the interests of other land and water user groups or cause environmental harm.
1.3	Wild Post Larval Collection	To develop a management plan that regulates the collection of wild fry to conserve the resource whilst balancing the needs for livelihood protection for shrimp fry collectors.
1.4	Hatchery Certification and Registration	To establish a sustainable hatchery sector which through registration and certification ensures quality management of the hatchery process and ensure adequate production of post larvae which meets, and is responsive to, the growers' demands for quality (with assurance of health and viability), without causing detriment to the environment.
1.5	Brood Stock Collection	To develop a sustainable management plan for brood stock collection that ensures hatcheries are able to produce quality post larvae to meet the needs of the sector without causing detriment to the environment or wild stocks.
1.6	Marine Shrimp Harvesting	To regulate and stabilise the marine shrimp trawling efforts to sustain its viability whilst ensuring that marine resources are conserved through compliance of regulations and the control of artisanal ESBN fishing.
1.7	Quality Control	To raise export earnings by improving the quality of shrimp products to ensure that shrimp is produced in compliance with the food safety or HACCP rules, the Human Rights and Labour rules and environmental

		codes as well as, improving the traceability of shrimp products at all points of the value chain from hatchery through to farm, marketing, and processing factory.
1.8	Quality control and certification	To establish a quality control system for the industry that combines the authority of Department of Fisheries in quality assurance together with the need for self regulation and quality control by the private sector.
1.9	Food Safety	To provide effective Government quality control procedures that will guarantee shrimp produce placed on the market is safe to human health and exported shrimp produce complies with the relevant food laws in importing countries.
1.10	Export Licensing	To upgrade and maintain an export licensing system that ensures exported shrimp products fully comply with international food laws.
1.11	Traceability	To provide a national license and registration system for all shrimp operators from hatcheries through to farmers, processors and exporters to ensure traceability within Bangladesh shrimp supply chains.

2. Support to industry

In support of the Private Sector, provide the services that will lead to a sustainable and equitable development of the shrimp sub-sector.

2.1	Extension	To form an effective two way flow of knowledge and information that will enable all stakeholders to develop the sector through the prudent application of knowledge.
2.2	Research	To improve the relevance of research to the needs of the sector and to develop mechanisms which will improve the uptake and application of key findings.
2.3	Education	To ensure that the development of the sector is supported by suitably qualified human resources who are equipped with the necessary skills and expertise.
2.4	Infrastructure development	To support the establishment of infrastructure, in areas identified and demarcated for production of shrimp, enabling improved water management and marketing of shrimp.
2.5	Input support	To ensure high quality inputs at affordable prices are readily available at every stage of the shrimp supply chain.
2.6	Marketing	To improve the overall position of the Bangladesh shrimp industry in a competitive global market, increasing market share and revenue from shrimp production.
2.7	Disease Monitoring and Prevention	To develop an effective disease surveillance, notification and control system to reduce the spread of disease and improve the management of outbreaks of disease.
2.8	Biodiversity and Environmental Conservation	To preserve the biodiversity and environment of coastal aquatic habitats while not depriving people of the right to make a living in those areas.

3. Collaboration and participation
To ensure the participation of all stakeholders who, through their collaboration and clear understanding of their role, will contribute to a sustainable and equitable development of the shrimp sub-sector.

4. Structures, Staffing and Resources
Develop and utilise the staff resources in the most effective fashion to support the services and regulatory enforcement required to develop the sector in a sustainable and equitable way.

5. Planning, Monitoring and Evaluation
To ensure that the objectives of the sector are being met and that management and planning of the sector is based on sound information collected and evaluated from all stakeholders.

3.2 Development Targets

The objective of the strategy is to set the long term focus for the sector. In this process some targets are provided to guide the development of the sector.

	Current	***Target 2010***
Farm yields kg/ha per year[24]	Bagda: 200 kgs ave. Golda: 375 kgs ave White and Brown:53 kgs ave	Bagda: 400 kgs Golda: 500kgs White and Brown:53 kgs ave
Area under Cultivation ha[25]	Bagda: 170,000 ha Golda: 40,000 ha	Bagda: 190,000 ha[26] (May rise slowly as part of a rice/bagda rotation). Golda: 80,000 ha
Average gher Size ha[27]	Bagda: 4.5ha (on downward trend), Golda: 0.3 ha (ranging from 0.15-2ha)	Bagda: 2 ha Golda: 0.3 ha
Annual production volume tons[28]	Bagda: 34,000 tons Golda: 15,000 tons } for export White/Brown 9,000 Shrimp trawler: 3,186 tons –for export	Bagda:76,000 tons Golda: 40,000 tons White/brown: 10,000 tons Shrimp trawler: 3,500 tons
Artisinal Capture Domestic consumption	(DoF statistics) Total: 84,773 tons Inland: 55,965 tons Artisanal: 28,808 tons	Capture Total: 60,000 tons Inland: 40,000 tons Artisanal: 20,000 tons
Export Earnings	Total EPB 2002-2003: Tk17,199 million (US$297 million) Bagda: US$233,million for 23,409 tonnes Golda:: US$54 million for 6,688 tons White and Brown US$10 million for 3,344 tons	Total US$ 1,000 million for 73,000 tons Bagda: US$685 million[29] for 50,000 tons Golda: US$300 million[30] for 18,000 tons White and Brown US$15 million for 5,000 tons

[24] Source: Fisheries Sector Review 2003.
[25] Source: Fisheries Sector Review 2003.
[26] 2% increase per annum
[27] Source: Fisheries Sector Review 2003.
[28] Source: DOF 2003
[29] from production gains and value addition with improved post harvest handling and processing
[30] from production gains, doubling of land under cultivation and value addition from improved post harvest handling and processing and sales to niche (organic) markets.

	Current	*Target 2010*
Mean revenue per hectare[31]	Bagda: Tk81,519 (includes finfish and mud crab) Net revenue per hectare: Tk37,567 Golda: Tk110,000 (includes finfish). Net revenue per hectare: Tk75,000	Bagda: Tk160,000[32] Net revenue per hectare: Tk100,000[33] Golda: Tk220,000[34] Net revenue per hectare: Tk180,000[35]
Employment Full Time Equivalents[36]	Total employed persons 600,000 Full time equivalent 156,000	Total employed persons 1,000,000 Full time equivalent 313,000
Employment by sector	Bagda: 94,342 Golda: 58,333 Marine: 3,000 Others: 10,265 Total: 165,904 Fry Collectors: 185,000	Bagda: 190,000 Golda: 120,000 Marine: 3,000 Others: 15,000 Total: 328,000[37] Fry Collectors: 100,000
Hatchery production capacity PL/year[38]	Bagda: Hatcheries: 55 Capacity: 10,000m Production 2004: 5,000M Market demand at 2004 utilisation rates: 5,000M PL. Wild PL: 2,000 M Golda: Hatcheries: 30 Capacity: 50M Production 2004: 50M Market demand at 2004 utilisation rates: 500M PL	Bagda: Hatcheries: 35 Capacity: 7,000m Production: 6,000m Wild 1,000m Golda: Hatcheries 500 Capacity: 5,000M Production: 5,000m
Processing plant capacity tons[39]	165,000 tons Only 18-20% of total factory capacity utilised.	130,000 tons Capacity should be slightly more than production.

3.3 Road map for strategy implementation

Three important elements are considered necessary in transforming the Government's current approach to shrimp sector development into an effective strategy: (i) continuous and effective interaction and consultations with all stakeholders to make it 'dynamic' with capability to address on-going development and emerging priorities along with consensus to guide and pull development efforts of all actors including the Government, NGOs, civil society and development partners in an integrated manner; (ii) devising and implementing a time-bound action plan to support the strategic thrust of the strategy; and (iii) installing an effective institutional mechanism to monitor the progress and provide regular and timely feed back to articulate actions needed to achieve the proposed targets.

[31] Source: Fisheries Sector Review 2003.
[32] From production gains
[33] From production gains, reduced input costs and improved management techniques
[34] From production gains
[35] From production gains, reduced input costs and improved management techniques
[36] Full time equivalent employment: Bagda farms(94,342), Golda farms(58,333), Processing factories(3,260), Post harvest Farias(2,205), Depot operators(1,812), Hatchery fry traders(746), Bagda hatcheries(536), Golda hatcheries(231), Commission agents(167), Feed factories(115). Source: Fisheries Sector Review 2003.
[37] Job creation through increased no of Golda farms, post harvest trading opportunities, hatchery fry trading, golda hatcheries and feed factories.
[38] Source: Fisheries Sector Review 2003.
[39] Source: Fisheries Sector Review 2003.

4 Regulatory Framework

In support of the Private Sector ensure the development and implementation, by all stakeholders, of a legal and regulatory framework that will lead to sustainable and equitable development of the shrimp sub-sector.

4.1 Rationale for a regulatory framework

The rapid and uncontrolled expansion of the shrimp[40] culture industry in Bangladesh has outpaced the development of national legislation. In some cases, this has allowed unsustainable profit-earning focused activities of some irresponsible private actors to damage the international reputation of shrimp products from Bangladesh and threatens the long term viability of the sector on economic, environmental and social grounds. The existing regulatory environment for shrimp production is weak and prone to circumvention. Tightening of international standards puts Bangladesh in a vulnerable position because of the difficulties faced in establishing a reliable and trustworthy quality control system.

The major export markets are also demanding greater traceability of shrimp supply chains via the introduction of the US Bio-terrorism Act and the EU Farm to Fork Policy. Failure to meet these international standards will limit Bangladesh' access to global markets and lead to international buyers losing confidence in shrimp exported from Bangladesh. In addition to the emerging food safety controls and traceability requirements being introduced by importing countries, increasing consumer awareness and demand for environmentally sustainable and socially acceptable products have placed Bangladesh producers under the spotlight increasing the risk of consumer-boycotts of shrimp products from Bangladesh. This calls for closer scrutiny of the methods used in Bangladesh to cultivate, harvest, process, market and distribute shrimp products. It is important, therefore, that the regulatory, legal and administrative framework reflects these concerns and facilitates the development of responsible shrimp aquaculture so the industry is positioned to meet international standards and consumer expectations.

The rationale for developing a more comprehensive and updated regulatory framework is thus threefold; to ensure that Bangladesh positions itself proactively to meet current and forthcoming international standards on food safety and traceability, that the industry is economically and environmentally sustainable, and that all aspects of the supply chain operate in a socially responsible manner and bring benefits to local communities.

4.1.1 Purpose of regulation

The regulatory framework provides a set of standards, legal and administrative procedures which will foster good management of shrimp production in Bangladesh in order to maximize the economic development for the country whilst ensuring an equitable distribution of benefits and sustainable use of natural resources. The regulatory framework deals with all areas of shrimp management: production, quality control, marketing and export, environment and social aspects and for effective management, requires strong interaction and coordination involving several GoB organisations (described in Section 4). However in order for the regulations to be enacted there is a need to provide support both to those that will be governed by the regulations and those seeking to enforce them. These therefore become an integral part of the regulatory side.

[40] The term "shrimp" refers to all commercial species of shrimp and prawn harvested in Bangladesh from both marine fisheries and culture systems.

4.2 Shrimp culture production

Objective: To put in place the regulations to ensure the sustainable increase in the supply and value of shrimp from culture systems enhancing earnings for farmers, improving the socio-economic conditions of local communities in shrimp farming areas and increasing foreign exchange earnings.

Background

The production from shrimp culture, particularly brackish water culture systems, in Bangladesh is low compared to other producing countries due to inadequate water management infrastructure, poor management practices and a high prevalence of shrimp disease. As a result, output of raw material from the production sector falls far short of the demand from processing plants (the processing sector operates at 80% over-capacity). However, whilst production gains are desirable, a shift to more intensive culture systems needs careful consideration given the environmental and disease problems experienced by other producing countries. Moreover, the limited capacity of Department of Fisheries to monitor and regulate producers represents a risk both in terms of food safety and environmental impacts especially if the industry were to intensify and increase its use of chemicals and other inputs. Instead, more emphasis can be placed on improving the extensive farming methods currently used by farmers to enhance production efficiencies and ensure the development of the farming sector is sustainable in the long term.

The role of the Government is to provide overarching guidelines on best management practices (tailored to local farming systems and the investment capacity of farmers) to ensure consistency and coherence at the national level as well as develop systems for dissemination. The regulatory framework also needs to encompass the rapidly expanding *Golda* (freshwater prawn) sector as well as the *Bagda* (brackish water shrimp) sector. There is also a need to amend the Fish Act (1950) which prohibits the construction of bunds, weirs, dams and embankments in or across rivers, canals, *khals*, and *beels* for any purpose other than irrigation, flood control or drainage, to include the purpose of "water supply in shrimp ponds".

Another challenge for the industry is how to satisfy emerging requirements for greater food safety controls and traceability given the large number of small farms in Bangladesh. Small-scale producers in Bangladesh operate some of the most efficient, environmentally sustainable and socially equitable farms but are not positioned well to participate in certified and traceable supply chains due to the small quantities of product produced and the costs associated with certification. Economies of scale will favour larger producers and prejudice the smallholders who currently predominate the production sector. The costs associated with certification are likely to be prohibitively high for individual farms producing small quantities of shrimp and prawn.

A transfer of shrimp farming land from smallholders to wealthier farmers is undesirable given the high levels of poverty and insecurity prevailing in the coastal zone. The current marketing system has developed around the existence of thousands of small-scale farms and results in the product being aggregated at several levels before it reaches the processing plants which makes it difficult to ensure traceability. Concerted efforts are therefore needed to develop a harvest and transport system that allows aggregation of product from small farms whilst maintaining traceability and build producer associations to ensure the smallholder sector does not lose out as buyers place increasing traceability demands on the processors. Updating and implementing the *gher* licensing policy in

collaboration with MoL, BWBD and DoEF would also help to ensure compliance with future standards and traceability requirements.

The priorities are therefore to increase shrimp production, improve disease surveillance, improve management and control, support the participation of farmers in traceability programmes, protect bio-diversity and critical coastal and inland wetland ecosystems, and ensure the sustainable use of resources, food security and equitable rural development in the coastal zone. This will necessitate upgrading Department of Fisheries' monitoring and regulatory functions as well as improving management structures to be more responsive to local priorities and developing information systems (monitoring, market and statistical data) to optimise management regimes and plan future growth. This will necessitate re-organisation of the administrative control structure to facilitate development at the Upazila level.

Effective coupling of shrimp sector development to poverty reduction could take place through a special emphasis on industry segments associated with pro-poor growth such as the freshwater prawn sector.

There is a need to establish the necessary infrastructure and human resources to ensure adequate testing of exported aquaculture products takes place prior to export, provide an overarching regulatory and enabling environment as well as develop measures to prevent fraud and regulate the proliferation of labels. Where shrimp farming is associated with conflicts and rights abuses, there is an urgent need to improve law and order and introduce coastal planning and management in areas where shrimp are produced.

4.2.1 Regulatory framework for shrimp culture production

a) The MOEF/Department of Fisheries through the implementation of the Integrated Coastal Zone Policy, will protect the coastal environment through the development of **environmental quality standards** and **Environmental Impact Assessment** for shrimp facilities producing more than 600 kg/ha (effluents etc).
b) The Government shall establish an **'Aquaculture Authority'** with a wide participatory base to oversee and regulate private sector aquaculture development.
c) All shrimp *ghers*/farms shall be **registered** with Department of Fisheries (started in 1998 but many farms still not registered). The *gher* licensing arrangements will be updated to include provisions for issuing identity cards to farmers and introducing record keeping systems so that registered farms can participate in traceable supply chains.

The Department of Fisheries will introduce a **disease surveillance, notification and control system** to reduce the spread of disease in shrimp farming areas.

4.3 Shrimp Area Development and Zonation

Objective: To ensure that shrimp production takes place only in areas where the prevailing agro-ecological conditions are suitable and that it does not adversely affect the interests of other land and water user groups or cause environmental harm.

Background

The conversion of coastal land from agricultural production for brackish water shrimp culture occurred rapidly during the 1980's following the expansion of international shrimp trade. Although highly profitable compared to rice cultivation, the viability of shrimp farming varies across the coastal belt depending on the local agro-ecological conditions. It is sensible, therefore, to restrict shrimp cultivation to areas with suitable land topography, tidal inundation, water salinity, soil

quality and other environmental factors. It is also important that fragile coastal ecosystems such as the Sundarbans mangroves are protected from the potential adverse effects of upstream shrimp farming activities. Moreover, in many areas, the requirement for saline water for shrimp cultivation within the coastal polders creates tensions between rice growers and shrimp farmers. The need to address these issues and for a strengthening of DOF's capacity to support sustainable shrimp sector development is emphasised in the iPRSP

> "The unplanned shrimp culture development, which has led to social and environmental problems, will be addressed through well-informed decisions based on studies carried out under the Fourth Fisheries Project and available research. The capacity of the Department of Fisheries will be strengthened so that it can play its due role in participation and cooperation with local communities and the private sector."

Coastal zoning provides an opportunity to improve land use planning, minimise conflicts over land tenure and identify appropriate areas for shrimp farming and areas that need to be protected (for grazing of livestock, common access, drainage canals etc.).

The objective of land zoning in the coastal zones is to optimise land use. This should encompass integration of water and land use taking into consideration the interests of all users and at the same time ensure that important ecosystems and common property resources are protected. In particular, it is important to improve the coordination of shrimp and paddy cultivation and to identify *Khas* land for allocation to the poor, a critical issue for poor communities in shrimp producing areas. The zoning process should therefore involve active participation from all stakeholder groups. One of the shortfalls with the existing policy and legislative framework is that the current rules do not adequately take into account the interests of key stakeholder groups. For example, under existing rules, land suitable for shrimp cultivation will be declared as Shrimp *Mohal* (no distinction has been made between government (*khas*) and private lands) and leased out to individuals with the capital and expertise necessary for shrimp cultivation. This ignores the rights and entitlements of landless people provided for in the *Khas* Land Settlement Act. There is a need for the Shrimp *Mohal* policy to be more closely harmonised with the *Khas* Land Settlement Act to protect the rights of the landless and also with the National Fisheries Policy to ensure that *Khas* land declared as shrimp *Mohal* should, where possible, be cultivated using integrated methods (rice/shrimp/fish or shrimp/salt etc) ensuring that shrimp crops are harvested before August in areas where rice can be cultivated. Improving the existing system requires close coordination with other ministries (Land, Water, Environment and Forest etc) and the expansion and activation of the Central Shrimp Cell of the Ministry of Fisheries and Livestock to field levels.

4.3.1 Regulatory framework for land zoning

a) Areas suitable for shrimp cultivation will be identified using a **land zoning** process which will limit brackish water shrimp aquaculture to coastal areas where the agro-ecological conditions (including land topography, tidal inundation, water salinity, soil quality and other environmental factors) are favourable for shrimp cultivation and which also takes into account the interests of other land user groups. This must be a participatory process largely determined and implemented at the local level.
b) Shrimp shall be cultivated, where possible, using **integrated methods** (rice/shrimp/fish or shrimp/salt etc) according to agro-ecological conditions in each area to ensure the co-existence of different cropping systems.
c) **Semi-intensive culture** of shrimp will be limited to designated areas and the overall area used for semi-intensive culture will not exceed ** ha.

d) In areas where rice can be cultivated, **shrimp crops grown on leased land shall be harvested by 31st July**.
e) Improved measures will be introduced to **prevent unauthorized *gher*/farm expansion** (*golda* and *bagda*) onto government *khas* water bodies, important wetlands and mangroves.
f) Improved measures will be introduced to **stop the unlawful practice of leasing drainage canals**.
g) Improved measures will be introduced to **protect the rights of landowners who do not agree to lease their land** for shrimp farming (in accordance with the Private Fisheries Protection Act, 1899).
h) Improved measures will be introduced to **protect public access rights** to common fishing grounds and grazing lands in shrimp farming areas.
i) **Monitoring** on the compliance of the regulations must be carried out. Independent organisations such as advocacy NGOs will have an important role to play in this respect.

4.3.2 Support measures

a) The capacity of appropriate Government agencies (Department of Fisheries/ DAE/ MoL/ BWDB/ CEGIS) will be strengthened to develop land use **management information systems** and carry out agro-ecological mapping to optimise the utilisation of land and water. The Department of Fisheries will monitor land used for shrimp cultivation and production rates through the development of an improved management information system.
b) The co-ordination and **decision making structures** and processes for land zoning in coastal zone will be improved, re-activating and re-organising existing national and local shrimp development structures. The functioning of inter-agency forums and bodies and inter-ministerial linkages will be strengthened.
c) Infrastructure **improvements to the drainage system** and water management regime will be made based on optimised land use and considering the interests of the different land user groups.
d) Mechanisms for **consensus building on water management regimes** will be developed via the strengthening of community level organisations and cooperatives.
e) **Awareness** of land use issues and management solutions will be raised with all stakeholders to improve the capacity of sector to resolve social problems.
f) Local participation in decisions affecting local zonation is important to ensure that conflicts between different production systems do not cause social conflict.

4.4 Wild Post Larval Collection

Objective: To develop a management plan that regulates the collection of wild fry to conserve the resource whilst balancing the needs for livelihood protection of shrimp fry collectors.

Background

This is a major issue setting environmental sustainability versus social equity, and generating much misinformed comment. Wild post larvae collectors are frequently female or children, with no land, poor education and few prospects. Alternative livelihood opportunities in the coastal zone are scarce, but some have been suggested. There would need to be considerable government support and seed money to have much impact. (These issues are detailed in the Department of Fisheries/MoFL Options Paper October 2002: Balancing resource conservation with livelihood protection for shrimp fry collectors; an integrated approach to managing coastal resources.)

The Government declared a total ban on catching wild post larvae in 2000, on the grounds of damage caused to coastal biodiversity and environmental sustainability reduction as a result of by-

catch levels taken in post larvae collectors' nets. No attempt was made by Government to make the ban area-related, gear-related or time-related. The effects of large by-catch death rates from post larvae collectors on biodiversity is not yet proven and the iPRSP advocates a more balanced approach ensuring that policies affecting natural resource utilisation strike a realistic balance between the existing livelihood requirements of the people and sound environmental resource management that can ensure sustainability.

It is anticipated that market forces will reduce farmers' desires for wild *bagda* fry, and that this market will be insignificant within the next 5 years. For this reason it is probably sufficient to implement seasonal, locational, gear-specific bans to protect high by-catch sites at key times. Options for management could include letting the rise of efficient *bagda* hatcheries bring market forces into play and gradually erode the demand for wild caught post larvae. FAO's Code of Conduct for Responsible Fisheries 'precautionary principle' suggests that preservation of biodiversity should be paramount.

There is also significant scope to improve the survival rates of shrimp fry that are marketed. A significant reduction in fry collection pressure could be achieved by reducing the mortality rates of the fry that are caught. Currently it is estimated that up to 40 percent of the fry are lost from the time they are caught to the time they are stocked in a farmer's pond. Survival rates can be improved by promoting better practices in gear operation, fry sorting, holding fry, controlling conditions under transport, and stocking and pond management practices.

4.4.1 Regulatory framework for wild post larvae collection

a) Any ban on wild fry should not only apply to fry collectors, but to all intermediaries in the fry marketing chain. Thus the ban would apply to fry traders, transporters, people that store fry and farmers that are buying fry. In this way the incentive for wild fry marketing is removed.
b) In respect to conservation and consultation initiatives, amendments should be made to existing legislation (Marine Fisheries Ordinance 1983, Shrimp Estate (*Mohal*) Management Policy 1992 and the Protection and Conservation of Fish Act) to ensure compliance with commitments made under the FAO Code of Conduct for Responsible Fisheries.
c) The use of the *behundi* net is restricted through a combination of closed areas on important migration routes and seasonal restrictions (to be identified by Department of Fisheries). In the long-term it is desirable that the use of this non-selective gear is gradually phased out.
d) The capture of fry from riverbanks be allowed using push/pull nets due to the lower catch rates and because the net users (often women and children) are the poorest group fishing for fry.

4.4.2 Support measures

a) Awareness programmes should take place in all areas to promote compliance with the ban and to promote improved catch methods and those traditional methods which are less destructive of by-catch. In areas where fry collection will be allowed to continue, the scope for introducing a licensing system should be assessed.
b) Awareness and training resources are updated and made available to all the intermediaries along the fry marketing chain. This includes farmers who must also be trained to discourage early stocking of fry during the winter months when low temperatures lead to high mortality rates for fry and intermittent stocking throughout the season.

c) Awareness campaigns need to be continued through various media and Department of Fisheries/ civil society extension networks and traditional rural structures.

4.5 Hatchery Certification and Registration

Objective: To establish a sustainable hatchery sector which through registration and certification ensures quality management of the hatchery process and ensure adequate production of post larvae which meets, and is responsive to, the growers' demands for quality (with assurance of health and viability), without causing detriment to the environment.

Background

The quality of hatchery fry remains a concern for shrimp farmers in Bangladesh and fuels the reliance on wild fry. The aim of certifying shrimp hatcheries is to restore farmer confidence in hatchery fry and to facilitate a reduced demand for wild fry. Hatcheries are currently unregulated with no quality assurance to prevent the sale of diseased, under-sized and under-aged fry. Confidence in the supply of strong, healthy, disease-free post larvae, coupled with a certified chain of custody procedure will both benefit the hatcheries in respect to increased penetration and will encourage displacement of wild caught products. In addition, certification that the hatcheries are operating within codes of practice ensuring environmental responsibility in their fry production would help international acceptability of Bangladesh shrimp.

4.5.1 Regulatory framework for hatchery certification and registration

During the stakeholder consultation for the Department of Fisheries/MoFL Options Paper October 2002, it was concluded that it is not appropriate to use legislation to support these initiatives. All that is required is a Certification Scheme supported by an Assurance standards inspection body.

- Ensure that all hatcheries are registered with the Department of Fisheries.
- Establish an industry led certifications scheme establishing standards for brood quality, disease free assurances, size and survival rates.

4.5.2 Support measures

Primary Issues

a) Post larvae quality health standards (disease status, viability, etc) are established for subsequent certification by accredited laboratories
b) Standards for laboratory certification, including equipment calibration, methodology standardisation, procedure quality control and staff training are established and approved, by a competent aquaculture organisation.
c) A code of practice for hatchery management, especially over the use of drugs, hygiene control and quality management needs to be established. This would be linked to the proposed Department of Fisheries hatchery registration scheme and would provide both (i) minimum criteria for critical standards and (ii) guidelines for good practice.
d) Independent third parties are identified to manage hatchery registration and certification. The role of Department of Fisheries would be to oversee the registration and certification process and to ensure compliance of the registration and certification bodies with legislation.

e) Standards for labelling should be established and a practical mechanism for hatchery post larvae batch traceability are established and promoted for use.
f) Subsidies to the *Bagda* hatchery sector have led to overcapacity and inefficiencies in the sector and should be redirected/restricted to *Golda* Hatchery production until capacity reaches the point where market demand is satisfied.
g) Expand on the development of *golda* hatchery production. Growth in this sector should not be haphazard and the concept of a production cluster should be examined
h) Environmental standards for hatchery effluents should be included in the codes of practice.
i) Fiscal incentives will be provide only to hatcheries which test broodstock and post larvae for virus infection using PCR (Polymerase Chain Reaction).

Secondary Issues

- A national reference laboratory is set up and would be responsible for further development of laboratory protocols and standard improvement.
- Foster the emergence of independently accredited private laboratories (mostly operated by the hatcheries).
- Establish domesticated Specific Pathogen Free (SPF) varieties of commercial shrimp and prawn species for use by the industry.
- Ways should be found to persuade hatcheries to be more reactive to needs of farmers in terms of timing of fry availability.
- Develop a hatchery registration process linked to the development of codes of practice that both establish a minimum standard to which hatcheries are operated and to provide higher levels of quality management to which the hatcheries should aspire.

4.6 Brood Stock Collection

Objective: To develop a sustainable management plan for brood stock collection that ensures hatcheries are able to produce quality post larvae to meet the needs of the sector without causing detriment to the environment or wild stocks.

Background

Both the *bagda* and *golda* post larvae hatchery sectors rely on the collection of wild brood. At present collection of wild *golda* does not pose a problem and is not seen as a limiting factor. Despite this codes need to be prepared to ensure that there is no inbreeding or other regressive problems arising.

Bagda on the other hand could soon be a limiting factor and the industry must regulate the collection and utilisation of these or there could be a serious crisis. The current system relies on brood being caught by trawlers and delivered to the hatcheries in Cox's Bazaar. This can take up to a week and often by the time they are sold they are no longer fit for breeding. Hatchery owners report that for every 10 brood purchased only 3 remain viable breeders and even these are declining in fecundity. Part of the problem lies in the stressful way the brood are caught and transported, but there are also concerns that the quality of brood is declining due the incidence of white spot disease.

4.6.1 Regulatory framework for brood collection

a) Establish a targeted fishery for brood mothers with a limited number of licences
b) Develop code of conduct for brood collection by the industry enforced by the industry,

c) Restrict brood collection to the months of January to May,
d) Enforce the marine sanctuaries already declared,
e) Define geographical areas suitable for brood collection
f) Enforce the ban on shrimp trawling for commercial catch during mid-January to mid-February,

4.6.2 Support for brood collection

a) Examine incentive schemes to encourage brood collectors to switch from trawl collection to trammel nets or shrimp pots,
b) Undertake research on brood collection gear to assess the impact of collection on the breeding grounds, quality and quantity of brood available,
c) Provide laboratory facilities to test for Shrimp White Spot Virus,
d) Create awareness amongst producers of the benefits of using tested virus free post larvae.

4.7 Marine Shrimp Harvesting

Objective: *To regulate and stabilise the marine shrimp trawling efforts to sustain its viability whilst ensuring that marine resources are conserved through compliance of regulations and the control of artisanal ESBN fishing.*

Background

Marine shrimp trawl catches have been declining slowly since early 1980s – before the wild post larvae collection fishery started. Yields for highest value *bagda* have declined more than for high value white shrimp (*P indicus)*, while low value brown shrimp *(M monoceros)* have increased. Total values have remained stable, as price rises have counteracted yield reductions. Too much fishing effort is probably being expended on the highest value marine (sub-adult and adult) *bagda* stocks. Removal or down-sizing of the estuarine set bag net fishery would be good for adult stock, but would create social problems for ESBN fishermen. If they were to convert to e.g. trammel nets (with Government financial support to effect the transfer), this would benefit the long term stocks of both shrimp and fish. Large scale shrimp trawlers are licensed and their numbers restricted to about 44 vessels. If fishing was prohibited in *bagda* breeding areas during January/February and ESBN fishing was controlled, there would be an improved chance of maintaining high value, high quality stocks. However, with total shrimp trawl landings being only about 3,200 m.t./year, and the tiger shrimp element of this being only 200-400 m.t./year the time might be approaching when a ban on *bagda* trawling might be necessary to preserve enough adults for broodstock to supply hatchery-reared fry for the farming industry.

4.7.1 Regulatory framework for marine shrimp harvesting

a) Maintain the cap on numbers and sizes of marine shrimp trawlers.
b) Issue no new *bagda* trawler licences, so that this fleet is gradually run down; while encouraging the boats to fish for other shrimp species outside the *bagda* grounds.
c) Enforce the ban on trawling in *bagda* breeding areas during the January/February breeding season –but provide a few licences to trawl at that time for specific numbers of *bagda* brood females. Existing fleet managers need to be aware of the consequences of poor management and be persuaded to endorse a policy of restrictive access.
d) Start to dismantle the ESBN fishery by providing Government support (and intensive persuasion) to change from this fishing method to less destructive methods.

4.8 Quality Control

Objective: To raise export earnings by improving the quality of shrimp products to ensure that shrimp is produced in compliance with the food safety or HACCP rules and the Human Rights and Labour rules and environmental codes as well as, improving the traceability of shrimp products at all points of the value chain from hatchery through to farm, marketing, and processing factory.

Background

The Fish and Fish Products (Inspection and Quality Control) Rules, 1997 lay down detailed procedures for inspection and quality control of fish and fish products during transportation, processing and export as well as empowering officers to implement the rules. The Fish and Fish Products (Inspection and Quality Control), Ordinance, 1983, prohibits the establishment and operation of fish processing and fish packing plants without obtaining a license from the government, and provides provisions for inspection and quality control of fish and fish products. In pursuance to Section 15 of the Ordinance, the government has framed rules such as the Fish and Fish Product - Inspection and Quality Control Rules, 1997. These rules include 10 Schedules which apply quality control standards and conditions for operating processing plants, transport vehicles, fish depots, service centres, *arats* and ice plants.

The Export Promotion Bureau deals with the processes of finding buyers for the processed shrimps and arranging for the required GoB export licenses and GoB quality certificates (required by buyers). This process is done through private companies or individuals. Processing plants may export directly or decide to go through specialized exporters or exporting companies. Quality certificates are issued by Department of Fisheries. There are three laboratories (Khulna, Dhaka and Chittagong) to test the quality (intending to comply with HACCP standards) and issue certificates.

Most processors and exporters are organized in associations that look after their common interests and represent them in different forums. The Bangladesh Frozen Food Exporters Association and the Shrimp Hatcheries Association are the most important industry associations which influence the formulation of government policies.

The long post harvest supply chains and large number of intermediaries handling and trading shrimp present difficulties for Bangladesh in its efforts to meet food safety requirements to ensure that buyer confidence is assured and that exported shrimp commands a higher price in the international market.

The recent tightening of international standards (through for example, the US Bio-terrorism Act) highlights the need to review existing rules and establish a mechanism to ensure the regulatory framework in Bangladesh is regularly reviewed and updated. There is an urgent need to prepare the industry for future international food safety and traceability rules e.g. the farm to fork approach in EU food legislation. This implies a need to consider all aspects of the food production chain from producer through to the point of sale to ensure food safety. The standards, legal and administrative procedures within the regulatory framework of this strategy should therefore guarantee a high level of human health and consumer protection by ensuring that shrimp produce placed on the market is safe and that exported shrimp produce complies with the relevant food laws in importing countries.

Private certification schemes are increasingly favoured by international buyers and it is likely that certified farmed shrimp products – in one form or another – will become a requirement for future

international trade and marketing. However, there are high transaction costs associated with these codes and a need to ensure they take into account local conditions in Bangladesh. Any move towards adoption of Codes of Conduct, certification of aquaculture products, and integrated supply chains, with trace-ability, therefore, has significant implications for producers in Bangladesh. There is concern particularly that small-scale producers operating low input farms may face difficulties in participating in such market chains. Efforts here need to focus on mechanisms to strengthen the organisation of the smallholder sector, to strengthen forward linkages to the post harvest chain and processors and raise their capacity to comply with emerging standards.

The emergence of private certification schemes in Bangladesh highlights the changing roles and responsibilities of Government and the private sector. Although the responsibility for validating exported shrimp products as safe rests with the respective Governments many buyers are increasingly asking for higher levels of quality and safety guarantees and international third party certification. The Indian Government now accepts third party certification as the norm because standards demanded by the buyers are higher than those the Government would normally comply with. Moreover, the private certification agencies are increasingly developing systems of "process" certification which has evolved from a recognition that product certification does not address issues of traceability and social and environmental concerns. In this context, the role of the Government is to provide the overarching regulatory and enabling environment to ensure that third party certification can be undertaken successfully as well as develop measures to prevent fraud and regulate the proliferation of labels.

The regulatory framework for this section divides into three sections:

- quality control and certification.
- food safety, and
- traceability,

There is also a need to promote greater confidence in the decision making process that underpins food safety laws for shrimp exports particularly the structure and independence of the institutions protecting health and other interests. Finally, there need to be a better systems in place to identify and respond to food safety problems.

4.8.1 Quality control and certification

Objective: To establish a quality control system for the industry that combines the authority of Department of Fisheries in quality assurance together with the need for self regulation and quality control by the private sector.

This section is supplemental to the Quality Control Strategy. It is primarily aimed at the export needs, whilst the QC Strategy offers a broader perspective.

Regulatory framework

a) The Department of Fisheries should ensure that private certification schemes do not conflict with national policies and regulations and are accredited with leading internationally recognised standards.

Support measures

a) The private sector should take increasingly more responsibilities for ensuring quality of their own products and of the raw materials they receive.
b) The private sector should be encouraged to establish an effective and self-sustained institution to develop and operate a seal of quality for the shrimp products.
c) The seal of quality should arrange international recognition that will elevate the image and credibility of Bangladesh products in the international market
d) The existing quality control system of GoB should be consolidated and adapted to effectively support and verify the accuracy and transparency of the private quality control system.
e) National codes should be established for all major stages of the industry, e.g., hatchery(brood and post larvae screening or WSV, antibiotics etc), farming including water management in private farms, processing, feed mills, ice plants and the transport process.
f) All positive measures and changes should be regularly publicized nationally and internationally by using electronic media, TV, newspapers and other news media and also by direct interactions with the buyers to elevate the country image
g) In all possible areas there should be private – public sector collaboration for quick development
h) Credit should be made available to help stakeholders comply with regulations.
i) The Department of Fisheries should support measures to improve testing facilities to ensure all hatchery fry are certified disease free
j) The Department of Fisheries should support private certification programmes and monitor their implementation and effectiveness.
k) The Department of Fisheries should develop a plan with industry to ensure that certified virus free mother shrimp are used in hatcheries.
l) The Department of Fisheries will examine mechanisms by which ice can be readily accessible to groups of farmers.

4.8.2 Food Safety

Objective: To provide effective Government quality control procedures that will guarantee shrimp produce placed on the market is safe to human health and exported shrimp produce complies with the relevant food laws in importing countries.

Regulatory framework for food safety

a) **Shrimp product shall not be placed on the market if it is unsafe** (injurious to health or unfit for human consumption).
b) Shrimp products exported from Bangladesh should meet **importing country food safety requirements and laws (**US FDA – HACCP, EU Directives and regulations for exported products). This may require amendments to, implementation/enforcement of FIQC, and a review of penalties for violation of rules.
c) **Shrimp products injurious to health should not be exported or re-exported**.
d) A shrimp business **operator shall immediately inform the competent authorities** if it has any reason to believe that its shrimp products may not satisfy food safety requirements.
e) Shrimp business **operators shall cooperate with the competent authorities** where action is taken to reduce the risk posed by the food which they supply or have supplied.
f) A **rapid alert system** will be established for the notification of serious food safety risks posed by shrimp products. A network of members from relevant bodies shall be formed

g) The Government will introduce **surveillance and control of shrimp supply chain operators** at all stages of production, processing and distribution.
h) The government will test the performance of private sector control capacities and capabilities through **audits and inspections**.

Note:
The Department of Fisheries shall enforce food laws and regulations, and monitor and verify that the relevant food laws are fulfilled by shrimp business operators at all stages of production, processing and distribution. The costs of monitoring should be met by charges levied on the sector. Penalties and measures will be applied to operators found to be infringing food law. A "Food Safety Authority" should take on the role as an independent scientific point of reference in risk assessment of food safety for the whole shrimp supply chain. The Authority would be a source of advice, information and risk assessment to improve confidence with importing countries. It would also contribute to the development of food safety standards.

Support measures

a) Department of Fisheries will implement improved **measures to prevent the inadvertent or deliberate contamination or adulteration of shrimp feed** during production, manufacture, transport and distribution of shrimp feeds.
b) An **awareness programme** will be introduced with immediate effect to inform all facilities that manufacture, process, pack or hold shrimp destined for consumption in the US or EU of their obligations under the relevant food safety laws.
c) Enhance capacity and **strengthen mandate of competent authority** to implement food safety regulations. This will require measures to improve monitoring and surveillance of food safety and the development of improved information management systems.
d) The capacity of Department of Fisheries to ensure effective **residue monitoring** will be strengthened.
e) Expand and strengthen capacity of Department of Fisheries to carry out its inspection functions of processing plants, depots and farms.
f) Department of Fisheries will provide incentives and other support to ensure **improved handling, transport and marketing of shrimp products** from farm to processing plant.
g) Department of Fisheries will support the development of **self check systems for industry**.

4.8.3 Export Licensing

Objective: to upgrade and maintain an export licensing system that ensures exported shrimp products fully comply with international food laws.

Regulatory framework for export licensing

a) The Government shall only issue export licenses to those processing plants and exporting companies which can comply with international food laws.
b) Shrimp produce will only be licensed for export following the issue of a quality certificate from Department of Fisheries.
c) The Government shall withdraw export licenses from processing plants and exporting companies that fail to meet importing country regulations.

4.8.4 Traceability

Objective: To provide a national license and registration system for all shrimp operators from hatcheries through to farmers, processors and exporters to ensure traceability within Bangladesh shrimp supply chains.

Regulatory framework for traceability

a) The Department of Fisheries will develop effective mechanisms to ensure that the **traceability of shrimp products** are established at all stages of production, processing and distribution.
b) Manufacturers, processors, packers, transporters, distributors, receivers, holders and importers of food are required to **keep records** identifying the immediate previous source from which they receive shrimp products as well as the immediate subsequent recipient to whom they sent shrimp products.
c) Shrimp which is placed on the market shall be **labelled** to facilitate its traceability throughout the supply chain. The Department of Fisheries will develop rules for correct labelling of inputs (feeds, ice, fry, etc) and shrimp products throughout chain of custody.
d) The Department of Fisheries will develop rules to provide for the **licensing of all shrimp facilities handling**, marketing and transporting shrimp.

Support measures

a) The Department of Fisheries in partnership with other implementing agencies will **support and facilitate initiatives that improve traceability** e.g. backward linkages from processing plant to depots and farms or contract farming, strengthening of trade associations and improving the horizontal and vertical linkages between them.
b) The Department of Fisheries will provide **identity cards** to all registered shrimp farms and depots.
c) The Department of Fisheries will support the development of an all-industry associations promoting the development of an **apex industry organisation** representative of the whole industry.
d) Department of Fisheries will conduct a logistical study to examine ways and means by which product flows from *gher* to processor can be enhanced.
e) The Government will provide fiscal incentives to processors increasing traceability with producers.

5 Support to the Industry

In support of the Private Sector, provide the services that will lead to a sustainable and equitable development of the shrimp sub-sector.

The industry is controlled by the private sector, and its growth can only be directed through support and the regulation of its activities. This can either be by the industry itself or by support and controls through the services provided to the industry by the government and other support services such as educational institutes and the NGO sector.

This section will look at the strategies needing to be employed to provide a vision of the support the sector will require to achieve its overall goal.

5.1 Shrimp Production Support measures

As seen from the proposals for a range of regulatory actions there is a need for a strong link between those actions required to control the sector and those actions required for its support.

a) The Department of Fisheries will promote **optimal use of inputs** (optimum stocking rates, use of low-cost high-value nutritional feed, application of fertilizers etc).
b) The Department of Fisheries will develop a **technical advisory service** for extension providers to increase productivity of culture systems.
c) The Government shall support applied **research and training** in collaboration with NGOs, research institutes and the private sector.
d) The Department of Fisheries and local Government institutions shall **support the development and adoption of codes of conduct** for sustainable management practices and international third party certification to organic or inorganic quality standards.
e) The Government will **improve coastal infrastructure** to support economic development and poverty alleviation in the coastal zone whilst ensuring that the environment is not adversely affected.
f) The **lease period for *khas* land** used for shrimp cultivation will be extended to 5 years to encourage private investment.
g) The Department of Fisheries and local Government institutions will **support small-scale producers** with low input, extensive, integrated production systems and assess the potential for 'organic' shrimp production by establishing linkages with appropriate certification bodies.
h) The Department of Fisheries will **support the participation of small-scale cultivators in traceability schemes** including initiatives to improve and strengthen forward and backward linkages of producers.
i) The Government will provide incentives to **promote employment of the poor in shrimp supply chain** activities (feed and fertiliser supply, nursing operations, harvesting, transport) to improve the equitable distribution of benefits from the sector.
j) The Department of Fisheries will support initiatives to improve the **organisational development of producer organisations**.
k) The **capacity of the Department of Fisheries to effectively monitor and regulate production** processes will be strengthened.

These different support mechanisms are more fully detailed in the following support topics.

5.2 Extension

Objective: To form an effective two way flow of knowledge and information that will enable all stakeholders to develop the sector through the prudent application of knowledge.

National Fisheries Policy

7.4 Highest priority will be given for the culture of shrimp by improved traditional method. However, eco-friendly semi-intensive culture systems shall be encouraged in controlled and feasible areas. The expansion of shrimp culture by mangrove destruction or by methods of shrimp culture that are harmful to the mangroves will be prohibited. In order to ensure ecological balance, tree plantation will be compulsory for owners of shrimp farms in the shrimp culture areas around the polders and on the land in between the polders and rivers.

7.12 Emphasis will be given to increase shrimp production by developing appropriate technology. Big farms will be encouraged to convert into smaller more manageable units by improvement of water supplies and drainage facilities.

The present low levels of production can mainly be attributed to the lack of knowledge by many of the shrimp producers. Through an appropriate extension service this knowledge could be raised. The production levels achieved in some of the neighbouring countries can only be aspired to by a few, as the risk involved and the inputs and infrastructure at present remain beyond the capabilities of most.

The approaches used for extension for shrimp are as laid out in the Aquacultural Extension Strategy. Many of the limitations of staff shortages, inadequate funding and poor linkages are as true in the shrimp sector as in the wider aquaculture sector. To counter these, the shrimp sector must use all of the resources available, collaborating with local government and other local service providers such as the DAE and the DLS.

As with the Aquaculture Extension Strategy the focus of extension work for support to the shrimp sector must be on; people's participation; decentralisation of planning; partnerships and cooperation.

As discussed earlier, the image of the industry needs to be addressed and its important that extension supports these objectives of ensuring that production is achieved without affecting the quality of the shrimp; of the food safety of the produce; that the environment is not adversely affected either through destruction of mangroves, or through the salination of land; or that changes in the production system do not cause any social injustice.

Varieties of extension approaches:

- Extension is based on the needs of farmers and is determined through locally designed strategies for dissemination of information,
- Extension is carried out by/through a variety of agencies and partners,
- Extension advice is disseminated through multiple channels,
- Secondary extension agents should be encouraged including farmer led extension,
- Extension services provided by the private sector and secondary extension agents should be encouraged, but they require to be monitored and supported by Department of Fisheries to ensure that they do not cause the farmers to become entrapped through tied linkages
- Different extension approaches should be adopted for *bagda* and *golda*. These should relate to how the different systems support efforts to tackle poverty, and environmental concerns

- Department of Fisheries should support, coordinate and monitor all extension activities
- It would also create a pool of fisheries technicians like health technicians and the Block Supervisors of DAE, to cater to the needs of the sector

The National Fisheries Policy advocates that an improved extensive system of production be followed, however no clear definition of this system is available. It is important to understand the boundaries of this system and what constitutes moving to a semi intensive system. An extensive system is broadly a system that:

- stocks at the rate 5 post larvae per m^2 Sustainable increase of coastal aquaculture productivity:Improved-extensive culture system will be encouraged
- Semi-intensive culture may be allowed in limited area with the provision of EIA
- Small scale farms will be encouraged to make farms more manageable and increase unit area productivity

Develop improved production system:Identify clear research priorities based on farmers needs leading to on station testing research,

- Field testing of adaptive research findings including farmer evaluation of findings
- Develop code of practices developed from examining best production systems advocated by leading farmers, Department of Fisheries and BFRI in association with private sector.
- Promote cross access of information through exchange visits and farmer evaluation of different production systems
- Exploration of local knowledge and adaptations of practices, under different local conditions
- Improve the access of the farmers to information from all sources, ensuring that all stake holders have equal access,
- Develop multiple channels for extension dissemination and awareness creation,
- Improve the quality of the information being extended to farmers,
- Ensure that extension systems are responsive to developing needs of the sector
- Rewarding or providing incentive for best practitioners by the industry
- Ensure support systems i.e. inputs and credit are linked to production cycle

5.2.1 Extension Partners

The principal partners involved in extension support are; the Department of Fisheries, NGOs and the private sector.

GoB
Through the Department of Fisheries, the government has one of the clearest responsibilities for ensuring that there is a flow of knowledge enabling the sector to develop. It has however severe constraints on its resources which restrict its ability to provide full extension coverage. The role of Department of Fisheries must therefore be to:

- play the leading role in coordinating extension and training activities in the sector,
- encourage formation of groups by the farmers, traders and other stakeholders to expedite quick dissemination of extension message,
- initiate linkages and partnerships with every tier of stakeholders and encourage regular interaction among the respective segments,
- provide major effort to develop appropriate extension and training materials,
- play primary role rendering ToT to GO and NGO staff and private sector extension agents,
- publish, print and distribute extension materials (Training Manual, Handbook, Booklet, Leaflet, Poster etc.) to the farmers and private extension providers,

- develop web based information on key issues including current market information,

NGO
NGOs are increasingly playing an important role in extension. This was driven from their desire to deliver credit, but there is increasing demand for these two to be kept separate. In addition the NGOs also play a key role in advocating systems that are environmentally friendly and socially just. The roles of the NGOs should be:

- encouraged to develop capacity and acquire skills to provide extension and farmers training at village level,
- encouraged to initiate motivational and awareness programme at local level enabling farmers to effectively participate in the extension process,
- ensure that farmers and CBOs are able to articulate their needs for extension support,

Private Sector
The need for the private sector and LGBs to encourage shrimp production is linked to their desire to increase quantities of shrimp for processing and to increase the market for their products such as fish feed. The private sector should be:

- link in with other extension providers to provide an integrated responsive network,
- encouraged to gradually share in the extension and training responsibility,
- encouraged to involve in awareness programme supporting the emergent need of the industry,
- Farmers or groups of farmers/stakeholders will be encouraged to share ideas and knowledge from where knowledge gaps (training need) can be understood and linked to the backstopping support form Department of Fisheries.
- SHAB and BFFEA will be encouraged to promote contract farming system through their membership in association with the progressive farmers and farmer associations.

External Partners

- Development Projects (both foreign aided and govt. funded) which promote community-based activities through CBOs and LGBs.
- International organizations engaged in extension and training will be encouraged to undertake site-specific extension and training activities suitable for the coastal areas.

5.3 Research

Objective: To improve the relevance of research to the needs of the sector and to develop mechanisms that improve the uptake and application of key findings.

If the sector is to combat some of the many technical problems and social problems besetting it, then more focused research is required. The current research programme is constrained by shortage of research funds and scientists adequately skilled in researching the full range of problems besetting the industry. It is therefore important to utilise all of the stakeholders who can undertake research to support the needs of the sector. This will require collaboration between several diverse organisations. In order to achieve this:

- ensure those best able to undertake the work are employed for the task,
- ensure that there are adequate resources to undertake the required research,
- Research planning meetings need to be held annually together with result and information dissemination workshops,

- Key individuals in each involved stakeholder organisation should be nominated as contact persons to ensure a cadre of skilled researchers and planners help develop and relevant programmes.

A critical constraint to research is the inadequate funding received for all organisations. A range of different funding should be sought including competitive government funding and contracted research by the industry. In addition low cost research by field practitioners and farmers should be acknowledged and used to help provide solution for simple field based problems.

Technical Research

The principal organisation mandated to undertake research for the fisheries sector is the BFRI. Research stations in Paikgachha, Cox's Bazaar and Chandpur are ideally placed to conduct research covering the three shrimp systems. Currently many of the research needs are not met. BFRI should:

- Bear the major responsibility to carryout the research needed by the industry.
- Plan a major thrust on farming systems research to meet dynamic needs of diversified farmers stretched over the coastal areas.
- Undertake specific research to establish effective procedures for coastal aquaculture management.
- Develop special research initiative to assess and monitor the environmental impacts of aquaculture activities comprising water extraction, land use, salinity intrusion, discharge of effluents and use of drugs and chemicals.
- Be given 'impact assessment and monitoring' type of research responsibility for the Department of Fisheries projects under 'research component' to enable immediate feedback and undertake necessary mitigation measures.
- Develop participatory process and regular field monitoring to identify suitable research areas. Department of Fisheries, BWDB, WARPO, SRDI, DAE should be invited to participate annually to prioritize suitable research areas and appropriate planning and designs.
- Interact with BFFEA, SHAB, Shrimp Fry Traders Association and Farmers Association to assess contemporary training needs felt by respective stakeholders.
- Undertake adoptive research on proven technologies from neighbouring countries at farmer's fields.
- Develop and make accessible a comprehensive database on contemporary research findings from home and abroad.
- Actively seek the collaboration of other research organisations to ensure research needs are addressed.

In support of the BFRI the role of the Universities is becoming relevant to resolving the research needs of the sector: The broader role of the universities will enable them to undertake research on other issues such as the economics of the industry and some of the social issues.

- Public universities should be encouraged to undertake research initiatives to protect and develop coastal aquaculture resources.
- Senior faculty members will be encouraged to undertake research activities on crucial technical, economic and social problems facing around the coastal areas.
- Thesis students doing Masters and Ph D from universities will be encouraged to undertake applied research related to the coastal resource development.
- Faculty members from universities will be encouraged to undertake collaboration projects on coastal environments with foreign universities and International Research Organizations.

- Strategies to counter funding constraints should draw on the systems developed by the SUFER project

Other Research Organizations:

- National and International organizations engaged in research and training will be encouraged to undertake site specific research activities suitable for coastal areas.
- National and International organizations will be encouraged to undertake action research in farmers fields.
- Policy and trade issues should be studied by organisations such as CPD,
- Other organisations such as BCAS, BIDS, IUCN should be supported to carry out research on environmental and social issues,

5.4 Education

Objective: To ensure that the development of the sector is supported by suitably qualified human resources who are equipped with the necessary skills and expertise.

There is a need to determine the current and potential skill requirements for the sector and compare these with existing skill base. The development of the capacity to implement the strategy is important if the goals set out are to be achieved.

Academic

Although recent trends have seen a proliferation of courses on aquaculture, few offer the required specialisation required for the shrimp sector. If the industry is to develop successfully then more attention must be given to ensuring that the needs of the sector are determined and that the training institutions develop the courses required to fulfil these needs.

- Courses at degree and post graduate levels need to be formulated for the shrimp industry,
- Courses need to cover the full range of issues from stock assessment, breeding, production, marketing and processing,
- Social issues also need to be included to improve the community participation in management of the resources,
- Universities should develop short refresher courses to update the skills of the key players.

Technical

At present many of the technical positions in the production of shrimp post larvae in hatcheries are staffed by Indian, Thai, Philippine or other Asian nationals. There is an urgent need for Bangladeshi nationals to be trained to take over these tasks and build up local capacity.

Additionally in the processing industry the skills found in ensuring quality control are limited and are not adequate to meet the increasing demands of the importers

- Improved technical training for local staff involved in post larvae production
- Training in the improved management of shrimp production
- Training in the improved detection and control of shrimp related disease
- Improved design and construction of infrastructure
- Improved training for staff involved in the sectors quality control and laboratory facilities
- The Marine Academy should offer short courses for technicians in hatchery production for both *bagda* and *golda*,

Education and training should not be seen in isolation from HRM/D. It is important that staff with the relevant skills are recruited and that they are able to develop a career in the shrimp sector.

- Systematic HRD strategy for Department of Fisheries and partner organizations
- Development of training manuals, handbooks and CD
- Develop expertise from beneficiaries
- Utilization of Training Centres for local level HRD

5.5 Infrastructure development

Objective: To support the establishment of infrastructure, in areas identified and demarcated for production of shrimp, enabling improved water management and marketing of shrimp.

The infrastructure required for shrimp production differs depending on the system. *Bagda* is heavily dependent on good infrastructure to allow for water management enabling the exchange of saline water. On the other hand the infrastructure required for *golda* is less of an issue as most is locally constructed by the *gher* owners and does not require water exchange.

The marketing infrastructure for the sale of both *bagda* and *golda* is becoming more crucial in ensuring that the quality of the product meets the quality standards. This requires improved handling, quicker icing and greater cleanliness.

5.5.1 Water Management

The construction of water management infrastructure does not come under the mandate of the Department of Fisheries as it is usually overseen by BWDB. There is however a need for Department of Fisheries to be involved as the requirements for shrimp differs from the usual mandate of BWDB which is to prevent saline water intrusion.

The development of sophisticated structure is beyond the resources of most of the shrimp farmers however if production is to be increased then they are essential. A major limitation at present is the depth of water in the polders and the frequency and ability to exchange water. The design and construction to facilitate these although not done by individuals or communities, must be mobilised to ensure the effective management of the infrastructure. This must involve:

- Department of Fisheries and BWDB working together to improve and maintain polder infrastructure with the support of the local stakeholder community
- Department of Fisheries and BWDB with partner NGOs will facilitate the participatory management process in the line of the relevant national policies (National Fisheries Policy, National Water Policy, National Environment Policy and National Land use Policy) and the guidelines on participatory water management.
- GOB will assist the Community Based Organisations (CBOs) to build up their capacities on organizational development, resource mobilization, improved technical knowledge base and taking over of OandM responsibilities
- Infrastructure building will be based on participatory planning and resource mapping at local level and agreed land use plan
- Community based, private sector led infrastructure development, rehabilitation and OandM where stakeholder communities are ultimate decision makers
- Ensuring that the management of the infrastructure is in the hands of the community and not held by elites as a means of extracting tolls.

5.5.2 Marketing

The infrastructure required for improved marketing range from improved depots, cold storage facilities, ice production plants, roads and power supplies. The later falls on the local government support and requires that decisions are taken by local government in support of developing this

infrastructure. The provision of depots, ice plants requirements etc. have generally been fulfilled by traders involved in marketing, but these have been limited by the availability of credit. However the requirements for credit to develop the infrastructure for *golda* expansion is more limiting as production is more wide spread. Support must be made available to:

- Provide credit for small loans to develop marketing infrastructure
- Develop guidelines for infrastructure development to ensure the best
- Ensure that the infrastructural needs are including in local development plans

5.5.3 Finance

The development of water management infrastructure for the production sector relies on finance either from the government or from donor assistance. At present these are both restricted. The government's financial support is aimed at either the processing or hatchery operations whilst the support from donors for these types of activities is declining as they are not seen to be supporting the poorest members of the society. Development of infrastructure for marketing receives no government, nor does it receive much support from the formal credit agencies.

- GoB needs to redirect much of support from the processing and hatchery sectors to support for the productive sector,
- Credit facilities should be made available at favourable terms for the development of small infrastructure that will enhance the quality of the sector,
- GOB will assist in the implementation of such programmes with financial and technical support

5.6 Input support

Objective: To ensure high quality inputs at affordable prices are readily available at every stage of the shrimp supply chain.

The growth of the shrimp sector is heavily reliant on a range of inputs including fry, feed, chemicals, equipment, ice and equipment. Failure to provide quality inputs is likely to constrain the development of the sector either through reduced rates of production or through rejection of the product due to contamination from either dirty ice or banned chemicals.

- Develop supply chains to ensure the timely availability of inputs
- Ensure that inputs are used in a responsible and cost effective manner
- Provide codes to ensure that inputs are available
- Provide extension advice on the best and most cost effective means of utilising the input

5.7 Marketing

Objective: To improve the overall position of the Bangladesh shrimp industry in a competitive global market, increasing market share and revenue from shrimp production.

Background
Marketing of shrimp is in two distinct phases. The first is post production up to the processing plant. The second is after processing and is primarily for export though limited quantities are sold on the domestic market.

Post production marketing is seen as one of the key areas that need to be developed under the strategy as loss in quality primarily occurs due to the weak marketing chain. From the farmer to the processor there can often be 3 or 4 middlemen who exert a strong control on the industry in determining the price the farmers receive and which processing plants receive the product.

- Rationalise the market chain to limit numbers of transactions,

- Encourage group marketing to improve bargaining power of farmers,
- Improve marketing infrastructure, depots, transport facilities etc.
- Ensure that HACCP regulations and Bio-Terrorism act of USA, SPS measures of the WTO,.are understood and adhered to,
- DoF will ensure adoption of the measures to remove the Nitro furan and Chloramphenicol from our shrimps
- Establish monitoring system to ensure compliance of sanitary marketing conditions,
- Establish credit system to reduce control of traders
- Develop linkages to research to understand the loss in quality and recommend packages to address the losses

Support measures for export marketing

- Improved utilisation of Commerce/Economic departments of Embassies in importing countries, better linkages between commerce and Fisheries Ministries.
- Promotion of Bangladesh products at international business fairs, seminars and websites.
- Improve market research to better understand market needs, consumer perceptions etc.
- Improve packaging of shrimp products.
- Support development of direct linkage with importers.
- Improve capacity of sector to promote the shrimp industry.
- Improving the image of the shrimp industry and promoting shrimp products in importing countries.
- Programmes must be undertaken to enhance the equitable distribution of benefits of shrimp exports and local marketing of shrimps. The farmers bargaining power will be established through
    - Empowerment of the communuty (followed by lessions learned from the ECFC project)
    - Awareness build-up with training as well as through the promotion of market chain
    - Undertaking appropriate action plans to eliminate middle-men from the market chain

Export growth

- Value addition.
- Product diversification.
- Improved utilisation of by-products.
- Develop new markets.

5.8 Disease Monitoring and Prevention

Objective: To develop an effective disease surveillance, notification and control system to reduce the spread of disease.

The development of an intensified shrimp industry has been hampered by the incidence of disease principally the White Spot Syndrome Virus (WSSV). Although this is the main disease affecting the sector

- The Department of Fisheries will introduce a **disease surveillance, notification and control system** to reduce the spread of disease in shrimp farming areas.
- Provide a diagnostic facilities to help reduce and control the incidences of disease,
- Train field staff in the identification of disease symptoms
- Ensure that skilled staff are in place to support system

5.9 Biodiversity and Environmental Conservation

Objective: To preserve the biodiversity and environment of coastal aquatic habitats while not depriving people of the right to make a living in those areas

A principal concern expressed against the shrimp industry is its impact on coastal biodiversity. Apart from loss of mangroves other concerns are based on the destruction of organisms during post larvae collection

Protect Coastal Environment:

- Impact assessment of aquaculture activities on environment
- Protect mangrove forest
- Protect costal biodiversity
- Sustainable livelihoods for the coastal people
- Restriction of hazardous chemicals and antibiotics

Habitat protection is the key to biodiversity protection, not species protection

Shrimp Post Larval Fisheries - Policy recommendations

- Year-round ban: Ecologically sensitive areas like Sundarbans
- Seasonal ban: February and March only (fry migration season)
- Area where ban to be applied: Khulna Division only (most by-catch)

Trawl Fisheries - Policy recommendations

- Location of breeding grounds known, so can create 'prohibition boxes' within breeding ground areas where trawling prohibited
- Time**:** Ban to operate within boxes in January only (peak shrimp breeding season)

Set Bag Net Fishery (ESBN) - Policy recommendations

- Seasonal ban: March - April (to protect juveniles)
- Location: National

6 Collaboration and Participation

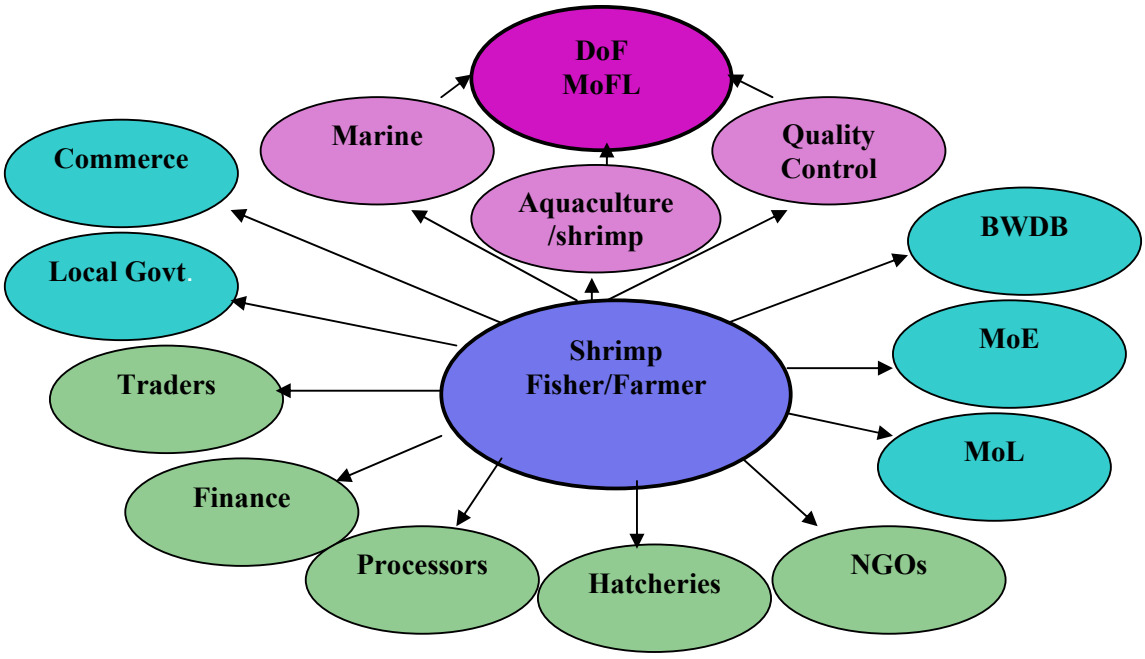
To ensure the participation of all stakeholders who, through their collaboration and clear understanding of their role, will contribute to a sustainable and equitable development of the shrimp sub-sector.

National Fisheries Policy

7.1 At national and other levels, necessary committees will be established. These committees operating according to government policies will take appropriate measures for the development of shrimp production, implement laws related to shrimp culture and mitigate other related problems.

The Department of Fisheries has to develop effective collaboration, co-operation and linkages with the different organisations while the different organisations have to be made aware about the responsibilities that they share in achieving the goal. The approach adopted should be based on the decentralisation of the decision making process as emphasised in the iPRSP.

The Department of Fisheries does not have the required strength and capabilities to carryout all the functions required of it. Thus the capabilities of the Department of Fisheries have to be strengthened. The Department of Fisheries should be reorganised to support the policy and provide field level support required to guide development of the shrimp sector.



MoFL /Department of Fisheries: This organisation has the broadest mandate to support the sector. Its role in regulating the industry from brood collection, hatcheries, production and processing and its support role establish it as the institution best placed to coordinate the sector. It does however have serious shortfalls (see SWOT analysis in Box 4). Department of Fisheries is supported

through four wings: shrimp, aquaculture, quality control and marine, which must also be coordinated.

Box 4: SWOT Analysis Department of Fisheries

Strengths
- Overall co-ordination role
- Technically trained staff at DFO level
- Potential for improved management
- Increased production potential
- Small farmers regaining control of their resources

Weaknesses
- Limited funds to undertake field activities
- No mandate for extension in shrimp
- Confusion in roles of private and govt. sectors
- Insufficient staff
- Loss of biodiversity
- Little connection between different institutions
- Too much of the wealth of the sector in too few hands

Opportunities
- Bring different players together
- Sector keen to improve production
- Access to organic market
- Improved auditing of social and environmental concerns

Threats
- Poor global image of shrimp
- Trade embargoes
- Increased disease
- Proliferation in use of chemicals
- Social unrest
- Poor governance

MoWA /BWDB: The production of shrimp is reliant on water be it fresh or brackish water. The role of the MoWA/ BWDB in providing access to this water is important as is the infrastructure that has been constructed initially to control salt water intrusion. These organisations should also be part of planning on zoning that should allocate land used for brackish and fresh water shrimp cultivation.

Ministry of Land: The Ministry of Land through its field representatives plays a crucial role in its responsibility for land distribution, principally *khas* land, and for its potential role in determining zones suitable for shrimp. At present both are perceived as problem areas, as the distribution of *khas* land is often in favour of the rich rather than the poor and the lack of zoning has led to a number of serious conflicts between the pro-shrimp lobby and those who do not wish to engage in the trade.

Ministry of Commerce: As the importance of shrimp as an export commodity has grown so has the involvement of the Ministry of Commerce. Some stakeholders have argued that they should be responsible for co-ordinating the sector, however their technical knowledge of the pre processing and marketing phase are limited and it is considered that they would not be able to support the industry effectively at the critical points.

Local Government: Local Government and their links to the DC and the ADC revenue play an important part in regulating and promoting the industry at a local level. Their responsibility to coordinate development in local government is crucial to ensure that all stakeholders are united in tackling the problems that the industry faces including environmental degradation, social inequity and unrest.

NGOs: The roles of NGOs cover many different aspects from supporting collaboration amongst water users and those under the zone protected by polders; to monitors and advocators for social justice and environmental protection. Credit provided by NGOs is also critical to the development of the small holder sector. NGOs can also play an important role in data and in conducting

independent monitoring particularly on social and environmental issues as well as in creating collective forums and dissemination channels to raise issues. NGOs can also ensure greater information sharing occurs on key issues so that small producers can respond more rapidly to the changing regulatory and trading environment.

Hatcheries: The growth in the number of hatcheries has been phenomenal and now has the capacity to produce *bagda* post larvae well in excess of the demand, though there is still a shortfall in the *golda* supply. The hatcheries must now learn to exist without subsidies and be able to show their ability to produce quality and disease free post larvae for the industry and wean the farmers off from their preference for wild post larvae.

Processors: The processors are key to the industry as they are responsible for the final product. However the numbers of processors has exceeded the needs of the industry and has resulted in inefficiencies. A rationalisation needs to happen based on commitment, quality and back ward linkages that help the industry comply with the new demands of traceability, social equity and environmental sustainability.

Finance The principal beneficiaries of financial support have been the processing plant and hatchery owners. Government support however has been a major cause of over capacity development in these areas and now needs to be redirected. This will require different arrangements as the loans will be required by those with less collateral i.e. producers, depot owners, nurserers and post larvae collectors.

Traders: The control exerted over the industry by traders of fry and of harvested prawn is immense and disproportionate to the value they add to the product. Because of the numbers of traders involved, returns to the productive sectors are often limited. Attempts to reduce the lengths of the marketing chains are needed to improve traceability and quality, however these efforts are likely to be strongly resisted by the traders. Much of the control exerted is due to credit offered which requires farmers to enter into arrangements with the traders that result in lower benefits to the producer.

6.1 Participation of all stakeholders

During discussion with various stakeholders during the development of this strategy, one of the most frequent comments made was the need to co-ordinate the efforts of all stakeholders and ensure that all were involved in the planning and development of the sector. This should encompass:

- Ensuring peoples participation during zoning for shrimp areas
- Creating an environment where stakeholders can voice their needs
- Developing mutual trust and accountability
- Ensuring extension is responsive to the beneficiaries
- Provision for farmers' participation in extension activities
- Cooperation of GO, NGO and Industry Associations
- Focus on poverty reduction and gender balance

In particular, the involvement of the NGOs/CBOs in a permanent collaborative framework with the government is emphasised in the iPRSP and should not be limited, as at present, to the traditional roles of delivery agents in the sphere of microcredit and safety net.

6.1.1 Linkages and Roles of Partner Organisations

A key role for the Department of Fisheries must be to establish improved linkages to partner organisations. This will bring all of the expertise together and help offset the shortages of manpower that individually is the case, but collectively is adequate. This will require:

- Enhanced coordination and collaboration and linkages with other extension providers and research organizations
- Strengthening cooperation and coordination with various government agencies like Department of Forestry, BFRI, BWDB, MoL MoC particularly by establishing and enhancing field and mid-level horizontal linkages,
- Partnership building between with LGI and private sector, particularly business associations like SHAB, BFFEA, Shrimp Farmers' Association
- Networking with relevant international organizations like FAO, NACA, World Fish, SEAFDEC etc.
- Collaboration and linkages among GO-NGOs and private institutions
- Capacity building of the CBOs
- Use of IT and media to enhance coastal aquaculture development and management.

6.1.2 Formation of Associations

One of the priority needs for the producers and other entrepreneurs is to form associations to enable them to meet the needs of the sector. These needs range from:

- The formation of committees to allow for the participatory planning for the use of land, be it shrimp or agriculture
- The formation of water management committees to control the use of water in brackish water areas
- The formation of groups to ease the requirements for tracing the source and marketing of shrimp
- The formation of bodies to act against the poor governance and lack of law found in many shrimp producing areas

The Government supports the formation of small enterprise associations in its iPRSP to ensure product standardization, quality control and flow of information necessary for access to foreign markets. These trade associations are also seen as key suppliers of market information, quality guidelines, and link rural enterprises to large enterprises or export houses through contracting arrangements.

6.1.3 Decentralization

In the iPRSP, decentralization and devolution of power is regarded as an essential pre-condition for good governance.

- Decentralization of responsibilities, authority and resources
- Decentralization of planning, budgeting and implementation
- Develop guidelines for decentralization

7 Structures, Staffing and Resources

Develop and utilise the staff resources in the most effective fashion to support the services and regulatory enforcement required to develop the sector in a sustainable and equitable way.

To effectively discharge the above functions the Department of Fisheries Shrimp Unit must:

- Be supported by key individuals at Headquarters or at field level to plan, execute and monitor shrimp sector activities,
- Support and co-ordinate with private sector for the sustainable shrimp activities,
- Have the capability to undertake monitoring of private sector shrimp related activities including awareness building, environmental status, infrastructure operation and maintenance,
- Have capacity to address the social aspects of brackish water production with better linkages to NGOs with experience of these issues,
- Have capability to develop legal framework for the governance of the shrimp sector,
- Ability to support participatory land use planning. Capacity to advise on suitability of land for shrimp cultivation reflecting soil suitability, water salinity, tidal fluctuations etc. and advise the SEMP committees on land issues,
- Support the hatchery sector in developing quality, disease free post larvae,
- Assist in developing a disease prevention, surveillance and control capacity for the industry,
- Provide technical advice and support to SEMP committees at upazila, district and national level including the National Committee on Fish and Shrimp,
- Act as a link /contact point with other line ministries and advise key issues –land, food safety, taxation and fiscal measures, environmental and social protection etc.

7.1 Proposed Department of Fisheries Institutional Structure

To perform the above jobs efficiently the Department of Fisheries will require a structure at headquarters and field level headed by a Director under the control of the Director General. The proposed structure is shown in Fig.1.

The Shrimp Unit in the headquarters shall be headed by a Director under the control of the Director General and shall be responsible for planning, execution, monitoring of shrimp sector activities and providing support and coordination to the private sector for sustainable development of country's shrimp sector. The existing post of DD (Shrimp cell) is proposed to be up-graded. The unit will be supported by one Assistant Director (to be allocated from the existing positions of the regional shrimp units), one AD level Sociologist, one AD level Legal Officer (to be recruited from persons with relevant qualification and experience), one Monitoring Officer and one Assistant Engineer (existing) with necessary support staff. The Director will head a Committee comprising concerned Deputy Directors, Regional Officers, and District Fishery Officers. The committee will identify shrimp sector issues, suggest measures for addressing the issues, co-ordinate and establish linkage with private sector organizations and provide support to agencies involved in the sector.
The head quarters activities will be supported by the Monitoring, Evaluation and Planning wing proposed under the MandE Strategy. This will also help environmental issues. There is also a need for support on economic issues with regard to shrimp production and marketing. Social issues need

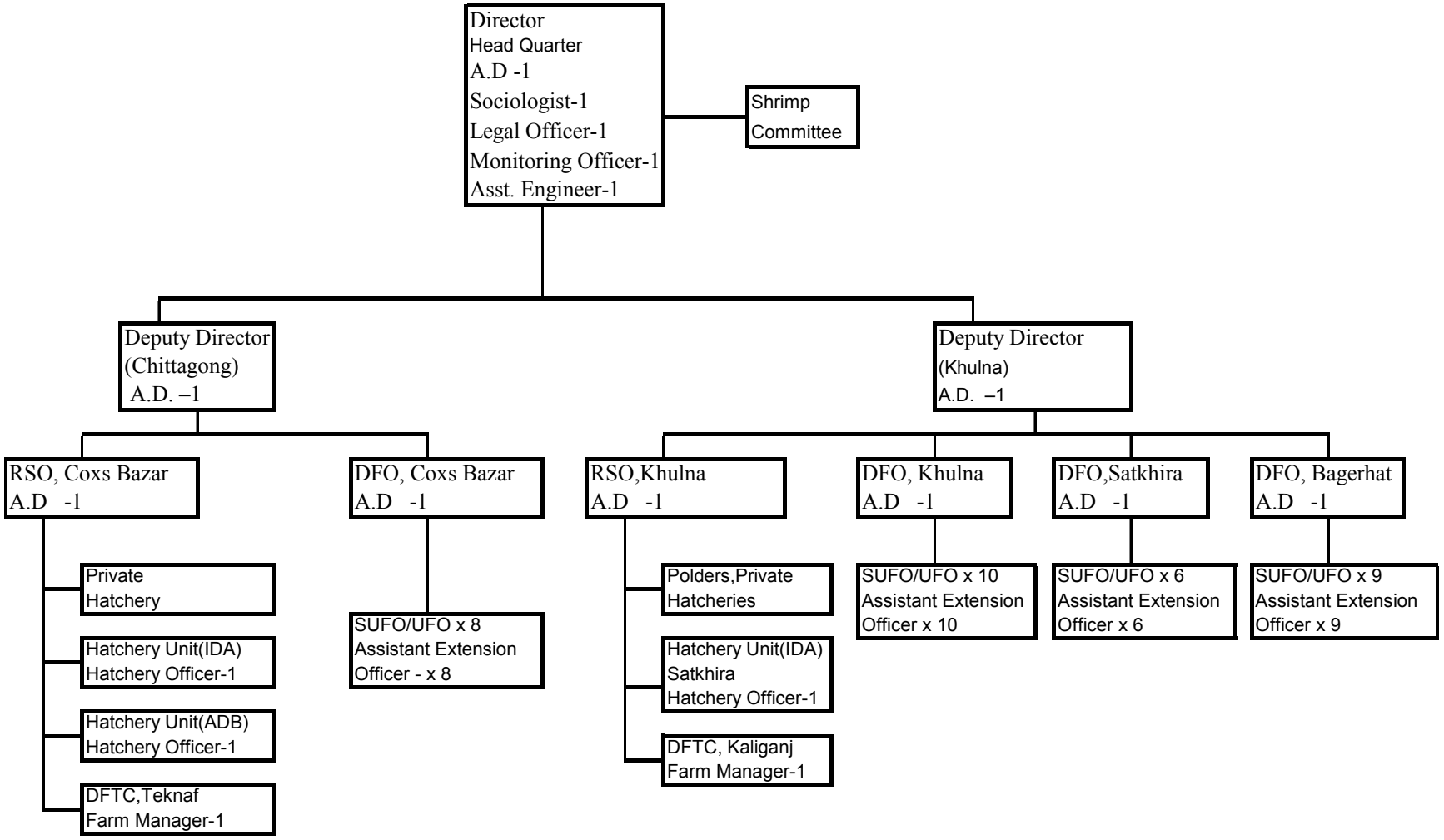
to be also supported by suitably qualified staff, who may work either as a separate unit or attached to wings such as shrimp and open water.

The Regional Shrimp Officer (re-designated), Cox's Bazaar shall be responsible for supervision and monitoring of all shrimp unit activities in the region including those of the private sector hatcheries, nurseries, post larvae collection. Only key manpower shall be retained in the existing shrimp units in Cox`s Bazar and Khulna regions. Other posts shall be withdrawn and allocated to extension units at district and Upazila level.

The Extension Units in both the regions shall be headed by the DFOs and supported by SUFO/UFO. The DFOs shall be allocated with one entry- level officer proposed as Shrimp Extension Officer from existing 15 available entry- level positions. Most entry- level positions namely Project Officer, Fishery Officer (Soil), Fishery Officer (Bio-chemistry), Scientific Officer etc. may be re-designated with mandate of shrimp extension functions. The SUFO/UFOs shall be supported by one Class II post of Assistant Extension Officer. There are some 32 Upazilas in the regions. 15 existing Class II positions (Assistant Extension Officer, Asst. Farm Manager, Technical Assistant) may be allocated to 15 Upazilas while the remaining 17 Upazilas may be filled up with 17 posts of Field/ Technical Assistants to be upgraded and designated as Assistant Extension Officer.

Due to their overlap, staff supporting the Marine sector and Aquacultural Extension will also help implement aspects of this strategy.

Fig. 1. Proposed Structure for Shrimp Units of DOF



8 Planning, Monitoring and Evaluation

Objective: To ensure that the objectives of the sector are being met and that management and planning of the sector is based on sound information collected and evaluated from all stakeholders.

The needs to manage the sector fall under the main objectives of the National Fisheries Policy. These cover production and utilisation of the resource; poverty alleviation and employment generation; fulfilling animal protein demand and ensuring public health; economic growth; and biodiversity conservation.

This role of collecting and evaluating information becomes more important as the sector has so many stakeholders, so it is imperative to gain a comprehensive understanding of how the sector is performing. This requires a high degree of co-operation from all stakeholders, including the private sector, who dominate the sector to the poor who are involved at the periphery. It is also increasingly important as many functions undertaken by government come increasingly under private sector control i.e. the monitoring of quality of exported produce.

The current management of the sector is based on information garnered from a range of different sources. Some of this information is accurate, however much is not. The quality of information needs to be improvement to ensure that the sector can develop through sound planning and management. By collecting information through a range of different sources cross checks can be built into the information thus improving its reliability.

The most accurate information is thought to come from statistics of shrimp exported for each of the different production systems. This however only relates to exports and does not cover local sales and consumption. Information on production levels from the different systems and areas is not accurate as there is no accurate baseline of resources allocated to shrimp production. This as in other sub-sectors of fisheries production, needs to be a priority so that development can be accurately assessed.

One of the major concerns of the industry is the image projected to the buyers abroad. In order to improve this then reliable information must be available on issues of social equity and environmental status. This should be used constructively to address issues of concern or provide importers and buyers of the true status of the sector.

The Planning, Monitoring and Evaluation of the sector is tied in closely with the strategy advocated under the P,M and E strategy already formulated. This recognises the different sources of information, and also focuses on the required capacity to utilise the information for effective management.

- Establish baseline of industry, on all aspects from post larvae production, collection, production, processing facilities.
- Assess improvements in production levels under different production system and benefits from different management systems. Economic assessment of merits of different systems and risks associated with intensification.
- Impact of extension and advisory services. Developments in organisation and implementation of extension

- Ownership of industry, and production units. Evaluation of ownership of production units and impact of *gher* licensing.
- Monitor economic generation from the export of shrimps and export statistics. Monitoring the value added through processing.
- Establish biodiversity and environmental status of resource and impact of developments. Monitor the impact of regulations on environmental pollution and loss of biodiversity.
- Monitoring and evaluation of the distribution of benefits from the sector
- Impact of regulations on quality, numbers of shipments accepted or rejected and economic impact of rejected shipments.
- Disease levels and impact on production
- Evaluate the impact of support to the industry of government initiatives