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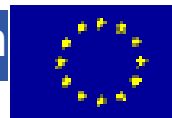
**Policy Research for Sustainable Shrimp Farming in Asia**

**A comparative analysis of Bangladesh, India, Thailand, and Vietnam  
with particular reference to institutional and socio-economic aspects**

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**Literature Review on Bangladesh Shrimp**

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# Literature Review on Bangladesh Shrimp

**Policy Research for Sustainable Shrimp Farming in Asia (PORESSFA):**  
*A Comparative Analysis of Bangladesh, India, Thailand and Vietnam with Particular Reference to Institutional and Socio-economic Aspects*

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## **BANGLADESH CENTRE FOR ADVANCED STUDIES**

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**List of Abbreviations**

ADB	Asian Development Bank
BARC	Bangladesh Agricultural Research Council
BCAS	Bangladesh Centre for Advanced Studies
BFFEA	Bangladesh Frozen Foods Exporters' Association
BOBP	Bay of Bengal Programme
BWDB	Bangladesh Water Development board
CPD	Centre for Policy Dialogue
DAE	Department of Agriculture Extension
DANIDA	Danish International Development Association
DFID	Department for International Development
DOE	Department of Environment
DOF	Department of Fisheries
DRC	Domestic Resources Cost
DEA	Data Envelopment Analysis
EPB	Export Promotion Bureau
EU	European Union
FAO	Food and Agriculture Organisation
FFP	Fourth Fisheries Project
HACCP	Hazard Analysis Critical Control Point
NACA	Network of Aquaculture Centre in Asia
NFP	National Fisheries Policy
NGO	Non Governmental Organisation
RMG	Ready Made Garments
TFP	Total Factor Productivity
TFP	Third Fisheries Project
UNDP	United Nations Development Programme
UNO	Upazila Nirbahi Officer
WB	World Bank
WWF	World Wildlife Fund

## 1. Introduction

The literature search found about 70 relevant documents for reviewing. In the initial stage, more than 130 documents were collected and after primary reviewing, finally, 60 documents considering the time of publication and contents of the literature have been used for preparing this literature review report. Most of them are in country publications and few are external articles, reports, and chapters of book, which focused on Bangladesh shrimp sector. The literature and documents have been collected from libraries and information centres of different government agencies, NGOs, universities and research organizations. Further, few of the documents were collected from websites. The bulk of the literature and documents (about 80 %) on Bangladesh coastal shrimp are of published and unpublished reports and the rest are journal articles, books and newspaper articles. The literature searching was limited with last three years, but in few cases materials of the last five years were collected.

Of the collected documents, about 35% address the environmental and social impacts of shrimp while 20% falls under broad category of history and development of shrimp and its contribution to economy of Bangladesh. About 10% of the literature focuses on policy, legal and institutional issues. The literature search has found few good documents on economics of farm production of shrimp i.e., economic cost benefit of shrimp. Further a number of literature have been found which address issues including shrimp and rural livelihood, rural development and economic growth, globalization etc., but most of them have primary focus on, economic, environmental, social and management issues of shrimp.

## 2. Overview of the shrimp production and shrimp industry in Bangladesh

The coastal aquaculture is not a recent development. For centuries the local people used to practice traditional coastal aquaculture- locally called *Bheri-culture*. They used to play tidal water within the paddy fields during January/February to June/July for aquaculture and during monsoon they used to go for T. aman plantation. There was no fry harvesting and stocking, no artificial feeding, liming, fertilization and aeration. But they used to get sufficient quantity of shrimp and fin fishes as well as paddy. By late sixties almost all the canals, medium sized rivers were closed by cross dams and the entire coastal area was embanked and divided into several polders having small and big drainage sluice gates. By mid seventies, out of desperation some local people forcibly cut open the embankment and started the traditional Bheri culture practice again. It all started in Satkhira district first and then quickly spread to other coastal districts up to Cox's bazaar.

### 2.1 *Trades information: volumes, values, trends, estimates of foreign exchanges*

Bangladesh's coastal brackish water shrimp export sector has grown over the past thirty years in response to expanded global demand for high quality sea food and attempts by successive Bangladesh governments since 1980's to liberalise and diversify the economy (Pokrant *et al*, 2002). Rahman (1998) says that subsistence shrimp culture is as old as 700 years in South Asian region. Opposed to this commercialized shrimp culture is a recent phenomenon. Exports of shrimp from Bangladesh was worth only US\$ 2.9 million in 1972/3 which was less than 1% of the total exports from the country. In the late 1970s and 1980s, encouraged by global demand for shrimp exports of shrimp increased to US\$ 33 million by 1980 and US\$ 90 million by 1985. This increase, however, was accounted for mainly by open water catches of shrimp.

The frozen food export sector is the second largest export sector in Bangladesh's economy. The contribution of this sector towards GDP is about 4.7% and of the total export, 9.38%. About 10 million people are directly or indirectly dependent on this sector (Aftabuzzaman: 1998). Quoting from BFFEA (2000), Pokrant (2001) write that in 1999-2000 Bangladesh seafood exports were the highest on record, earning some US\$ 356 million from frozen shrimp alone and accounting for 6.28% of total export earnings.

Culture of shrimp as a 100% export oriented activity based on commercial farming of shrimp is predominantly a development of 1980s. During this period Bangladesh shifted its development strategy from inward to outward focusing on export oriented activities through a number of policies and regulations. Like the ready-made garments (RMG) there was an opportunity to translate the comparative advantages of the country's natural resource and cheap labour. Besides RMG, shrimp sector took the advantage of export friendly policies. This policy environment was very critical for the initial breakthrough of this non-traditional sector. Commercial shrimp farming in Bangladesh got a crucial break with the implementation of the World Bank/UNDP investment programme of US\$ 30 million in late 1980s and early 1990s which helped launching Bangladesh's prawn industry with infrastructure, technology and foreign advice (Rahman: 1998). The conducive domestic policy environment and the emerging global market opportunities reinforced the commercialization of shrimp culture.

Concentrated in the southern coastal belts of Cox's bazaar (20% of the area), Bagerhat, Khulna and Satkhira (80% of the area) under shrimp culture in Bangladesh has witnessed a three fold increase in the last decade. It now covers about 145 thousand hectares sprawled over 9000 farms, 18% of the total farms in the world. Most of the shrimp culture in such farms is done through extensive method, productivity averaging only 120 kg/ha/year. The tables below show the position of Bangladesh among the shrimp producing countries of the world in terms of production.

**Table 1 : Shrimp Farm Production of Bangladesh (1989-90 to 1998-99)**

Year	Production (MT)
1989-90	18,624
1990-91	19,489
1991-92	20,335
1992-93	23,530
1993-94	28,302
1994-95	34,030
1995-96	46,223
1996-97	52,272
1997-98	62,167
1998-99	63,164

Source: DOF(2001)

**Table-2: The Top 25 Producers of Farmed Shrimp in 2000 by Weight and Value**

Country	Production (MT)	Production (,000 US\$)
Thailand	299,700	2,125,384
China	217,994	1,307,964
Indonesia	138,023	847,429
India	52,771	393,938
Vietnam	69,433	319,392
Ecuador	50,110	300,660
Philippines	41,811	271,385
Bangladesh	58,183	199,901
Mexico	33,480	194,184
Brazil	25,000	175,000
Malaysia	15,895	124,577
Colombia	11,390	91,120
Sri Lanka	6,970	78,342
Taiwan, Province of China	7,237	60,483
Honduras	8,500	59,500
Venezuela	8,200	34,030
Australia	2,799	27,557
Madagaskar	4,800	24,000
Nicaragua	5,411	17,423
USA	2,163	14,513
Belize	2,648	12,710
New Caledonia	1,723	12,061
Costa Rica	1,350	11,475
Panama	1,212	6,399
Peru	512	3,741

Source: WB, NACA, WWF and FAO 2002.

## 2.2 Farm/farms information

Shrimp production in Bangladesh is largely extensive and improved extensive with low capital inputs, low yield per hectare. It has a least developed shrimp export sector and a small player in the global wild and cultured shrimp industry. Transport and other infrastructure are poorly developed. Pokrant (2001) shows that in 1998 cultured shrimp accounted for 25% of world shrimp production with black tiger prawn the most popular cultured species worldwide. Bangladesh stood seventeenth by volume (23,000 MT) and eighth by value (US\$ 246.6 million) of shrimp (wild and cultured) exports in that year.

Ali (2002) reports that till early 1980s coastal shrimp farming was almost traditional and extensive in nature. The culture practice was by trapping shrimp larvae which would enter the farm with tidal water during high tide through indigenous sluice gate (box type) placed in Water Development Board embankment by cutting it. Along with the target species of shrimp- Bagda (*Penaeus monodon*) other species of shrimp and fishes including predator fish would enter the farm and there by the production was very low. However technological improvement in the culture system took place and traditional stocking system was gradually replaced by selective stocking of Bagda fry collected from natural water in the coastal region. During early 1990, some farmers started semi intensive for shrimp farming at a very small

scale. Some 10 ha farm was under semi-intensive culture but within a year or two semi-intensive farm was affected by viral disease (white spot disease) and caused the damage to shrimp very soon. This disease spread out the entire shrimp farming area measures (Cox's Bazaar and Khulna area) and caused a heavy loss to the shrimp industry in country. The cause of the outbreak of this disease in Bangladesh was identified to be shrimp fry imported from Thailand. Thus shrimp farmers of Bangladesh largely became dependent on the supply of natural fries and limited in country nurseries and thousands of poor and landless people, women, and children were engaged in shrimp fry collection by push net and bag nets (Ali, 2000).

Ali (2000) further notes that about four hundred thousands of people are presently engaged in fry collection, most of them from earlier agriculture labour before shrimp farming and about 300-400 crore of Bagda (peanous monodon) shrimp fries are collected annually. This became a concern of the government and fishery scientist that the destruction of shrimp larvae/juvenile might affect fish and shrimp stock in the Bay of Bengal and coastal region.

The shrimp sector predominantly relies on the export of black tiger prawn and is shifting towards greater control of new technological, organizational and ecological techniques. The Bangladesh shrimp industry is technologically and organizationally less developed compared to other developing country shrimp industry such as Thailand and India. There are 43 commercially run hatcheries, several ice plants and feed mills employing male and female wage labourers. At the shrimp farm level there are thousands of leased in lands or landowner operated shrimp farms run on capitalist and/or pretty commercial lines, and haunting and gathering type fry collectors working to meet subsistence requirements either independently or for advance giving traders (*Dadondars*) and commission agents (*Arotgars*). The advance system operates throughout the sector. Thus wild or hatchery fries are supplied to shrimp farmers through direct sale or advances using a chain of intermediary fry traders and commission agents.

### 2.2.1 Main farming areas, hatcheries

The two main centers of shrimp production are located Khulna/Satkhira/Bagerhat districts in the Southwest, and Chittagong and Cox's bazaar districts in the Southeast. Almost all hatcheries are located in Cox's bazaar. Rahman (1998) highlights that about 80% area of Khulna, Bagerhat, and Satkhira are under shrimp culture in Bangladesh and noticed a three fold increase in the last decade. It now covers about 145 thousand hectares of land sprawled over 9000 farms, 18% of total farms of the world.

### 2.3 *Socio-economics of shrimp farming activities*

The sector has many stakeholders such as GO, NGO, donor, foreign buyers, transporters, wholesalers, processors, retailers and consumers in Europe, North America and Japan. Donor and NGO involvement is mainly to alleviate poverty, protect the environment and promote sustainable livelihood strategies.

Bangladeshi people in main shrimp growing districts of the country have settled in those areas over several centuries during that time they cleared forest and removed many species of flora and fauna in order to cultivate paddy, seen as both a source of livelihood and as sign of civilization (Eaton: 1993). These communities have been subject to various kinds of control by landlords, rich landowners, state administrators, traders and religious figures. While

export oriented shrimp farming represents a relatively unprecedented development, it has not been imposed on communities unfamiliar with or unreceptive to change.

Although children play an important role but they do not figure as prominently as women in shrimp literature. Most of the work has only been done on child fry collectors. Child labour across the industry as a whole is neglected in the literature and does not have the same public profile as in garments. However, Delap and Lugg (2000) provide a detailed report of the social, cultural and economic conditions of women's and children's labour in both fry collecting and shrimp depot work.

Literature on environmental impacts of shrimp farming is extensive and many studies report negative environmental consequences of which the most important are shrimp disease, deforestation, loss of local flora and fauna, and salinisation. The more radical NGOs argue that shrimp production as an export industry cannot be eco friendly while the mainstream NGOs, donor agencies and government agencies discuss on ameliorative measures to protect the environment.

The most recent assessment of the socio-economic costs and benefits of shrimp farming in the Khulna region (BCAS, 2001) suggests that the main alternative source of income to crop farming labour and sharecropping for the poor in shrimp areas is fry collection and to a lesser extent fry trading. Reliance on this one source of income is highly precarious for the poor, given the government's attempts to ban the fry collection. In a study Moudud *et al.* (1988) speak of unsustainable development in Bangladesh's coastal areas and proposes better utilization and management of coastal resources such as the Sunderban and its diverse flora and fauna.

### **3. Economics of Shrimp Production in Bangladesh**

The existing literature on shrimp in Bangladesh mainly focuses on shrimp farming areas rather than on the industry as a whole or farm production system. However, a few of the reports and articles contain micro-economic aspects i.e., cost and benefits of shrimp farming, which include: Shah *et al.*, 2000, Aftabuzzaman, 1998, Thomas, 2001, Bhattacharya *et al.*, 1999, NACA, 2001, Ling *et al.*, 2001, Shang *et al.*, 1998 etc. One of the general problems of reviewing the literature on economics of shrimp production is that the available literature does not describe costs and benefits on farming system basis. In most cases, the costs are aggregated and these are not shown as input cost, establishment cost and cost for construction and equipment.

#### *3.1 Farm Production Costs and Benefits*

Shah *et al.* (2000) gives an economic analysis of shrimp production on the basis of cropping or cultivation patterns i.e., monoculture (shrimp only) and mixed culture i.e., shrimp and other fish, shrimp and rice cultivation etc., but not on the basis of farming system such as extensive, intensive, semi-intensive, or improved extensive. It is assumed that all those farming systems fall under extensive or improved extensive or traditional plus categories. The data for the study was collected from Bagerhat, Khulna and Satkhira districts of southwestern and Cox's Bazaar district of southeastern coastal zones of Bangladesh during December 1999 to March 2000.

The article shows that per acre/year production of *Bagda* (Black tiger shrimp/ *Penaeus Monodon*) shrimp and other fish had been 52.46 kg and 23.42 kg in study farms. The average cost per acre/year was US\$ 263 excluding cost of other fish and crop cultivation. The average per kg cost of shrimp production was US\$ 5.0. The items of cost included establishment and repairing, fingerlings (seed), liming, fertilizer, feed, fuel, labour and rent. The costs have been categorized into three broad groups i.e., (i) fingerlings, (ii) labour and (iii) rent and establishment costs which together contributed to 94% of the total costs. The shares of fingerlings, rent and labour were 60%, 22% and 12% respectively. The rest 6% cost was for feed and fertilizing. This article also reports on income and benefits from shrimp farming. The total annual farm income from shrimp and other fish was US\$ 307 per acre/year excluding crop value. The annual gross income from black tiger shrimp was US\$ 5.8 only per kg. The net benefit from black tiger shrimp has been about US\$ 0.80 per kg only.

Thomas *et al* (2001) in their recent study, under Fourth Fisheries Project – shrimp component, examines the distribution of costs and benefits of shrimp farming. The profitability of shrimp production in farm operated by owners/managers in different farm size was also calculated. The principal cost for production was for shrimp fry (at about US\$ 273 per ha.) followed by labour cost for maintenance and construction, guarding, pond cleaning, harvesting and preliminary processing of shrimp (US\$ 91 per ha.). The other input costs including lime, cow dung, urea, TSP, *Khail* (oil cake) and feed etc. was very low i.e., US\$ 18 per ha. Water, which was almost free to many farmers and had an average cost of US\$ 4 per ha. The total cost per ha per year was US\$ 700. The report then showed the benefit of shrimp farming. The averages gross return/benefit from shrimp farm per ha for all categories was US\$ 1041 which ranges between US\$ 1000 to US\$ 1145. The report points out the importance of shrimp farming and fry collection in contributing to the total net income generated by the shrimp sector. The net income was US\$ 2.6 per kg. The total production of tiger shrimp in 2000-2001 was 32,424 metric tones in Bangladesh.

Ling *et al* (2001) gave a comparative analysis of cost and benefits of shrimp farming of the Asian countries including Bangladesh. Costs of hatching, producing, harvesting, transporting, processing, marketing etc. have been included in the analysis with reference to different farming systems including intensive, semi-intensive and extensive farming. Fixed cost as well as variable costs of both extensive and semi-intensive farming systems in Bangladesh have been shown in the article. The article described different physical feature of the farming system including: the average farm size (16.6 ha), stocking density (1.5 PL/m<sup>2</sup>), feed conservation ratio (0.4), number of crop per year (1.2) and production per ha (216 kg) in extensive farming systems in Bangladesh. The fixed costs for the extensive farming systems have been calculated as US\$ 1.34 per kg including overhead and depreciation costs i.e., US\$ 0.99 and US\$ 0.35 respectively while the variable costs was US\$ 2.73 per kg including seed, feed, labour, power etc, where the cost for seed was the highest i.e., US\$ 1.77 per kg (43.5%). Thus the total cost of shrimp production was USD 4.07 per kg and the farm gate price was US\$ 6.90 per kg. Thus the net profit was calculated as US\$ 2.83 per kg.

For semi-intensive farming, the average farm size was found 12.7 ha, stocking density as 30 PL/m<sup>2</sup>, feed ratio as 2.7, number of crop as 1.4 and production per ha/year was 1633 kg. The fixed cost was US\$ 4.57 kg while the variable cost was US\$ 7.46 per kg and thus the total cost per kg has been US\$ 12.04. The farm gate price was found US\$ 5.26 and net loss has been US\$ 6.78 per kg. It is to be mentioned here that the limited semi-intensive shrimp

farming in Bangladesh has been stopped recently. ADB/NACA study team collected the data in 1996.

Shah *et al* (2001) shows that the net benefit of black tiger shrimp has been very low i.e., less than US\$ 1 per kg while both Thomas *et al* (2001) and Ling *et al* (2001) have shown that the net benefit from shrimp was comparatively higher i.e., more than US\$ 2 per kg. This may happen due to different approach of study and different size of sample.

Bhattacharya *et al* (1999a and 1999b) made attempts to analyze the gross cost and benefits of shrimp sector in Bangladesh. They tried to explore the nexus between environment, trade liberalization, structural adjustment programme and the growth of export-oriented shrimp in Bangladesh with particular focus on environmental implication of shrimp. The study examines the cost of shrimp cultivation including: a) opportunity costs of land degradation due to salinity, b) health costs in terms of mortality and morbidity and c) costs of mangrove destruction. The benefits have been estimated based on the income of the industry received through export of processed shrimp and employment generation in the shrimp sector. The study gives costs-benefit ratio of 0.21 (on a production of loss basis) and 0.30 (on a restoration cost basis). In the final analysis, it has been found that the cost is 21 percent (production loss) and 30 percent (restoration cost) of the benefit derived through shrimp cultivation.

Further, there have been diverse opinions on cost-benefits of shrimp and few may argue to consider macro-economic benefits of sector at regional and national levels. The macro-economic benefits include earning of foreign exchange, employment creation, diversification of economy, stimulation of backward and forward linked sectors (Neiland *et al*, 2001). However, the main beneficiary of shrimp is a small group of people who control the production systems, processing of products, internal trading and export of shrimp while the vast marginal and poor people get some sorts of livelihood support through wage earning, fry catching and trading of inputs for shrimp farming. The most benefited group may include: outside shrimp farmers, large rural landowner, absentee landlords, urban entrepreneurs, few government officials and political elites. The distribution of benefits from shrimp across different social categories is very unjust and unequal (Datta, 2001, Mainuddin *et al*, 2001 and Chowdhury, 2001).

### 3.2 Profitability and Economic Feasibility

The cost and benefit analysis by Thomas *et al* (2001) shows that taking shrimp production together with shrimp fry collection (undertaken by about 45% poor and marginal households in the shrimp villages) and fry and shrimp business contributed 60% of the total household income in the shrimp producing areas. It also suggests that the small farmers appear to have greater returns than the large farmers per acre/hectare shrimp cultivation. Reasons for this can be found in their efficient use of input to gain higher yields while keeping costs of both fry and labour relatively low (because of their direct involvement in farm management and maintenance). Such an outcome is entirely consistent with the performance of all small scale farms in other largely agrarian economics and elsewhere in Bangladesh in the broader agricultural sector. The study further focuses on relative economic efficiency of production of farms managed by members of different land classes and found that the overall distribution of benefits is determined by how this economic surplus is shared. There are a number of dimensions of political economy of rural Bangladesh that affect this. The major dimensions of rural political economy may be: money lending, leasing and sharecropping of land,

interlinked contracts, marketing of products and market chains starting from the farmers and small traders to exporters (Thomas *et al.*, 2001). Considering present Bangladesh shrimp sector, it is worth mentioning that shrimp processing and export companies are currently experiencing severe financial difficulties due to downward pressure on international shrimp price and it is questionable whether for the sector as a whole earnings are sufficient to cover all fixed costs in terms of depreciation and maintenance.

NACA (2001) has undertaken a technical efficiency analysis of seed, feed and labour uses considering Domestic Resources Cost ratio (DRC), Total Factor Productivity (TFP) and Data Envelopment Analysis (DEA). The results indicate that out of ten countries, Bangladesh is the 6<sup>th</sup> most efficient country when taking into account of extensive farming, but considering semi-intensive farming Bangladesh remains very inefficient and less productive in terms of economic cost and benefits.

Shang *et al.* (1998) suggest reduction in production cost and negative environmental impacts through bio-technical improvement and efficient management are all important for sustainable development of the shrimp sector, but the existence of a potential market and an efficient marketing system together with other adequate supporting services such as hatcheries, feed mills, credit, research, training and extension are very necessary. Therefore in addition to production efficiency and minimizing environmental impact and social disparity, the shrimp farming industry needs to coordinate its production and marketing, diversify of products and market as well as improving quality of product in order to make shrimp sector sustainable.

#### **4. Environmental Issues of Shrimp (Environmental Impact Assessments)**

The environmental problems associated with shrimp farming in Bangladesh have been widely reported through out the period of 1990s. The extensive farming systems requiring large land areas have contributed most to encroachment of agriculture land and mangrove clearance with increased intrusion of salinity, degradation of land and de-stabilization of coastal ecosystems. The important recent documents that address environmental issues of shrimp farming are: Ghafur *et al.* (1999), Aftabuzzman (1998), Huq and Mainuddin (1999), Datta (2001), Gregow (1997), Deb (1997), Gain (1998), Manju (2000), Bhattacharya *et al.* (1999a), Bhattacharya *et al.* (1999b), Islam (1999) etc. Some of the literatures discuss with environmental impact of shrimp while the others focus on both environmental and social issues. The mainstream literatures argue that shrimp farming in Bangladesh has many negative environmental impacts including salinisation of soil and water, loss of wild and domesticated flora and fauna, mangrove destruction, change in cropping patterns and species composition.

##### *4.1 Recent Works that address Environmental Issues of Shrimp Farming in Bangladesh*

Bhattacharya *et al.* (1999a) examines the complex trade-environmental dynamics and innovative strategies to manage emerging environmental problems of shrimp industry in Bangladesh. They observe that the shrimp farming areas in the south coastal Bangladesh have suffered environmental degradation including: increased salinity of soil, canals and ponds within polders; reduction in grazing land and a consequent reduction of livestock; destruction of mangrove forest, adverse affects on the potential crop-mix, cropping intensity, crop calendar and overall cropping pattern in the shrimp growing areas. Bhattacharya *et al.* (1999b)

also explores the consequences of shrimp in Bangladesh in the context of structural adjustment programme. The study focuses on land degradation and production loss, destruction of mangrove, loss of livestock and health impact due to expansion of shrimp. They mention that environmental costs are far-reaching and the impacts may be observed later over a long period of time and some of the environmental impacts such as bio-diversity loss are irreversible.

Gregow (1997) critically analyzed the ecological problems created by unplanned shrimp cultivation particularly in the *Chokoria Sundarbans*. The report concluded that the extinction of mangroves in *Chokoria Sundarbans* by introducing shrimp farming was a tragic example of how commercial interest have been allowed to direct the development process, which has led to the destruction of natural resources and deprivation of the marginalized sections of society.

Deb (1997) examines the impacts of unregulated shrimp culture on coastal resources and environment and focuses on loss of bio-diversity, destruction of mangroves, salinity intrusion and danger of importing post-larvae. The report mentions that the existing shrimp systems fail to recognize and mimic natural ecosystem functions and hence give rise to many environmental problems. The practice is regarded as the most obdurate destroyer of mangroves. The pond construction eradicates natural mangrove vegetation; the construction of canals and dikes alters irreversibly the hydrological characteristics of the coastal areas. A large number of immigrating young shrimp and fishes are destroyed before attaining biologically sustainable size due to intensive fishing pressures. Further, targeted shrimp fry collection indiscriminately destroy innumerable other fish species.

Gain (1998) reported on environmental concerns caused by shrimp in Bangladesh. The book mentions that the coastal environment, which has already suffered tremendously due to embankments built from 1962 to 1972, was exposed to more risk through unplanned and unscientific shrimp cultivation. The rapid expansion of shrimp farming has drastically reduced the stock of indigenous fish varieties and destroyed many mangrove flora and fauna.

Ghafur *et al* (1999) expressed grave concerns about environmental degradation and suggested that shrimp cultivation should be limited to the high salinity zones and part of medium salinity zones, where shrimp cultivation is economically more profitable.

Islam *et al* (1999) studied the impacts of shrimp farming on soil and water quality in some selected areas and the results of the study demonstrated some adverse impact of shrimp farming on soil properties by increasing soil salinity levels (upto 500%) in non-saline area that hampered crop cultivation seriously. Water bodies were also found contaminated with high salinity (upto 22 ppt) that does not favour growth of many fresh water organisms.

Manju (2000) felt that in shrimp cultivation, the issue of natural equilibrium is not only absent in the production practices, but also absent in the perception of different classes of people engaged in shrimp farming in Bangladesh. The study solicited people's views regarding their environmental problems due to extensive shrimp farming in their localities. The local people identified two most important problems i.e., depletion of fisheries resources and reduction of plants and trees that affect their lives, livelihood and environment.

#### *4.2 Major Environmental Concerns in Shrimp Farming*

Most of the environmental studies and reports on shrimp have focused on salinity intrusion, loss of soil fertility and crop cultivation and destruction of mangroves that are affecting land and water, agricultural productivity and loss of bio-diversity. Few report have reported on degradation of ecosystems and human health hazards due to unhygienic shrimp processing, salinisation and associated issues.

##### 4.2.1 Destruction of Mangrove Forest

Aftabuzzman (1998) emphasizes that mangroves play an important role in ecology of coastal zones and support the marine species that utilize mangrove environment during part or all of their life cycle and appropriate utilization of mangrove resources allows for maintaining high level of integrity in the mangrove area while capitalizing on the economic benefits of brackish water aquaculture. On the other hand, many other studies and reports have shown that with the rapid expansion of shrimp farming, the mangrove ecosystem has been greatly affected (Gain, 1998, Manju, 2000, Islam, 1999, Deb, 1997, Bhattacharya *et al*, 1999, Gregow, 1997 etc.).

Gain (1998) reports that *Chokoria* Sundarbans used to be a reserved and protected forest managed by the government's forest department in Cox'sbazar district (southeast coastal region of Bangladesh). In 1985, the government decided to hand over all shrimp cultivable forest land to the Ministry of Land (MoL) and the MoL gave about 7,000 acres of forest land to the Department of Fisheries to start shrimp farming in the mangrove forest and foreign-assisted shrimp farms were set up in the areas. The MoL also leased out forestland to other local entrepreneurs for shrimp cultivation. An ADB report (cited in Gain, 1998) says about 800 hector of mangrove forest was cleaned to culture brackish water shrimp. A large portion of land (approximately 100,000 hector) now being utilized for shrimp culture in Bangladesh was originally mangrove forest. The cleaning of mangroves in the *Chokoria* Sundarbans under the project has clearly reduced shrimp/fish breeding and nursery grounds in the areas.

Gregow (1997) also reports on disappearance of large amount of *Chokoria* mangrove forests in Cox's Bazaar largely due to shrimp cultivation and mentions that this has been an example of how shrimp cultivation has caused unprecedented harm to the unique mangrove systems. Unfortunately, this has happened under government-private initiatives with donor's supports. The process of mangrove destruction in Satkhira, Khulna and Bagerhat districts started two decades ago, which disbenefitted both the natural environment, ecosystems and social systems (Deb, 1997 and Manju, 2000).

##### 4.2.2 Salinity Intrusion and Loss of Soil Fertility

Deb (1997) emphasizes that in the south-western part of the country, the salt water intrusion has caused many problems because of loss in crop production, fresh water crisis and related gastro-intestinal diseases, loss of green vegetation, fodder etc. Because of changes in culture practices, saline water is retained for long time, which virtually leads to percolation of salts in surrounding soil resulting in changes in soil chemistry. Islam (1999) reported that the mean values of salinity of water were 1.2 and 1.64, 4.25 and 5.14 in the low and medium zones while these were 9.75 and 9.17 in the high saline zones in Bagerhat, Khulna and Satkhira study areas. Water salinities, as recorded from different saline zones as well as from experiment and control sites, were found to differ significantly ( $p < 0.01$ ) both among saline zones and between experimental and control sites. Salinity was zero ppt in all the control sites of the studied areas during the entire study period. Datta (2001) reports that when

monsoon rainfall is early and heavy, the shrimp producers keep on adding extra salt into the water to ensure better growth of shrimp. This extra salt eventually gets stored in the field and adds to the level of soil salinity further. This process hampers the microbiological system and decreases the soil fertility significantly.

#### 4.2.3 Loss of Bio-diversity

Degradation of mangrove forest, salinity intrusion as well as the shrimp farmers destroyed many wild lives and fisheries resources. Habitats for animals, birds, fishes have been lost primarily due to degradation of mangroves and excessive salinity. Gregow (1997) observes that otters are among the first species to disappear when the natural habitat of the wetland has been destroyed. Many shrimp farmers very often kill mammals and reptiles considering them harmful for the shrimp i.e., the animals could eat shrimp and share the foods of shrimp. Many of those animals have been almost abolished from shrimp producing localities (Manju, 2000). Further due to salinity many fresh water fish species like *Ruhi*, *Katla*, *Shole*, *Boal*, *Tengra*, *Koi*, *Shing* etc. are about to extinct in the localities. Datta (2001) feels that long term inundation has destroyed the traditional fish population of the coastal regions. Fish resources have further been depleted due to unscientific catching of fingerlings by the shrimp fry collectors. The fry collectors keep the larvae of tiger shrimp only and throw all the other species on ground and thus destroy the coastal fisheries resources.

### **5. Legal Issues of Shrimp**

The key literature that focused on legal issues of shrimp farming in Bangladesh included: Maniruzzaman *et al* (2001), Habib (1998), Habib (1999), Hossain and Ahmed (1995) and Ali (2002). Maniruzzaman *et al* (2001) in their *Acts and Actors in Fisheries and Shrimp Sector* discuss fisheries laws, acts, ordinances, and regulations in general with a particular focus on coastal aquaculture, shrimp and coastal environment. Habib (1998) analyzed the legal and administrative aspects of shrimp culture. In another work with ICLARM, Habib (1999) broadly discusses the relevance, limitations and need for reformulation of existing laws, acts and regulations in the context of coastal resource bases, uses and sustainable management of the resources including shrimp and mangroves. Both Maniruzzaman and Habib listed the important laws, acts, ordinances and regulations that were enacted to develop shrimp sector, promote conservation of resources and protect rights of the local people and various stakeholders of the sectors. The following are relevant rules, acts and regulations:

- ❑ Fish Protection and Conservation Act, 1950, Subsequent Amendment and related Rules
- ❑ Marine Fisheries Ordinance, 1983
- ❑ Territorial Water and Maritime Zone Act, 1974
- ❑ Embankment and Drainage Act, 1952
- ❑ Bangladesh Water and Power Development Board Ordinance, 1972
- ❑ Shrimp Mohal Management Ordinance, 1992
- ❑ Manual for Land Management, 1990
- ❑ Shrimp Farm Taxation Law, 1992
- ❑ Bangladesh Environment Conservation Act, 1995
- ❑ Bangladesh Environment Conservation Rules, 1997
- ❑ Fish and Fish Product (Inspection and Quality Control) Ordinance, 1983
- ❑ Fish and Fish Product (Quality Control) Rules, 1997 etc.

### 5.1 Land and Water Management

The embankment that was constructed to protect the coastal areas from saline water intrusion for agriculture production was illegally cut by the shrimp farmers and placed wooden sluice gate for taking saline water into their farm for shrimp culture. This created a legal problem with Water Development Board (Embankment Act-52) and social conflict between shrimp farmer and agriculture farmers. To resolve the conflict the government of Bangladesh adopted administrative measures in 1986 by issuing administrative order to regulate shrimp farming in a manner which would not affect the interest others and shrimp farming could only be allowed in such area where more than 85% of land owners have consent for shrimp farming and that shrimp farming would not affect the adjacent rice field through leaching saline water. The embankment could not be cut to take saline water into shrimp farm without proper permission of the BWDB. The local government (*Upazila Parisad*) along with concerned government official were responsible to execute the policy order. To give incentive to fisheries sector, the government declared aquaculture and hatchery as industry vide notification no.wkg/wkbx/6/wP/91/31, Zvs 26/5/1991, through which they would get tax holiday, reduced rate of bank interest etc. The government executive order of the cabinet division for management and regulation of shrimp culture was up dated and revised in 1998.

Under different development projects (shrimp culture project, Third Fisheries Project), government developed water management infrastructure for shrimp farming and as World Bank loan agreement condition in 1992, the government imposed taxes (Shrimp Culture Tax-1992) to the shrimp farmers who were benefited by BWDB water management/development programme as cost recovery vide Act No. 53 of 1992 dt. Nov. 10, 1992, but rate of realization of the cost was very poor.

The government has declared *Khas* land suitable for shrimp culture as '*Chingri Mohal*' (Shrimp estate) and introduced new leasing system of *Khas* land for shrimp culture (MOL 1992). In 1995 Land Ministry declared intensive semi-intensive shrimp culture land as "Shrimp Industry Land" in the coastal districts of Bangladesh providing various facilities/advantages including the provision of letting *Khas* leased land as collateral against Bank loan (vide land/sec-8 Khajab /2/93 parts/122 (14) dated 7/3/1995. In another orders, land Ministry imposed land development tax for shrimp industry land under private ownership @ Tk. 10 per decimal land and fix lease value of *Khas* land for shrimp farming at the rate of Tk. 1500 per acre per year and it would increased at the rate 5% per year (vide Land Ministry's No. L.M/Sec-8/Khajab/2/93 (part/123 (14) dated 7/3/1995.

### 5.2 Ban on Fry Collection and Promotion of Hatchery

There has been a concerns that the destruction by returning them back into water and for that the government strategy was to educate and train the fry collectors so that they return back those non targeted species into water instead of throwing on the ground and to develop methodology of selective catch of target species. Under Fourth Fisheries Project a massive programme has been envisaged for motivation and training of shrimp fry catchers to reduce the destruction of non-targeted species and handling and transportation mortality. Side by side, the government encouraged establishing shrimp hatchery in the private sector so that dependence on natural fry is reduced gradually. The programme of motivation and training was undertaken under different development projects of DoF.

In mid 1990s, few private entrepreneurs including those who undertook semi-intensive shrimp farming started importing shrimp fries from Thailand due to scarcity of fry in the country. Consequently, it was reported that there had been spread of diseases in the shrimp farms from the imported fries. In this context, the government issued an order banning import of shrimp fry from outside of the country vide notification no. 65 (95-97)/import dt. 24-6-1998 of Chief Controller of Import and Export.

Probably on the plea that hatchery production capacity was sufficient to fulfill the demand of fry and considering adverse impact of collection of shrimp fry on other species, the government recently banned collection of shrimp fry through out the country. The banning of fry collection has not yet been effected though order has been issued by MOFL to implement it, because of the concern expressed and objection raised by different agencies including donors. Further, Ali (2002) mentions that there is no provision of banning shrimp fry collection in the National Fisheries Policy 1998, rather the policy (clause 7.8) states-“Arrangement based on scientific approach with necessary training of the fry catchers and other related persons be made so that other species are not destroyed in the process of collection of shrimp fry from natural sources and that the shrimp fries are not lost due to mortality during transportation, and if necessary physical infrastructure will be created for this purpose.

As harvesting of shrimp from the sea by trawler continued all the year round and collection of shrimp fry from natural systems increased, the shrimp stock in the sea became under tremendous pressure and showed a sign of decline. To arrest this decline of the stock, fishing by trawlers in the sea was banned in 1995 from 15 January to 15 February every year, the peak spawning season of shrimp. Further, four specific areas in the Bay of Bengal has been declared as “Marine Reserves” banning fishing throughout the year (Vide Memo No. SRO No.327/2000 dated 29/10/2000 of the MOFL).

### *5.3 Conservation of Mangroves*

The Sundarbans is one of the largest mangrove forests in the world. This is the Reserved Forest area. There are laws and regulation for protection of mangrove forest in Sundarbans and in other area particularly in *Chokoria* Sundarbans in Cox’s Bazar zone. The Forest Act of 1927 was amended in 1989 prohibiting, hunting, shooting and fishing in the reserved forest. The Bangladesh Wildlife (Preservation/Amendment) Act of 1994 also prohibits hunting, killing or capturing of animals of the designated as protected areas. Further, the Sundarbans has been declared as the World Heritage recently by the UN body and there have been many moral and legal imperatives to conserve and the flora and fauna including aquatic resources of the forest.

### *5.4 Quality Control of Fish Products*

Many external buyers of shrimp asked for quality and safety assurance of the products from the government. The Ministry of Commerce issued the quality assurance certificate for exportable fish and fish products. In 1974, the responsibility of issuing health certificate for fish and fish products for export was vested with DOF. In order to check and control the quality of fish and fish products for export and domestic consumption, the government established a fish inspection and quality control unit in DOF in 1979 and promulgated the ‘Fish and Fish Products (Inspection and Quality Control) Ordinance 1983’ and enacted ‘the

Fish and Fish Products (Inspection and Quality Control) Rules 1989. The major features of the ordinance and the rules are:

- Without license from DOF fish, shrimp etc cannot be processed;
- Fish shrimp etc will be processed in licensed processing factory according to set hygienic norms and principles;
- The processing plants shall be run by abiding the set rules and conditions;
- In transportation of fish, shrimp etc set hygienic conditions will be followed;
- Exportable fish and fish products will be inspected and tested for quality; and safeness and health certificate will be given. Without health certificate low fish and fish products can be exported; and
- Any breach of this law is punishable and license is liable to be cancelled (Ali, 2002).

However, the external buyers were not satisfied with this rules and regulations regarding quality and safety assurance and they imposed more conditions. The EU countries introduced new system of quality control and safety for fish and fish products namely, “Hazard Analysis Critical Control Points”(HACCP). The main concept of HACCP system is to follow or maintain quality and safety programs set under HACCP system at every step of marketing starting from production place to the last point. In September 1997 the European Union (EU) imposed a ban on entry of Bangladesh’s frozen food exports based on a report by the EU inspection team, which noted that the shrimp processing plants in Khulna and Chittagong were not complying with EU rules pertaining to quality control. Toufique (1998) informs that four factors, amongst other, were identified by the EU to rationalize their decision to ban imports of shrimp from Bangladesh, which included: a) unskilled and unhygienic labourers, b) unhygienic way of shrimp transportation and preservation, c) irregularity and unhealthy composition for acquiring shrimp, and d) corrupt practices for making excess profit. The government wanted three months time to follow EU Guidelines for processing shrimp and in March, the government of Bangladesh made it mandatory for shrimp processing farms to follow the guidelines contained in HACCP. In this context, the EU finally lifted the ban from July 1998.

## **6. Social Issues**

Literature on social issues highlights both positive and negative impact of shrimp farming. Pokrant (2001) shows that positive benefits include increased employment and a growth of average wage rates, growth in purchasing power, growth in number of earners in households, improved health and increased use of facilities such as tubewells, sanitary latrines and more substantial house structures, decline in land sales, rise in land prices, greater household food security, greater earning opportunities for women etc. Negative social consequences, given greater prominence in oppositional literature, include growth in income inequality, disruption of local networks of social security, violence against women and the landless, decline in access to sharecropping opportunities, privatization of public lands, exacerbation of existing unequal gender and class relations. However, there is no comprehensive evaluation of social costs and benefits of shrimp farming for the whole sector.

### 6.1 *Marginalisation of the Poor*

Ahmad, N. in her paper (1996) shows that the relationship between export oriented shrimp cultivation and human rights is clearly negative. As she says that since early 1990s, a boom in export driven commercial shrimp cultivation in the southwest region of Bangladesh has been at the root of a feud between landless villagers, small farmers, fishermen, and diary producers, and a small group of wealthy shrimp exporters who control most of the area's land. While the shrimp industry has brought thousands of jobs to the Bangladesh economy, and export earnings rose significantly, the profits have enriched a miniscule portion of the population. The majority of the impoverished people of the shrimp cultivation zones have suffered a marked economic decline.

It is said that the child born today begins catching fry tomorrow, the children usually become involved at the age of five. Girls, it was found, were allowed to catch fry only till the age of 10-11. It was considered improper for girls to work outside their houses after puberty (BOBP/WP/63, Page 12).

With regard to the impact of conversion of agriculture land into shrimp farm Primavera (1997) in his article quote from other studies as "...the conversion and salinisation of rice and other agricultural lands also leads to the marginalization of the rural communities. Dispossessed farmers are forced to seek work elsewhere, migrating to the cities and swelling the ranks of the urban unemployed (Alauddin and Hamid 1996) and leaving women and children alone for long periods (Sultana 1994 in Barraclough and Finger- Stich 1996).

### 6.2 *Breakdown of traditional livelihood support and increasing poverty*

Ahmad (1996) also reports that the health of most of the people has suffered from transformation of the landscape and declining incomes. Many can no longer produce or purchase adequate nutrition for their families. In particular their diet lacks protein from freshwater fish, dairy products, meat and poultry since livestock must be raised elsewhere. Proximity to standing water has led to an increase in diseases like malaria, and diarrhoea.

Women and children from poorer families are hired as cheap labour to catch shrimp in open water, requiring them to stand in cold and salty lime-mixed water for eight to ten hours a day. This activity is blamed for a variety of skin problems such as the decay of their fingernails and hands.

### 6.3 *Social disruption*

Villagers reported that hired hands from urban areas have introduced the use of drugs, alcohol, gambings and prostitution in the area. Cash wages on the shrimp farms have lured children from schools into employment, contributed to a documented decrease in school enrollment and attendance (Ain O Shalish Kendra: 1994). Villagers report that gher employees have attacked and burnt villages and assaulted women and children. In a typical incident on 7 November, 1990, 50 women and men were injured and one woman was killed when a wealthy shrimp farm owner and his armed men opened fire with rifles and machine guns in an attack on a zone that had been kept free of shrimp at the resistance of local residents. However, this sort of incidents rarely take place in the current scenario of shrimp farming as the locale shrimp farmers have surpassed the outsiders in number.

#### 6.4 *Transfer of land and wealth to local and national elites*

Hart and Nandy (1990) also report from Khulna that in the late 1980s the local population was gradually being replaced and land ownership rights threatened by people from Khulna and Dhaka. They show that shrimp farming eliminated traditional agricultural crops such as sesame, paddy, and vegetables and that lease arrangements denied land owners access to their land for seven to eight months a year. Local labourers were left with few local earning opportunities and women were required to go long distance for drinking water. Shrimp farmers restricted duck keeping and saline water made it impossible to raise cattle. They argue that while shrimp farming might be profitable in money terms, the social costs (deterioration of embankments, sterility of soil, poor water, diminution of land rights) were very high. They conclude that current shrimp practices did not enhance social equity.

#### 6.5 *Conflict*

Akhter H. and MacGrory J. (1996) in their report say that shrimp culture is highly controversial as there are many disputes between local and outside landowners, and conflicts between rice and shrimp producers. Caritas (an NGO) suffered problems from influential shrimp farmers and six members of their staff were falsely charged with murder. However, the report noted that the formation of Mohila Samities by the Caritas was a positive achievement under the shrimp project as those women of remote area have access to development assistance.

Begum A and Alam (2000) in their report highlight that shrimp culture has brought a number of problems and conflicts between paddy farmers and shrimp cultivators. Polders and shrimp culture has cut off traditional dry season activities such as grazing cattle and goats, home gardening etc. Shrimp culture has led to social conflicts over land tenure and user rights. Agitation between those groups in favour of shrimp culture and those opposed has led to conflicts, fragmenting and dividing community. Migrant labourers have been accused of creating greater personal insecurity for women.

##### 6.5.1 Employment of women

Begum A and Alam (2000) have shown that the mobility, diversification of the sources of income and organizational activities encouraged by the TFP has contributed significantly towards the improvement of social consciousness. In addition, spontaneous and enormous involvement of women in public work is one of the important issues that found in the selected polders, compare to the most of the rural areas of Bangladesh. The proportion of involvement of poor in employment is higher and mostly from the Hindu community.

#### 6.6 *Gender*

The argument that new income opportunities from shrimp production provide greater choice for local people, including some rural poor. Where people have greater choice they have improved bargaining power and so can begin to exert greater control over their lives. Such control is a precondition for sustainable livelihood. However, it is unclear from the limited data available what these new choices consist of and what proportion of the rural poor are in a position to exercise them. In case of women, there remains an imbalance between economic and social change. For example, women working outside the home are still subject to traditional patriarchal norms regarding the appropriateness of such work. New normative practices have yet to emerge which would provide the social support to women's greater physical and economic mobility. Women's social security is still at risk as patriarchal norms

and practices continue to determine control of public space, appropriate work, marriage patterns and the like.

Ghafur et al (1999) in their report show that violation of women by the guards of shrimp farms has been a common phenomenon. Women are particularly vulnerable since some of their husbands have either migrated to find work or are in hiding because of their involvement in protest activities. Women involved in organized resistance to the expansion of shrimp cultivation have been physically and verbally abused. A number of these attacks have resulted in the death of unarmed women. However, this sort of incidences particularly resistance to the expansion of shrimp cultivation were organised by the anti shrimp groups and occurred in the past/ or at the beginning of shrimp farming.

In a working paper on shrimp fry collectors by BOBP (October, 1990) it was found that there is a gender division of labour. For example, equipments for fry collection is procured by men, catching fry with net by men, women and children, sorting by women, sometimes by men. Labour is recognized only at the catching level; all other work is considered subsidiary. With regard to the pattern of employment the report shows that the menfolk and the male children caught fry, and brought them back to the shore or the house, where women and female children sort the catch. However, women with no adult male support turn to fry catching for livelihood despite cultural, social, and religious barriers. The report also found that in Satkhira and Khulna districts, women lived in more oppressive conditions despite their hard work in various activities, their position in the family and society was distinctly subordinate. This was so in the poor families too, though the women in these families appeared to be more independent than those in Cox's bazaar. As for the economically better-off families, they were not allowed to work outside their households, just as in Cox's bazaar. Discrimination found in average wage rate, based on gender and age.

## 7. Policy, Institutional and Political Economy of Shrimp Farming

There is lack of literature on the policy and institutional issues of shrimp farming in Bangladesh, but the few that could be mentioned are: the Ministry of Fisheries and Livestock of the Government of Bangladesh, (1998): *Coastal Shrimp and Aquaculture Policy in the National Fisheries Policy of Bangladesh*, Maniruzzaman *et al* (2001), Nabi (2001), Habib (1999), and Ahmed (1996). There is ample macro-economic analysis of shrimp but the literatures on political economic analysis of shrimp have been very few in number, which are: Datta, 2001, Manju, 1997, Chowdhury (2001) and Ghafur *et al* (1999). The main focus of the literature was on socio-environmental issues and the same they have interesting discussion on political economy of shrimp.

### 7.1 Policy Perspectives of Shrimp

The goal of National Fisheries Policy have set the perspectives of the policy of coastal shrimp farming in Bangladesh. The broad goals of National Fisheries Policy (1998) are:

- ❑ to develop fisheries resources and increase productivity of the sector;
- ❑ to alleviate poverty and improve of socio-economic condition of the fishers through generation of self-employment;
- ❑ to meet people's requirement of animal protein;
- ❑ earning of foreign exchange and achieve economic growth through exporting fish; and
- ❑ conserving ecological balance, bio-diversity and improvement of public health.

The National Fisheries Policy (1998) document contains a section on coastal shrimp and aquaculture. It acknowledges the contribution of shrimp culture and at the same time it underlines the low yield of the sector. It emphasizes on integrated and mixed cultivation of shrimp and rice making the system more productive and environment friendly. The policy encourages establishing hatcheries instead of fry collection from natural systems. The policy also suggested to adapting improved technologies in farming and greater input for higher production of shrimp. Some of the main measures suggested in the NFP for the development of shrimp sector are:

- ❑ To form committees at different levels including *Thana* (now *Upzila*), district and national shrimp committees. The committees will help to implement the rules and regulations and take necessary steps to solves problems relating to shrimp farming,
- ❑ Conserving biodiversity in the coastal region through fish/shrimp culture in the rotation with rice or in concurrent phases,
- ❑ Appropriate measures to be taken to encourage rice and shrimp culture in a way that would not destabilize the ecological balance in the polders,
- ❑ Encourage improved extensive shrimp culture. Limit semi-intensive culture in controlled and feasible areas only. Banning expansion of shrimp farming in the mangrove areas to improve ecological balance. Tree plantation will be encouraged in the shrimp areas.
- ❑ Establish demonstration shrimp farms in the private sector with government assistance and arranging training for shrimp farmers,
- ❑ Shrimp farming be considered an export industry and given facilities like other industries,
- ❑ Private entrepreneurs to be encouraged to establish commercial shrimp hatcheries in order to reduce dependency on shrimp PL collection from natural source,
- ❑ To ban shrimp harvest during the breeding season and some breeding grounds in the Bay of Bengal to be declared shrimp sanctuaries,
- ❑ Private entrepreneurs to be given priority to establish shrimp and prawn hatchery,
- ❑ Using local food ingredients to produce shrimp feed. Import of fishmeal, mineral premix etc. to be allowed where necessary,
- ❑ Maintaining hygienic conditions in farm management and post harvest,
- ❑ Training programme to be chalked out for workers in post harvest and to expand infrastructure facilities,
- ❑ Develop marketing to ensure better export price,
- ❑ Modernizing quality control facilities,
- ❑ Central shrimp cell be extended up to the field level to serve the needs of the shrimp farmers,
- ❑ Demarcating shrimp farming zones in the coastal areas, and
- ❑ Combined efforts with development partners to achieve environment friendly shrimp farming.

The other laws relevant to coastal aquaculture and shrimp farming include: Embankment and Drainage Act (1952), Shrimp *Mohal* Management Policy (1992), Bangladesh Water and Power Development Board Ordinance (1972), Manual for Land Management (1990), Bangladesh Environment Conservation Act (1995).

Van Houtte (2001) points out the new features and shifts in legislation, policy and institutional framework in governing aquaculture. The main thrusts of the shifts reflect attention to environmental and social responsibility for management and development of the

resources. The emerging changes also emphasizes the production process requires to meeting public and consumer expectation. The shifts in policy of other shrimp producing countries are also more or less noticeable in the recently formulated NFP and shrimp policy of Bangladesh.

### *7.2 Institutional Arrangements*

Maniruzzman *et al* (2001) observes that there is multiplicity of institutions in the fisheries sector. The major institutions include: ministry of fisheries and livestock, ministry of land, ministry of local government, rural development and cooperatives, ministry of water resources, ministry of agriculture, ministry of forest and environment, ministry of planning, ministry of finance and economic relation, ministry of establishment, ministry of commerce and the line departments at the national levels. A comprehensive list provided by Maniruzzman *et al* (2001) gives an overview of the involvement of more than one and half dozen of ministries and divisions and more than two and half dozen of departments involved in the activities of fisheries sector. Most of them are equally important for the shrimp sector. At the local level, beside the district and *Upazila* administrations, the fisheries, land offices and financial institutions like banks are directly involved in the shrimp sector development. There has been a set of informal institutions including shrimp farmers, traders and exporter's association, cooperatives and networks etc. Thus it demonstrates the complexity and the need for both inter and intra-agency cooperation and coordination.

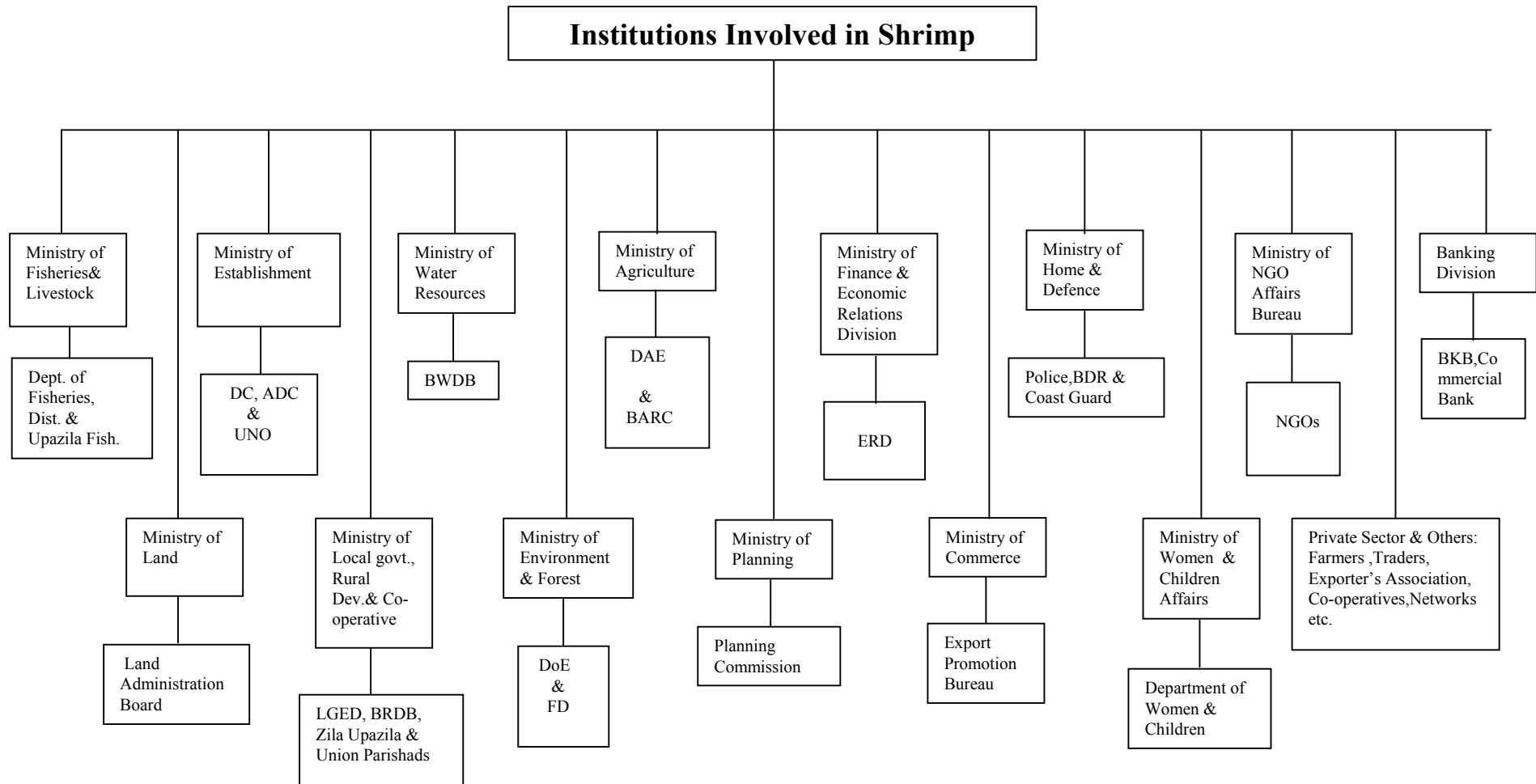
Pokranta and Bhuiyan (2001) shows that the main institutions and organizations that influence shrimp sector are: government organizations, NGOs, donor agencies, cooperatives of shrimp farming groups, and local union *Parishad* (council). In addition, there are informal associations of landless, farmers and others, which lack the institutional capacity to mobilize their supporters on a continuous basis.

NGOs play an increasingly important role in terms of providing, credit for small farmers, training on farming and raising awareness about social equity, women and human right issues. For example, Pokranta and Bhuiyan (2001) report says that Caritas has provided a major role in several shrimp related projects. Its role has been to provide information about projects, assist in consciousness-raising, management training, local empowerment and organizational training. Nabi (2001) points out that the institutional arrangement comprise 'operational rule' or allocation of property rights that determines the entry to resources and the patterns of exploration and uses of resources. The entry is subject to mutual agreement or relations of power and authority between competing interests. The power relation and authority also plays a very crucial role in accessing or occupying and using or exploiting resources (land and water) in shrimp sector in Bangladesh.

### *7.3 Debates on Policy, Institutions and Political Economy of Shrimp*

As mentioned above, Bangladesh has a national fisheries policy which included a policy for the coastal shrimp and aquaculture, but still there has been confusion about the legal and institutional position of shrimp. People in general treat it as part of agriculture supporting food production while government and a section of shrimp producers felt that it should be treated as an industry. Further, there have been many laws and regulations (such as a recent ban on shrimp fry collection) to address social and environmental issues but there is serious lack in enforcement of the laws.

Figure-1: The Complexity and Multiplicity of the Ministries, Divisions and Departments involved in the Shrimp Sector



Habib (1999) provides a profile and analysis of legal, institutional and policy mechanisms of Bangladesh. He argues that the regulatory framework is flawed and prone to circumvention due to limitations in the legal definitions, unclear and conflicting jurisdictions, lacks of regulation of fry catching practices, unclear and conflicting policies on the management and regulation of mangrove fisheries in reserved forests and land conservation to shrimp estates and regulation of fishing licenses. The result, Habib argues, has been mangrove destruction, social conflicts, and environmental pollution. There is a lack of delegation of power and decision-making is overly centralized. This may be caused by unclear, inconsistent job description and authorization and also by higher level of staff unnecessary interfering with the work of their subordinates and the subordinates not defending their responsibilities. So there is need for new legal and institutional arrangement to address the emerging issues in the context of making the sector sustainable.

It is generally viewed that the government institutions suffer from lack of coordination and cooperation and misappropriation of public resources. Khan (1999) felt that beside top-down and bureaucratic in nature, the government institutions lack in skill, efficiency and coordination. Maniruuzzman *et al* (2001) reports that one particular problem is lack of capacity of the involved organizations to implement the programmes. Soussan and Datta (1998) mention that many institutions and organizations involved in rural development, agriculture, fisheries and water sector development are centralized, authoritative and are not responsive to the needs of people and situation. In most cases, the existing organizational structure of local government bodies (such as Bangladesh Water Development Board) is not appropriate for management, operation and maintenance of their assigned programmes. Most importantly, they can implement projects but they do not have much operational flexibility and capacity to respond to the complex and locally specific circumstances.

Chowdhury (2001) briefly describe the rural power structure and politics of shrimp. In rural Bangladesh land is the major source of power besides kinship, family status, income and education. The ownership, access and control over land very often determine the economic and social position and power relation of individuals and family. In the initial stage, many outsiders were involved in shrimp farming and they have broken the traditional power relation in the shrimp producing areas. Those people were rich, powerful, influential and well connected with the local and national politics as well with the administrative structure. They used all those means and tried their best to capture agricultural land forcefully to cultivate shrimp against the will of the owners of land. They resorted to all sorts of violent means such as killings, abductions, harassment, case, torture etc. to suppress anti-shrimp movement. Apart from these violent means, a good number of political leaders and organizers of anti-shrimp movement were sold out to them. Further, the state machineries primarily favored the outsiders both because of pressure from higher authorities, and as result of booties that they received from the outside shrimp producers. Thus it is evident from the analysis that the outside shrimp producers take the benefits from existing power relation. The good link of the shrimp producers with the rural political elites who dominate the socio-political systems and help them to gains maximum benefits from shrimp production, trading and rural economy.

Datta (2001) reports that the government policy and the sheer profitability of shrimp farming attracted outsiders and in the early 1990s, seventy percent of the shrimp fields were owned or controlled by the outsiders. He further mentions that about 66% (of the 8621 shrimp farms spread across the country) of the shrimp farms have been managed by non-land owners through leasing arrangement. People call them shrimp lords and they are well aware of the importance of land and therefore pursued several policies to keep their control (or even extent

their control) over the land of local people. They are trying to hold their control through market mechanisms (rent) or extra market mechanisms (force and violence). In persuasion of the above, they use to buy the support of many local rich and political elites who have control over the local population. This they arrange by taking them as partners in the production process. Some of them who could not be accommodated as partners were managed through financial arrangement. Further, quite a large number of political leaders (most of them have shrimp farms) and the local body politics play a very crucial role in the conflict management though not by negotiation or consensus building but by putting pressure or applying force on the local opponents i.e., the anti-shrimp group and movement.

In the very recent time, there have some changes in both government policy (which have been reflected in the NFP, 1998 and Shrimp Policy) and local people have become more aware and organized. In few cases, the local people (sometime mobilized by NGOs) have challenged the irresponsible use of resources (land, water, mangrove etc.) and the resulted environmental degradation and social problems created by the outsiders. The local people are trying to organise shrimp farming avoiding many of the social and environmental negative consequences. In few cases, they are showing early good results (Begum and Alam, 2000, Datta, 2001, Chowdhury, 2001). One of the examples is *Gonogher* i.e., shrimp farming by the local groups. Begum and Alam (2000) suggest that poor and marginal farmer could be benefited through *Gonogher. Khas* (owned by government) land could be leased out to the poor farmers and landless groups for shrimp farming and these groups are to be supported with training and finance. Further, the mainstream literature suggests to reviewing the limitations of existing policy and institutions for making them pro-people, pro-poor and pro-environment. There has been a serious need to explore - how the process could be reversed to empowering the large section of people economically and politically through their increased access to resources, institution, transfer and adoption of new technology, and diversification of livelihood options.

## **8. Other Issues and Aspects of Shrimp Farming Activities**

The mainstream literature has responded to criticisms by suggesting ways of mitigating some of the worse economic, social and environmental costs of shrimp farming. These include land zoning to separate shrimp production as far as possible from vulnerable paddy land (Bhattacharya et al: 1999, Karim: 1998), increased hatchery production to reduce dependence on wild fry; improvements in techniques of production within the improved extensive system; promotion of mixed rice-shrimp farming; promotion of smallholder shrimp production; experiments with semi-intensive production methods; regulation of child labour along lines similar to the garments sector but adapted to conditions in shrimp production; land taxes and effluent charges; reservation of land for forest and grazing; promotion of new income earning activities in shrimp producing areas which are directed at those displaced by shrimp farming and by the impact of new policies to promote more environmentally sustainable shrimp farming practices; and the promotion of sector forums involving government, business, donors, NGOs and local communities.

The more radical NGOs such as Nijera Kori and UBINIG argue that the bulk of the poor oppose shrimp farming because they do not benefit from it (Ghafur et al: 1999). The shrimp sector suffered from serious setbacks in recent times due to sanctions imposed by some developed countries guided by ecological-environmental concerns. As in September 1997, the EU imposed ban on entry of Bangladesh's frozen food exports based on a report by the EU

inspection team which noted that the shrimp processing plants in Khulna and Chittagong were not complying with EU rules pertaining to quality control. The US foods and drug administration expressed similar concern. Adherence to FAO's HACCP has been made mandatory for access to developed country markets. Later on the ban was uplifted.

Begum et al (2000) in their report also highlighted that respect between landless and landowners in the shrimp farming areas appeared to have declined. The landowners complained that an NGO, Nijera Kori always created a distance between these two categories of people in the area.

Pokrant (2001) divided shrimp literature into two categories viz. majority/non oppositional and minority/oppositional. Majority/non-oppositional i.e. Government of Bangladesh, donor agencies, several large NGOs, industry groups who support the sector's continued growth. The oppositional or minority i.e. some domestic and international NGOs and sections of shrimp farming communities who oppose the industry either wholly or in part. Non-oppositional literature emanating from the majority category is written within a usually unstated framework of economic globalisation, free trade and the benefits of economic growth. On the other hand, the minority of the literature associated with more oppositional domestic and international NGOs. Presents an alternative development model based on fair trade, some disengagement from the global economy and support for a steady state economic model.

### *8.1 Resources Management and Access of Poor to Natural Resources*

Bangladesh was very rich in natural resources including fertile land, water, fisheries, forestry, biodiversity and agricultural productivity in few decades ago. But in recent years, the natural resources (NRs) base has been greatly depleted due to mainly anthropogenic factors e.g., growth of population, increasing demand of food for the large rural population, indiscriminate use of agro-chemical, unplanned industrialization and urbanization etc. In the past, the poor and common people would take substantial livelihood supports from the NRs in terms of food and fodder, nutrition, housing materials, health seeking, protection from natural disaster etc., as well as they conserved the resources for generations. But in the present situation, the traditional safety nets of the poor provided by the NRs have been seriously eroded. The productivity and the capacity of the NRs has also been greatly declined and thus the livelihood of the poor are at a stake and they would face greater food insecurity and vulnerability in future (Rahman *et al*, 2002).

A fragmented and ineffective approach of NRM coupled with a weak institutional framework result in degradation and low productivity of resources. Further, policies and institutions to take control over the already degraded resources base generated lot of conflicts in access to and use of NRs, where the poor and the marginal people are continuously losing their traditional rights and entitlement to the resources. On the other hand, the rich and the power elites are increasingly gaining greater control over the resources, who very often overexploit the resources without considering the future productivity and sustainability of the resources base (Rahman *et al*, 2002 and Ahmed, 2002). The shrimp farming in Bangladesh in the earlier stage dominated by the outsiders overexploited the coastal resources including land, water, mangroves and coastal fisheries.

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