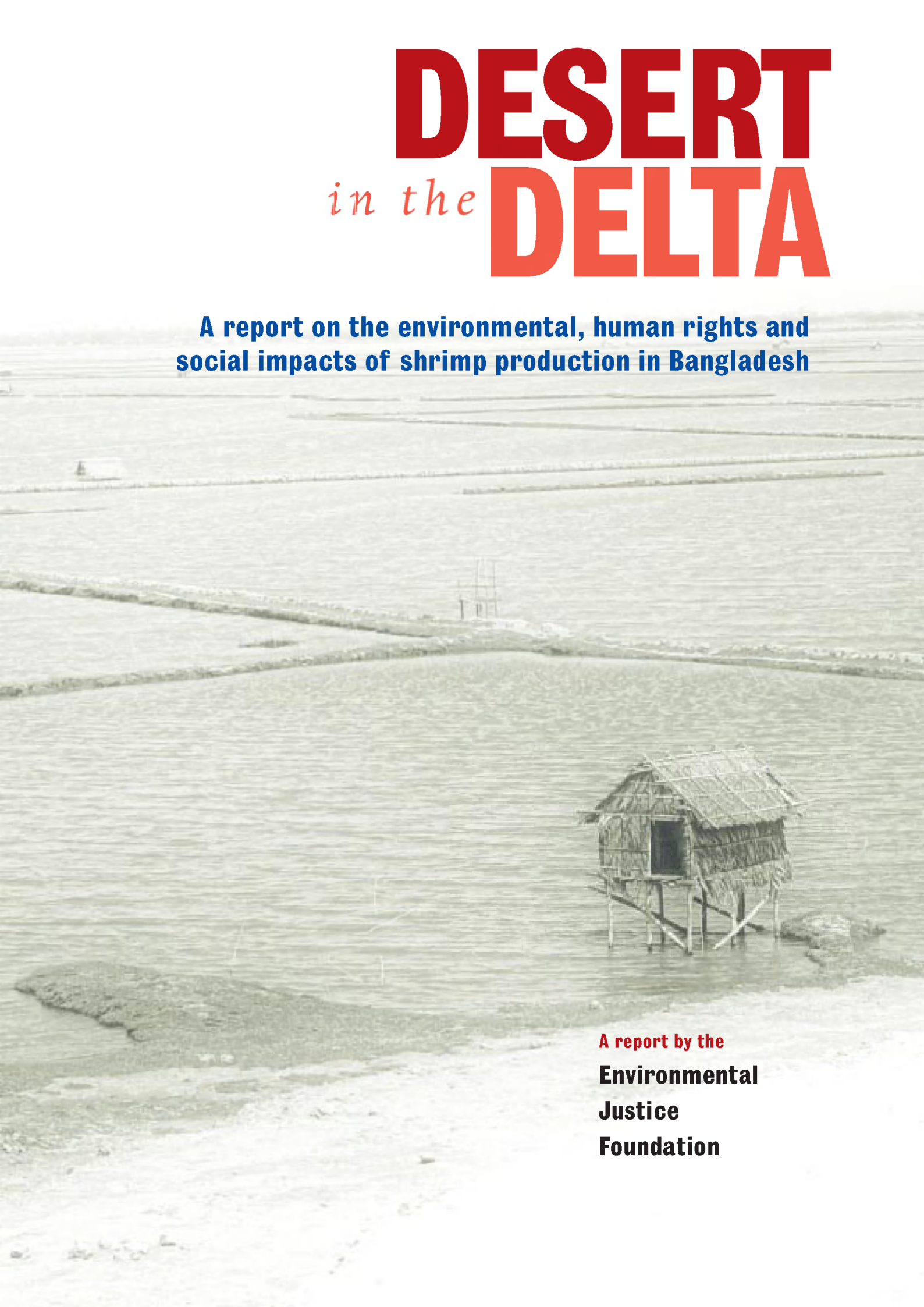
DESERT *in the* DELTA

A report on the environmental, human rights and social impacts of shrimp production in Bangladesh



A report by the
Environmental
Justice
Foundation

This report is one of a series documenting EJF's international investigations into the social, economic and environmental impacts resulting from shrimp production and consumption.

More information about EJF's shrimp campaign and PDF versions of this and other reports in the series can be found at: www.ejfoundation.org

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ONE WORLD ACTION
FOR A JUST AND EQUAL WORLD

The Body Shop Foundation

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This report is dedicated to all those people in Bangladesh working to peacefully resolve conflicts relating to shrimp farming.

In memory of **Manik Chandra Saha** who dedicated his life for social and environmental justice – and was murdered for his beliefs.

The **Environmental Justice Foundation** is a UK-based environmental and human rights charity. PDF versions of this report can be found at www.ejfoundation.org. Comments on the report, requests for further copies or specific queries about EJF should be directed to **Steve Trent** (strent@ejfoundation.org) or **Juliette Williams** (jwilliams@ejfoundation.org).

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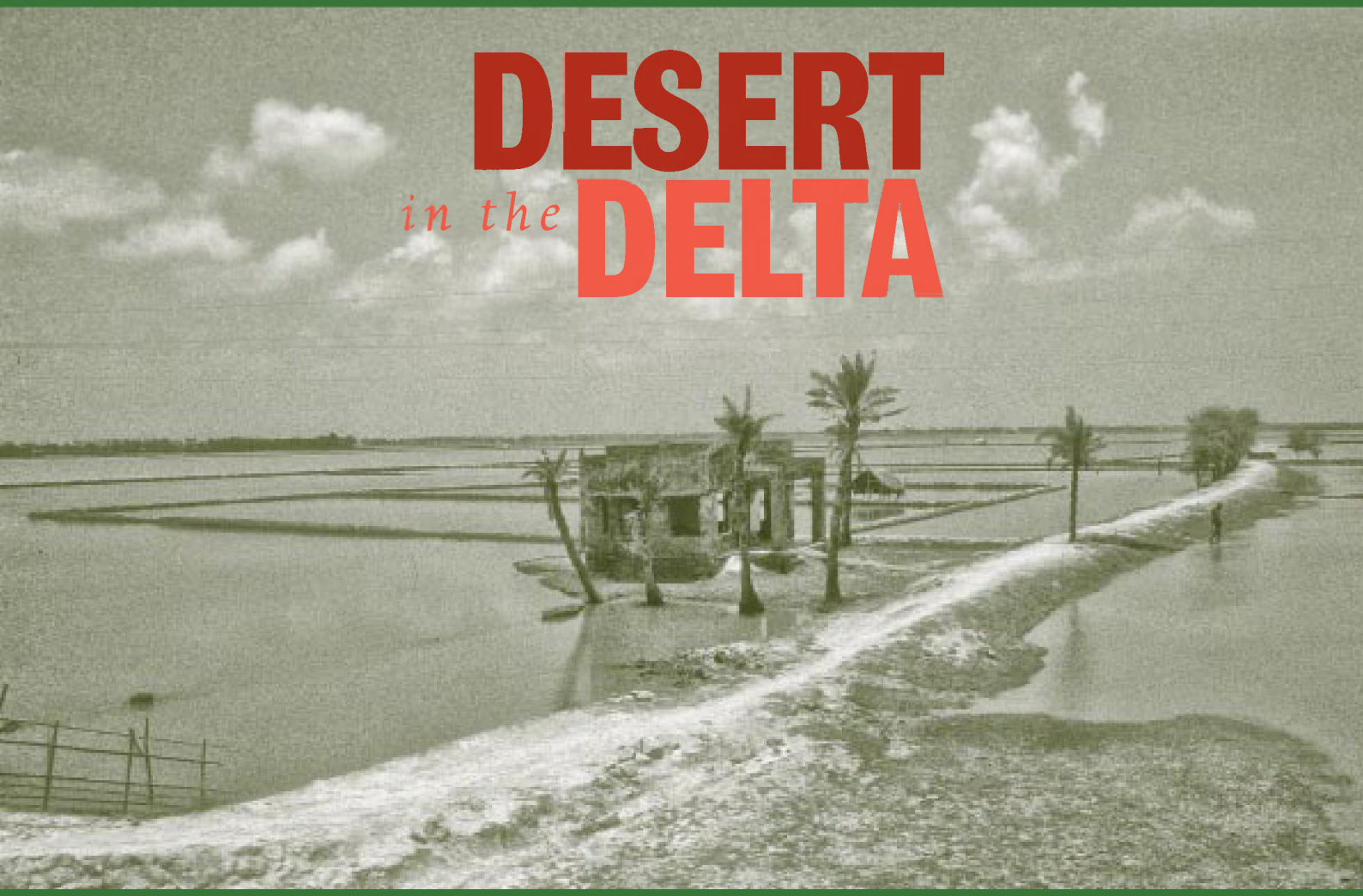
ABOVE OPPOSITE: *Shrimp ponds, Khulna, Bangladesh.*

What's in a name?

Some people use the terms *shrimp* and *prawn* interchangeably – EJF makes no distinction between the two.

DESERT *in the* DELTA



'After shrimp farming started there is no harvest on the lands, and for those who don't have lands it is difficult to survive. Women are insulted and abused, they are victims of rape. And if people try to protest, they are beaten up by the shrimp farmers and are arrested on false cases'

Mohammud Shahidul Islam, Landless Citizen, Khulna, Bangladesh[1]

Glossary

Bagda *Penaeus monodon* or tiger shrimp, a brackish water species

District Major administrative area divided into *thanas* (Medium scale administrative unit) and *upazila* (local administrative unit)

Gher Raised embankment structure within which is a pond for fish or shrimp cultivation

Golda *Macrobrachium rosenbergii*, jumbo freshwater prawn

Hari Rent or contract money for lease of land

Khas land Common or government-owned land that can be registered by the landless

Mon Unit of weight used for agricultural produce, equivalent to 37.4kg

Polder Tract of lowland reclaimed from water

Taka Bangladesh currency; equal to US$0.017 (2004)

CONTENTS

EXECUTIVE SUMMARY

This report summarises the abuses and problems associated with shrimp production in Bangladesh, while defining potential solutions. Researched over an 18-month period, it incorporates over 250 references and, crucially, the personal testimony of Bangladeshi individuals directly affected by the shrimp industry.

As over-exploitation caused marine shrimp stocks to decline, shrimp farming (aquaculture) has rapidly surpassed wild capture in terms of production. Structural Adjustment Programmes, foreign lending and aid, government policies and increasing global demand for shrimp have all encouraged the growth of shrimp aquaculture in Bangladesh. Exports of shrimp increased from US$90.8 million in 1986 to US$280 million in 2002-3, mainly to the European Union, the USA and Japan.

Bangladesh ranks fifth in world farmed shrimp production, producing 55,000MT in 2001 from shrimp ponds covering an estimated 200,000 hectares. The total catch from shrimp trawlers is now estimated to be just 3,000 tonnes per year.

The rapid expansion of commercial, export-oriented shrimp farming has carried considerable environmental and social costs. These costs are externalities often borne by vulnerable rural communities that are entirely outside of the sector.

The absence of a national policy and strategy for shrimp aquaculture and with it the lack of any provision to ensure sustainability has led to fundamental problems within the industry and profound negative environmental and social impacts.

Shrimp aquaculture in Bangladesh has encouraged unacceptable business practices and corruption. These factors, allied with increasing land values, poor governance and minimal regulatory oversight have led to – and escalated – conflicts over land rights and access to resources, exacerbating existing brutality and conflicts. Kidnapping, intimidation, arson, rape and even murder linked to the industry have become widespread occurrences, and peaceful grassroots opposition to the industry has all too often been met with violence. Over 150 people have reportedly been killed since 1980 in clashes related to shrimp farming.

Women and children have been particularly badly affected by loss of livelihoods and breakdown in social structure, and by sexual abuse linked to the shrimp industry.

The inundation of agricultural land to create shrimp ponds has reduced the availability of land for homestead crop or fruit cultivation or livestock production. Shrimp aquaculture has had direct impacts on food production and security and on the health, incomes and livelihoods of rural communities.

The development of shrimp aquaculture has led to the displacement of labour from agricultural activities. For some sections of society – in particular the most marginal farmers and sharecroppers – aquaculture has led to unemployment and migration to urban areas. Only the unsustainable practice of catching wild shrimp fry to stock ponds with has prevented many households suffering a total loss of income, following their loss of land.

Economic benefits have accrued to Bangladesh, but these have not been evenly distributed. The richest, some of whom are urban dwellers, have been the biggest beneficiaries, whilst the landless, the poorest and the most vulnerable in rural society have seen livelihood options reduced, and food security and social cohesion diminished. Direct cash benefits are not necessarily perceived as compensation for these losses.

The international donor community has supported the development of shrimp aquaculture in Bangladesh under the rationale of poverty alleviation and/or economic liberalisation designed to promote national development. However, the benefits for the poorest and most marginal communities remain inconclusive.

The aquaculture sector in Bangladesh (as elsewhere) has been volatile and has failed to deliver secure long-term economic benefits. Production and income remain at risk due to changes in consumer demand, international economic conditions and disease.

RIGHT: *The memorial to Kuranamoyee Sardar, murdered for peacefully protesting against the shrimp industry.*
© Trent / EJF

'The industry is…increasingly being called the "Blue Death". Apprehensions have been expressed that, as has happened to many countries in the past, Bangladesh is being haunted by the prospect of turning itself into a "desert in the delta".'

UNITED NATIONS ENVIRONMENT PROGRAMME, 1999[2]

Collection of wild postlarvae to stock ponds is thought to significantly impact wild shrimp stocks, while the substantial by-catch has serious impacts for both biodiversity and capture fisheries production. The shrimp fry fishery has been estimated to remove over 90% of the *Penaeus monodon* (Black Tiger shrimp) stock, while it is thought that over 98 billion individuals of other species and zooplankton are discarded by this fishery every year.

Shrimp trawling is a highly destructive fishery. The total shrimp catch from trawlers in Bangladesh is estimated to be just over 3,000 MT, while the by-catch from shrimp trawls totals 35,000 – 45,000 MT. As much as 80% of the total catch from shrimp trawlers is subsequently discarded. The combined pressure from trawling for adults and broodstock and shrimp fry fisheries has led to a declining trend in *Penaeus monodon* catches over time, and depleted catches of this species may be a sign that the stock may collapse.

This report concludes that high-calibre strategic thinking, applied across sectors and within the context of a national land-use plan and national policy for shrimp production is needed. New thinking and approaches, quickly translated into regulations and actions, should be applied – and applied consistently.

Vastly improved implementation, alongside upgraded policy, must be accorded priority. Long-term solutions, addressing the environmental, social and economic concerns associated with the industry, need to be delivered and reforms embedded at all levels. All parties should be wary of unrealistic short-term expectations – 'quick-fix' solutions are unlikely to work. Sustainability and social equity need to be placed at the centre of management and reform.

Serious consideration is needed about the wisdom of promoting the shrimp industry as a strategy for poverty alleviation in one of the world's poorest nations.

Shrimp production and aquaculture generally, *may* have a role to play in Bangladesh both as a development tool and source of food. But only in the context of fundamental changes with the structure, management and regulation of the industry and substantial improvements in the ways in which government provides oversight, control and accountability.

INTRODUCTION

This report summarises the many concerns raised over Bangladesh's export-oriented shrimp production industry and highlights potential solutions to the serious conflicts and abuses that have occurred.

Multiple problems and conflicts have characterized the industry in Bangladesh. Human rights abuses, including intimidation, rape, violence and murder, have been commonplace and widespread. Fresh water supplies and traditional sources of livelihood have been negatively affected, widely impacting human health. Traditional social structures have been lost and unemployment has in some areas increased. Widespread inundation of agricultural land has occurred and with it increased salinity levels in soils and the loss of land, livestock, poultry, home-gardens and fuel sources. A growing disparity in wealth between rich and poor and over control of land has been witnessed, alongside serious damage to mangroves, wetlands and biodiversity.

Although many of the problems highlighted in this report were already entrenched in Bangladesh in areas far removed from shrimp aquaculture, the shrimp industry has created strong incentives to encourage abuse: shrimp aquaculture has rewarded corruption, short-termism and brutality at the expense of the vulnerable and the environment.

Simplistic 'cash-accounting' has all too often been applied in assessing Bangladesh's shrimp industry. Claims of benefits derived from foreign export earnings have been inflated and have almost universally failed to take into account the negative impacts of the industry and thereby provide a balanced cost-benefit equation. Such shallow 'cash value' calculations have not worked in Bangladesh and remain inappropriate.

Shrimp aquaculture *may* have a future role to play in the development of Bangladesh's economy and in delivering benefits to the poor. However, if it continues in its current form, without far better governance and a new commitment to social equity, human rights and transparency from politicians and businesses alike, it has no role to play.

EJF's investigations – summarised in this report – show that delivering the stimuli for reform within the industry and associated areas of governance is the first and most important step toward achieving true sustainability in the industry. Multilateral and bilateral aid and development support, foreign direct investment, Western retailers and consumers can – and have an obligation to – provide the stimuli for reform of Bangladesh's shrimp industry. The authors believe it is imperative that clear and compelling messages are communicated to the political elite and business community in Bangladesh that there is no market for shrimp that is produced in a manner that feeds social deprivation, human rights abuses and environmental degradation.

A small price to pay for environmental justice

£5 / $6 per month could help kids get out of the cotton fields, end pirate fishing, protect farmers from deadly pesticide exposure, guarantee a place for climate refugees

This report has been researched, written and published by the Environmental Justice Foundation (EJF), a UK Registered charity working internationally to protect the natural environment and human rights.

Our campaigns include action to resolve abuses and create ethical practice and environmental sustainability in cotton production, shrimp farming & aquaculture. We work to stop the devastating impacts of pirate fishing operators, prevent the use of unnecessary and dangerous pesticides and to secure vital international support for climate refugees.

EJF have provided training to grassroots groups in Cambodia, Vietnam, Guatemala, Indonesia and Brazil to help them stop the exploitation of their natural environment. Through our work EJF has learnt that even a small amount of training can make a massive difference to the capacity and attitudes of local campaigners and thus the effectiveness of their campaigns for change.

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LEFT: *Sorting shrimp fry, Khulna.*
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Hungry and hard up: Bangladesh today

Bangladesh remains one of the world's poorest and least developed nations[1]. An estimated 34% of the population live below the national poverty line (2000)[4], 57% of the population have no access to sanitation, and 56% of children under age five are classed as underweight[2]. Child malnutrition and maternal mortality rates remain among the highest in the world.

Although more than half of Bangladesh's GDP is generated by the service sector, nearly half of Bangladeshis are employed in agriculture, predominantly in rice cultivation[1]. The economic growth rate is slow and real GDP growth is estimated to have slowed from 5% in fiscal year (FY) 2000/2001 to just 3 % in FY 2001/2002[6].

MAP NO. 3711 UNITED NATIONS
NOVEMBER 1992


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Bangladesh – Vital Statistics

Population: 133 million (2002 estimate)[1]
Labour force: 64 million (1998)[1]
Labour composition: Agriculture 57%; Industry 10%; Services 34% (All figures rounded up by original source)[5]
Exports: US$6.6 billion (2001). Extensive export of labour to the Middle East and Malaysia results in further remittances estimated at US$1.71 billion returning to Bangladesh in 1998-99. Main exports: garments, jute and jute goods, leather, frozen fish and seafood[1].
External Debt: US$17 billion (2000)[1]
Economic aid received: US$1.575 billion (2000 estimate)[1]
GDP: US$230 billion (2001); GDP (per capita): US$1,750 (2001)[1]
United Nations Human Development Index: Ranked 146 out of 174 countries[2].
Transparency International Corruption Perceptions Index: Ranked 102nd out of 102 countries (2002)[3].

Compromised by corruption

One major impediment to economic growth is widespread corruption at all levels of government[1]. In 2002, Transparency International ranked Bangladesh as the most corrupt country of those included in its Corruption Perceptions Index[3]. The World Bank holds that, without corruption, Bangladesh could achieve 2 to 3 percentage points more growth and twice the *per capita* income, while the Asian Development Bank and the European Union have attributed Bangladesh's inability to attract substantial foreign investment to corruption, lack of transparency and bureaucratic tangles[7].

As a consequence, Bangladesh's economy has been heavily dependent on foreign aid – approximately US$1.5 billion per annum in aid has been given to Bangladesh over the past decade or so (US$1.575 billion in 2000)[1], and external debt was estimated at US$17 billion in 2000[1]. Since Bangladesh joined the World Bank in 1972, the International Development Association (IDA), the World Bank's concessional lending arm, has alone financed operations with loans totalling more than US$8 billion[8].

MISERY IN THE MAKING

A background to Bangladesh's shrimp industry

Bangladesh has a long tradition of coastal aquaculture or '*Bheri*-culture' that seasonally alternated shrimp production with aman rice cultivation. Local people were able to produce sufficient quantities of shrimp and finfish as well as paddy rice. However by the 1970s entrepreneurs and the government came to view shrimp as a commercially valuable crop and the industry boomed both in cultivated area and exports during the 1980s and 1990s. A combination of a rapidly expanding global demand for shrimp and initiatives aimed at developing and liberalising the national economy (sponsored by the World Bank and IMF through the means of Structural Adjustment Programmes), spurred growth in the sector. As in many other tropical countries, shrimp culture was seized upon as part of a 'Blue Revolution' intended to bring money, food, employment and other benefits to rural communities and national economies alike.

Bangladesh's coastal area comprises 3.22 million ha, representing 25% of the total land area[1], and the country was quick to exploit these natural characteristics – vast tracts of low-lying flat land and a tidal range that ensures a ready supply of saline water. During the early stages of development in the 1970's, shrimp farming was largely restricted to peripheral land between flood embankments and the main river systems[2], but agricultural land was soon targeted for expansion. Embankments around polders (reclaimed land) were easily breached and farmlands flooded with saltwater[1]. Elsewhere salt-pans, abandoned and marginal lands, and wetlands including mangroves and marshes, were also appropriated for conversion[1].

Export-oriented production developed in Cox's Bazaar in the 1970s and rapidly expanded across Khulna and Chittagong. The area under shrimp farms expanded from 52,000 ha in 1983-84[3] to 140,000 ha by 1995[4] and an estimated 200,000 ha in 2002[5]. Of this total, 170,000 ha[5] (over 37,000 farms[6]) are used for *bagda* production, and 30,000 ha (105,000 farms) are under *golda* production[6]. Today production is highly concentrated in the three districts of Satkhira, Khulna and Bagerhat which are estimated to produce

BELOW: *Collection of shrimp fry to stock ponds is an ecologically devastating practice with over 98 billion individuals caught as by-catch every year.*

80% of Bangladesh's *bagda* shrimp. Meanwhile,a number of farms in Cox's Bazaar were badly hit by shrimp disease[7] and poor harvests and have reportedly been abandoned[8,9].

The expansion of production led to Bangladesh ranking fifth in world farmed shrimp production with an estimated 55,000 MT produced in 2001[10]. Exports of shrimp more than doubled from US$90.8 million in 1986 to US$197.6million in 1994 and by 2000 were valued at approximately US$335.8 million[10], a massive increase on the US$2.9million that was produced (largely by marine capture fisheries) in 1972-73[11].

The seafood sector is today regarded as a cornerstone of the national economy, but many commentators have questioned whether the production of a luxury export commodity justifies the socio-economic, environmental and hygiene problems that have become associated with shrimp farming. Furthermore, the Government of Bangladesh receives very little revenue from the sector due to a lack of enforcement of licensing regulations and minimal tax collection. The precise amounts that this massive export market generates for national revenues are unknown.

The reality of shrimp farming in Bangladesh (as in much of the tropics) has not lived up to its promise of providing food for the hungry. Instead production has largely been for export and characterized by a cycle of boom and bust, as disease, environmental problems and changing global demand have created fluctuations. Unemployment has climbed as shrimp farming needs little labour compared to traditional agricultural activities. Crop and livestock production (and with them livelihoods of rural communities) have suffered as saltwater has inundated their lands.

The shrimp farming 'gold rush' has in fact led to a dearth of suitable lands for conversion, pushing nominal land values higher, leading to greater competition between – and amongst – communities and shrimp farmers grappling for their share of the wealth. Intimidation, violence, rape and murder have been used against smaller landowners who refuse to hand over their land and against communities that have peacefully resisted the development of shrimp farming in their locality. Whilst shrimp farming has been highly concentrated in a few areas in the southwest (Khulna, Satkhira and Bagerhat) together with the Cox's Bazaar area of the southeast, there are indications that it is expanding into other areas around the southeast (such as Noakhali) and reports are emerging that conflicts and human rights abuses are now being replicated there.

Local subsistence communities and the environment have lost out to big business and short-term cash incentives. Bangladesh's experience with shrimp aquaculture has not differed greatly from other nations – except that the level of corruption, bad governance, human rights abuses, land conflicts and general mismanagement associated with the industry and its development have perhaps been greater than anywhere else.

Shrimp Production and Consumption

Shrimp are both wild-caught and farmed. Black Tiger Shrimp (*Penaeus monodon*) or *bagda* thrives in brackish water, shallow ponds known as *gher*, and supplies the greatest proportion of shrimp production and area covered by shrimp ponds. The majority of environmental and social problems linked to shrimp production concern *bagda*.

Golda chingri (*Macrobrachium rosenbergii*) is a jumbo shrimp cultivated in freshwater ponds. This species is found in most inland freshwater and estuarine areas, and requires brackish water only in the initial stages of the life-cycle[12]. For the past 15 years production has been reported to increase by approximately 20% annually[6]. The area under *golda* production increased from 4,200 ha (1995) to 21,532 ha (1999-2000)[2], and to an estimated 30,000 ha in 2001[6]. *Golda* now accounts for around 29% of exports[6a]. Freshwater prawn farms are generally smaller than saline shrimp farms and support a greater proportion of poor and marginal farmers[6a].

Almost all farm-produced *bagda* and *golda* is exported, mainly to the USA, Japan and the European Union. Bangladesh exported an estimated 31,200 MT of shrimp in 2000, worth approximately US$335.8 million[10], though the export figures plummeted in 2001 /2002 due to concerns for consumer health[13].

The major destination is the EU, which imported 13,467 MT of fresh, frozen and chilled Bangladeshi shrimp in 2000, worth an estimated $197 million[14]. In the same year, the USA imported 10,200 MT, but this fell to 8,700 MT in 2001[10]. Together, the USA and the EU take over 80% of Bangladesh's exports[15]. Japan imported 3,169 MT of frozen shrimp from Bangladesh in 2001[10]. The UK is a major market for shrimp from Bangladesh, and Bangladeshi shrimp made up over 10% of UK shrimp imports (by value) in 2001[16].

'Continuous destruction [will lead to] the extinction of most of the benthic fauna and ultimately break the food chain, seriously affecting the marine ecosystem.'

FAO Fisheries Circular, 2001[4]

Trawling

About 20% of coastal people rely on wild fisheries for their livelihood[1] and the fisheries sector contributes about 78% of animal protein intake[2]. However, wild shrimp fisheries are adding further threat to these precious and pressurised resources. The explosion of shrimp aquaculture has paralleled a demise in wild shrimp harvests. Over-exploitation of the penaeid shrimp stock[3], to supply shrimp farms and a large artisanal fishery for juveniles, is well-documented[3]. Such is the pressure on the Black Tiger Shrimp (*Penaeus monodon)* – the most highly valued species – that the wild stock may collapse[4].

Trawlers have very high bycatch rates: as high as 1:15[2,5]. The total trawled shrimp catch is 3,000 tonnes but a further 35,000-45,000 tonnes are incidentally caught, of which around 80% is discarded[4,5], representing an incredible waste of protein. In the Bay of Bengal, shrimp fisheries have led to declines in species like red snappers, groupers and large croakers, leaving fishermen impoverished and struggling to sell lower-value fish[4] and conflicts have arisen as fishers compete for limited resources[4]. Trawl nets also drag along the seabed, crushing, trapping and damaging fauna and habitats[2,4,6].

Short-term and short-sighted – the risks behind shrimp production in Bangladesh

ABOVE: *Shrimp processing factory – concerns over processing standards have led to bans on imports of Bangladeshi shrimp.*

An over-reliance on shrimp production for an export market carries its own risks. A glut on the world market can cause quick unforeseen falls in international prices; competition between producing countries is high; and the poor quality of shrimp and concerns over processing standards has left Bangladesh in a relatively weak position.

In 1997, major European buyers stopped importing shrimp from Bangladesh due to an EU ban based on the prognosis that 'consuming fishery products processed in Bangladesh posed a significant risk to public health'; the 5-month ban cost the industry an estimated US$65.1 million[1]. Despite subsequent investments, Bangladesh's exports have been unable to return to their pre-ban levels and the value of frozen shrimp fell by at least 30% in 2001 as a result of reduced demand and lower prices[2]. The problems were compounded when shrimp export consignments were found to be contaminated with bacteria, including *Vibrio cholerae*[3] and banned antibiotics (see table).

The problems have been so great that some commentators have questioned the viability of the sector as a whole as earnings are proving insufficient to cover the fixed costs of processing plants[4]. The use of chemicals, including banned antibiotics such as nitrofurans and chloramphenicol, is reportedly widespread in shrimp hatcheries, with little control over application and dosages[5].

Disease can also threaten the viability of the sector, for example in Ecuador, an outbreak of white-spot disease reduced production from 115,000 MT to 43,000 MT between 1998 and 2001[6], and led to a decline in employment from an estimated 250,000 in 1998 to just 96,220 in 2002[7]. In January 2003, it was reported that at least 60% of fish farms in the Khulna area had been affected by viruses and exports were reported to be on the wane due to disease and death of shrimp fry. As a result of this and price falls on the global market, 23 out of the 43 frozen fish factories in Khulna were closed[7a].

TABLE 1: *Banned antibiotics or pathogens detected in Bangladesh shrimp imports to the EU in 2002*[9]

Date	Notifying Country	Product	Country of Origin	Results	Producer / Exporter	Importer / Retailer
16 Sep 2002	Greece	Raw freshwater king prawns	Bangladesh via the UK	Nitrofurans (Nitrafurazone-Sem)	Seafood Marketing. International PLC	Firma Pesban
16 Sep 2002	Germany	Head-on freshwater king prawns	Bangladesh via the UK	Nitrofurans (Nitrafurazone-Sem)	Seafood Marketing (Bangladesh) Ltd.	Seafood Marketing International
28 Aug 2002	Germany	IQF freshwater shrimps	Bangladesh via the UK	Nitrofurans (Nitrafurazone-Sem)	Seafood Marketing International PLC.	FA. Rari GMBH
20 Mar 2002	Finland	Prawns	Bangladesh	*Vibrio parahemolyticus*	Fresh Foods Ltd, Bangladesh	Mamar International – Holland
22 Mar 2002	United Kingdom	Raw fresh water prawns	India and Bangladesh	Presence of Nitrofurans	El-te Marine Products, India	Lyons Seafood limited, Wilts.
25 Mar 2002	Finland	High Seas raw peeled prawns	Bangladesh	*Vibrio parahemolyticus*	Fresh Foods Ltd, Bangladesh	W.G. Den Heijer & ZN B.V. Scheveningen, Holland
4 Jan 2002	Norway	Black tiger shrimps, raw, headless with shell	Bangladesh	Presence of *Vibrio cholerae*	Fresh Foods Ltd.	Enghav Norway & Pieters Visbedrijft NV Brugge,Belgium
4 Jan 2002	Finland	Frozen headless black tiger shrimps with shell	Bangladesh via Denmark	*Vibrio parahemolyticus*	Fresh Foods Ltd.	Nordic Seafoods Denmark & Oy Trio Trading, Finland

Nitrofurans are a group of antibiotics; they are believed to be potential carcinogens[10], and are banned for use in food-producing animals in the EU and USA[11,12]. *Vibrio cholerae* and *V. parahaemolyticus* are both pathogens of humans – *V. cholerae* is the bacterium which causes cholera[13]; *V. parahaemolyticus* causes gastrointestinal illness and diarrhoea[14].

Cashflow – developing the shrimp industry

The development of the shrimp sector has been almost entirely profit-oriented and driven by the private sector. However, the Government has provided support in the form of a plethora of tax breaks and other financial incentives that have served as subsidies to the sector. Reforms implemented under the World Bank and IMF Structural Adjustment Programmes (SAPs) of the 1980-90s, designed to liberalise trade and develop the economy, led to policy initiatives and fiscal and financial incentives that set the context for shrimp culture to develop into a major, export-oriented economic activity[1].

Provisions such as zero-tariff access to imports, fiscal incentives for direct and deemed exports, preferential loan rates and an indirect subsidy to *bagda* production of Taka 334 million (approx US$5.8 million) per year[2]; income tax rebates and a nine-year tax holiday; subsidised credit, leasing of land (both private and government *khas* land) on favourable terms; and institutional support for setting up downstream factories gave huge stimuli for private investments in shrimp culture, processing and exports[1].

The absence of any licensing or registration fees applicable for shrimp farmers, fry collectors or small traders (although fry collectors in the Sunderbans reserve forest pay a small fee of Tk 150 p.a.)[2] further encouraged untrammeled development of the industry.

Government land has reportedly been leased to entrepreneurs for far lower than the commercial value (at approximately Tk6000 per acre compared to TK50,000 per acre) – an implicit subsidy of 88%[2]. With the help of government loans, a reported 124 processing factories have been established; however of these just 50 are reported to be operational, reflecting a massive over-capacity in the sector that has resulted in a high demand for shrimp[3].

Several development projects have also been undertaken to develop shrimp farming with the aim of poverty alleviation and some or all of these have received support from donor agencies including the FAO, World Bank, Asian Development Bank (ADB), DfID, UNDP, Danida, and USAID. Although not exclusively related to shrimp production (and not an exhaustive list), the donor/government projects listed below (which include shrimp as a key component) total over US$200 million.

Key development projects

Aquaculture Development Project (ADP) and 2nd Aquaculture Development Project

The ADB approved a loan of US$18 million in December 1976, followed by technical assistance and a loan of US$42.8 million in 1986[4]. The loan from the ADB was used for the development of shrimp farms in the Chokoria region and reportedly led to the clearance of over 800ha of mangrove forest[5].

Shrimp Culture Project

Shrimp farming received crucial support from the World Bank (IDA) and UNDP with a loan of US$22 million for a project active from 1986-1993[6]. An estimated 9,145 ha of land were converted to shrimp production in Cox's Bazaar and Khulna[5], allegedly causing damage to mangroves[5]. In Khulna, many of the poorer people were unable to participate due to high land lease prices[7]. Farmers stated that rice yields, grazing land and trees all declined as a result of shrimp farming, and that lease payments due to them were late and irregular[7].

3rd Fisheries Project

Funded by the IDA (credit equivalent to US$44.6 million), GoB (US$9.6 million), UNDP (US$4.2 million) and UK DfID (US$4.3 million), the Third Fisheries Project was active from 1990-1997[8].

The Project rationale included poverty alleviation, enhanced food and water supplies[7] (with a focus on shrimp/rice rotational crops) and the development of fisheries' potential. As part of the project, a total of 10,454 ha of private land was developed into shrimp farms and 150 sluice gates were built in 4 polders. The premise was to involve the poor and landless in shrimp farming and form women and farmer committees to maintain the drainage systems. However, both project design and implementation have been strongly criticised[8,9,10]. Heavy siltation has taken place at the mouth of the sluice gates built under the project, creating problems of water flow, and all sluice gates are reported to now be under the management and control of large shrimp *gher* owners[11].

The project was accused of being top-down and has been associated with the displacement of small and marginal farmers, increased landlessness, human rights violations and environmental degradation[12]. In virtually every respect poor governance can be seen to have exacerbated obstacles and problems.

4th Fisheries Project

The US$60.8 million Fourth Fisheries Project became effective in December 1999, and is expected to run until 2005[13]. Funded largely by the World Bank (with IDA loans totalling US$28 million; GEF US$5 million), DfID (US$15.5 million, of which 14% is for the shrimp component of the project) and the Government of Bangladesh (US$9.3 million), the project's goal is poverty alleviation through accelerated agricultural growth and rural development, it's objective to support sustainable and equitable growth in the benefits generated from increased fish and shrimp production.

Key performance indicators of the project include the production of shrimp from the polders targeted increasing by 20%, and the production from aquaculture (both shrimp and fish) increasing by 50% in the target communities of 200 *thanas*[14]. The IDA concluded that the project components were found to have relatively limited environmental impact potential, though the project's Environmental Assessment stated that eutrophication, depletion of freshwater groundwater supplies, intrusion of saline water and disease in wild and cultured stocks could all be expected from project activities. The Assessment also states that 'the principle desirable impact of the project...could feed back negatively to the environment in the form of increased fishery resource exploitation pressure' and 'an increasing population that relies heavily for food on the intensified fish production that the project aims to achieve would be put at greater risk if production was disrupted by natural disasters...that Bangladesh is particularly prone to, or by...disease'[15].

IMPACTS ON PEOPLE AND THEIR ENVIRONMENT

ABOVE: *Shrimp ponds, Khulna.*
© Trent / EJF

'Whether we earn large amounts of foreign currency or not is not the key question. What is fundamental is whether the ecology and environment of this region is sustainable. Shrimp cultivation impacts negatively on the environment and on people's livelihoods.'

FIROZ AHMED, ADVOCATE[1]

From a trade perspective, why should Bangladesh tackle the environmental impacts of aquaculture?[3]

1. If not tackled adequately, the environmental implications may undermine the sustainability of the growth process itself.
2. Environmental issues are increasingly being monitored by developed countries, and can seriously jeopardise global market access of developing country export products, thereby seriously undermining the efficacy of export-led growth strategies.
3. There is an increasing realisation that future economic and structural reforms and growth strategies must be designed and implemented by integrating social and environmental concerns into them.

Future access of least developed countries such as Bangladesh to the markets of developed countries will critically hinge on the nature of entwining trade and environmental factors (UNEP, 1996).

The impact of shrimp farming on Bangladesh's environment cannot be overstated: mangrove forests and wetlands have been destroyed and agricultural land has been inundated to create ponds or *ghers*. In many coastal areas, agricultural land is protected only by low embankments that can be easily breached to inundate land with saltwater. This conversion of farmland has significant impacts upon crop and livestock production and on the health, income and employment of rural communities. The destruction of mangroves and wetlands has left coastal areas exposed to erosion, flooding and storm damage, altered natural drainage patterns, increased salt intrusion and removed critical habitats for many aquatic and terrestrial species[2].

The consequences for the poorest and most vulnerable in society – especially the landless who rely on *khas* (government-owned) land and on access to common resources – are particularly profound. Environmental degradation, saltwater pollution and conversion of land have led to increased social problems and conflict, characterised by violence, intimidation, and serious human rights abuse.

'As in many tropical countries, the tragedy [in Bangladesh] is that the transformation of multiple-use coastal resource system into a privately owned single-purpose use deprives the coastal communities of their traditional resource use rights ….this expropriation further aggravate [sic] the livelihood of the vast majority of desperately poor coastal communities.'

A K DEB, *OCEAN AND COASTAL MANAGEMENT*[4]

'The shrimp owners ask for their permission to cultivate land, and some people sign. But often the amount of money does not follow the assignment. Some people do not get any single taka for their land. The shrimp owners often use false assignment to prove their rights'

Asheh E Elahi, Noakipur, Satkhira[11].

Changing the Landscape

Farmlands upon which shrimp ponds are established are either leased from landowners (to whom a payment known as *'hari'* should be made), purchased, or converted by the landowner. Conversion is, in theory at least, regulated by the following key requirements [5, A]:

1. The consent of 85% of landowners in the designated area. This is not a legal requirement but has been adopted by two committees representing the government at the local level;
2. A licence (in most cases a licence is needed from the Upazilla / District Shrimp Resource Development and Management Committee);
3. A registered lease document (where land is not owned) showing that the prospective shrimp farmer has the agreement of 85% of landowners to lease their lands;
4. Flushing out of saline water by July 31st every year in order to allow the cultivation of rice (in integrated shrimp/rice systems only).

In theory, these regulations should provide a buffer against the illegal appropriation of land. However, they are not enforced and infractions are common. For example, in interviews with local community representatives in Khulna, all were under the incorrect assumption that the approval of just 65% of landowners was needed prior to the construction of a shrimp farm; landowners frequently complain that *hari* is not paid or is paid late[6,7] ; and shrimp farmers often fail to flush saltwater out of the ponds by the July 31st deadline[6].

It is also common for force to be used to occupy lands and landowners have been compelled to accept lease agreements against their wishes[8]. Tactics such as deliberately inundating rice paddy with saline water are reportedly widespread[4,6,9,10]. Shrimp farmers have also used false deeds to establish their leasehold rights over land. For example, it is reported that out of approximately 13,000 shrimp farms, just over 1500 were properly registered, the rest having false land registration or none at all[5]. In Assasuni Upazilla of Satkhira, approximately 1/4 of the 700 shrimp farms are reportedly unlicensed and more than 40,000 ha of paddy fields have been illegally converted to shrimp ponds[5a].

The Embankment and Drainage Act of 1952 supposedly empowers rice farmers to oppose the salinisation of their land[12]. However, it was apparent from interviews conducted by EJF that many communities are not aware of their rights of recourse to the law and, in practice, shrimp farmers are able to disseminate incorrect information or simply ignore the requirements of administrative orders. Even where communities are aware of their rights, shrimp farmers often have powerful ties with the political structures that serve to protect their economic interests[8].

The Water Development Board (BWDB – responsible for protecting crops from saline or floodwaters)[5] has been seemingly powerless to bring wrongdoers to justice: of the approximately 250 cases filed, all have been dismissed due to either a lack of witnesses or a failure to identify the perpetrator[10]. A recent report stated that 'the rich farmers control the water resources to a great extent by controlling the sluice gates in collaboration with the BWDB officials. Some of them have also constructed private sluice gates to control the water. The small gher owners are the victim of it'[13].

ABOVE: *Members of a landless group, Noakhali.*
© Williams / EJF

Landless and left out

While the administrative orders do in theory provide a degree of protection for landowners, it is vital to record that as many as 50% of Bangladeshis[14] are landless. These are the poorest and most vulnerable members of society, who do not have control over any private lands, rather they often rely almost entirely on *khas* land for their livelihoods.

Khas land is illegally used for shrimp farming in many areas; such farms are allegedly often run by influential members of society, sometimes in the possession of false property deeds and in some cases with the support of local police or government officials. In Noakhali, NGOs have been working with landless communities trying to challenge the government over the leasing of *khas* land, however the Government has stopped issuing documentation and with no 'paper trail' such cases cannot be taken to court[15]. This situation is exacerbated by the current leasing system where much of the government owned khas land is leased out to shrimp farmers, many of whom are outsiders or entrepreneurs, who are given rights to cultivation above the local residents and this has created enduring dissent[16].

Future Problems?

In May 2003, the Bangladeshi Government declared that 4,780 ha – including 1,500 ha of *khas* land; 1,660 ha of forest; and 825 ha registered for the landless – in Noakhali Sadar and Companiganj upazillas in southeast Bangladesh should become a shrimp production zone. Since the mid-1990s, shrimp farms have encroached upon local khas lands and so this recent announcement has exacerbated an already difficult situation. It has also caused considerable anxiety to the 13,000 landless families living in a further 8,100 ha of *khas* land across Noakhali District who are already under pressure from land encroachers, including local political leaders and industrialists, many of whom are allegedly acting with the connivance or support of the local administration[17].

A recent media report stated that around 1,200 ha (of the 4,800 ha) allocated for shrimp farming has in fact fallen into the hands of influential, illegal occupiers. Local people now doubt the administration's ability to recover large farms from illegal occupants and divide them into their intended use as smaller plots for individuals and small companies as ministers, lawmakers and ruling alliance leaders figure high on the list of encroachers[18].

ABOVE: *Chilli crops, Noakhali.*
© Williams / EJF

OPPOSITE BELOW: *Declines in rice production have been reported in many shrimp farming areas.*
© Philip Gain / SEHD

Food for the Hungry?

Shrimp farming physically takes over farmland, while salt water intrusion and chemical pollution associated with shrimp farming can result in irreversible changes in soil composition of the ponds and surrounding areas[1], and can reduce the productivity of agricultural land or render it infertile[2]. Destruction of wetlands for aquaculture, shrimp fry fisheries and shrimp feed production have all been linked to declines in capture fisheries. Shrimp farms can also physically block traditional users' access to coastal and estuarine resources, severely limiting local communities' access to fishing sites and forest / wetland resources and leaving them increasingly marginalized in degraded environments.

Spoiling the Soil

More than 20% of Bangladesh's cultivatable land is in the coastal area[6], of which about 80% is tidally inundated with salt water[7]. Salinity has long posed a problem and water control measures have significantly exacerbated this in more recent decades[7]: by the mid-1990s more than 890,000 ha of crop-land[8] had been affected. While saline intrusion is not uniquely linked to shrimp aquaculture, retention of saltwater by shrimp farms is thought to have exacerbated these problems[7,9,10,11,12,14]. A study undertaken in the late 1990s compared salinity levels in shrimp and non-shrimp areas and revealed that shrimp farming could increase soil salinity levels by up to 500% and proved to be 'the main constraint in the crop production' in shrimp areas[14a].

The construction of *ghers* has meant that brackish water is retained for months on end, seeping into the soil, ground and surface water[12] and resulting in a loss of soil fertility. It has been suggested that there could be a band of increased soil salinity adjacent to the shrimp ponds that extends for 100-250m[13], though definitive scientific evidence is lack-

'The conversion of land to ponds and the consequential loss of productive agricultural land is a major concern, especially as in some areas pond production is sustainable for a few years and the conversion of coastal habitats such as mangrove forest leads to a loss of fish habitat.'

DR. MD. SHAHADAT HOSSAIN, INSTITUTE OF MARINE SCIENCES, CHITTAGONG UNIVERSITY[3]

ing and is hampered by the fact that there is little baseline data to compare land and water salinisation before and after shrimp aquaculture development[13]. Research has found however that during May and June, salinity levels in rivers in Khulna have been reported to be more than four times the typical level, while in the dry months of December – January, when shrimp pond enclosures dry up, a white layer of salt becomes visible on the soil with a concentration as high as 12,900 ppm[15].

In the Rampal area of Bagerhat District approximately 32 crops were traditionally grown, but salinisation is believed to have led to the loss of half of these[16]. In a recent study of the Shyamnagar Upazilla (Satkhira District), the development of shrimp culture was found to be the primary cause of an increase in soil salinity[9] and has been linked to declining tree cover, with coverage falling by 68% during the period 1985-2000[9].

Salt-sensitive species such as guava, jackfruit, black plum, mango, palm tree, hog-plum (*amra*) and sapota are gradually disappearing, and existing trees of these species are suffering from top-dying, root rot and leaf shedding[9]. In other areas, declines in agricultural and homestead crops (including rice, jute, teel, sugar cane, cauliflower, cabbage, brinjal,chickpea, wheat, groundnut and chillies), in fruit and woody trees (mango, blackberry, jackfruit, lemon, papaya, banana, coconut, betelnut, guava and *babla*) and in homestead vegetables have also been reported[6,7,12,14,148,17,18] . One study found that, during the period 1987-1990, half of jackfruit and mango trees were destroyed in polders 20 and 21 (where there is shrimp aquaculture) compared to polder 22 (which had no shrimp farms)[19]. As well as food production, a scarcity of mango, wood apple, banana, and coconut has implications for offerings made by Hindu worshippers[20].

Bad Harvest

Rice is a staple food in Bangladesh, but there are numerous reports of reduced rice yields following the onset of shrimp culture[10,22,23,24]. A fall in rice production in Satkhira district from 40,000 MT in 1976 to just 360 MT ten years later is believed by local groups to have been due to salt encroachment from shrimp pond canals crossing rice fields[25].

Though the promotion of integrated shrimp-rice systems could in many ways be regarded as a positive aspect of Bangladesh's shrimp farming industry, there are serious concerns over its practicalities. Previously, farmers prepared their land for rice cultivation in June, but the delay of the planting time to late July / August in shrimp farming areas has adversely affected the paddy yield[18]. This is exacerbated by shrimp farmers who, in an effort to grow shrimp until August or September, fail to flush saltwater out of the shrimp ponds by the 31st July deadline[20,26].

Salt crystals encrust surface of soil next to a shrimp pond.

© Williams / EJF

'The study clearly demonstrates some adverse impact of shrimp farming on soil properties by increasing soil salinity level (up to 500%) in non-saline area [sic] that hampers crop cultivation seriously.'

A study of the impacts of shrimp farming undertaken by the Research and Development Collective in Bangladesh[5] found that: 'The main constraint in the crop production is the increase in soil salinity levels due to prolonged inundation of the land by saline water.' Following the introduction of shrimp farming, the study found that salinity in experimental compared to control sites increased significantly – in some areas (Tala and Fakirhat), the mean increase was as high as 500%, while in Shyamnagar and Koyra the salinity level was found to have increased to a level at which the growth of many crops (including rice, maize, wheat, groundnut, jute, sugarcane and banana) are seriously affected. The study also found that the pH of the soil in shrimp *gher* sites was high compared to control sites, which can affect productivity of the soil, and that there was a significant difference in water quality between control and experimental sites, in particular with respect to salinity, pH, dissolved oxygen content, free carbon dioxide and ammonia-nitrogen.

TABLE 2: *Electrical conductivity in control sites compared to shrimp ghers*

Date	**EC control site** / *dS/m*	**EC shrimp gher** / *dS/m*
May 1997	0.20 – 2.13	2.20 – 5.30
August 1997	0.28 – 2.20	1.53 – 3.63
November 1997	0.33 – 2.67	2.0 – 3.86
February 1998	0.50 – 3.40	2.05 – 4.03

'Increased salinity of soil, and the destruction of mangrove forests has negative economic impacts including a reduction in grazing land and reduced crop productivity.'

UNITED NATIONS ENVIRONMENT PROGRAMME, 1999[4]

Rice yields in some rotation areas have been adversely affected[18,20,26]: a reduction of as much as one-third has been reported[20]. Farmers variously report that soil is less fertile, yields are lower[7,18], that there is an increased prevalence of 'stem root' virus[27] and increased sedimentation following shrimp cultivation, all of which affect rice yields[28].

A recent study also revealed that rice production has declined as a result of many *golda* farmers avoiding cultivating rice during the monsoon as they felt that rice competed with shrimp for their limited capital[24]. The construction of *ghers* for *golda* production has also led to the loss of wetlands and a decline in populations of the Indian bullfrog, *Rana tigrina*,– regarded as the 'farmer's friend', they consume large quantities of insects, and rice production has been found to increase where they are present in rice fields[24].

Declines in rice production have meant that households are increasingly dependent on rice purchased from markets[24], and areas that previously produced food surpluses are now reported to import rice from other regions[10]. This has created a feeling of insecurity[17], represents an increase in household expenditure (especially problematic for those who derive no economic benefit from shrimp production) and crucially represents a net transfer of food production for domestic consumption to an export commodity.

'Vegetation has decreased significantly due to lack of sweet [fresh] groundwater in shrimp farm regions due to prolonged stay of salt water in the fields.'

Dr Raquib Ahmed, Rajshahi University[21]

Losing Livestock

Flooding and crop declines have led to reductions in both grazing land and animal fodder (such as paddy straw)[15,24,29], which, together with salinisation and pollution of water supplies, have been associated with increased livestock mortality[12,20]. Furthermore, many farmers are reported to have sold cattle in order to invest in shrimp aquaculture[24], or have been forced to sell livestock as available grazing land declines[30]. Poultry have suffered increased mortality due to salinisation and depletion of land[13], and many shrimp farmers also ban poultry or duck keeping due to fears that they will eat the shrimp crop[6]. One report estimates that 80% of the households in shrimp farming areas of Khulna and Satkhira had experienced a notable decline in livestock and poultry production[7], whilst a second study found that one-third of cattle heads disappeared in shrimp producing areas[19]. Religious rituals have been affected with fewer sacrificial animals available for the Muslim festival, Eid-ul-Azha[6].

The livestock population has started declining with the introduction of shrimp farming for lack of fodder, conversion of grazing land into shrimp farms, changing of occupation of local population from farming to shrimp farming, and higher level of salinity in the water.'

Dr A.H.G.Quddus[22]

Net Loss – impacts on wild fish stocks

One of the most serious consequences of shrimp aquaculture development has been its impact on wild fish stocks. Shrimp farming impacts these fish and shrimp stocks both by adversely affecting the mangroves that provide nursery areas for fish species and by the capture of juveniles as by-catch in shrimp fry and broodstock fisheries.

Destruction of wetlands

Mangrove forests provide nursery grounds and refuges for a great variety of fish, crustacean and mollusc species, many of which are of commercial or subsistence value in marine capture fisheries[1]. A close association between shrimp and other fisheries and mangroves has been demonstrated in the Asia-Pacific region and elsewhere[2,3,4,5,6,7]. An estimated 35% of fish in the Bay of Bengal rely on mangroves as a nursery for their young life stages[8] and the loss of mangroves can have severe impacts on these fisheries. For example, fishermen in the Chokoria region of Cox's Bazaar have reported 80% declines in catches since mangrove were removed and dykes created for shrimp farming[9].

Large areas of wetlands have been used for *golda gher* construction, and the reduction in wetland habitat is thought to have affected *beel* (shallow lake or swamp) fisheries. Access to these fisheries has been reduced, and local fishermen have reported correspondingly reduced catches and incomes[10]. Additionally, canals used as common fishing grounds have been converted for shrimp ponds, while fishing around shrimp culture areas is sometimes prevented by shrimp farm guards[11].

By-catch and discard

The by-catch (non-target species caught incidentally) and discard from shrimp fry fisheries are a particular cause for concern.

Shrimp fry are harvested with very fine-mesh nets and the by-catch rates associated with these fisheries are thought to be the highest of any in the world[12]. In Bangladesh alone, it has been estimated that over 98 billion juveniles and zooplankton are caught and discarded every year[13]. Many juveniles are of commercially and ecologically important species and this can have significant impacts on biodiversity and capture fisheries production[3].

Farmers interviewed in Khulna and Bagerhat reported scarcity and decline of many indigenous fish, turtles and molluscs, which they attributed to the significant by-catch associated with fry fisheries[14]. A recent study by CARE Bangladesh found that fishermen in Bagerhat reported a 90% decline in their fish catches over 20 years which they attribute to shrimp fry collection and pond construction on *beel* habitats.

Feed production

In some areas, excessive collection of snails as feed for *golda* has depleted populations of the freshwater snail *Pila globosa* in inland waters[10,15] – up to 66.5 kg are used for each hectare of *golda* pond every day[10]. Snails are crucially important within these aquatic systems, acting to filter the water and providing an important source of food for fish[16]: removal of the snail is likely to result in an increase in the growth of aquatic macrophytes, which could lead to eutrophication of water bodies[15]. The impacts of their loss are likely to be far-reaching, and the reduction in their numbers is said to be one cause for increased pollution in inland waters[15,17]. Waterways in areas surrounding *golda* farms have been blocked and polluted through dumping of snail shells and viscera[10].

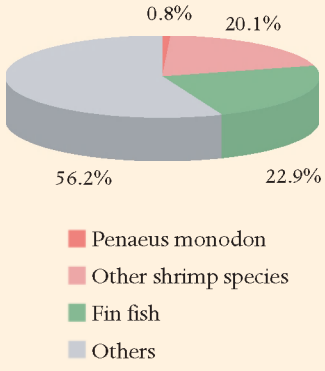
ABOVE: *Many juveniles of commercially and ecologically important species are discarded as by-catch during shrimp fry collection, with impacts on biodiversity and capture fisheries production.*

© Williams / EJF

BELOW: *Snail trading in a floating bazaar, Chanda Beel.*

© Philip Gain / SEHD

FIGURE 1: *Percentage composition of shrimp fry catch, 1994.*[11]



LEFT: *Depletion and salinisation of freshwater supplies mean Bangladesh's women and children have to walk increasingly long distances to collect clean water.*

© Williams / EJF

'Water management is probably one of the most contentious subjects in coastal shrimp aquaculture, especially in the polder areas of the Southwest. Most of the polders were built for agricultural production, which is reflected in the infrastructure and water supply systems. Ponds are shallow (<60 cm) with barely sufficient water available to cover the 20% fortnightly loss due to evaporation. This is compounded by local frictions over water sharing, with the more powerful farmers and land owners controlling water supplies for their own use.'

TIM HUNTINGTON, AQUATIC BIODIVERSITY SPECIALIST, FOURTH FISHERIES PROJECT[33]

Water in the Delta

Depletion of freshwater drinking supplies have been reported following the expansion of shrimp aquaculture as rural water supplies are almost entirely dependent on surface water[31]. A recent study found that 95% of people interviewed relied on water from freshwater ponds for cooking and washing[32] and women have to walk long distances – in some cases up to 3 miles – to obtain water for their households[12].

Bio-fuel

Cattle dung is traditionally plastered onto jute and dried, providing fuel and an additional source of income, but declines in cattle numbers, together with the prevalence of cattle diarrhoea, have reduced this use from around 80% of the fuel supply in the 1980s to perhaps as little as 5-10% today[20]. Other traditional fuel sources such as hay, paddy straw, and tree branches have also reportedly declined due to the use of land for shrimp aquaculture. Farmers are increasingly having to purchase fuel wood from markets[24] and in the southwest, the Sundarbans mangrove forest is being increasingly exploited by fuel collectors, to the extent that illegal fuelwood collection is now thought to be a significant cause of mangrove loss[34].

BELOW: *Traditional fuel sources such as cattle dung have become scarce following shrimp aquaculture development.*

© Philip Gain / SEHD

'Everything is gone'

'Since shrimp farming started, rice paddies have become barren, trees have died, cattle and poultry have died and no vegetables can be grown due to the saline water. There is increased disease, and diarrhoea and cholera are common here now'.

31-year old Kolyani Mondal used to farm rice and keep livestock and poultry, but after shrimp farming began in the area, her cattle and goats developed diarrhoea-type diseases and together with her hens and ducks, have all died. Now much of her land is inundated with saline water, and what little she has left is very unproductive – previously her family were able to harvest 18–19 *mon* of rice per hectare, but now they can only get 1 or 2 *mon*.

Shrimp farming began about 12 years ago and the villagers were promised improved incomes as well as plenty of crops and food, but now, 'everything is gone'. The shrimp farmers who use her land are supposed to pay her 8/9,000 Tk (US$140) *hari* every year, but this is rarely paid, all she gets are occasional instalments of 500 Tk (US$8.00) here and there and her family are struggling. Kolyani seeks work where she can, in the fields, in road construction and collecting waste from the shrimp farms; she says that 'it didn't used to be like this, women wouldn't have worked in this way'. In the past the family could get most of the things they needed from the land, but now there are no alternatives to going to market to buy food and other goods; all of the 100 or so families in the community are affected in this way, unemployment is high and increasingly parents cannot afford dowry payments for their daughters[17].


© Williams / EJF

'Does shrimp culture help in reducing malnutrition?…the answer is simple – no. Most of the coastal people do not have the buying capacity of the costly shrimps which are processed and exported to markets abroad. However, sometimes low-quality shrimps rejected from the processing factories and diseased shrimp from the farm site are sold out for local consumption.'

A K Deb[29]

Hungry for Change

A reduction in diversity of agricultural products combined with reduced access to coastal resources has serious implications for the health of rural communities. Overall, diets in shrimp farming areas now typically contain less meat, eggs, milk, vegetables and fish than before the advent of shrimp culture[27,32,35]. Cattle declines are cited as particularly detrimental for children's nutrition, in terms of reduced availability of milk and meat[6,10] and there are other declines in the consumption of the small fish species that have traditionally been key suppliers of crucial nutrients, such as calcium, minerals, fatty acids and vitamins, especially vitamin A (that is essential in preventing childhood blindness[36]. Poor nutrition in shrimp farming areas has been linked to birth defects, stunted growth, night blindness, increased incidences of childhood diseases and increases in miscarriages, maternal morbidity and mortality[37].

Health has been further affected by a variety of factors related to the onset of shrimp farming. For example, the lack of dung for fuel has resulted in less frequent boiling of water and reportedly led to increases in waterborne diseases[20], (which cause around 80% of all illness)[27]. Incidences of diarrhoea, malnutrition, dysentery and skin diseases (including lesions and infections, brought on by bathing or fishing in saline and / or polluted water[20,35]) are also higher, with children the most seriously affected[35]. Finally, malaria and other mosquito-borne diseases such as dengue fever are reportedly higher in shrimp farming areas[11,14,32] a similar situation to those reported in, for example, India, Sri Lanka[38] and Indonesia[39]. In Bangladesh, communities have complained of 'unprecedented' attacks by mosquitoes and other insects following the destruction of mangrove forests for shrimp aquaculture on Sonadia Island[40,41].

'There are no winter crops anymore – they used to grow pulses, oil seeds, and vegetables. The collapse of cattle-raising has had serious economic and nutritional consequences.'

Khushi Kabir, Nijera Kori, Bangladesh[43]

SMASH AND GRAB

Violence and intimidation

'These shrimps destroy our environment. The saline water is harmful for the vegetation, and animals. Some women have been raped and assaulted by the guards in the enclosures. Our blood is not shown on this recipe'

A villager in Noai, Bangladesh talking about recipes from England for 'spicy prawn curry'[1]

'Do you like food that is mixed with the blood and tears of many of my country?'

Sheik Abdur Jalil, Former Chairman of Rampal Upazilla Parishad[17]

The shrimp industry in Bangladesh has been – and continues to be – associated with violence, kidnapping, arson, torture, rape, intimidation and murder. As shrimp culture has caused nominal land prices to increase, conflicts have ensued and disputes between competing shrimp farmers and fears of theft from ponds have exacted a bloody toll. Peaceful opposition to the industry's expansion have been met by threats, intimidation and violence, and the presence of armed guards at many shrimp ponds has increased tensions between the industry and traditional users. Poor governance, corruption, seemingly ubiquitous impunity for well-connected business people and an absence of adequate law enforcement has left rural communities bereft of government support.

This situation is replicated in other countries, such as Honduras, Guatemala, Mexico and India where shrimp culture has caused conflicts between traditional resource users[2]. However, the frequency and severity of human rights abuses, the impacts on women and children and especially landless people and the widespread corruption and injustice set Bangladesh apart.

Undoubtedly the country has suffered from a violent history and seemingly endemic conflict but the suggestion made by some commentators that violence attributable to shrimp culture is merely another manifestation of this culture is misleading. The reality is that the development of shrimp aquaculture has directly encouraged brutality, corruption and injustice.

Since 1980, violent clashes have directly led to the known deaths of some 150 people[3], yet the precise number of deaths remains unknown and some believe the figure stands closer to 200[4]. What is clear is that, for example, over the past 10 years, 42 people have been killed in just two sub-districts of Bagerhat district – Mongla and Rampal – areas where shrimp culture is concentrated.[5] The number of rapes and other acts of violence and intimidation remain unquantified.

Accusations of violence and intimidation are often levelled at so-called 'musclemen', hired thugs paid by wealthy business people – and politicians and police – to protect their interests[6]. Local law enforcers are often reluctant to admonish wealthy or powerful business people and a weak judiciary is unable to enforce its judgements and orders for recompense even if wrongdoers are found guilty[7].

Sufia Khatun, from Sesuk village (Khulna) lost her husband, Maula Box Morat, in 1988. Maula was fishing in a river adjacent to a shrimp farm when he was accused of stealing shrimp by Wazed Ali Bizwas, the farm owner. According to an eyewitness, Maula was put into the farm's ice room, tortured and murdered; his body has never been found. After a case was filed by Maula's father, arrests took place, but the accused were released from jail after just six months, allegedly after the police were bribed[8].

Perhaps more shocking has been the level of police involvement in these conflicts. In October 2000, the Daily Star newspaper reported that a senior police officer led a campaign of arson, bombing and violence to drive residents out of Kaliganj-Lebukhali. Sixty villagers were injured and 350 families abandoned the land they leased from the government[9,10].

In 1998 in Satkhira district, a High Court injunction prohibited the granting

BELOW: *Sufia Khatun's husband was murdered for fishing on land near to a shrimp farm.*

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The Memory of Kuranamoyee Sardar

In November 1990, Kuranamoyee, one of the many landless in Bangladesh, led protests against the encroachment of shrimp farms in Polder 22, in Khulna. A peaceful demonstration was attacked by a local industrialist – Wazed Ali Biswas – and around 100 men armed with guns and explosives. The women led the protest in the hope that this would help to avoid violence and Karunamoyee, at the front of the crowd, took the full impact of an explosion and died instantly. Rupban Bibi was also caught by an explosion or gunfire, beaten and put in a boat next to Kuranamoyee's headless body that was later dumped in a river[2,8]. However it was the villagers rather than the attackers who were initially arrested and held in custody[5], for example, Urmila Rani Sardar was injured but arrested following her release from hospital and her husband was recently jailed after false accusations were made against him[4].

After years of legal wranglings, the chief suspect in the murder of Kuranamoyee, Wazed Ali Bizwas, is due to stand trial[5]. However, the harassment and violence continues and villagers are struggling to keep their land. On the 5th October 2002, Nijera Kori staff and landless group leaders were viciously attacked, resulting in the hospitalisation of four Nijera Kori staff and serious injuries inflicted on 12 group members. The attack was clearly aimed to intimidate and silence the opposition and the perpetrators demanded that Nijera Kori: does not protest against shrimp culture in polder 22; does not provide legal aid to landless group members; and does not object to the government land derequisition process (that will deprive landless people of khas lands and could benefit shrimp farmers). They also demanded that November 7th, the anniversary of Kuranamoyee's death and a focus for peaceful opposition to shrimp farming is not observed[4]. On 20th March 2003, the Nijera Kori members in polder 22 came under attack again; three landless group leaders and another man were hospitalised, and the Nijera Kori members were once again threatened. Nijera Kori's staff and members are continuing to fight for their lands and livelihoods, under the constant threat of violence for their opposition of shrimp farming[4].

© Nijera Kori

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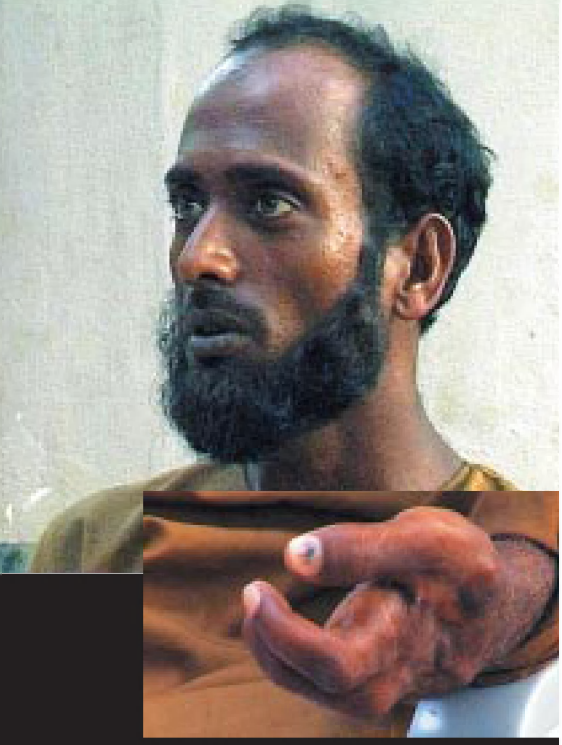
of leases for shrimp cultivation thereby enabling 1,200 fisher families to legally reside in nine contested ghers[11]. However the district administrator, reportedly under pressure from local government leaders, contravened the injunction and issued shrimp farming leases. Police and thugs hired by the lease-holders forcibly evicted the landless families, destroying houses and injuring many who protested against this violent expulsion. The violence culminated in an attack by police who opened fire on a procession of mostly women and children at Barurabad village. Four people (including two children[12]) were killed, including Zaheda Begum, leader of Kisani Sabha (Peasant Women's Association), and dozens of others were wounded[11,12].

Opponents of shrimp farming – farmers, landowners, community leaders, journalists and NGOs – have found themselves accused of false allegations or themselves wrongly imprisoned[9,10]. For example, in May 2002, it was reported that 'miscreants' linked to a political leader captured 16 shrimp farms belonging to a local cooperative in Cox's Bazaar. However, the police arrested four of the cooperative members and not the miscreants[13].

In southwest Bangladesh, 53 legal cases (each involving around 30 people) have been filed against group members and staff of Nijera Kori, an NGO supporting the landless[14]. Fighting false cases is a time-consuming and expensive process and defendants frequently lack money or knowledge to enable them to obtain justice, and in this way false cases have become a means to 'silence', harass and intimidate opponents[14,4]. One such victim is Sheik Abdul Kuddush; his land was deliberately flooded with saltwater and he – and others in the locality – lost livelihoods and protested. The result was the filing of 7 false cases against 103 people, and though all but two of the cases have now been resolved, the accusations led to Sheik Abdul Kuddush being jailed for three months[15,16].

'On one side are the rural poor, who feel powerless as their traditional livelihood is threatened and fear for the long-term survival of their families. Ranged against them are the prawn entrepreneurs, who can make substantial profits within a matter of months and take little responsibility for the industry's environmental and social impact.'

Christian Aid[18]



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The price of protest

Mohammad Shahidul Islam's testimony tells a similar story to that of countless other poor, landless people. Shrimp culture has destroyed crops and vegetation, killed livestock and poultry and left the landless on the brink of their existence. After peacefully protesting against shrimp farm development near his village of Birat (Khulna), Shahidul was attacked by 'musclemen' and shot in the hand. Appropriate treatment was too costly and he now has a badly disfigured and disabled hand. Nearly a decade after the attack, Shahidul is still unable to work, his family face severe financial difficulties and his children's education has declined. Despite identifying his attackers, no action has been taken against them, on the contrary, it was the protestors who were arrested and for the last 3 years, Shahidul has had to fight false cases filed against him pushing him deeper into debt[19].

Future conflicts?

As shrimp farming has spread across the coastal belt, Noakhali district in south-east Bangladesh is one area that has witnessed recent development onto *khas* land. The situation experienced elsewhere has been replicated as outsiders have sought control over *khas* land and conflicts with communities have occurred. For example, in Middle Bagga Village, violence followed the forced conversion of around 500 ha of land and though there has been a temporary halt to the planned expansion of the farm, villagers fear that it could resume at any time[20].

In Dhaner Shish Village, the development of shrimp farms has been followed by violence against local communities, and the loss of crops and livestock[21]. A large shrimp farm surrounded by barbed wire and protected by armed guards has recently been established on *khas* land in South Char Mazid village. Chemicals and saltwater from the farm have led to crops (including rice and chillies) failing and trees and livestock dying[22], while cases of skin diseases, diarrhoea and ill-health associated with poor nutrition have increased[22,23]. The result of opposition to shrimp farming has been the harassment, rape and violence exacted on local people[23,24,25] and numerous false cases have been filed – one man, Mahfuzur Rahman, had 19 cases filed against him[25].

Violence against shrimp farmers

Such is the demand for land that shrimp farmers themselves have become the target of violent clashes, as the following two cases illustrate. In February 2002, 18-year old student Sirajul Islam Liton and 3 others went to the family shrimp farm in Mongla (Bagerhat district) after hearing of an attack on the farm guards. They were attacked by a group of 8-10 people armed with spades and metal weapons who were attempting to take control of the farm. Sirajul sustained serious injuries and died in hospital 2 days later. His family have kept the land but they continue to feel threatened and the group is still demanding money from them. The attackers were identified and although a case has been filed against 16 people, only 1 has been arrested[26].

In April 2002, in Rampal (Bagerhat district), Abdur Rob Howladar and his 16-year old son, Istiak Hasan Shohag, were attacked by 7or 8 people armed with machetes and iron rods. The attackers were known to Abdur Rob Howladar, as they had previously demanded money (approximately US$860) and two-thirds of his family's shrimp farm. Abdur's right arm was broken and his back and the left side of his face was slashed, leaving his eye badly damaged. Appropriate medical treatment was too costly and a subsequent infection resulted in the loss of his eye. His son received head injuries and has been greatly traumatised by the attack. The attackers, though arrested, were released on police bail and Mr Howladar's family face the threat of false law cases being brought against them in an attempt to force them to drop their charges [27].

RIGHT: *18 year old Sirajul Islam Liton was murdered in February 2002 due to conflict over the family's shrimp farm.*

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FAR RIGHT: *Abdur Rob Howladar was seriously injured defending his land.*

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WHITE GOLD VICTIMS

Women and children in shrimp production

'In many cases it's been the women who've been in the forefront and the women who've been killed and martyred. It's the women who've been raped by these thugs. It's been the women who've really. . .caught the brunt of it'

KHUSHI KABIR, NIJERA KORI[1]

LEFT: *Women and children have been the greatest victims of shrimp culture developments.*

© Williams / EJF

'The White Gold, shrimp, has been enriching the rich and affluent urban peoples of the country from the 1970s though it is depriving the poor rural communities....it is the women and children of shrimp farming communities who suffer the most, socially and economically, as well as through the violation of their human rights by being subjected to various forms of physical violence, including rape and torture.'

DR S. HALIM, BANGLADESH CENTRE FOR ADVANCED STUDIES[4]

The development of shrimp culture has particularly affected women through the loss of traditional livelihood opportunities, violence – especially rape – that is perpetrated against them, the migration of men from rural areas and the breakdown of families and social cohesion. Male migration to urban areas has led to an increased incidence of divorce[2], and increased numbers of female-headed households. This is a serious situation in a country where women suffer severe deprivation and where over 95% of female-headed households fall below the poverty line[3]. Typically it is women who have to walk for long distances to find fresh drinking water and fuel following groundwater depletion or pollution and the loss of traditional fuel sources: the time spent on fuelwood collection has reportedly doubled in some areas following the introduction of aquaculture[4]. Income from shrimp-related activities may have given some women economic independence[5] but many more have found themselves disadvantaged by necessary changes in occupation.

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'Our young girls are afraid. They don't dare to go for washing and bathing near the shrimp farms. Also collecting cow dung for fuel frightens them because the guards sometimes taunt after them. It has also happened that some of them have been raped'

Aruti Rani, Harinkhola, Bangladesh[16]

A proportion of women are able to find jobs on shrimp farms as day labourers clearing ponds of weed, constructing embankments and maintaining service roads, however, such work is scarce and often seasonal, temporary, menial and poorly paid. The average annual income for this work is just Tk3743 (US$65) and this needs to be set against a reduced contribution to women's traditional unpaid work in family agricultural activities, home gardening and household production[4]. These activities remain under-valued[4] leading to further skewing of the positive benefits derived from shrimp-related activities.

Thousands of women from rural areas have taken up work in processing factories or as shrimp fry collectors, which are among the lowest paid jobs in shrimp production[6]. Some of these women have been forced into this work as shrimp farming has reduced or eliminated other employment opportunities. A recent study of women factory workers found that most had migrated from rural areas, and though there were many reasons for this, those interviewed in Cox's Bazaar felt that shrimp farming in rural areas had reduced their livelihood opportunities, making shrimp processing an attractive proposition[7].

Harassment and sexual abuse (including rape and assault) have been strongly linked to both shrimp fry fisheries, shrimp farms and shrimp processing plants[4,8,9,10]. There is such a stigma attached to working in the industry that many Muslim women claim they are treated as outcasts as a result[4] and it can damage their chances of marriage[4,11]. There are reports of guards harassing women on the pretence of checking that they are not stealing the shrimp[12].

In shrimp fry fisheries, incidences of sexual abuse are exacerbated by the fact that the fishery is linked to the tides and therefore women often have to work at night. Women do not always dress in the traditional full sari – as they are pulling nets through water for hours at a time – and this lack of clothing has also increased their susceptibility to attack[12].

Even within their villages, women have suffered humiliation due to loss of privacy – the loss of trees associated with shrimp farming has meant that women are often unable to use the toilet in private, and in many cases they are under the gaze of armed shrimp farm guards[4,12]. The introduction of migrant labour associated with shrimp farm development has also created greater personal insecurity for women[13]. Rape has been used as a means to intimidate women in communities that have opposed shrimp culture.

'Poor man's bedding'

In a number of coastal areas of Bangladesh, shrimp cultivation has led to declines and even local extinctions of Meley (*Ciperus* sp) marsh grass, the flower stalks of which are used to weave the traditional mats ('*madur*') that are found in almost every household in the country. Declines in Meley have left thousands of women unemployed, and meant that this 'poor man's bedding' has become increasingly expensive. Recently, programmes conducted by Bangladeshi NGOs have found that Meley cultivation has been found to be more profitable than rice farming, and that profits can be doubled or even trebled through the sale of fish that are found among the marshes[17,18].

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The status of women

Women in Bangladesh are disadvantaged and suffer greater privations than men. Over 95% of female-headed households in Bangladesh fall below the poverty line[3], the literacy rate is 49.5% (compared to 67% for men)[14] life expectancy (60.5 years), is slightly lower than for men (60.7 years)[14]. Violence is prevalent[15] and sexual abuse, trafficking, prostitution, domestic violence, dowry-related deaths, psychological abuse, and acid throwing attacks all continue in Bangladesh[14].

Child Labour

In a number of countries (including Bangladesh) child labour within the shrimp industry is not uncommon. In Bangladesh, the reduced coastal and agricultural productivity has been implicated in the increasing numbers of children having to help find food or become wage-earners. Many of these children work as cheap labour, collecting shrimp fry, working in shrimp processing depots, or working on shrimp farms[11,19,20,21]. A 1998 study for Save the Children (UK) reported that almost 40% of income-earning children classified work in the shrimp industry as their main occupation – more children are reported to work in the shrimp industry than in any other[11].

Thousands of children, some as young as six[10], are employed in shrimp fry fisheries. This work entails dragging mesh nets through the brackish waters and sorting the catch. Collection is time-consuming : children may be occupied for up to 13-14 hours per day[11] of which up to 6-8 hours per day[12] is actually in the water. As a result of this prolonged immersion health workers report that skin and respiratory diseases, urinary problems, sunstroke and hepatitis are commonplace[4,11,12,19,23].

The fruits of their labour may be the capture of 20-40 fry or post-larvae[22] that will earn them between US$0.45 and US$1.10 per day[11]. However, female collectors tend to be younger than their male counterparts (10.6 and 12.3 years, respectively) and earn just over half that of boys (3,667 Tk (around US$60) compared to 6, 374 Tk (around US$110) per year)[10].

The impact of the fry collection on future generations should not be underestimated. As collection times vary according to the tides, children often miss schooling and an estimated 74% have ceased their schooling altogether. The result: 56% of the children working in this sector are functionally illiterate[10], figures that compare unfavourably with the government's Food for Education Programme that has resulted in a 94% school admission rate nationally[11,24].

Child labourers in shrimp processing depots may work for up to 9 hours without a break in extremely unsanitary conditions. They are frequently cheated of what little pay they are due (less than US$1 per day), and the inflexible working hours often prevent these children from attending school[11]. Cuts to hands and feet are common and these can become badly infected, abscessed and swollen[11]. Sexual abuse is also reportedly common and for unmarried girls, the very fact they work in the industry can mean their reputations and marriage prospects are tarnished, regardless of whether or not they have engaged in sexual activity[11].

'Whether we have cuts on our hands and feet, we have to carry on de-heading. If not, they will get employees from other places'

Bangladeshi child labourer[11]

'Women and children labourers work with low levels of income and little job security and encounter various forms of oppression and harassment.'

Dr S Halim, Bangladesh Centre for Advanced Studies[4]

BELOW: *Long hours, little money, disease and sexual abuse characterise daily life for Bangladesh's child fry collectors.*

© Williams / EJF

ENVIRONMENTAL DESTRUCTION

'Increased salinity, land degradation, deforestation and destruction of mangroves in southern coastal regions have led to serious damage to biodiversity and ecosystem which is, for the most part, irreversible'

United Nations Environment Programme, 1999[1]

Due to the extensive nature of most shrimp farms in Bangladesh – there are few artificial inputs such as feedstuffs or antibiotics and some consider that the environmental impacts have been less severe than in other countries. However, the extensive farming systems have led to the conversion of large areas of land for shrimp ponds and this can engender different, but equally profound problems.

While much of the shrimp aquaculture development has been on land already made in to polders for agricultural use (see previous chapters), conversion of natural wetlands has occurred and there are considerable areas of both tidal and freshwater wetlands that have been targeted by the shrimp farming industry[2].

The precise extent of the environmental damage associated with shrimp aquaculture development remains largely unquantified due to the lack of reliable data over time. However, there is substantial evidence to indicate that shrimp farming has resulted in environmental degradation; restoration costs have conservatively been estimated at 30% of the total revenues derived from shrimp aquaculture[2,19]. The real costs may be much greater, and it must be recognised that some of the environmental impacts that have been attributed to shrimp culture – such as biodiversity loss – will be irreversible.

There are also indications that the emerging trend of semi-intensive farming may present new environmental challenges, such as the use of ground water and the utilisation of coastal wetland habitats inland of traditional polder shrimp aquaculture[2]. Shrimp aquaculture has adversely impacted the ecology of coastal and wetland areas of Bangladesh. Changes in temperature and salinity are thought to have led to changes in composition and density of both zooplankton and phytoplankton communities[3], while the expansion of *golda* farming has led to the conversion of large areas of freshwater wetland[4,5], with impacts on biodiversity[5]. Shrimp farming has been associated with declines in populations of a number of ecologically important wetland species, including frogs (such as the Indian bullfrog *Rana tigrina*), snails (e.g. *Pila globosa*), otters and birds[4,6].

As in other shrimp producing countries, serious concerns have been raised over the degradation of mangrove forests and the damage associated with shrimp fry fisheries.

ABOVE: *Shrimp farming around the Sundarbans has led to increased exploitation of forest products, often illegally.*
© Williams / EJF

OPPOSITE RIGHT: *Over 9,700 ha of mangroves in Bangladesh have been lost as a direct result of shrimp aquaculture since 1975.*
© Williams / EJF

'Indiscriminate conversion of the country's mangrove forests into shrimp farms has resulted in the destruction of marine breeding grounds and the erosion of shorelines. The destruction of the mangroves has far-reaching ecological implications for the whole region. A large number of local varieties of fish have disappeared and nutrient content of the soil has diminished, resulting in drastic reductions of land productivity.'

United Nations Environment Programme, 1999[1]

Mangroves

Worldwide, mangrove and wetland destruction has been considered to be one of the major environmental impacts of shrimp aquaculture. Mangroves are among the most productive ecosystems on the planet, supporting considerable marine and terrestrial biodiversity and stabilising and protecting coastal areas. They provide numerous essential services to communities – including fuel-wood, food, medicine and construction materials.

Mangroves act as nursery grounds and refuges for many species of fish, crustacean and molluscs[7,8]. An estimated 80% of the Indian fish catch from the Ganges and Brahmaputra river deltas originates in the Sundarbans mangroves[9], while others estimate that perhaps as much as 90% of commercial fish catches in the Bay of Bengal rely on Bangladesh's Sundarbans Reserved Forest as a nursery area[10]. About 20% of Bangladesh's coastal communities rely exclusively on wild fisheries for their income[11] and declines in these fisheries could result in the loss of livelihoods and food security for thousands of families[12].

In Bangladesh, shrimp culture has had devastating impacts on the mangroves of the Chokoria Sundarbans and has been cited as a threat to those on Sonadia Island and in the Sundarbans, the largest remaining mangrove forest in the world. One recent report concluded that, overall, over 9,700 ha of mangrove loss in Bangladesh can be directly attributed to shrimp culture since 1975[13]. In recent years the rate of mangrove destruction has decreased, although the conversion and degradation of mangrove areas due to shrimp aquaculture is still occurring.

Intensifying the problems?

Currently, the majority of farms in Bangladesh are extensive, with few inputs in the way of feed or chemicals. Supplementary feed application is estimated to be 162 kg/ha compared to the average 700 kg/ha elsewhere in Asia. However, Charoeun Pokphand India – a subsidiary of Charoeun Pokphand, a Thai company producing shrimp and shrimp feeds – has established a distribution centre in Satkhira and is encouraging farmers to use their compound feeds in order to increase production. A recent newsletter produced by the Shrimp Seal of Quality (SSOQ) made mention of US soya producers targeting farmers to use soya-based feeds. Such intensification and increased use of compound feeds is thought by some commentators as likely to lead to increased water quality, disease and chemical therapeutant problems[2]. Additionally, a recent report has stated that 'the likely trend for new farms is their establishment in supralitoral areas where deeper ponds can be built out of the influence of tides and away from river-fed rice culture. These will need to rely upon pumped khal or ground water and to compensate for the higher costs involved, will need to intensify production, probably using compounded feeds – indeed a number of these farms are being part-funded by feed-companies. This has implications for the future where more concentrated pond effluents may become more prevalent'[2].

'The clearance of mangroves is not only causing a colossal loss of coastal habitat, aquatic resources and biodiversity, but it is also increasing soil erosion, changing sediment patterns and shoreline configurations, increasing vulnerability to cyclonic storms, tidal bores and the denudation of feeding, breeding and nursery grounds for various marine, estuarine and fresh water fishery resources. As a result natural fisheries production have greatly reduced.'

Dr Md. Shahadat Hossain et al.[14]

ABOVE: *The remains of the Chokoria Sundarban – the forest has been almost completely destroyed by conversion to shrimp ponds.*

International community funds destruction[17]

The Asian Development Bank (ADB) began to fund shrimp cultivation in the Chokoria Sundarban area in 1982, helping to establish over 100 shrimp farms and a 16km embankment. In 1986, the World Bank and UNDP provided US$26.5 million to develop infrastructure and a further 468 shrimp culture plots.

The World Bank claims that the project improved conditions in Chokoria, but satellite images prepared by the Bangladeshi NGO SEHD reveal the disappearance of the forest over a period coinciding with the development of shrimp culture. In 1972, forest cover in the Chokoria Sundarban was 8,000 ha; by 1985, this figure stood at 1,600ha, halving again by 1991. By 1995, the forest had almost completely vanished.

The World Bank and ADB came up with contradictory opinions on the outcome of the projects. The World Bank stated: 'there are no negative environmental effects caused by the project... No mangrove forests have been destroyed as a result of the project'. The ADB, on the other hand, stated that as a result of their project: '...about 800 ha of mangrove forest was (or is being) cleared to culture brackish water shrimp. The project has clearly reduced shrimp/fish breeding and nursery grounds in the area, but the effect on resident shrimp/ fish has not been determined'.

Chokoria Sundarban – A Forest Without Trees

A unique mangrove forest of 8,000 ha in Cox's Bazaar has been lost in all but name to be replaced by thousands of shrimp farms[17,18]. Some 2-3 decades ago, local people were almost entirely dependent upon the mangrove forest[15] for their livelihoods. Mangrove cover fell from 8,000 ha in 1972 to 973 ha in 1988[19] and just 411 in 1999[13], primarily due to the development of shrimp aquaculture in this area[14,15,17,19,20,22]. Destruction of mangroves has left local communities vulnerable to cyclones and tidal waves[15,23,24]; resulted in a reported 80% drop in fisheries catch[25]; forced around 50% of the local population to change their occupation[15] and has devastated biodiversity[17]. The deforestation is reported to have had adversely impacted the incomes and livelihoods of over 90% of the local community[14].

Sonadia – Continuing the destruction

Other mangrove areas in Southeast Bangladesh have also been cleared for shrimp aquaculture. Approximately 130 ha of mangrove (known as the Keora forest) on Jaliardwip Island has been cleared for shrimp ponds – this mangrove provided an important habitat for crab-eating monkeys, and represented most of the inland area of this small coastal island[22]. An estimated 670 ha of mangroves elsewhere along the Naf River, almost 300 ha of mangrove on Maiskhali Island and over 100 ha on Matabar Island have also been lost to shrimp farms[13]. Other estimates for mangrove clearance for shrimp farming around the Naf River estuary and offshore islands are as high as 1,800 ha[26]. Alarmingly, the rapid deforestation along the Matamuhuri River basin has led to the increase in both the discharge rate and sediment load of the river[22].

Very recently, concern has been growing over the loss of the ecologically important mangrove forests on Sonadia Island in the Bay of Bengal as a result of shrimp farming[27,28]. Deforestation has left the island exposed to tidal waves and cyclones and people have complained of 'unprecedented' attacks by mosquitoes and other insects[27,28]. Although Sonadia Island is small, about 70 species of waterbirds use the island for resting, roosting, feeding, wintering and as a staging post during migrations[28] and forest loss has led to declines in these bird populations[28].

The Sundarbans

Straddling the border between India and Bangladesh (which possesses over 60% of the total area), the Sundarbans, at approx 1 million ha[10], is the world's largest mangrove ecosystem, and one of the richest, providing an important habitat for a high diversity of amphibians, reptiles, birds and mammals, many of which are endangered [10,32,33,34] .

A recent study found that 58 of the indigenous wildlife species are threatened[34], including the Ganges River Dolphin (*Platanista gangetica*), Irrawaddy dolphin (*Orcaella brevirostris*), Olive Ridley Turtle (*Lepidochelys olivavea*), River Terrapin (*Batagur baska*), Hawksbill Turtle (*Eretmchelys imbricata*), Estuarine Crocodile (*Crocodylus porosus*), Spot-

ABOVE: *The Sundarbans supports the world's largest remaining population of wild tigers and its preservation is considered to be critical to their long-term survival.*
© Dr. P. Kumar

billed Pelican (*Pelacanus phillipinensis*), and Pallas's Fishing Eagle (*Haliaeetus leucorpyhus*)[34,35,36]. The Sundarbans also supports the world's largest remaining population (around 600) of Royal Bengal Tigers (*Panthera tigris tigris*) and is believed to be critical to their long-term survival[32,34,37,38].

The Sundarbans is of great socio-economic importance as a source of timber, fish, honey and numerous other products such as medicines[35]. The Bangladesh portion provides employment and income for at least half a million people[33]; it provides a subsistence living to millions of people in the impact zone[39], as well as seasonal work for wood-cutters, fishermen, and gatherers of honey, golpatta leaves (*Nipa fruticans*) and meley grass[35]. Approximately 46% of all local income is derived directly from the forest's resources[33] and the Sundarbans is also an important source of revenue to the Government through the sale of licenses, permits and royalty payments for access to resources[18,32,33].

The Sundarbans provide a buffer to cyclones and devastating tidal waves, protecting millions of people who live in the immediate vicinity as well as the infrastructure and urban populations in major towns such as Khulna and the shipping port of Mongla[18,32,40].

However, the Sundarbans are under serious threat[36] and the ill-planned expansion of shrimp aquaculture in the areas adjacent to the Sundarbans is considered by some to be the most significant cause of the gradual loss of the mangrove forest[18,21,30]. Degradation of surrounding lands has depleted traditional fuel sources (such as cattle dung, hays, branches etc) and communities are increasingly exploiting the Sundarbans for fuel (including leaf litter, fallen fruits and wood)[21,30]. Shrimp culture has led to unemployment in many rural areas and in the areas around the Sundarbans, many displaced farmers have resorted to the collection of honey, fuelwood or other products (such as Nypa palm fronds for thatching) from the forest, often illegally[41,42,43]. Such exploitation (particularly of fallen fruits) damages the ecosystem and hampers its regeneration[21,30].

Excessive shrimp fry collection in and around the Sundarbans is severely impacting the aquatic ecology of the area, and the physical disturbance caused by fry collectors is said to be affecting the growth and regeneration of the mangroves themselves[37] thereby damaging the nursery grounds for many species[45], undermining the basis of shrimp production and further impacting wild fisheries.

'The most recent and significant cause of the gradual loss of the mangrove forest [Sundarbans] is the expansion of luxury shrimp industries in the areas adjacent to the Sundarbans.'

THE DAILY STAR, 24 SEPTEMBER 2002[21]

'We now understand that the current crude method of shrimp cultivation in the region is also affecting the regeneration capacity as well as the biodiversity of the forest.'

FOREST DEPARTMENT OFFICIAL[21]

SHRIMP FRY FISHERIES

Destructive Gears

Shrimp fry are collected using a variety of gears that vary in their destructiveness:

Bag net (*behundi jal, pictured below*) Responsible for high by-catch. Widely used throughout coastal areas from 1985 onwards as rising prices for fry justified investment in boats with bag nets. In Cox's Bazaar these nets are fixed in the sea rather than operated by a boat.

© Williams / EJF

Push net (*hat jal*) Operated by hand in shallow areas along the river bank in the Khulna region. Low by-catch but operators cause erosion of river banks. In Cox's Bazaar, the net is modified so that it can be used on beaches and pushed through the waves (*feni jal*).

Pull net Most commonly operated by hand in shallow areas along the river bank in Khulna region. Low by-catch but operators cause erosion of river banks.

For both brackish (*bagda*) and freshwater (*golda*) shrimp production in Bangladesh, there is a heavy reliance on the capture of wild fry to stock ponds. Hatchery production of *golda* fry is especially low and currently fulfils just 10% of demand, and *golda* production is therefore heavily dependent on wild fry collection[6]. Some 1500-2000 million postlarvae (*bagda* and *golda)* valued at around US$30 million, are collected from the wild every year[2]. Such a high demand is driven both by farmers' perceptions that wild fry are hardier than hatchery-produced fry and quite simply because there is a very high mortality rate: an estimated 40% of all fry die between capture and stocking in the pond[3] (this figure can be as high as 80% for hatchery produced fry[4]). Subsequent survival rates of shrimp are extremely low: from stocking to harvest less than 25% survive[5].

The impact that this demand has on wild shrimp stocks is considerable. Wild postlarvae collection for *bagda* may remove up to 90% of the wild stock[3] and average postlarvae collected per person is now falling drastically indicating declining wild stocks[5] (caused by fry collection and other factors). Additionally, the substantial by-catch (incidental capture of non-target species) of all shrimp species (including *golda*[4]) has serious impacts on both biodiversity and capture fisheries production[3,5,7,8].

By-catch rates are extremely high as shrimp fry are typically harvested using very fine mesh nets [8] that are indiscriminate, catching most aquatic organisms in their path. The result are by-catch rates that are some of the highest of any fishery in the world[9].

The favoured species for brackish water shrimp culture *(P. monodon)* typically constitutes a very small proportion of fish and invertebrate larvae in a fry collector's catch[8,10]. The total annual catch of more than 2 billion *P. monodon* larvae is thought to represent less than 2% of the total catch, suggesting that over 98 billion individuals of other species and zooplankton are caught as by-catch every year[11]. A more recent estimate suggests that 3 billion *P. monodon* are caught annually, along with 300 billion other organisms[4]; whilst CARE Bangladesh found that for each *golda or bagda* fry caught, an average of 1341 individuals of other species were caught.

It must be remembered that many of the by-catch species caught and discarded are juveniles of commercially and ecologically important species. The Sunderbans has been particularly affected by the excessive collection of shrimp fry[14] and the removal of juveniles of commercially important species or those that provide a bedrock of local food security may lead to serious problems for the long-term fisheries and development across the Bay of Bengal.

Fry collectors

The seriousness of the environmental impacts and the undoubted unsustainability of the industry need to be considered in light of the fact that as many as 400,000 people[4] work as fry collectors. Many of these are among the poorest members of society including women and children who are at risk of disease as they wade through shallow waters[15].

Fry collectors are the amongst the most impoverished and marginalised people in coastal communities. They tend to be unskilled and untrained; about 93% of women and 70% of men are functionally illiterate and around a third of women interviewed in a recent survey were divorced, separated, deserted or widowed leaving them in a very vulnerable position[15]. An estimated 86% of all collectors are landless and have few opportunities for alternative income gen-

ABOVE: *Fry collection in the Sundarbans. Most fry collectors are amongst the poorest, most vulnerable members of society*
© Williams / EJF

eration[15]. Ironically, some commentators note that it has only been these new opportunities for fry collection that has prevented many landless households from suffering an absolute decline in income following the expansion of shrimp culture across the coastal belt[16].

However, fry collectors derive a very low income from their trade – typically just over US$1 per day during the three-month season[17]. Some collectors become indebted to *dadondars* who advance money in exchange for the catch, from which they will typically take 10-15% of the proceeds as interest. *Dadondars* and other middlemen (*arotdars*) have been accused of fixing the market prices of fry and collectors have reported being verbally and even physically abused when they fail to supply sufficient quantities[15]. Fry collectors are, in effect 'the lowest of the low' looked down upon socially. Women are particularly impacted as they are subject to sexual harassment and in some cases excluded from community activities because their work is considered to be demeaning[15].

The reinstatement of a ban on fry collection (Dec 2003 – see below) has made the situation more desperate for all fry collectors. Many hundreds of poor fishermen living in the Sunderbans are now trapped in serious *dadan* (debt) and unable to repay the loans that enabled them to buy nets and other equipment. Several legal cases have now been filed by moneylenders, including local influential shrimp businessmen who made loans on the proviso that the fishermen would both return money and supply shrimp fry. One fisherman quoted in the media said that he had been threatened with 'dire consequences' by a moneylender, but without any land or other means to support his family he commented, 'How can I survive if I am not allowed to catch shrimp fry?'[19].

An End to Collection?

In a bid to reduce the ecological impacts of shrimp fry fisheries, the Government of Bangladesh announced a complete ban on fry collection in September 2000[3]. The ban merely served to criminalize some of the poorest members of society who lacked any alternatives[18], had very little impact on fry capture but reportedly encouraged low-level corruption as officials were bribed to overlook infractions. The ban was unworkable in its original state and it was lifted in February 2002, pending a review, before being brought back into force in December 2003.

Ultimately the capture of wild fry cannot be sustained and it is imperative that a transition to alternative income generation takes place if a disaster is to be avoided.

Key facts about Hatcheries[2]:

- **Bagda** – 50% from wild, 50% from hatcheries
- **Golda** – 90% from wild fry, 10%
- Overall production for bagda postlarvae currently exceeds demand
- An acute shortage of golda postlarvae exists
- Rationalisation of hatchery sector along with better coordination and dissemination of market information, better quality control and management within hatchery sector are needed.

Alternatives

Reliance on shrimp fry fisheries is highly precarious due to both the unsustainable nature of collection and the likelihood of a permanent government ban. There is a clear need for fry collectors to transition to alternative livelihoods and preferably outside of the shrimp industry.

Village level farming projects that diversify food sources and methods of income generation should be encouraged, and a number of location-specific alternative livelihoods have been suggested. These include aquaculture and fisheries related activities, such as cage culture, mariculture (oyster and crab fattening), making fishing traps and gears, operation of fish feed mills and sorting dry fish. However, it is imperative that these alternatives are themselves sustainable and do not further deplete wild fish stocks. A range of other small enterprise activities that could be promoted include home gardening, hogla and mat making, bee keeping, coir industry, tree plantation, horticulture, tailoring and knitting, homestead gardening, poultry and livestock rearing, cultivation of meley grass for mat weaving, quilt making, bread making, sewing, paper bag making, net mending, marketing of fruit and vegetables, honey or salt collection, betel leaf production, and cultivation of golpata for roof construction[3]. The potential for income generation and sustainability of such alternative livelihoods should be assessed as a matter of urgency and international development and aid agencies should be using funds to generate and develop alternatives and enable the successful marketing of products.

In many areas, improved access to common resources will be required to enable fry collectors to switch to other forms of livelihood, and it should be recognised that land tenure and reform are crucial to this issue on all levels.

Integrated management of shrimp fry fisheries

As part of the Shrimp Action Plan, DfID and the Department of Fisheries published a report in October 2002 outlining an integrated approach to managing the fry fishery[3].

The report proposes a combination of seasonal, geographical and gear restrictions in the short-term together with building community awareness and making the transition to other livelihoods.

EJF strongly endorses these measures, noting that they would need to be introduced *before* bans are implemented. Particular attention should be given to (i) support for an NGO facilitated transition to alternative livelihoods with improved access to credit, *khas* land and markets, along with training for small enterprise development, (ii) technical support for the establishment of a hatchery certification scheme and training to reduce wastage of fry during transport and storage along the supply chain[3].

These near-term spatial and seasonal bans and gear restrictions are essential, and it is vital that aid is specifically targeted toward relief and alternatives *prior* to the introduction of the bans as suggested.

BELOW: *A government ban on all fry collection, introduced due to its devastating ecological impacts, has served largely to criminalize the poorest. Measures to support the transition of fry collectors to alternative livelihoods are urgently needed.*

LEFT: *Shrimp aquaculture has been associated with increased socio-economic differentiation and social instability.*
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VOODOO ECONOMICS

Winners and Losers in the Shrimp Industry?

'The prawn culture industry has the potential to generate considerable amounts of financial capital relative to the resources of associated groups. However, the study shows that small farmers, fishermen, snail collectors etc are often disadvantaged due to differentially distributed financial capital'

DR NESAR AHMED, BANGLADESH AGRICULTURAL UNIVERSITY[1].

One of the key arguments cited for the defence of shrimp culture – and indeed in support of its expansion – has been the supposed economic benefits that this export industry can bring to rural development and poverty alleviation. A plethora of studies exists expounding the economic costs and benefits of shrimp culture. Of these analyses, the evidence points to a net increase in income derived from a given land area when shrimp culture replaces traditional agricultural practices. For example, the gross yield per hectare from shrimp culture (estimated at around TK 32,000 / ha) is higher than that from rice cultivation (estimated at TK 12,000 / ha)[1,2]. Indeed, the increased potential profits from shrimp aquaculture over traditional agriculture has been one of the strongest arguments used to promote its development.

However, many of these analyses lack inclusion of the financial values foregone as a result of lost livelihoods and employment as shrimp culture has subsumed previously agricultural lands. Little consideration is given to the non-economic or qualitative values linked to the breakdown in traditional rural incomes and society, or infringements of human rights and undermining of long-term environmental security. The immediate cash benefits are analysed with little consideration given to the wider impacts on rural communities of alternative practices, the so-called multiplier effect. Crucially, virtually all of the analyses concern only the immediate short-term benefits and fail to analyse shrimp culture in terms of benefit-sharing, poverty alleviation and sustainable and equitable rural development.

Over 600,000 people are estimated to earn at least part of their income from *bagda* related activities[3]. However, 86% of the total employed in shrimp sector as a whole are unskilled and poor, and they receive a disproportionately smaller proportion – 61% – of the total earnings to the sector[4]. Crucially, the ability to

ABOVE: *The benefits of shrimp farming are not evenly distributed – while the largest, often non-local, landowners gain the most, smaller, more marginal farmers have their livelihood options reduced yet further.*

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profit from the shrimp industry seems intimately connected with the ability to own, lease or otherwise control land – something that the majority of the poorest, landless sections of society cannot achieve[8]. Even successful farmers lack the ability to negotiate on the price they receive for their shrimp[9] thereby reducing opportunities to maximise the revenues that could accrue to the local area. As long ago as 1990 a study commissioned for the Third Fisheries Project found that while there are huge profits for entrepreneurs, the poor and marginal households in shrimp farming areas (for example, those who find work as fry collectors and in the processing plants) did not share in the economic benefits to any significant degree[3]. Although the situation has improved to some extent since that time, it is EJF's contention that current research supports these conclusions.

The lion's share to the largest landowners

From the available data, it appears that the distribution of benefits from shrimp production is skewed towards the largest landowners. Although the trend has been towards local ownership and reduced farm size, the major beneficiaries of shrimp farming still tend to be non-local entrepreneurs, and large landholders gain disproportionately large benefits. This scenario is 'consistent with their [large landholders'] advantage in terms of access to political, social and financial capital and their ability to bear risk...[and] all that is known about the way in which power is exercised in rural Bangladesh'[4]. Others benefiting from shrimp production as a whole include absentee landlords, urban entrepreneurs, government officials and political elites[4a].

A recent (2001) study found that the 4% of households with over 3 ha derived the majority of direct benefits from shrimp cultivation, while the 41% of landless households derived just 2%. Although landless farmers appear to have the highest net returns per hectare (in part due to their efficient use of inputs and the low costs of labour and fry which many collect themselves), they form a smaller overall proportion of the shrimp producers. The landless accounted for 60% of the households interviewed for the study, but operated only 2% of the area under shrimp cultivation[4].

A 2001 study found that the income from shrimp culture (rather than the shrimp sector as a whole) was highly skewed in favour of the relatively rich, who have a mean annual income of Tk 105,000 (US$1,830) while the very poor have a mean annual income of only Tk 9,920 (US$170). The same study found that 84% of the very poor derive no income at all from shrimp culture[5].

A further study found that the rich control about 15 times more land (not only shrimp ponds) than do the poor; about 71% of the very poor didn't con-

'It seems certain that the rich are getting richer as a result of prawn farming.'

DR NESAR AHMED, BANGLADESH AGRICULTURAL UNIVERSITY[2].

'The resultant distributive injustice has aggravated income erosion and income inequality, which in turn has accentuated social as well as economic disempowerment of the local people. Thus, it is the poorest segments of the local people are the hardest hit by changes brought about by the introduction of shrimp culture.'

UNITED NATIONS ENVIRONMENT PROGRAMME, 1999[2]

trol any land at all[5]. The same study found that whilst the very rich earn 58% of the total income from shrimp farming, the very poor earn only 8% – as the study notes: 'It is distinctively clear that the rich and influential control the shrimp farms'[5].

A similar situation exists for *golda* production – a recent thesis stated that, taken as a whole, the majority (81%) of *golda* farmers interviewed had improved their living conditions through shrimp farming. However, one-third of those with small farms (less than 0.21 ha) did not see any improvement in income and 20% of the small and marginal farmers reported increased hardships since turning to aquaculture. Although clearly a minority, these figures nevertheless illustrate that for the poorest members of society, conversion to an industry with high risks can result in a state of increased vulnerability[1]. The same study found that over 50% of farmers who cultured *golda* in leased *ghers* were worse off financially as a result of shrimp aquaculture: due to rising costs of leases at a time of falling returns from *golda*. Almost all of the *golda* farmers had experienced decreased returns due to rising costs of inputs including feed and fry[1].

Increasing vulnerability

Shrimp culture can be a risky business with cycles of boom and bust brought about disease, self-pollution of ponds and the vagaries of the international marketplace. Unlike more traditional agricultural practices that are more reliable sources of income, shrimp culture can leave farmers in a vulnerable position. A recent study found that many poor farmers obtain loans from moneylenders in order to construct *ghers*. Interest rates can be as high as 20-25% per month (annual interest can be as much as 120-180%[5]), and farmers are often forced to use their principal asset – land – as their collateral. In some cases, poor harvests force farmers to default on their loans, risking their lands[1]. As one farmer stated, 'I feel very afraid after taking a loan from a moneylender. If I fail to get a good crop of prawns, I will have no profit. I have sold all our assets. If the prawn crop is lost, I will lose everything'[7].

Golda production fares no better, indeed problems have been exacerbated due to escalating production costs. A recent study found that many farmers were heavily indebted to traders and middlemen, and reported that increasing costs, a high level of debt and an almost total lack of technical assistance has left many of the smaller and more marginal farmers who had taken up *golda* farming in a state of increased vulnerability[1]. The report noted that, 'the debt assumed in order to finance prawn cultivation, accompanied by the disposal of assets, can place these small and marginal farmers in a position of extreme insecurity, especially in the initial years after converting their land to ghers. For those that do manage to enter, the declining profit margin over increasing production costs may mean that it will be even more difficult to break out of the debt cycle and that risks of falling into poverty may increase'[1]. The report further remarked that food security may be an issue for these marginal farmers, especially for those who had turned rice fields into *ghers*[1].

For many of the most marginal farmers and landless who do not own their land, the situation has become increasingly difficult due to the increasing land prices and competition associated with increased demand for land on which to culture shrimp. One recent study reported that land values in Bagerhat district had increased six times since 1987 due to *golda* farming; and land that would have sold for between Tk100,000 and Tk150,000 (approx. US$2,000-3,000) in 1994-1995 was worth around Tk475,000 to 500,000 (US$9,896 to 10,417) in 1999[1].

Increasing land value has also meant that areas of *khas* land and private land that would previously have been available to the poorer members of society for grazing their cattle have been used for shrimp culture – 'today, most of these lands have been turned into shrimp farms by using muscle power or manipulation. The rich and influential control these lands'[5]. The loss of sharecropping opportunities and availability of *khas* land has affected the landless and marginal famers disproportionately[4].

'The first year of prawn (golda) farming is the period of greatest insecurity for small and marginal farmers, because assets such as cows, gold jewellery, and timber are sold, loans taken out, and rice crops foregone in the rush to gher construction and operation. As a result of this many of them actually become poorer, or at least potentially more vulnerable.'

Md. Faridul Islam, Bagerhat Sadar Thana Fisheries Office[1]

BELOW: *Many small farmers cannot afford the initial investment in shrimp farms: for those who can, conversion to an industry with such high risks can leave them vulnerable.*

© Williams / EJF

'All of the studies point out that shrimp farming leads to changes in land-use patterns, thus affecting traditional agricultural activities and practices. The situation is aggravated as major beneficiaries of shrimp farming are non-local entrepreneurs who do not have a long-term stake in the development of the local community. As a result, sharecroppers whose livelihood[s] traditionally depend on the leasing and renting of cultivatable land are deprived of access to the major productive resource and become unemployed. Furthermore, traditional economic activities like cattle grazing, poultry keeping, household vegetation and social forestry are no longer possible in many areas which have been under shrimp cultivation for relatively long periods of time.'

UNITED NATIONS ENVIRONMENT PROGRAMME, 1999[2]

Less rice

Thousands of Bangladeshi subsistence farmers have suffered declines in their income as a result of the voluntary or forced inundation of their rice paddies or by salinisation of their agricultural land from neighbouring shrimp ponds. The establishment of farms has forced large numbers of people away from both their land and source of livelihood. An estimated 120,000 people have been reportedly driven from their farmland in the Satkhira region alone[10], either due to declines in food or under direct pressure from shrimp farming interests. In just 6 years, 30-35 families were found to have been displaced from their land in one sub-district of Satkhira where rice production fell from 40-45 mon / acre to just 7 mon / acre following the advent of shrimp aquaculture[11].

One recent study found that 87% of farmers interviewed reported declining rice yields; contrary to the claims made by the defenders of shrimp culture on economic grounds, the average income was found to be 30-45% lower in these villages than in non-shrimp villages [4]. Another study provided estimates of financial loss to poor rural households in southern Bangladesh subsequent to the introduction of shrimp cultivation as a result of declines in rice productivity, loss of poultry and livestock, and erosion of homestead vegetables and social forestry. The study estimated that post-shrimp income levels of poor local households were only 62% of the pre-shrimp level[7].

As a result of shrimp aquaculture development, the most marginal farmers appear to be becoming poorer and uprooted from their traditional lands and livelihoods. Although some jobs have been created in pond preparation and maintenance, fry collection, harvesting and processing, shrimp farming is a capital rather than labour intensive industry, and has caused a net decline in employment through the displacement of labour from agriculture-related activities[12].

Some of the jobs created (such as farm guards) are deliberately given to outsiders, due in part to the conflicts of interest between local communities and shrimp farmers[8,12,13,14]. Recent surveys revealed that guards comprise 50% of the total labour costs with the remaining employment for locals standing at just 40 man days work /ha/year. This contrasts with the labour demands for transplanted *amon* rice which typically requires 137 man days/ha/year. As the number of workers is high compared to the number of jobs, the wage rate is also reported to have fallen compounding the problems[14,15]. While shrimp fry fisheries have undoubtedly provided a source of income for a large number of rural poor (see below), it should be recognised that many of these people became fry collectors because they were deprived of an alternative following the onset of shrimp farming in their locality. The numbers employed in fry fisheries does not necessarily represent a net gain in employment.

Some displaced farmers have found limited alternative income and employment as brickmakers, rickshaw drivers, and unskilled labourers. In areas around the Sundarbans, others have resorted to the collection of honey, fuelwood or other forest products, often illegally[11,16]. For many, such a transition represents a reduction in quality of life and loss of liberty. Others have migrated to urban areas in search of work, or due to harassment by shrimp farmers[14].

'In the shrimp enclosures, all the upper level staff as well as security personnel are outsiders. Local people who are engaged for maintenance of dikes and weeding amount to less than 5% of the available unemployed people who have lost their occupations because of shrimp cultivation. In the shrimp depots, only the menial jobs are given to locals.'

ÅSA WISTRAND, THE SWALLOWS, SWEDEN[14]

ABOVE: *Thousands of Bangladeshi subsistence farmers have been affected by the loss of traditional agricultural opportunities.*
© Williams / EJF

BELOW: *'My old life was a good life, what I have now is not a life at all'[18]: 35 year old Bimal Krishna Mondal, of Munshiganj village, Satkhira used to work as a farmer, with some land of his own, and some land on which he was a sharecropper. Following the loss of his land to shrimp aquaculture, he is now unemployed for most of the year.*
© Williams / EJF

Changes in rural livelihoods[4,14]

Agriculture

Previous Economic Activities Agricultural work was carried out on farmers own lands as well as on those of others, with opportunities for rural communities to work in ploughing, planting, harvesting, threshing and other related work.
Impacts of Shrimp Cultivation Job opportunities have been drastically reduced due to reductions in agricultural land and productivity declines associated with water-logging and increased salinity. Crops substituted, depression of rice yields, reduction in the amount of land share-cropped.

Cattle / Livestock rearing

Previous Economic Activities Cattle were owned by the majority of rural households. Families had additional income from the sale of milk, calves and cow dung for fuel. Animals were available for sacrifice for holy festivals.
Impacts of Shrimp Cultivation Reduction in grazing land and in crops used for cattle fodder. Together with salinisation / pollution of land and water, this has led to increased cattle disease and mortality, reducing food security and opportunities for income generation for many rural farmers. Cattle declines are particularly detrimental for children's nutrition, in terms of reduced availability of both milk and meat, while the reduced availability of dung fuel has also resulted in less frequent boiling of water, reportedly with associated increases in water-borne disease.

Poultry rearing

Previous Economic Activities Poultry were traditionally kept by many families, with women earning supplementary income from the sale of eggs and chickens.
Impacts of Shrimp Cultivation As with cattle, poultry have suffered increased disease and mortality due to salinisation / pollution of land and water. In addition, some shrimp cultivators have banned poultry keeping (especially ducks) around the farms due to fears that they will eat the shrimp. Food security, health and income, particularly for women affected.

Homestead farming

Previous Economic Activities Rural households cultivated vegetables on homestead lands, selling the surplus after meeting household needs.
Impacts of Shrimp Cultivation Declines of homestead vegetables have been reported in many areas due to inundation of land with water and increased soil salinity . Food security, nutrition and income generation all affected.

Fishing

Previous Economic Activities Fishing provided food and a source of income for many rural families, particularly for the poorer sectors of society and landless communities.
Impacts of Shrimp Cultivation Salinisation of fresh water bodies has altered species composition, while significant levels of by-catch associated with shrimp fry fisheries and destruction of wetland habitats have impacted biodiversity and capture fisheries. In addition, access to traditional fishing grounds has been restricted by shrimp pond development. Use of snails to feed *golda* shrimp has removed an important food source for many fish species, and reduction in snail populations is thought to have led to increased levels of pollution in inland waters. Reduction in availability of fish has serious consequences for food security and health of rural communities.

Handicraft manufacture

Previous Economic Activities Weaving mats from flower stems of *meley* marsh grass traditionally provided a source of income for many women in coastal areas.
Impacts of Shrimp Cultivation Declines in *meley* following shrimp aquaculture development has left thousands of women unemployed.

After Wistrand, A. 2002. Bangladesh chapter, in *Blues of a Revolution,* in press [and from[48]].

Weighing up the Costs

'As output from this industry is consumed primarily in export markets, the degradation of the Bangladesh environment in affected regions remains a local externality whose costs go unaccounted for in consumption markets.'

United Nations Environment Programme, 1999[2]

ABOVE: *It is critical that a full economic analysis of shrimp production, taking into account both the environmental and social costs, be carried out in Bangladesh.*

It is crucial that a full economic analysis, taking into account both environmental and social costs is undertaken in Bangladesh. However, it must be recognised that some of the social costs associated with shrimp aquaculture development cannot be measured in simple monetary terms.

Whilst it is true that economic benefits are accruing to Bangladesh, these are unevenly distributed – the richest, predominantly urban dwellers are the biggest beneficiaries whilst the landless, the poorest and most vulnerable in rural society are all too often having their livelihood options reduced . It appears that some of the support voiced for shrimp farming is due to the lack of any alternative[13].

Even where there is a recognisable increase in household incomes, it is difficult to quantify whether this is in itself contributing to proportional improvements in living standards. One study of a shrimp producing area concluded that a large number of the population did not have access to safe water for drinking, bathing, washing and cooking as the high salinity makes it difficult to sink tube wells and women have to fetch drinking water over long distances. Malnutrition was found to be increasing due to the lack of vegetables, fishes, fruits, eggs and milk. Working women, their children and young girls were cited as the greatest victims of these problems[23].

Furthermore, there is a dearth of research into the true economic cost of reduced productive potential from livestock, fish or poultry, rice, vegetable, fruit and other crop production, or fuel supplies, and nor is the removal or reduction of labour opportunities – especially for the landless – accurately calculated.

Traditional safety nets have broken-up – surplus food or land that could satisfy some groups during lean periods have now disappeared and rice must be purchased from markets rather than borrowed from patrons. The reliance on a market for rice – the staple food – and other products has created a feeling of over dependence and insecurity[13]. A 2001 study (of a shrimp producing area) found that calorific intake was lower than the national average with lower nutritional food values despite an increase in income derived from shrimp related activities[23]. Women who were able to make some income from poultry, livestock or home gardens or *meley* weaving have been particularly placed at risk. Furthermore, growth of the cash economy has been responsible for an increase

Undervaluation of wetlands

For years there has been a trend of profound under-valuation of natural wetlands[25]. A recent analysis of a mangrove system in Thailand revealed that conversion for aquaculture made sense in terms of short-term private benefits, but when benefits of mangrove cover including timber, charcoal, non-timber forestry products, offshore fisheries and storm protection were considered, the total economic value of the intact mangrove exceeded that of shrimp farming by 70%[26,27].

in the dowry market and has reportedly contributed to increased violence against women[24].

Finally, it can be argued that the rapid accumulation of income by one group of people has led to a destabilization of society and a loss of age-old values[24]. Quality of life issues related to the diversity of income sources and products derived from communal lands, health and nutritional wellbeing have been neglected. Social prestige and respect now depend upon how much money a person has rather than their land, kinship bondages or family heritage. Although these changes are not uniquely linked to shrimp cultivation, 'the pace of these changes in the shrimp cultivation area are arguably way faster that that of the rest of the rural Bangladesh'[24]. Human rights abuses have been strongly linked to the growth of shrimp farming and communities clearly identify the increased power and corrupt practices as a direct result of the concentration of finance in the hands of a few[13]. As one study puts it, 'in the past some private or khas land were left vacant in every village for grazing cattle and public use. Today most of those lands have been turned into shrimp farms by using muscle power or manipulation. The rich and influential control these land [sic]'[5].

Rather than offering a universal panacea to assist rural development, the onset of shrimp aquaculture appears to have led to both greater income disparities between rich and poor and exacerbated social instability, including the breakdown of family and rural communities[11] and conflicts.

'Only a few individuals, companies and institutions have benefited from shrimp culture. On the contrary, because of mangrove destruction and shrimp culture the local environment and livelihood means of the local people have been greatly damaged, human habitations and agricultural fields have become more vulnerable to tidal surges, the livestock has much decreased, resulting in reduction of milk, milk products and animal protein, the local fish species have largely decreased and some have disappeared altogether.'

PHILIP GAIN, SEHD, BANGLADESH[28].

Postscript

Although violence, social problems and other abuses are by no means exclusively linked to shrimp production, it is worth noting the predominance of incidents – including brutality towards shrimp farmers and labourers – that are linked in some way to shrimp production and its lucrative nature. To give a snapshot of the situation, the following headlines appeared in a number of newspapers in southwest Bangladesh over a 6-week period (June-July 14th, 2003)[25].

6 June *Daily Shabok*. Land grabbing in Morelganj increasing. Influential people using armed thugs to grab small *ghers* after a UP election. Complaint made to local MP but no action was taken.
8 June *Daily Star*. Continued fry collection due to lack of alternative jobs.
8 June *Daily Purbanchal*. Shrimp farm owner killed in Badokhali, Bagerhat. Brother claims he was murdered so his farm could be occupied.
9 June *Gramer Kagoj*. Shrimp businessman attacked for refusing to pay extortion money.
10 June *Daily Purbanchal*. Rape of young women in Asasuni by shrimp farm owner.
29 June *Daily Star*. Shrimp farmer shot dead in Tala, Satkhira for failure to pay Tk1 *lack*.
30 June *Daily Janmovumi*. Shrimp farm labourer attacked and Tk1 *lack* stolen from shrimp farm in Bagerhat.
4 July *Daily Sebok*. Firearms and ammunition seized from a shrimp farm in Rampal.
10 July *Daily Sebok*. Court cases filed by widow against 10/12 persons for the murder of Yakub, a shrimp farmer.
10 July *Daily Purbanchal*. Fries worth Tk100,000 looted from a shrimp farm in Rampal upazila
12 July *Daily Sebok*. Gang fired at Abdul Malek, a shrimp owner, Phultala upazila.
14 July *Daily Sebok*. No arrests following the murder of shrimp farm owner in Phultala upazila.

As Professor Abdul Hayes (Professor of Economics at Jahangirnagar University, Bangladesh) recently noted, 'Everyday on average, one incident of death or other crimes are reported to take place in greater Khulna to drive home the point that deaths and dollars have unfortunately become a regular phenomenon. The government should take the situation very seriously before the vital sector gets sick when, perhaps, deaths will occur but dollars would flee.'[26]

BELOW: *The full economic costs of reduced agricultural productivity and loss of labour opportunities must be considered.*
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PERFORMANCE BONDS

The potential for their implementation in the shrimp farming sector in Bangladesh

Background

Theory is one thing: implementation is another. Good governance and financial infrastructure are the key to implementation.

Performance bonds are used successfully in the United States, Canada and Australia in the strip mining industry. In Sweden they are applied to oil tankers to reduce the risk of oil pollution. To date, however, performance bonds have not been successfully implemented in a developing country.

Experiments have undertaken in the tropical forestry sector, for example in Cameroon, the Philippines and Indonesia. However, in none of these cases can they truly be said to have succeeded.[1]

In Cameroon and the Philippines, the problem was governance. Loggers considered the bonds merely an additional tax, since governments were reluctant to pay back the money regardless of the loggers' behaviour.[2] In Indonesia in the early 1980s the level of the bonds was set too low. Forfeiting was less costly than complying with the bonds' conditions; therefore they were compromised as an environmental incentive. Furthermore, it can be argued that the Indonesian examples could not actually be termed performance 'bonds', since they were not interest-bearing instruments. They were straight deposits, held in an escrow account.[2]

ABOVE: *Performance bonds could play an effective part in a suite of measures to promote sustainable shrimp farming.*

Bonds in Bangladesh

In the context of Bangladesh and shrimp farming, prospective shrimp farm developers and processing plants or even exporters could be required to make an upfront payment that would be redeemable only if agreed environmental and social criteria were adhered to.

This immediately raises various questions:

- Who would be required to pay the bond?
- What criteria would be specified?
- How would monitoring take place, and who would be responsible?
- Who would monies be paid to, and how would they be administered during the term of the bond?

In brief, how could the whole process be implemented, taking into account Bangladesh's endemic problems of corruption, its weak financial infrastructure, and the staggering number of small shrimp farms that currently sprawl across the country's coastal zones?

Despite the potential obstacles, it is worth considering the use of performance bonds in Bangladesh. In the right conditions, and with the right modifications, they could play an effective part in a suite of measures to promote sustainable shrimp farming.

Implementation

Who would pay?

At which stage of the production chain should the bonds be applied – to the farmers, the processing plants, – or even higher up the chain? Performance bonds are (at least in theory) a practical enforcement of the 'polluter pays' principle. The chosen stage of the chain of production at which they are applied is a real-world reflection of who is perceived to be responsible for social and environmental sustainability. It is not inconceivable therefore that a form of performance bond could be applied to exporters, (or even importers in consumer countries), to give a concrete monetary incentive to take an interest in what happens downstream[3].

EJF believes the application of performance bonds (alongside certification schemes) to processors – requiring them to source shrimp produced to specific standards – should be given the most serious consideration. However, the most obvious level at which to apply a performance bond remains the farmer. One of the great strengths of performance bonds in industries such as strip mining, where contractors are huge corporations, is the very fact that money is put up at the start of a project (so that it is readily available for restoration work if damage is caused). In the Bangladesh situation though, before the sale of their shrimp harvest, thousands of small farmers simply would not have the money available to pay a performance bond.

Problems of Scale: Co-operatives

Aside from the payment problems implied by small, individually owned farms, such bonds would also be practically impossible to monitor. One potential solution here would be for individual farmers to organise into co-operatives. The co-operative could then jointly pay one bond, and be monitored as a whole.

Bangladeshi society has experience of co-operatives through the numerous micro-credit schemes operated by NGOs (since the idea was pioneered by the Grameen Bank in the late 1970s). Co-operative shrimp farming has been piloted by at least 2 NGOs, and if this could be expanded, it could have important implications for the implementation of performance bonds.

BELOW: *Environmental and social criteria need to ensure that farmers act in accordance with terms of industry codes of conduct.*

Criteria

Social and environmental criteria for performance bonds should be along the same lines as for certification schemes. They need to be relatively easy to monitor, but basically should aim to ensure that farmers act in accordance with the terms of agreed industry codes of conduct.

Performance Bonds vs. Certification

Performance bonds are an obligatory measure that must be applied to all developers in a given sector. Certification schemes are voluntary schemes that producers can choose to sign up to. Although both are very similar in many respects, it may be appropriate to recommend a two-tier system using both, in which farmers (above a certain size or productive capacity) along with processors and exporters lodge a performance bond and could then choose to join a certification scheme.

The comparison between performance bonds and certification is interesting. Certification is black and white: either you are approved, or you are not. If you are not, you are blocked from access to the certified market. A performance bond with a grading say from 1 to 10 of quality of compliance, would put less pressure on the producers. A farmer would get a certain amount of his bond back depending on how well he had complied, and the money withheld would be used to restore damage caused by malpractices – but the advantage is that farmers not capable of achieving the very high standards required for certification would still be able to sell their product.

The other clear advantage of performance bonds over certification is the potential benefits of creative use of the interest earned.

Environmental performance bonds consist of up-front financial payments by a company or operator prior to the commencement of project activities. These 'bonds' or guarantees are then returned to the company at the end of the project if certain predetermined environmental performance standards are met. If not, the performance bond can be used to fund appropriate environmental mitigation measures, or other environmental schemes. Such bonds are generally held on deposit by appropriate government departments or agencies.

Various sophistications can be added to this basic formula. For example, performance bonds could be used to capitalize endowment funds the interest on which is used to finance environmental projects over the short-term. Alternatively, interest from the performance bonds can be used to fund field inspections of the bound company's activities, which, if favorable, could result in periodic partial refunds of the bond over the length of the project cycle.

Governance and Monitoring

To avoid internal problems of governance and corruption, bonds could be lodged with an independent, international third party. Aside from ideological objections to this idea (that it is not the place of the international community to impose conditions on a national government over the use of it's own resources), there are practical restrictions. To lodge funds at an international level would require inter-governmental agreements / conventions which are hard to come by.[3]

It would be feasible however, that the international donor community could help the Bangladeshi government to administer the funds in a transparent way, ensuring they remain ring-fenced and used for the purposes intended. Bond monies could be paid into a segregated fund, and any income could only be used for development purposes in shrimp farming areas. The Bangladeshi government could hold the account, but could agree that an independent third party could take charge of monitoring. It is in activities of monitoring that the international community is really essential.

'Where … internationalisation could be particularly useful is in the decision of whether a bond should be forfeited. If a forest lessee has misbehaved, and should by rights lose his bond and his licence too, and if it is the forestry department which must make the decision, then the lessee will exert enormous pressure on the department to turn a blind eye. An international organisation would be more objective. It could either itself monitor the situation in each concession by means of periodic missions, or it could make use of one of the big international inspection firms like SGS (Société Générale de Surveillance) or Veritas.'[4]

Term of Bond

Implementation in the context of shrimp farming has the further obstacle that there is no obvious time period after which to return the bond. However, EJF considers that it would be possible to work within a time-frame.

Conclusion: Consumer demand

Performance bonds, properly implemented, can benefit all parties involved, particularly through reinvestment of income from the funds. However at the introductory stage, they will provoke resistance from both farmers and government, and will require political will and strong donor encouragement to be effective.

Following the 1997 EU ban on hygiene grounds, Bangladeshi processors managed to successfully implement improved hygiene measures. If consumer demand were directed toward sustainably produced shrimp – witnessed by bond performance and certification – then it seems reasonable to propose that these mechanisms would work.

Ultimately the costs of the bond (such as monitoring) should be paid by the consumer. Until consumers want to pay more for their shrimp, performance bonds will remain nothing more than a good idea.

ABOVE: *Initially, introduction of bonds will require political will and strong donor encouragement. Ultimately, the costs should be paid by consumers.*

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CONCLUSIONS

'The whole history of shrimp cultivation [in Bangladesh] shows a severe lack of policy and direction. There appears to be no distinct policy as regards shrimp culture. Everything is being conducted on an ad-hoc basis, and decisions are left in the hands of local bureaucrats.'

Ashraf-Ul-Alam Tutu, Coastal Development Partnership, Khulna[1]

Shrimp farming has had direct and significant negative impacts on rural communities in coastal Bangladesh. All too often shrimp culture has failed to assist the poorest in Bangladeshi society and has encouraged corrupt practices, environmental damage, social disruption and human rights abuses.

This export-driven industry brings substantial foreign capital into Bangladesh but this has failed to generate much-needed economic returns or tangible assets such as schools, sanitation or healthcare in the communities and areas where shrimp farming takes place. On the contrary, it has increased the gulf between rich and poor and for many the onset of shrimp farming has led to a diminished quality of life.

Shrimp farming has not been driven by the need to provide food for the hungry, but as a cash crop for an export market. It has undermined local food security and limited livelihood options where they are most at risk. Shrimp farms have caused land prices to increase, compromising the most vulnerable – the poor and landless.

The average size of shrimp farms has fallen – itself seen as a desirable outcome of the donor community's intervention in the sector – but this does not overcome the fact that access to land is a pre-requisite for engagement in the sector, thereby excluding many of the most vulnerable and impoverished communities. Collecting fry to stock shrimp farms is one of the few means to derive a livelihood, yet this is ecologically unsustainable and brings with it a range of social and health problems. Ironically, for many, fry collection is one of the few alternatives once access to government-owned *khas* land is gone.

Whilst importing nations have moved quickly to protect consumers at home from health threats posed by poor production methods and insanitary processing plants, the very same importers have failed to require controls and standards necessary to ensure environmental protection or social equity.

Despite the potential for large, quick cash profits from the shrimp industry, a reliance on international trade that is itself subject to the vagaries of fluctuating exchange rates, consumer taste and competition from other suppliers will leave Bangladesh in a vulnerable position. As in other countries, shrimp production may be doomed to a cycle of boom and bust with all the social and economic problems that may entail.

Governance of the sector is woefully poor and corruption associated with the industry permeates government and industry alike. This poses serious problems as regulations and legislation are applied partially and unevenly across the entire sector.

Communities rarely have any real stake in the management of the natural resouårces upon which they depend and little confidence that their interests are served by authorities. Few avenues exist for conflict resolution or to address the concerns of local communities affected by shrimp farms. Corruption continues to ensure that the law offers little recourse to the poor and little deterrent to the rich.

Crucially, the lack of any clear national policy or planning and effective, uniform implementation of laws compromises the industry at all levels, further encouraging corrupt, unsustainable and inappropriate practices.

Despite the plethora of problems and abuses widely known to be associated with shrimp farming in Bangladesh, the industry has received substantial financial support from the multi- and bi-lateral donors. The desired objectives for such aid have commonly failed to materialise. A compelling argument exists for a fundamental restructuring of all aid and development assistance to this sector.

This report concludes that root and branch reform of the industry and the mechanisms that regulate it is required. Environmental security and social equity must be put at the heart of such reforms. Development aid within the sector needs to be much more carefully directed toward assisting the poorest, especially women, children and the landless. Greater and more effective consultation with local communities should be undertaken in developing programmes. Assistance should, in the first instance, be focussed towards alternative livelihoods for fry collectors and towards community based natural resource management. Development aid generally needs greater conditionality designed to improve governance and tackle corruption. All aid and assistance to the sector should be thoroughly reviewed in this context.

RECOMMENDATIONS

General Recommendations

In light of the evidence presented in this report, it is urgent that all relevant parties should:

- Acknowledge that there is substantial evidence to suggest that shrimp aquaculture in Bangladesh may have serious negative environmental and socio-economic impacts with serious implications for sustainable development and food security, social well-being and human rights, biodiversity conservation and natural ecosystems.
- Recognise that large areas of agricultural land and wetland have been converted for use as shrimp ponds and that this has had direct impacts on the health and livelihoods of local farming and fishing communities.
- Recognise that the industry has been associated with serious human rights abuses and unacceptable working conditions.
- Recognise that there are serious concerns over the sustainability of shrimp aquaculture as currently practiced.
- Recognise that alternative livelihoods – including those that existed prior to the onset of shrimp farming – can provide significant employment and income opportunities and make a substantial contribution to rural development.
- Recognise that costs have not been internalised within the industry, that the full costs of aquaculture remain unquantified and that there is an urgent need for a full economic analysis of this industry.
- Recognise that the economic benefits and considerable foreign currency earnings of the industry are not evenly distributed; shrimp aquaculture appears to be leading to increased socio-economic differentiation, reducing the livelihood options of the poorest members of society while increasing the wealth of a marginal minority.
- Acknowledge that commercial shrimp aquaculture can be associated with high levels of risk, and that it is vulnerable to changes in market forces over which Bangladesh has no control.
- Ensure the development of aquaculture in a manner that is compatible with the social, cultural, and economic interests of coastal communities, and ensure that such developments are sustainable, socially equitable, and ecologically sound.
- Ensure that the precautionary principle is applied to every step of shrimp production.

OPPOSITE LEFT: *Barbed wire fence around shrimp farm sited on* khas *land in Noakhali. Social equity – including the protection of traditional rights to* khas *lands – together with environmental security must be made central to shrimp production in Bangladesh.*

The Government of Bangladesh

Ultimate responsibility for the development of shrimp production lies in the hands of the Government of Bangladesh which should undertake immediate, robust measures to ensure that shrimp farming is environmentally and socially sustainable. The Governnment should:

- Develop and implement a national policy to ensure sustainable shrimp production which reduces or eliminates the direct adverse environmental and social impacts associated with production. There is a strong need for more holistic strategies and planning and for greatly improved coherence between the policies to protect environmental and social needs. The policy akin to a 'Sustainable Shrimp Production Act', should encompass both wild-caught and farmed shrimp, including shrimp fry fisheries, broodstock fisheries, and artisanal and commercial fisheries for adult shrimp.

  Such a national policy must be developed in the light of full consultation with stakeholders and civil society groups. It must also incorporate the necessary enabling legislation and appropriate mechanisms to ensure that policies are implemented and laws enforced equally across Bangladesh. Such a policy should also aim to increase inter-agency coordination in the management of coastal and marine resources and strengthen institutional capacity for sustainable use of coastal resources[1].

- Enforce existing regulations. There are a number of regulations which, if properly implemented and enforced will go some way towards reducing some of the environmental and social concerns associated with shrimp farming. These regulations must be made law and be properly enforced with clear penalties for infractions.

- Reiterate commitments to implement the FAO Code of Conduct for Responsible Fisheries (Article 9 urging responsible aquaculture development) by encouraging better practice and adoption of robust and effective national legislation, policies and codes of conduct for sustainable aquaculture.

- Introduce and implement new laws to cover areas identified as needing further regulation. These should include:

  a. Shrimp aquaculture development in, or negatively affecting, mangroves, wetlands and other ecologically sensitive areas should be prohibited and such prohibitions enforced with clear penalties for infractions. Farms in areas previously covered with mangrove forest should be required to replant and restore degraded mangrove areas over a certain proportion of their land area

  b. Licensing should be conditional on a favourable environmental and social impact assessment for shrimp farms above a certain size. The potential for sector-wide impact assessments should be explored in light of the fact that collectively farms may create synergistic problems that may not be apparent or remedied at farmlevel alone. This recommendation is inline with the FAO Code of Conduct for Responsible Fisheries (Aquaculture), which requires States to establish procedures for Environment Impact Assessment (EIA) and monitoring to minimise adverse ecological changes and related social and economic consequences (resulting from water extraction, land use, discharge of effluents, use of drugs, chemicals and other activities).

c. Stringent regulations regarding the use of chemicals in aquaculture should be formulated and enforced.

d. Prohibiting and preventing pollution and salination of agricultural land and freshwater supplies.

- Strengthen property rights by expanding land registration and titling together with measures towards land reform that include greater access to *khas* land.
- Identify and clearly demarcate suitable – and unsuitable – areas for shrimp cultivation to improve land use planning, minimise conflicts over land tenure and usage and protect ecologically sensitive areas. There is a need to undertake an extensive survey of the geographical and environmental features of the coastal zone (topography, tidal fluctuations, salinity, soils, existing land use and social needs etc) to provide a comprehensive overview that will enable clear decision-making and dialogue between government and all stakeholders. Shrimp production should be centred around CBNRM, within an integrated coastal management plan; and management of coastal resources should include participation of all stakeholders.
- Land-use zones need to be identified, recognised and protected in law and these laws must be enforced. Zoning must also be tied to awareness and educational programmes amongst stakeholders.
- Examine the need for licences to be granted by a new, independent agency rather than by the Upazilla / District Shrimp Resource Development and Management Committees in order to reduce the potential for corrupt or biased practices. Efforts should be made to increase stakeholder participation in these committees or any new agency.
- Establish and support an independent complaints resolution mechanism to enable communities to report on problems and gain peaceful resolution to concerns.
- Implement education and awareness programmes for local communities and for shrimp producers to ensure that regulations are adhered to, better practices adopted, and alternative livelihoods promoted. Such an educational programme could effectively promote the legislative rights and responsibilities of coastal communities and improve their access to the judicial process. Awareness raising of the importance of wetland ecosystems together with greater understanding of best practice and alternative livelihoods should be carried out by the media, NGOs, government institutions, mosques and temples and schools.
- Examine the potential for introducing performance bonds as mandatory tools for all farms over a certain size.
- Reduce and/or remove subsidies, tax holidays and other incentives that serve to distort the production of shrimp by conferring an artificially favourable economic climate on producers and processors.
- Introduce and effectively implement economic instruments and fiscal incentives including land use taxes for shrimp farms, effluent charges on pollutants (where applicable) and soil conservation funds that will better reflect the true economic costs of shrimp cultivation. Soil conservation funds could provide loans in support of more environmentally sound technologies to reduce salinity and water-logging.
- Establish an eco-restoration fund with contributions from fees and taxes on earnings of shrimp producers, processors and traders. The fund must be administered in a transparent and highly accountable manner and funds used to provide compensation to those whose livelihoods have been damaged by shrimp culture and for restoration and protection of wetland habitats and agricultural lands.
- Increase stakeholder consultation in the development and regulation of the shrimp industry and promote transparency in decision-making.

Alternative Livelihoods

The development and promotion of viable alternative livelihoods should be prioritised. Research should be undertaken into the range of livelihood options that existed in coastal areas prior to the onset of shrimp farming, as well as into new income-generating projects and marketing opportunities that specifically benefit the poorest sectors of Bangladeshi society. Village level farming projects should be encouraged in order to diversify local food sources and income generation; these could include: production of fishing traps and gears; *hogla* and mat making; bee keeping and honey collection; coir industry; tree planting; horticulture; tailoring and knitting; oyster and crab cultivation; cultivation of *meley* (marsh grass); cultivation of *golpata*; poultry and duck rearing; and handicrafts. In many areas, improved access to common resources will be required to enable fry collectors to switch from catching fry to other forms of livelihood, and it must be recognised that land tenure and reform are crucial to this issue on all levels.

The International Donor Community

The rapid and poorly-regulated expansion of shrimp production has been supported by the international donor community who have a responsibility to support the move towards sustainable and equitable production methods. Much emphasis has been placed on developing the needs of those within the shrimp industry, however this does not encompass all of the rural stakeholders who are affected by shrimp, particularly the rural poor and landless communities who are facing reduced livelihood opportunities in the wake of shrimp farm expansion. The international donor community should therefore:

- Undertake an independent review of the impact of donor funding to shrimp production taking into consideration the costs and benefits to the environment, communities and national development. This should involve a comprehensive consultation with civil society organisations and the communities that have been affected by shrimp culture.
- Support the development of a comprehensive national policy on shrimp that has as its goal socially and environmentally sustainable and economically viable shrimp production.
- Target landless and coastal communities for support and redirect aid and development funds towards maximising local poverty alleviation and long-term environmental and social benefits and ensuring food security at local levels.
- Give greater recognition and support to the livelihoods that were pursued before shrimp cultivation became established.
- Develop alternative livelihoods and assist with the marketing of products in Bangladesh and overseas. Specifically, develop and facilitate transition to alternative livelihoods for individuals involved in shrimp fry collection, and those who have been displaced due to shrimp farming. Provide support and raise awareness of co-operatives and enhanced means to market products.
- Support independent, comprehensive cost-benefit analysis of shrimp farming vis-à-vis the alternatives that existed before the onset of the industry. This should take into account the employment lost when shrimp farms claim lands. Recognise many people have experienced reduced livelihood options as result of shrimp farming; some of these have found employment in the unsustainable capture of shrimp fry, broodstock and in other marine fisheries.
- Undertake rigorous cost-benefit analysis of the value of wetlands and agricultural land versus that of shrimp farms that incorporates all environmental, social and economic factors.
- Support greater governance of the industry via direct, targeted support to civil society organisations who can raise awareness of issues and alternatives and also serve to disseminate information relating to regulations, rights and responsibilities. These efforts should be viewed as a significant component to improve governance of Bangladesh's natural resources.
- Support the development of independent monitoring and reporting of practices by the communities that are affected by shrimp aquaculture to help ensure compliance with environmental and social laws and regulations. Support the development of an independent complaints procedure to resolve land use conflicts.
- Provide support to civil society organisations, independent legal agencies and innovative means for the dissemination of information on rights and responsibilities of rural communities affected by shrimp farming and their means for legal redress of dispute or complaint.
- Support the introduction and promotion of trade-related and market-based mechanisms such as performance bonds that can promote better practice within the industry and press for the removal of trade-distorting subsidies that have led to the expansion of shrimp aquaculture and processing.

'In a poverty-focused aid programme the ODA [DfID] should give careful consideration as to whether participation in shrimp farming projects provides an efficient means of targeting the less well-off members of a rural community. Indications are from this study that it does not'.

Recommendations of the Social Report on the Fisheries III Shrimp Component, produced for the Overseas Development Administration (now DfID), April1990[4].

- Prioritise the full participation of all stakeholders in any development and subsequent monitoring of shrimp aquaculture.
- Employ substantially improved standards (relating to human rights and social equity, economic viability and environmental sustainability and security) in the design, distribution and monitoring of lending and aid packages.
- Link financial assistance for the Government of Bangladesh to improved governance and regulation of the shrimp industry and natural resource management. Donors should encourage improved environmental, social and land-use legislation and robust mechanisms for implementation, enforcement and compliance. Financial penalties should be imposed for failures to achieve agreed standards while promoting incentives for achieving them. Encourage improvements to governance through the development and enhancement of effective government inspection capacity.
- Provide financial assistance for mangrove forest and wetland conservation, protection and restoration for the protection of coastal livelihoods.
- Support educational programmes to raise awareness of the social, environmental and economic benefits of wetlands amongst all members of Bangladeshi society; and support environmental education at all levels, with an emphasis on conservation through community based natural resource management.
- Support efforts to increase coordination among public agencies, and assist in the development of communication and information sharing among public agencies, NGOs and universities / research institutions.
- Explore the potential for supporting / setting up a fund which civil society groups can access to support legal defence and to bring legal cases where there have been infractions of human rights associated with shrimp production.

All parties should undertake the following recommendations in relation to :

1. Shrimp Fry Fisheries and Hatcheries

- Recognise that the expansion of shrimp fry hatcheries will reduce some of the demand for wild shrimp fry but that it will lead to a reduction or loss of livelihood opportunities for many who are currently engaged in fry fisheries who will need to find employment in alternative sectors.
- In place of the current total ban, implement spatial and seasonal bans and gear restrictions (for a recommended minimum of three years) to allow wild stocks to recover; these must be tied to parallel economic and social measures for fry catchers to transition to alternative livelihoods. Fry collection should be banned in certain ecologically sensitive areas such as the Sundarbans and other important migration routes and a seasonal ban should be put in place in all other fry catching areas from August to January. These bans should be applied to all intermediaries in the shrimp fry collection chain. Following the three year period of the partial bans, the scope for introduction of a full ban should be assessed.
- Introduce alternative livelihood strategies (outside the shrimp sector) immediately to ensure that a buffer exists for the marginalised communities, and target specific aid to women and children – ideally these should have been introduced prior to implementation of any bans on fry collection.
- Examine the feasibility of introducing a licensing system for fry catchers at times and in areas where shrimp fry collection is deemed acceptable.
- Promote improved catch and handling methods to minimise environmental impacts of fry collection and to reduce current high rates of fry mortality.
- Promote community based enforcement of fry collection bans and move

towards appropriate means to establish effective community based natural resource management (CBNRM) to enhance community support, deter corruption and increase chances of success of the bans.

- Support education and awareness programmes – education is vitally important to ensure the reasons behind fry collection bans are understood, increasing the likelihood of enforcement – for example, a 2001 survey found that the majority (69%) of respondents believed that fry catching was not harmful to the environment and did not kill other species in the process of sorting or catching fry. Environmental awareness should focus upon the ecological role of postlarvae, importance of nursery and recruitment grounds, migratory routes, and the impact of river-bank erosion; together with awareness of legislation and regulations.
- Discourage new entry into shrimp fry collection through education and promotion of alternative livelihoods.

2. Improved Hatchery-Produced Fry

- A certification scheme would improve farmer's perception of hatchery-produced fry, and technical support should be given to this end.
- There is also a need for rationalisation, improved coordination and dissemination among shrimp hatcheries. Currently, production capacity for *bagda* shrimp is reported to exceed demands, while there is an acute shortage of *golda* postlarvae – 90% of *golda* is currently obtained from wild sources, and the price was three times higher than for bagda postlarvae in 2001.
- There is an urgent need for improved methods of broodstock collection, and existing devastating harvesting methods should be phased out. Applied research into techniques for rearing farm-raised brood stock should be supported. Development of production unit's own breeding programmes should be encouraged.

3.Wild Capture Fisheries / Trawling

- Adopt a precautionary approach to the management of shrimp fisheries that considers all of the interacting fisheries affecting wild shrimp and other commercial or subsistence fish stocks.
- Strengthen the existing regulation of the shrimp trawler fleet. Seasonal and spatial bans on shrimp trawling must be effectively implemented and enforced.
- Reduce by-catch from shrimp trawlers to ecologically sustainable levels by enforcing requirements for by-catch reduction devices and turtle excluder devices; introducing operational changes such as trawling at slower speeds for shorter periods and avoidance of areas of high by-catch; and re-assessing means to strengthen the effectiveness of by-catch reduction techniques.
- Support research into the use of catch methods such as stationary nets and traps that are more ecologically benign.
- Urgent consideration should also be given to the temporary prohibition of all shrimp trawling in Bangladeshi waters in order for stocks to recover.
- Develop a plan of action to reduce the fishing capacity of commercial shrimp trawlers.
- Research is urgently needed into the ecological and social impacts of shrimp trawling and by-catch. There is a need for accurate stock assessments; data on the type and amount of by-catch; trends in production and fisheries catches and socio-economic impacts on coastal fishing communities. Examine the potential for compulsory, independent by-catch monitoring programmes.

In the absence of appropriate environmental policies and proper enforcement of such policies, conventional estimates of incremental gains accrued from export-oriented activities may overstate the gains to society, which in turn puts a short-term perspective on a phenomenon which inherently has long-term implications and consequences… government regulations have been criticised on the grounds that they are inadequate, weakly enforced and insensitive to environmental concern….there is a need for a comprehensive shrimp farming policy in bangladesh which should be designed, implemented and monitored in collaboration with major stakeholders….the essential issue here appears to be putting in place adequate mechanisms to internalise such concerns in policy design, and ensure they are effectively implemented'.

United Nations Environment Programme, 1999[3].

The Producers

Shrimp producers must act to reduce the environmental and social impacts of the industry through pond design and management. Specific actions include:

- Encouraging the use of hatchery-produced fry, and support efforts to produce farm-reared brood stock and to regulate the use of wild shrimp fry.
- Complying with land zoning and environmental regulations to ensure protection of critical ecosystems, and for larger operations ensure that development and continued operation is conditional on environmental and social impact assessment. No new shrimp farms should be developed in, nor divert essential water flows to or from, mangroves, wetlands or other ecologically sensitive areas, or areas of productive farmland. Shrimp farms sited in mangroves must ensure that a proportion of the land is reforested, and in these areas integrated shrimp-mangrove systems should be encouraged
- Encouraging traditional aquaculture systems, with an emphasis on the carrying capacity of the environment and the real and effective participation of all groups that benefit from coastal resources.
- Encouraging diversification within shrimp culture areas, supporting polyculture and rotation with agriculture. In areas where shrimp and rice are farmed, saline water must be flushed out by the 1st July deadline.
- Promoting organic systems of shrimp production. Holistic shrimp health management with a focus on disease prevention should be encouraged, and drug and pesticide use discouraged. Pesticides listed by the World Health Organisation in class Ia, Ib or II should not be used in any systems.
- Ensuring that pond design is site-specific, and that design and management act to minimise the risk of pollution to the surrounding environment and the risk of spread of disease between farm stocks and from farm stocks to natural stocks. Brackish water or effluents must not be discharged into freshwater bodies or agricultural land. Discharged water should be of equal or better quality than intake water, and where possible, the quality of effluent water should be monitored before discharge.
- Ensuring that water use and exchange is minimised, and that groundwater and freshwater (for marine / brackish water systems) are not used.
- Avoiding and discouraging the use of shrimp feeds that impact the environment and local food security, and promoting the design of ponds to ensure that natural foraging behaviour of shrimp is supported. Globally, the shrimp farming sector is a net consumer of aquatic products[6]. Typically 25-50% of ingredients in most commercial shrimp feeds are from marine capture fisheries[6], and the ratio of wild fish used for fishmeal for farmed shrimp using compound feeds is over 2:1[7], increasing pressure on marine resources and leading to a loss of protein to coastal communities. The use of external feeds should be reduced as far as possible, whilst the development and use of alternative feeds that are not based on fish products should be supported.

The Shrimp Aquaculture Industry must:

- Acknowledge its obligation and responsibility to use best practice, specifically ensuring environmental sustainability, economic viability and social equity.
- Respect all national laws and international treaties aimed at protecting the environment and human rights.
- Ensure that all operations adhere to existing and forthcoming government regulations, and ensure that both new and existing farms are assessed to ensure full compliance with national land use policies, strategies and legislation.
- Commit to reducing the environmental and social impacts of shrimp aquaculture operations through stock selection, improved site selection, pond design and farm management. While the extensive nature of most shrimp farming systems in Bangladesh has meant that some impacts (such as pollution and use of feeds) has been less than in other countries, it must be recognised that large areas of land have been converted for shrimp farming, and that a trend towards intensification is thought likely.
- Ensure that shrimp farms do not lead to salinisation or other pollution of water supplies or land in areas adjacent to the shrimp farms.
- Ensure that the human rights, including resource rights, of all people affected by shrimp production are respected, and that future operations are only developed following full consultation and support of local stakeholders. Farms must not block or interfere with traditional user access to critical resources, and specific commitments to fully respect coastal communities' traditional access to natural resources are required.
- Ensure that all shrimp farmers have clear legal title or rights to land use, water use, construction and operation. All decision making regarding leases and rental of public land or licensing permits should be transparent, and the terms of all leases respected; in particular land must not be acquired by coercion. Lands that have previously been illegally occupied by the shrimp industry must be returned to local communities and restored.
- Undertake specific commitments to safeguard the basic human rights of employees and improve labour conditions and pay, and strive to source employees from the local community. All employees must be made aware of their rights, and the rights of local communities.
- Act to identify human rights abuses, and assist in the development of an independent body to whom complaints regarding infringements of human rights can be made. All complaints should be monitored, and all alleged human rights violations must be investigated by competent, duly authorised authorities.

'While the data is incomplete on the number of persons whose quality of life, livelihood and property have been severely impacted, it is not an exaggeration to state that the unplanned commercial and intensive shrimp farming in the coastal region has caused major environmental and social degradation. It needs to be controlled immediately or the situation will take an irreversible downward spiral.'

A.Barkat & P.R.Roy, 2001[2]

- Ensure that shrimp ponds do not lead to reduced productivity of farmland or reduced livelihood opportunities for local communities.
- Encourage the development of schemes whereby local communities can benefit from shrimp farms, and assess the potential for using a percentage of profits generated by the industry to fund local community initiatives focused on education and health provision.
- Encourage, support and abide by independently developed and monitored certification schemes and trade related mechanisms aimed at ensuring social equity and environmental security.
- Ensure that every effort is taken to introduce transparency into the industry.
- Participate in the promotion of responsible shrimp production through education and training.

Labour Standards

- Ensure that shrimp operations employ local workers to the extent possible. The scope for the introduction of regulations regarding the minimum percentage of employees that must be local should be explored.
- Working conditions must adhere to national and international laws and regulations and should conform to International Labour Organisation (ILO) standards. There should be regular inspections of all shrimp operations and employers should provide a safe and healthy working environment in which every employee is treated with dignity and respect. No employee should be subject to any physical, sexual, psychological, or verbal harassment or abuse, or any other form of intimidation and they should receive fair remuneration for their work.
- Child labour in processing plants and elsewhere in the supply chain should be scrutinised and eliminated where it entails dangerous, unhealthy or unsuitable working conditions (such as in fry collection).
- The Government and donor community should recognise the underlying causes of child labour in the shrimp (and other) industry and take immediate steps towards long-term improvements to the situation.
- Where children are employed, it should be mandatory for the employer to participate in and contribute to policies and programmes that enable him or her to remain in quality education.
- Recognise that the Child Labour Deterrence Act bans the importation to the United States of products that are manufactured or mined in whole or in part by children.

Certification

The objective of any certification and labelling scheme must be to ensure ecologically sustainable, economically viable and socially equitable shrimp production. Certification to a Fair Trade standard may also go some way to ensuring that financial benefits reach the small producers, but it is important that any schemes are tied to efforts to increase environmental and social sustainability. In Bangladesh in particular, the potential for linking organic and ethical / Fairtrade schemes should be encouraged.

However, for any certification scheme to be effective in promoting positive changes in production standards, it must be thoroughly developed and rigorously implemented. There must be independent standard-setting, monitoring and reporting leading towards a certification standard; this process should not be industry-led or self-policing and should engage the views of all stakeholders in the development of standards and in implementation. It is of particular concern that corrupt practices and intimidation of certifying agencies could render future processes a failure, unless real commitments are made to combat these problems.

There is some scope for the development of independent third-party certification for shrimp products in Bangladesh with the objective of improving the environmental sustainability and social responsibility of the industry. Certification must not be viewed as a universal panacea to the problems of the shrimp industry and must take into account the wider impacts of shrimp production, many of which do not manifest themselves at the farm-level.

It must also be recognised that there are a number of problems facing any certification programme in Bangladesh, including:

- Small production areas mean providing assurances that individual farmers have adhered to the standards and criteria agreed upon is difficult. The formation of co-operatives could be a potential for addressing this issue and should be explored.
- It may be unrealistic to expect a farmer with a marginal amount of land to meet the costs of the verification and approval process. As a result, smaller-scale farmers may not be able to take advantage of the benefits of certification, and may suffer the loss of access to markets. The potential for tying certification schemes to financial and technical assistance to smaller-scale farmers should be assessed.
- There are some concerns that the production and marketing of certified shrimp may lead to an increase in overall consumption (both of certified and non-certified shrimp). It is recommended that the potential for certification schemes is complementary to strategies to reduce production to sustainable levels.
- Given the complex nature of the production chain, establishing provable, verifiable chains of custody from producer through intermediaries and then to processor / exporter may prove difficult.
- Certified products invariably carry a premium in the marketplace but this would not necessarily find its way back to the producer and serve as an incentive to improve standards.
- Bangladeshi shrimp is often sold into the catering trade via a complex supply chain, and its visibility in the marketplace (directly to consumers) is low (it is not sold in supermarkets and labelled). Thus, the potential for certified shrimp to generate market-based incentives for sustainable production methods is reduced, as consumers are not able to make a positive choice. However, there is still scope for importers and suppliers to make this choice.
- Shrimp can be traded in frozen form meaning that it can be bought in bulk by speculative investors – this would make it very difficult for fair-trade labels to be effective.
- There is a great need for consumer confidence in any certification scheme – consumers are well aware of 'eco-labels' and what they may or may not entail.

Governments of importing countries, shrimp importers, retailers and consumers should:

- Acknowledge the existence of widespread negative impacts, including serious human rights abuses and environmental problems, associated with shrimp production in Bangladesh.
- Refuse to buy, sell, distribute or eat shrimp products without certain knowledge that they have been produced without causing environmental destruction, social hardship or human rights abuses. Buy only products with recognised, credible environmental, Fairtrade and organic labels.
- Lend support to the development and implementation of independent certification of shrimp products based on robust social and environmental criteria that also ensures the industry as a whole becomes sustainable.
- Support independent monitoring and investigation of shrimp production methods and their environmental, economic and social impact on communities.
- Call upon international aid and development agencies and multi-lateral institutions to fund the effective independent monitoring and reporting of shrimp production techniques in Bangladesh and other major producing countries.
- Support the development of an independent monitoring and compliance agency to which communities and labourers can address concerns for remediation.

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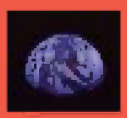

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