FROM FISH AND FOREST TO SALT AND SHRIMP: THE CHANGING NATURE OF COASTAL DEVELOPMENT POLICY AND ITS IMPACT ON COASTAL RESOURCES AND COMMUNITIES IN SOUTHEAST BANGLADESH

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ABSTRACT Coastal Bangladesh is both rich in aquatic and terrestrial resources and subject to natural and human-made risks and vulnerabilities of flood, cyclone, political change, competition for resources, deforestation, piracy and the like. Since the 1950s, two of the most important transformations in land use along the coastal region of Southeast Bangladesh have been the growth of solar evaporative salt production (from an older salt sector) and the introduction of export shrimp culture. This paper traces the development of these two 'industries' over the past 50 years in the southern part of the southeast coastal region. It summarises their impact on long-standing land and aquatic use practices such as fishing, farming and forestry and on the lives of people dependent upon these practices. Through a case study of the Chakoria Sundarban, it illustrates the piecemeal and fragmented approach to coastal development of the East Pakistan and Bangladesh governments since 1950 to the 1990s. Finally, it describes briefly the new Integrated Coastal Zone Management Plan set for implementation in 2006, which promises to provide a more inclusive and integrated approach to coastal planning.

Introduction

There has been debate in recent years over the most appropriate strategies for the management of coastal resources and communities. Earlier strategies were criticised for being fragmented and sectoral, top-down and non-participatory, conflict-ridden, uncoordinated and driven by engineering, constructionist and technological solutions. Several writers have proposed the need to move towards a more integrated approach to coastal management, defined as:

> … a process by which rational decisions are made concerning the conservation and sustainable use of coastal and ocean resources and space. The process is designed to overcome the fragmentation inherent in single-sector management approaches (fishing operations, oil and gas development, etc.), in the splits in

> jurisdiction among different levels of government, and in the land–water interface (Cicin-Sain and Knecht, 1998)

Brown et al.(2002) have argued that any new strategy must recognise:

> … the complexity of ecosystems, the interaction between different ecosystems, the linkages between human activity and ecosystem health, and the need for integrated interdisciplinary management (20)

Adger et al. (2005:1036), in their discussion of reactions to coastal disasters such as the 2004 Indian Ocean tsunami, suggest that '…a better understanding of the linkages between ecosystems and human societies can help to reduce vulnerability and enhance resilience of these linked systems in coastal areas'. Visser (2004:26-30) proposes that research on coastal development be transdisciplinary, challenging disciplinary assumptions and boundaries, recognise inter-disciplinary contradictions, move towards new research questions and paradigms which transcend disciplinary boundaries and focus on understanding the complex interactions between social and environmental processes.

This paper has two objectives. First it examines the growth of salt and brackish water shrimp production from 1950 to 2003 and their impact on coastal resources and communities in Southeast Bangladesh. It shows that these industries have been allowed to expand in a fragmented and uncoordinated way which has resulted in environmental degradation, economic dislocation and social disruption. Second, it discusses the Government of Bangladesh's new Coastal Development Strategy, set to be implemented in 2006, and assesses its stance on the role of salt and shrimp production in future coastal development. The main empirical focus of the paper is Cox's Bazar District in Southeast Bangladesh which contains a high concentration of salt farms and mills and shrimp farms and hatcheries.

Cox's Bazar District

Cox's Bazar District forms part of the Chittagong Coastal Plain Agro-ecological zone which also includes the Districts of Chittagong and Feni. Mineral resources include Limestone on St Martin's Island, beach and sand minerals (monazite, rutile, caesium) at Cox's Bazar and hard rock/engineering stone in Chittagong (Islam, 2004:30-31). The Chittagong-Cox's Bazar coastline is subject to major cyclonic activity and received twenty seven percent of the eighty two recorded cyclones between 1582 and 1998 (Islam, 2004:78). This zone lies outside the deltaic zone and is influenced more by wave or tidal energy from the Bay of Bengal along its open-ocean coast with some remnant mangroves in sheltered estuaries. The tidal range increases from a low in the extreme southeast to a high in the northeast at the mouth of the Karnafuli River, Sandwip Island and Hatia Island. Monsoon winds can drive tides up to 2.4m.

Soils are formed on the piedmont and through river deposits. Coastal soils are found in areas of young tidal deposits and during the rainy season, most coastal soils are non-saline. Salinity is of less importance here than in Khulna, the other main centre of

shrimp production, affecting fifteen percent of arable land compared with seventy percent in Khulna.

The shoreline is wave-dominated sandy coast with a narrow coastal plain and 145km of sloping sandy beaches backed by sand dunes. While shoreline erosion is not a serious problem, there is concern that any rise in sea levels and landside sediments are insufficient, coastal erosion is likely to increase (Warrick and Ahmed, 1996: 383).

There are high coastal population densities with most people living rurally. Cox's Bazar District has a population of 1,759,560 (2001 figures: BBS, 2003) of which over eighty five percent live in rural areas. It also has a literacy rate of twenty nine percent which is considerably lower than the national average of forty five percent.

The coastal population of Cox's Bazar District is largely dependent on rice production with double and triple cropping of T-aman (monsoon rice crop), Aus-T aman (rice harvested during the monsoon) and Aus-T aman-rabi. A high proportion of crops (over seventy five percent) are high yielding varieties. While agriculture continues to play a central role in people's livelihoods, in the coastal zone as a whole there has been a decline in the proportion of households making a living from the land they owned from forty percent in 1960 to thirteen percent in 1991 (District Gazeteers, 1999). Cox's Bazar District has a high proportion of non-farm rural households (42.5 percent) compared with a national average of 33.8 percent (BSS, 1999). Eighteen percent of rural households were fisher households in 1999.

The growth of salt and shrimp production in Cox's Bazar District: 1950-2003

Over the past 50 years Cox's Bazar District has seen the expansion of an existing domestic salt 'industry' and an export-oriented shrimp sector located largely along the coastal strip. Of the two activities, production and trade in salt is the oldest going back to Moghul times and before (Islam, 1978). Export-based shrimp farming dates from the 1970s, although closed culture fishing, which included some shrimp species, has been practised for centuries in Bangladesh and Bengal.[1]

In Cox's Bazar, the first commercial salt mill, Eastern Salt Works Ltd., was established in 1942 at Gumatali with a paid up capital of Rs. 100,000 which was used to lease 100 acres of khas land for ten years. It began production in 1946 and produced 2,430 maunds of salt after which the company was hit by the 1947 cyclone which destroyed operations. The East Pakistan Government Ministry of Finance established a salt mill at Kutubdia in 1951.

The poor state of salt production which was inherited from the British in the then East Pakistan is indicated in a letter in 1951 from the Joint Secretary and Director-General of the Department of Civil Supplies who wrote to the Ministry of Food and Agriculture in Karachi that local supplies of salt amounted to 500,000 maunds compared with a demand of 6,500,000 maunds. The deficit was covered by legal imports and smuggling from India (Shah, 1951). In the early 1950s in Noakhali, to the north west of the southeast coastal zone, the main form of salt production was through carrying mixed

[1] Prior to 1947, Bangladesh was known as East Bengal and formed part of greater Bengal within British India. From 1947 to 1971 it was part of Pakistan and known as East Pakistan. After a brutal civil war, it won its independence from Pakistan in 1971 and became Bangladesh.

salt and sand from the char lands to the homes of salt labourers for conversion to salt. The duty on salt was abolished in December 1951 as a means of stimulating the salt industry. However, the Pakistani Government retained a monopoly of the salt trade and favoured Karachi salt manufacturers over those of East Pakistan.

At this time farmers combined farming with salt production which was carried out from January to April and was more profitable than paddy. Three main processes were used in the production of salt:

1. The collection of brine from saline earth and evaporation by boiling. This method was most common in the northern coastal part of Cox's Bazar District. The method combined lixiviation (separating the mixed salt and earth into soluble and insoluble parts by percolation of water) and boiling. The wood for boiling came from illegal cutting in local forests, including the Chakoria Sundarbans. Eight maunds (320 kg) of salt earth and one maund of wood were needed to produce one maund of salt. Local producers tested the strength of the brine by placing a log in the mixture.
2. The partial evaporation of sea water through exposure to the sun followed by boiling. This was more widely practised and organised into small groups of workers who rented about an acre of land from local landowners. The workers lived locally and used family labour. The brine solution was boiled in pans using wood collected under licence (an illegally) from local forests. Wood collection was time consuming and officials saw this as a constraint of productivity, suggesting cooperative societies work with the Forest department to supply wood locally. There were also complaints that government officials exacted levies from them and they were harassed by Forestry officials. Reports of the time state that timber supplies at low cost were unlimited if managed properly.
3. Solar evaporation. This method became increasingly popular in the region and was adopted by the Eastern Salt Works and a few other producers and was said to be unknown to producers outside the southeast. It took larger areas of land relative to the other methods in order to be economic and difficulties were faced by the Eastern Salt Works when it expanded its operations by what a report at the time referred to as forty refugee families in a Burma Refugee Camp who lived on land blocking saline water access to the salt beds from the Moheshkhali channel. Already there were tensions between government departments as the Cooperative Department wanted to convert the land to agriculture which was opposed on the grounds that the land was too saline and prevented further expansion of salt production.

Between 1949 and 1952 salt production in Chittagong (including Cox's Bazar) rose from 250,000 maunds to 1,100,000 maunds which was explained officially by the abolition of salt duty, good salt prices in 1951 and the work of Salt Section in the Directorate of Industries. Employment grew from 100,000 to 350,000 during the same period and included women and children and boatmen who collected wood. Land devoted to salt production grew from 250 acres to 1200 acres. Fifty percent of salt producers were reported to have mortgaged 'moveable assets' to take a salt lease and purchase iron sheeting and firewood, paying twenty five percent interest per season. The Pakistani rulers followed similar policy and held monopoly on salt trade. The relationship between the government and salt producers was not conducive to a healthy growth of salt industry

in East Pakistan. Salt manufacturers of the province were worse off especially because of the government's discriminatory policy of protecting the interest of salt manufacturers of Karachi.

By the 1960s salt producers had shifted to the solar evaporation method which reduced pressure on timber resources in the Chakoria Sundarban, although by this time the forest was much denuded.

Today, the main salt producing areas of Bangladesh are located mainly in Cox's Bazar District with a few in Chittagong District. In 2004 there were 764 salt ghonas or large salt beds in seventy one mouzas in forty six Unions of eight sub-districts in the two districts, which also officially contained sixty five of the country's 310 salt mills[2]. During the 2002-3 salt season, about 59,000 acres of land were taken under salt cultivation in the two districts. In Cox's Bazar District, it is estimated that fifteen percent of rural households and 500,000 people are directly involved in salt farming and that over 2.5 million people are dependent on the salt production industry in the coastal zone (WARPO, 2005). Moheshkhali sub-district in Cox's Bazar is thought to have the largest concentration of mostly poor salt farmers with 10,118 working one third of the total land area under salt farming in the District (See table 2).

Table 1
Table 2

In 2004 in Islampur, one of the main salt centres of Cox's Bazar District, the study field survey counted forty one salt mills of which only twenty three were active (Table 2). The Bangaldesh Small and Cottage Industries Corporation (BSCIC) estimates that between 1960 and 2003-4, land devoted to salt production increased from 2,742 ha. to 25,000 ha. and that in 2004, 500,000 people were employed directly in salt production and 41,000 were listed salt farmers.

In Islampur salt mills about 1500 to 2000 people are employed as salt mill workers and include men, women and children. Workers move from mill to mill and obtain work through labour contractors employed by the mills. About seventy five percent of salt mill workers surveyed were able to work for twenty to twenty five days a month all year round. About six percent of salt mill workers also obtained work as salt bed workers, four percent worked in shrimp farms, five percent worked in agriculture, ten percent did a variety of jobs and the majority (seventy five percent) worked in salt mills only.

Among salt bed workers, thirteen percent of the total salt bed work force worked only as salt bed workers. About fifteen percent were dike labourers on shrimp farms, twenty five percent were permanent workers in shrimp farms, twelve percent caught fish in the shrimp farms, twelve percent were fishers in rivers and canals outside the Union, twelve percent worked in rice farming and eleven percent worked outside the Union as rickshaw pullers, day labourers, wood cutters, building workers, small traders in local markets.

Many shrimp workers in the area also work in the salt industry. Some thirty eight percent of shrimp workers worked as salt bed labourers, seven percent worked in the salt mills, twenty five percent in crop and paddy cultivation and eighteen percent in

[2] Located in Banskhali, Ramu, Moheshkhali, Kutubdia, Chokoria and Teknaf sub-districts.

rickshaw/van pulling, day labouring, wood cutting and dike labouring. Only twelve percent worked as shrimp workers only.

In Islampur Union fifty percent of paddy and crop workers were involved in shrimp farming, salt beds, salt mills, boating, fishing, wood cutting, day labouring and van/rickshaw pulling. Twenty percent of the Union agricultural work force worked only in the Union and about thirty percent migrated seasonally to other sub-districts and unions in Cox's Bazar District.

Salt is produced by salt farmers who usually operate under one of three salt leasing arrangements. Agu or straight leasing is where a landowner (Malik or Jomidar) leases out his land directly to a salt farmer for one season at a fixed lease price. The farmer retains all salt produced. This is a simple method but difficult for poor salt farmers who do not have their own lease money and may have to borrow. The second arrangement, Ekshona (1), is a sharecropping arrangement where the landowner gives land to the farmer who repays with seven out of nine parts of salt produced. The third arrangement, Ekshona (2) or dalal system, is where the landowner leases land to a sub-leaseholder or dalal who then sub-contracts production to a farmer who pays a lease price. The farmer sells the salt crop to a dalal at a price agreed before the lease is entered into.

Some salt mill owners own their own salt beds but generally these are insufficient to supply the mill and they usually buy through traders and dalals. The salt producers of Cox's Bazar are part of a nation-wide network of salt trading dominated by salt mill owners in the main urban centres. There is also a considerable illegal trade in salt with India and Myanmar which competes with local producers.

In contrast with salt, the monoculture of shrimp for export is a recent industry dating from the 1970s. Prior to this time, closed culture fishing was polycultural and integrated into the seasonal social and ecological rhythms of village life and characterized by family and community ownership of ponds and tanks, integration of production with food cropping and livestock activities, risk-averse strategies of spreading food risks across different food sources, provision of off-season work for farmers, and production largely for local consumption. There was little processing of fish apart from drying, although there was extensive trade in fish fry between Chittagong and Kolkata during British and Pakistani times. For example, the 1951 FAO-backed Kesteven and Ling report on the fisheries of East Pakistan refers to 'brackishwater trapping pond operations' (bheries) in the Khulna area in which mullet, bhetki (ocean perch), chanda (pomfret) and shrimp were the main catch. Some 9,000 fishermen using seine and cast nets operated on the ponds alone or as part of paddy cultivation. They discuss freshwater tank culture, noting that tanks were supplied with wild spawn and fry supplemented the capture of fingerlings from beels. Over 20,000 people carried some 15,000 containers of spawn and fry by train from Rajshahi and Chittagong in East Bengal/Pakistan to other parts of the province for local stocking. Kesteven and Ling (1951) point out that tank cultivation for commercials reasons was limited and '…in the majority cultivation is for subsistence and pleasure; consequently the operations are not carried out with any efficiency and in fact many of the tanks are neglected and even derelict'. Apart from some processing of fish for export to Bangladeshi communities overseas and a trade in dry fish with East Asia, most fish and crustaceans were consumed domestically. These early forms of culture

fisheries are best described as 'proto-aquacultural' or a form of stock enhancement with limited intervention in faunal life cycles (Beveridge and Little, 2002)

The beginnings of a more specialised shrimp industry in East Pakistan can be traced to the 1950s, particularly to the later part of the decade when the first shrimp and fish processing and freezing plant was established Chittagong in 1959. Production was largely of headless, shell-on freshwater shrimp for export to Europe and the USA. At that time, Khulna (in present-day southwest Bangladesh) was the main centre of shrimp production. Chittagong Division had nearly 61,000 privately owned fish ponds which were used for domestic purposes (Rizvi, 1970). It was not until the late 1970s that a brackish water shrimp export sector began to emerge in the southeast and in Cox' Bazar District.

In the late 1970s, a shift towards a more open economy began in which cultured shrimp was promoted by government and private business as a means of stimulating private investment, expanding production, and increasing overseas earnings. In 1991 the shrimp export sector was declared a thrust industry and shrimp farmers and hatchery operators were given a tax holiday and reduced rates of bank interest on loans. 1992 saw the introduction of the Shrimp Mohal Management Policy, which supported the turning over of suitable public land to shrimp farming.

The sector grew rapidly to become Bangladesh's second largest earner of foreign exchange (excluding worker remittances). Today shrimp (both fresh and brackish water species) are raised on over 145,000 farms covering 200,000 ha concentrated in the Southwest and Southeast of the country (table 3). In addition to shrimp farmers, the sector consists of several hundred thousand wild fry collectors, 48 hatcheries, many thousands of agents, independent traders and shrimp depots, several feed companies and 128 processing plants. Overall, several million people are directly and indirectly dependent upon the sector. Over one million people are directly employed in a range of activities of which wild shrimp collecting was the most important but is now in decline through government prohibition and competition from hatcheries (table 4).

The southeast contains a small proportion of the country's shrimp farms. These farms are mainly located in Cox's Bazar District, producing brackish water species of which black tiger prawn is the most important. Two main forms of production are practised: shrimp cultivation only where salinity is high and shrimp alternating with salt and white fish. The land is used for salt production from December to May and shrimp culture from June to September/October. Farmers usually stock shrimp fry in the canals inside the farm during February-March and after salt production the land is inundated with tidal water.

Most observers agree that coastal Bangladesh has changed considerably as a result of shrimp and salt farming (Rahman, Pokrant, Quddus, Ali, 2005). In Cox's Bazar District, there has been some decline in rice sharecropping and other work which has been partly compensated for by shrimp fry collecting and salt bed and salt mill work. However, wild fry collection is being phased out and attempts are now being made to assist fry collectors to obtain other work. While there has been some loss of grazing land, according to Nuruzzaman (2005), the average number of livestock reared in shrimp farming households is higher than the national average. There has been growing diversification of employment in the rural areas and most rural poor have two or three occupations in order to survive which is becoming a necessary condition of survival in a

labour surplus economy (Toufique and Turton, 2002). The rotation of shrimp and salt and shrimp and rice has contributed to the provision of all-year employment for some of the rural poor. Those who have benefited most financially from shrimp expansion are absentee landlords and shrimp farmers. For example, a recent study in Cox's Bazar revealed that shrimp farmers who alternated shrimp with salt earned high gross and net incomes than those who produced rice only or who alternated shrimp with rice (Islam et al., 2003).

There has been a loss of agricultural land and common property resources to salt and shrimp production and forest resources have declined considerably. In Cox's Bazar District in the 1980s some 3,000 of 10,000 ha of Government-owned land in 4 to 4.5 ha plots with peripheral dikes, water supplies and drainage channels were leased out to private entrepreneurs under the Asian Development Bank (ADB) and World Bank (WB) financed development project. A significant part of this land was mangrove forest, although its destruction is part of a long-term process of resource denudation occurring over several centuries.

Unlike salt production, shrimp farming is one part of an international trading network which includes wild fry collectors and shrimp fry hatcheries, fry traders, shrimp buyers and depots, processing plants in Chittagong, Cox's Bazar and Khulna and local agents for overseas buyers in the EU, USA and Japan. These global value chains have a considerable influence on coastal shrimp production, particularly with regard to quality and safety standards and pricing. One of the great risks for shrimp farmers and traders working along the coast is that they are increasingly reliant on global trade for their survival, something which a zonal or territorially defined coastal development policy can do little to alter.

Table 3
Table 4

Coastal development and planning in Southeast Bangladesh

The growth of these two industries from 1950 to the 1990s took place in a poorly regulated planning environment and an undeveloped transport system and infrastructure. At independence in 1971 the country was devastated by a liberation war which left it with a shattered infrastructure, limited industrial investment from years of neglect by Pakistan, a growing and largely rurally based and highly stratified population living on a small land area which had by this time lost over 90 percent of its forests. Concern with coastal communities, economies and the environment was subsumed under a broader development agenda which focused on rehabilitation of a large refugee population, rebuilding the country's infrastructure and laying the groundwork for a state-directed development policy based on expanded rice production and the promotion of import-substituting domestic industries. According to the DFID (2003):

> The problem of coastal areas [in Bangladesh] has traditionally been conceived as one of physical protection and efforts concentrated on the construction of embankments and cyclone shelters. There were hardly any governmental efforts until the 1990s to address the problem of institutional representation and people's

vulnerability in terms of maintaining their livelihood in a context of the isolation of the areas and the extremely unequal distribution of assets (such as land) or access to fishery resources.

The beginnings of a greater concern over the environment, and within that, coastal development and protection, can be traced to the late 1970s when local farmers, NGOs and others, particularly in the Khulna region where most shrimp farms are located, began to challenge the unplanned and environmentally and socially destructive impact of shrimp farming and its impact on coastal resources and communities. However, such protests were more concerned with protecting local people's access to common property resources or ensuring that any land distribution went to the less well off than it was about protecting the environment as some separate natural sphere with its own specific ecological value (see discussion below).

It was not until the late 1980s with the introduction of the World Bank-Government of Bangladesh (GoB) Flood Action Plan aimed at flood control after the floods of 1987-88 (Blair, 2000) that Bangladesh saw the emergence of a broader state and civil society environmental agenda. The Flood Action Plan became a rallying point for many local and international NGOs and local farmers and fishers who attacked the Plan on environmental, social and political grounds. The effects of this plan on inland fishers was especially serious as it would have disrupted fish migration routes, reduced the size and number of water bodies and increased conflicts with local farmers over access to remaining fishing areas.

The unplanned and sectoral nature of coastal development is well illustrated by the growth of the salt and shrimp sectors during the period from 1971 to the late 1990s. The next part of the paper looks at the impact of shrimp farming on the Chakoria Sundarban, a once large mangrove forest located in the delta of the Matamuhuri River in Southeast Bangladesh.

Shrimp, salt and the Chakoria Sundarban

A good example of the narrow focus of government and aid agencies and their emphasis upon sectoral rather than integrated coastal planning is that of the history of the Chakoria Sundarban located in coastal Southeast Bangladesh. In the early 20th century the Chakoria Sundarban reserve forest was created by the British and covered over 8,758 hectares, largely in Charandwip and Rampur mouzas. Before 1975 when shrimp farming began, this had been reduced to 6,258 h., with 1,629 hectares being given in 1929 to the Badarkhali Samity (Badarkhali Cooperative Society) made up of landless and marginal farmers who were granted land for farming. Thus, over twenty five percent of the forest was removed prior to the advent of shrimp farming.

In addition, from the 1920s to the 1960s, official concern from the Forestry Department was expressed that the forest was being degraded by illegal wood collection, the impact of wood cutting during World War II, cattle and buffalo grazing, hunting and dams created by fishers. On pre-second world war and wartime impacts, Ghani (1954: 27), Divisional Forest Officer and compiler of the 1950 working plan for the forest of the Cox's Bazar Division, noted:

> Due to the extreme accessibility of these forests to boats, there has long been a very heavy demand for produce from the Chakaria-Sundarbans. Even before the war [world war II], the area was reported to have been overworked and the crop reduced in many parts. During the war, from 1942 to 1945, the demand for firewood vastly increased as a result of the many thousands of troops camped near the area.

He goes on to say that if proper siviculture practices were to be introduced, the forest would have to be closed for ten to twenty years '…to give the shattered growing stock a chance of recouperation' (27). Recognising that this is not possible because of the pressures from local people, he proposed that exports of wood to Chittagong, Cox's Bazar and other markets be stopped and felling restricted for local uses, namely domestic cooking and salt manufacture. Other restrictions were placed on dry firewood collection, buffalo grazing, and fishing grounds (to avoid conflict among rival groups of Muslim, Hindu and Mogh fishers). This latter restriction had been in place since 1937 and Ghani proposed some modification.

In the case of salt production, Ghani observed:

> The demand for firewood for salt manufacture is a new factor in the management of the Chakaria-Sundarbans which has developed during the past 5 or 6 years. The salt manufacturers are poor local people who live in the immediate vicinity of the forest at Palakata, Uyllabania and Ramkumar Choudhuri Ghona. They manufacture salt by boiling salt water collected on *khosh* areas for a brief season during the hot weather. Their demand for a convenient source of firewood is considerable and most insistent. If no provision is made for the legitimate supply of the salt manufacturers' demands, then large scale thefts by night are inevitable (27).

Ghani proposed dividing the Sundarban into two felling series each of which were to be divided into sections. Salt manufacturers were to obtain their supplies from Palakata and Ramkumar Choudhuri Ghona cutting sections in the Charandwip block. Areas to be worked from 1950-51 to 1969-70 ranged from 86 to 291 acres. Restrictions were to be placed on tree species to be cut, including prohibition of the felling of *guttya*, except for fishers with permits who used it for fishing stakes. Some species were classed as reserve because they were used for purposes other than firewood and could only be cut if specifically designated by a senior range officer. The rules regulating the use of the forest by salt manufacturers were as follows:

1. *Bone fide* salt manufacturers only were to be allowed to cut trees for firewood;
2. Particular sections of the forest were to be reserved for salt manufacturers from different local villages;
3. The coupes were to be open for two and half months from 15 March to 31 May;
4. Quotas for cutting were to be established and distributed equally among registered salt manufacturers.

Restrictions on boat sizes were also to be introduced to prevent over-exploitation of the forest for commercial reasons. Children under 12 and women from salt manufacturing villages were allowed to collect dry firewood upon receipt of a permit.

In 1969 another plan for the Sundarban was formulated in which the compiler, Divisional Forest Officer Chaudhury, noted that since the Ghani report salt manufacturing had greatly expanded and led to over-cutting in the forest. Combined with neglect by forestry officers who were concentrating on other forest areas, '…there was dearthless illicit cutting of forest in the area which was so disasterous that hardly any tall tree is now available over the whole of Chokoria-Sundarbans Reserve.' (Chaudhury,1969: 82). Chaudhury considered that management's main objective was to improve the condition of the forest and then to move towards ensuring a sustainable output of wood for local people. By this time, salt manufacturers had begun to switch to solar production and new forest areas were opening up to meet local demand so Chaudhury recommended closing the forest for timber felling for the period of the plan, that is, up to 1977-8. He also recommended mangrove restoration and river bank tree planting to hasten the process of regeneration (82). Local farmers, fishers and others requiring wood were to draw mainland forests in other local areas such as Dulahazara, Hargeza, Fashiakhali and Ringbong and also from Moheshkhali Island.

Apart from timber cutting, Chaudhury blamed over grazing and over fishing for the poor state of the forest. He proposed a rotational grazing system over a 5 year cycle for local residents only. On fishing he proposed the banning of dam building in creeks and canals, no permits for fishing stakes and dry firewood, and fishing by net in main rivers and canals only. No permits for dry firewood were to be issued in the Chakoria Sundarban.

He concludes on a grim and somewhat prescient note:

> Any deviation from this arrangement at the present state of this mangrove forests [*sic*] will be disasterous not only to the growing stock …but also to the deltaic belt of islands which will become barren in no time. The ultimate effect of this imposed disafforestation will mean the complete destruction of the adjoining villages and paddy lands in the wake of cyclone and tidal bores. The subsequent suffering of the surrounding population will be beyond human miseries. These have been proved beyond doubt from time to time in the past (83).

The Forestry Department's efforts to protect the mangroves came to little as in the 1970s there was a gradual erosion of the forest as sections of land were transferred to the Fisheries Department and to the Land Ministry as part of the move to create a shrimp export sector.

The pressures on the Bangladesh Government to earn foreign exchange, the power of local landlords and urban business interests, the shift towards a more open export economy and the existence of international donor agencies, such as the WB and ADB, ready to promote a large-scale expansion of shrimp farming, resulted in a rejection of the Forest Department's argument for the development of alternative rural livelihood strategies rooted in long-standing local practices.

Between 1980 and 1988 shrimp cultivation in the Chakoria region expanded from 20,000 ha to 94,000 ha. In 1990 Mahmood, a marine biologist, called for a halt to further

destruction of the Chakoria Sundarban and its more rational use in which shrimp farming would be one component of an integrated use of the ecosystem. He further proposed that future shrimp farm leasing include a requirement for planting of '…appropriate species…' to compensate for mangrove loss, that lateral expansion of shrimp farms into remaining forest be stopped and that there be a move to more intensive production methods (Mahmood, 1990: 108-109). Neither of these recommendations was taken up by government and the forest had all but disappeared by the early 1990s

Table 5

The shift in government thinking is well illustrated by a 1987 report by the Bangladesh Institute for Development Studies prepared for the Ministry of Planning on rural industries in Bangladesh (Planning Commission, 1987) which focused on Chakoria sub-district in Cox's Bazar District, one of the emerging centres of shrimp production at that time in which the Chakoria Sundarban was located. It showed the sub-district to be an agricultural surplus area with high volumes of rice cultivation, potatoes, mustard, chillies and other vegetables and fruits. It was also described as an important centre of salt production.

The report strongly recommended the expansion of shrimp production in the area through intensive and extensive methods. The intensive methods proposed included increasing the minimum size of shrimp ponds to be '…economically feasible', removal of all plants that could disturb the shrimp, elimination of all predator fish, killing of mud lobsters, leveling and asphalting of shrimp beds to exclude predator fish and mud lobsters, and establishment of fry hatcheries to reduce dependence on wild sources.

The extensive methods proposed were to use all fallow land, including the bulk of the remaining Chakoria Sundarban mangrove forest. The report dismissed Forestry Department objections that this would '…disturb the existing ecological balance of the locality and increase erosion of the hilly regions covered with forest' (59). The report claimed that removing the forest would have 'microscopic' effect on the ecology as the forest was covered in prickly plants and swamp. It went on to claim that ecological conditions would improve through planting coconuts in rows along shrimp farm embankments.

This example illustrates the low level of official interest, even by the mid-1980s, in developing a broad and integrated coastal protection policy. Rather, the main focus was on developing particular economic sectors, raising revenue and the productivity of the land. The BIDS report referred to the Sundarban as unutilized land, reminiscent of the British colonial reference to 'waste lands,' thus demonstrating its ignorance of all previous work on the forest which showed that it contained a range of plants and trees which were used extensively by local fishers, by local people for housing and other purposes. It contradicts earlier comments in the report which showed the central importance of the rivers and creeks running through the forest for local fishers. It also ignored the 1969 Chaudhury report for the Forest Department which recommended a ten year moratorium on felling of trees in the forest to allow regeneration after years of unplanned felling for fishing stakes, home building and salt production and extensive cattle and buffalo grazing.

According to Das (1995) the clearing of the Chokoria Sundarbans resulted in a decline in a complex ecosystem supporting a variety of users to a simplified system with limited use and subject to exploitation by private entrepreneurs; a decline in availability of wild post-larval shrimp; increased risk to cyclones and storm surges; a rise in land values and increased concentration of land ownership; and increased local control of land and water by outsiders.

More generally, much of the expansion of shrimp farms has been into the now destroyed mangrove forests along the coastal strip and offshore islands, of which the Chakoria Sundarban was the largest. This expansion has had several effects on the availability of work and access to common property resources. Some traditional occupations have declined, which has had a more severe impact on landless workers and marginal farmers than the wealthier landowners and business people who have become the main shrimp farmers, money lenders and employers of labour in the area. Among the occupations that have declined are wood and honey collecting, creek and river fishing, cattle grazing and rice farm sharecropping. The decline in water buffalo and other livestock, once depended on by rich and poor, is due to a lack of fodder as grazing lands were converted to shrimp farms and as water salinity levels increased. Also, the use of power tillers instead of draft animals has resulted in a decline in the use of cattle. As fodder became scarce, pressures were placed on farmers further to use tractors or power tillers. Rearing cattle is now seen as time consuming, expensive and too labour intensive.

The enclosure of common property resources that accompanied the destruction of the mangrove forests deprived many of access to fish, fodder, building materials and plant vegetation and increased their reliance on earning cash and the market economy, forced some to migrate to Chittagong and Cox's Bazar, and pushed some in-shore fishers into deep sea fishing. This decline has been partly compensated for by a growth in fry collecting, shrimp and shrimp fry trading, shrimp depot handling, transport work, salt production, and shrimp farm labouring. However, several of these activities as sources of employment such as fry collecting and terrestrial transport have been badly affected by government bans on wild fry collecting and the shift to air transport for the movement of hatchery-produced shrimp fry to shrimp producing areas in the southwest of the country (Pokrant and Reeves, 2003).

There were local protests against forest clearance as well as attempts at land grabbing in the 1970s and 1980s (Pokrant and Reeves, 2003). In particular, in Chakoria there was much opposition to the government's policy of allocating khas (state) land from the mangrove forest to wealthier local and outsider interests. In one instance, a group of Hindu fishers had managed to obtain the lease of over 100 hectares of land form shrimp farming which they farmed themselves and leased out (illegally) to others. They were unable to pay the lease money on time and the local District Officer re-allocated the land to a local politician (Uddin, 1995). Protests against land grabbing for shrimp and other purposes by the political powerful continue to today.

More generally, land movements in rural Bangladesh have been concerned historically with protecting landless labourers' marginal farmers' and fishers' control over land, fishing grounds, employment opportunities and other resources. These have been sporadic and focused on single issues rather than promoting a broader agenda of environmental or coastal protection as specific discursive and material spheres of political agitation although in seeking to protect their lands and waters from shrimp

farming, farmers and fishers may realise through their actions what others call environmental objectives such as the protection of particular types of vegetation, plants, rural landscapes etc.

Farmers and fishers did not themselves define these aspects of rural life as having environmental value in the sense of being worthy of protection for their own sake or to realise some larger biospheric agenda. Rather, they were seen as part of their way of living and the means by which they could meet their subsistence needs.

These protests took place at a time when the state, donor agency and NGO intervention into Bangladesh rural life grew considerably. In Cox's Bazar District, most of this intervention has been sectoral, aimed at particular groups of people, usually the poor, and at particular economic activities, particularly shrimp farming. In the shrimp sector, NGO involvement has taken two forms. The majority of NGOs such as CARE, Caritas, BRAC, and Grameen Bank work with the international donor agencies and the Bangladesh Government within an ecological modernization framework to promote better environmental, social and economic management of shrimp farms. Their main focus is the improvement of shrimp farmer performance, financial and technical assistance to farmers, gender-based programmes aimed at raising women's awareness of, and participation in, work opportunities in the non-domestic sphere, and assistance to fry collectors to improve their economic standing and protect the natural resources upon which they depend.

A minority of more radical NGOs such as Nijera Kori, the Coastal Development Partnership (Upokulio Unnayan Shahajogy) and Uttaran, which operate mainly in the south west, and UBINIG (Unnayan Bikalper Nitinirdharoni Gobeshona or Policy Research for Development Alternatives), which has two major projects in the south east, do not share the reformist objectives of mainstream NGOs, instead working with the landless and marginal farmers in shrimp areas to raise their consciousness about the environmental, economic and social impacts of shrimp farming, to present alternative models of development practice, to gain control over public land and to represent their views at international and national fora. Their approach can be characterised as a defence of what Escobar (1998) calls biodemocracy against bioimperialism.

These more radical NGOs see the problem of environmental destruction, declining biodiversity and increased vulnerability of coastal and other communities to mainstream development policies as having Northern roots rather than being caused by the actions of local actors in the South. They believe that the best way to improve the working and living conditions coastal communities is to move away from industrialised shrimp farming to more environmentally benign forms of farming based on organic farming methods, double-rice cropping, minimum or no use of artificial chemical and biological inputs, community control of resources and a de-commodified exchange system which is local and regional in spread.

Put in other terms, these NGOs are attempting to combine environmental and agrarian goals and to show that creating sustainable livelihoods depends, *inter alia*, upon protecting biodiversity and other environmental values. These include proposals to limit brackish water shrimp farming to high saline areas and to allow rice farming and other activities to take place elsewhere. It also includes replanting of mangroves and saline-resistant grasses to allow cattle grazing and local mat weaving and encouragement for planting saline and flood resistant rice varieties to provide food and protect Bangladesh's

rice gene pool. These NGOs also promote greater small farmer participation in shrimp farming by restricting shrimp farm size togive them a personal stake in protecting land from over-use. Underlying these suggestions is a shift away from shrimp monoculture for export towards a more polycultural system rooted in local ecosystems.[3]

However, the impact of these more radical NGOs is limited, particularly in the Southeast region. For example, UBINIG's Naya Krishi Andolon aims at creating small farming communities devoted to more organic farming methods, including the planting of mangroves, but does not engage much in political mobilisation involving any direct confrontation with industrial shrimp farming. They have shown very little interest in salt production. In the meantime, the legal and illegal conversion of land for shrimp farming continues in environmentally sensitive areas and is being promoted by local businessmen, State politicians and middle-level bureaucrats.

Integrated coastal development

From 1950 to the 1990s, the expansion of the shrimp and salt sectors was relatively unplanned and the main beneficiaries of the industries have largely been the wealthier and politically well-connected sections of rural society and the owners of urban-based mills and plants. This expansion occurred within a largely productionist paradigm which emphasised increasing productive capacity and earning foreign exchange, often at the expense of coastal ecologies and communities, within an increasingly liberalised economic system integrated into the global economy.

There are some signs of a shift in thinking on coastal development with the beginning in 1999 of a GoB integrated coastal zone development programme, which attempts to move away from what Brown et al.(2003) refer to as enhanced sectoral management and coastal zone management approaches which have a more geographically delineated or sectoral focus. These latter approaches saw departments competing with each other for control of particular resources or working in isolation, unable and unwilling to cooperate.

A 2003 British Government Department For International Development policy review of coastal development in Bangladesh has described previous approaches to coastal development (see table 4 for a history of coastal zone management to 2000) as suffering from 'institutional weakness' with many government departments working in semi-isolation from each other and often with little local presence. The review also referred to the work of agencies and departments as adopting a 'construction approach,' focusing on physical protection of the coast through the construction of embankments and cyclone shelters and largely excluding local people in a more comprehensive planning process which recognized the complex relationship between coastal ecological, social, political and economic systems. Huda (2004) reviewed the performance of fifteen

[3] More generally, these local NGOs, which are linked to regional and international support groups such as the South Asian Network on Food, Ecology and Culture (SANFEC, 2001), the Industrial Shrimp Action Network (ISAN, 1997, 2003) and the Environmental Justice Foundation (2003) have several objectives which include obtaining land for the landless; protecting biodiversity; protecting women from harassment; promoting new forms of agriculture; keeping control of the economy in local hands; and educating people of their rights. These aims combine environmental, land reform and broader social objectives.

Bangladesh Government agencies with regard to their institutional capacity to participate in an integrated program and he concludes that while some progress has been made, '..there is still an evolving framework for multiorganization cooperation on coastal issues' (92).

Table 4

In the case of the fisheries sector, including shrimp farming, international donor agencies began to show an enhanced awareness of the interconnectedness of social and ecological systems with the launch of the WB-GoB Fourth Fisheries Project (FFP) in 1999[i]. The FFP had as its main objective:

> …to increase fish and shrimp production for domestic consumption and exports, consistent with sustainable resource management and with special emphasis on rural poverty alleviation, employment generation, improved capacity of local users to manage aquatic resources in a sustainable and equitable fashion, and conservation of aquatic biodiversity.

This objective was to be achieved in the shrimp sector by:

> …[the] establishment of sustainable and equitable institutional arrangements for managing shrimp polders and works (including improvements in salt-water inlets, flushing structures and channels) to facilitate the development of environmentally friendly smallholder shrimp production; (c) improvement of sustainability of shrimp fry collection through the development and extension of less destructive methods and by helping poor shrimp fry collectors gain access to services and support; (d) development and application of an appropriate extension strategy for freshwater aquaculture and establishment of an institutional network including the Department of Fisheries (DOF) and other organizations to apply and improve that strategy…

In 2002, the GoB and DFID within the FFP framework developed a shrimp action plan to correct what it saw as '… a lack of vision and strategic direction' in the sector. It identified the main environmental problems in the sector as:

> …the loss of agricultural land, increased salination of land and potable water, destruction of mangroves, over-exploitation of wild post larvae and snails (for feed of Golda[freshwater prawn]), and loss of grazing land and trees.

It proposed a number of measures to ameliorate such environmental and social problems. The first two measures proposed were the requirement for an environmental impact assessment for new shrimp projects and better environmental assessment monitoring systems to reduce the adverse ecological changes and related economic and social consequences resulting from water extraction, land use, discharge of effluents, use of drugs and chemicals. A third measure was a zoning policy to identify areas for shrimp farming and areas to be protected for grazing of livestock and common access. The fourth and fifth measures were for *khas* (public) lands for the landless and marginal farmers,

including requiring landlords to release some of their lands to the poor, and the reservation of some *khas* land for cattle grazing. A sixth measure was to require all new farms to be licensed with the aim of promoting a smallholder shrimp strategy. Finally, it was proposed that an integrated production system based on the year-round rotation of shrimp-rice and shrimp-salt be introduced to reduce the present monocultural system.

Many of these measures have been incorporated into the Department of Fisheries draft shrimp strategy which was under discussion in mid-2004 and which will be implemented within the framework of the new coastal development strategy (personal communication: Md. Maniruzzaman, Dec. 2004). The shrimp strategy emphasises that for the shrimp sector to become more competitive internationally, production yields need to be increased and sees this occurring through the promotion of a rice shrimp rotation, something which is already happening, using where possible new saline tolerant rice varieties, improved fertility of rice fields and better water management to reduce the incidence of disease (DoF, 2004). Importantly, increased yields are expected through better management of existing shrimp land rather than through any lateral expansion of shrimp farms.

The new Coastal Development Strategy is to be implemented from January 2006 and so it is not possible at this time to evaluate its impact. The main aim of the strategy is:

> …to create the circumstances through which the local communities of the coastal area are able to cope with the multiple vulnerabilities they face and realise the zone's development potentials. Its focus is on a knowledge and institutional environment and a poverty/livelihood focused orientation as a basis for building and implementing the specific management mechanisms for ICZM. This does not imply that all activities are centrally managed. It does mean that they should take place within a framework that facilitates coordination and harmonisation and removes conflicts.

The policy document identifies the coastal zone as a site of instabilities and vulnerabilities. These include poverty, limited livelihood opportunities (especially outside agriculture); poorly developed domestic and international economic linkages; poor levels of service provision and very poorly developed institutional structures that make the isolation of many coastal areas worse; unequal social structures, with a small powerful elite dominating the mass of people through legal and illegal means; decline in key common property resources such as marine fisheries, mangroves and freshwater resources, threat of cyclones and storm surges; long-term effects of climate change, with predicted rises in sea levels, possible increases in the frequency of major storms and changes in rainfall patterns over the whole Ganges-Brahmaputra basins, active processes of land erosion and accretion in the Meghna Estuary combined with geological and tectonic processes that are causing land to sink; changing patterns of land use, both in the coastal zone (including the growth of shrimp and salt production) and over the catchment as a whole that are affecting the coast's morphology and water resources characteristics; declining viability of many distinctive and threatened coastal ecosystems, including the Khulna Sundarban and other mangroves, coastal wetlands and marshes, and offshore marine habitats that are important spawning grounds; widespread pollution and resource

degradation; poor access to many forms of infrastructure and technologies and many examples of technical interventions that are poorly adapted to the characteristics of coastal areas; surface and sub-surface salinisation, including saline intrusion into freshwater aquifers some distance from the coast; and poor resource management, including the unsustainable exploitation of fish resources and poor ground and surface water management.

It prioritised a number of strategies for integrated coastal development, which it says have '…evolved through a consultation process, guides interventions and investments in the coastal zone'. These are ensuring fresh and safe water availability; safety from man-made and natural hazards; optimizing use of coastal lands; promoting economic growth emphasizing non-farm rural employment; sustainable and equitable management of natural resources: exploiting untapped and less explored opportunities; improving livelihood conditions of people; specially women; environmental conservation; empowerment through knowledge management; and creating an enabling institutional environment.

The policy document says little about the salt industry other than encouraging it as a small to medium size enterprise sector. More attention is paid to the shrimp sector and the document draws on the expertise and advice of the Bangladesh Department of Fisheries and the Bangladesh Frozen Food Association, the shrimp processors' apex body representing the majority of shrimp processors. Thus, it recognizes the need for coastal zoning policies to protect land for agricultural and other uses while promoting a more pro-poor pond aquaculture program to provide income, employment and food security. The document defers to the shrimp processors' apex body, the Bangladesh Frozen Food Association, which aims to increase the income from shrimp fivefold by 2008 while '…accommodating certification in all stages, food safety, traceability and environmental protection and management'.

There remain areas of conflict between the proposed shrimp strategy, industry pressures to increase yields through more intensive farming methods rather than improved extensive methods and existing government policy which, through the 1992 Shrimp *Mohal* Management Policy, supports the turning over of suitable public land to shrimp farming. More intensive farming and the conversion of more land to shrimp farming are likely to have negative environmental consequences such as reduced biodiversity and the production of waste and be socially disruptive in that public land would be denied to landless and other poor rural inhabitants.

Conclusion

This paper examined the impact of salt and shrimp farming on the Southeast Bangladesh coastal zone since the 1950s. It showed that these two activities were allowed to develop in a relatively ad hoc and unplanned manner as the Government of Bangladesh had no comprehensive coastal development strategy to manage their economic, social and environmental impacts. The policy towards salt production was to encourage more production to ensure that Bangladesh became self-sufficient in salt. In the case of shrimp, policy focused on providing financial, insurance, infrastructural and other support for a largely private export-oriented industry as a means of realizing foreign exchange

objectives as part of the government's economic liberalization strategy. Concerns over the local impacts of these activities focused largely but not exclusively on shrimp production and were raised by national and international NGOs and some members of local communities who acted defensively to promote several not always complementary objectives ranging from protection of forests and biodiversity to the distribution of land to poorer members of the community for farming and for shrimp production.

It was shown that in recent years there has been a shift in government thinking towards a more integrated coastal development strategy and some of the features of that strategy were outlined. However, the strategy exists largely in paper form and will not be implemented until 2006. An initial reading of the documentary material on the strategy reveals that shrimp and salt production will continue to be supported as key national 'industries' within the new coastal policy with an emphasis placed on making them more economically and environmentally sustainable. How successful the strategy will be in realizing this objective remains to be seen.

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Appendices

Table 1: salt land, enlisted growers and salt production, Bangladesh: 1990-1991 to 2002-2003.

Year	Salt cultivated land (acres)	Total enlisted growers (persons)	Production (metric tons)
1990-91	36,102.80	28,348	6,00,000.00
1991-92	37,084.65	30,565	8,98,205.00
1992-93	38,675.00	31,283	3,31,382.00
1993-94	39,129.65	30,009	6,94,234.00
1994-95	41,545.34	31,392	9,50,284.00
1995-96	43,670.50	33,874	6,53,554.00
1996-97	46,360.19	34,170	8,98,688.44
1997-98	49,488.15	33,269	8,00,921.00
1998-99	51,076.48	35,112	11,79,095.00
1999-2000	48,688.33	38,194	4,24,000.00
2000-‘01	51,541.00	37,293	9, 90,450.00
2001-‘02	54,717.50	36,285	7,75,000.00
2002-‘03	58,650.70	38,328	8,10,251.00

Source: BSCIC, 2003

Table 2: Islampur salt mills: 2004

1	2	3		4
	Name of Islampur Salt Mills	Ownership Type		Year established
		Single	Joint (number)	
1.	M/S. S.S. Salt Refinery.	≤	-----	1978
2.	M/S. Saodia crushing Mill	----	5 (brothers)	1999
3.	M/S. Mecca salt (unit-1)	----	3 (kinsmen)	1996
4.	M/S. Grameen salt Indus.	≤	-----	1997
5.	M/S. Sea Rose Salt Indus.	≤	-----	1988
6.	M/S. Millat Salt crushing Mill	≤	-----	1982
7.	M/S. Haji solt	≤	-----	1990
8.	M/S. Siddiquia salt Mill	≤	-----	1997
9.	M/S. K.B. Salt Mill	≤	-----	2001
10.	M/S. F. Alom salt crushing Industry.	≤	-----	1992
11.	M/S. BRAC salt	≤	-----	2000
12.	M/S. Bogdadea	≤	-----	1992
13.	M/S. Mitaly salt Refinary	≤	-----	1985
14.	M/S. L.K. Salt Crushing Indus	----	3(kinsmen)	1990
15.	M/S. Saharia salt Crushing Indus.	≤	-----	1998
16.	M/S. S.R. Salt Industry	≤	-----	2000
17.	M/S. Madina salt Indus.	≤	-----	1986
18.	M/S. Haque salt Crushing Indus.	----	8(family members)	1989
19.	M/S. Mocca salt(unit-2)	----	3(private)	2002
20.	M/S. Sapla salt Crushing Mill.	----	2(friends)	1994
21.	M/S. Bismilla salt Crushing Mill.	≤	-----	1989
22.	M/S. Riad salt Crushing Indus.	----	Company	1986
23.	M/S. Nurani salt Crushing	----	5(brothers)	1988

Source: field survey, 2004

Table 3: Number and district-wise distribution of shrimp farms in Bangladesh (2003)

District	Galda		Bagda		Total	
	No. of farms	Area (ha)	No. of farms	Area (ha)	No.of farms	Area (ha)
Satkhira	728	754	12,068	47,576	12,796	48,330
Khulna	36,275	14,292	9,474	37,629	58,545	51,921
Bagerhat	34,261	16,271	18,562	43,204	52,823	59,475
Jessore	2,543	2,905	41	23	2,584	2,928
Narail	2,863	1,215	-	-	2,863	1,215
Gopalganj	350	142	-	-	350	142
Madaripur	55	39	-	-	55	39
Pirojpur	687	2,293	-	-	687	2,293
Borguna	87	618	30	20	117	638
Barisal	47	64	-	-	47	64
Potuakhali	9	246	28	56	37	548
Bhola	21	84	1	2	22	86
Jhalokathi	46	51	-	-	46	51
Noakhali	8	65	-	-	8	65
Lakshmipur	5	5	0		5	5
Chittagong	11	10	81	797	92	807
Cox's Bazar	-	-	2,403	32,018	2,403	32,018
Total	77,996	39,054	42,688	161,325	120,684	200,379

Source: Department of Fisheries 2003

Table 4: Employment in shrimp and related activities

Activities	Number of people engaged	%
Wild Fry Collecting	444,000	42.48
Bagda Farming	166,485	15.93
Golda Farming	105,000	10.04
Processing Plants	9,780	0.94

Faria (Small shrimp traders)	5,293	0.50
Wild Fry Trading	5,176	0.49
Depot Operation	5,256	0.50
Hatchery Fry Trading	1,791	0.17
Bagda Hatcheries staff	1,665	0.16
Galda Hatcheries staff	42	-
Commission Agents of shrimp	500	-
Feed Factories	230	-
Wage labouring in shrimp farming & other activities.	300,000	28.70
Total	1,045.218	100

Source: Fisheries Sector Review, 2004 and DoF.

Table 5: Evolution of Coastal Zone Management in Bangladesh: 1960s -2000

Major Events
1960s Launching of Coastal Embankment Project
1978 Start of LRP
1986 ESCAP initiative "*Coastal Environmental Management Plan for Bangladesh"*
1986 Completion of the National Water Plan (NWP), Phase I, Ministry of Irrigation, Water Development and Flood
Control
1987 Presentation of the ESCAP report to an Inter-ministerial Symposium in Dhaka
1988 Finalisation of the ESCAP report
1989 *Cyclone Protection Project II jointly sponsored by the GoB and the European Community*
1990
1991 *National Water Plan II,* Ministry of Irrigation, Water Development and Flood Control
Launching of the FAP, Ministry of Irrigation, Water Development and Flood Control
1992 Food and Agriculture Organisation (FAO) *Integrated Management of Coastal Zones*
GoB initiated a study titled "Multi-purpose Cyclone Shelter Programme" (MCSP) with financial assistance
from the UNDP and World Bank.
1993 Tropical Research and Development Inc. *Feasibility Study: Integrated Coastal Zone Management for*
Bangladesh
Creation of the Disaster management Bureau under the Ministry of Disaster management and Relief with
support from UNDP, UNICEF and DFID
1994 Based on the review of LRP experiences, to consolidate the land based activities CDSP was launched as a
multi-sectoral rural development project, and the water based activities led to the start of MES
1995 Cyclone Shelter Preparatory Study (Cyclone Risk Area Development Plan) was launched with financial
support from the European Union.
1996
1997 University of Newcastle upon Tyne I*ntegrated Coastal Management : South Asia*
1998
1999 February 18-27: GoB Delegation to Thailand with EC support to study ICZM
February – March: ICZM Formulation Mission (WB, NEDA and WFP)
August - WB proposal to use CERP and other projects (CDSP, MES, SEMP, FFP, FRMP etc.) as a building
blocks of an ICZM Plan.
September – Policy and Human Resources Development (PHRD) Grant to help ICZM project preparation

December – Formulation of a TAPP for ICZM
2000 Establishment of the Project Development Office to prepare ICZM approach
2nd CERP submits final report "Coastal Zone Water Management Programme" as a building block for ICZM
Adapted from DFID, 2003

Table 6: Loss of mangrove forest in Cox's Bazar District through shrimp farming: 1975-1999

Location	Total area of mangrove (ha)			Loss of mangrove (ha)
	1975	1983	1999	
Chokoria	8512	4758	411	8102

Source: Adapted from Shahid and Islam, 2003