

Essay on Development Policy

Impacts of Shrimp Farming in Southwest Bangladesh: Challenges for Poverty Alleviation

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Acronyms

ADB	Asian Development Bank
BFFEA	Bangladesh Frozen Foods Exporters Association
DOF	Department of Fisheries
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
IMF	International Monetary Fund
NGO	Non Governmental Organization
PRSP	Poverty Reduction Strategy Paper
SAFE	Simple Action for the Environment
SEAT	Sustaining Ethical Aquaculture Trade
USAID	U.S. Agency for International Development

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1 Introduction

Bangladesh is a densely populated, low-lying, deltaic country with sub-tropical monsoon climate. Its coastal area in the southwest has a unique brackish water ecosystem. Due to favourable resources and agro-climatic conditions this region is considered to be one of the most suitable areas in the world for shrimp farming (Ahmed et al., 2008a). FAO (2013) ranked Bangladesh as fifth largest aquaculture producing country after China, India, Vietnam and Indonesia, with a production of 1,523,759 tonnes of food fish in 2011.

Shrimp aquaculture has become one of the most important sectors of the national economy. Frozen seafood is Bangladesh's second largest export commodity after ready-made garments and contributes 4.7% to the national GDP and 2.7% to the country's export earnings. In the fiscal year 2011-2012, Bangladesh exported 89,970 tonnes to which shrimp contributed 81% (BFFEA, 2013). The EU has emerged as the largest exporter of shrimp from Bangladesh currently holding 60% share of the total export (Innovision, 2012).

In the 1970s, local farmers in Bagerhat district began to modify their rice fields into ponds for shrimp cultivation, locally known as *ghers*¹. Due to the availability of wild shrimp fry, low lying agricultural land, warm climate and the high profit from shrimp, more farmers started using their lands extensively for shrimp farming. In the last decades the demand for shrimp from both national and international markets has been increasing and many countries, especially in the global north, depend on imports of fish and seafood (Ahmed et al., 2008a; FAO, 2014). In Bangladesh, the export-oriented national production of shrimp tripled from 1988 to 2008 and the area under shrimp cultivation expanded rapidly from less than 20,000 ha in 1980 to approximately 276,492 ha in 2012 (BFFEA, 2013; FAO, 2014). The major shrimp producing districts are Bagerhat, Satkhira and Khulna in the southwest of Bangladesh, which contribute 80% to the national total production (Nupur, 2012). Approximately 1.2 million people are working along the shrimp production value chain, which is depicted in Figure 1, and an additional 4.8 million household members are associated with the sector (USAID, 2006).

¹ An enclosure made for shrimp cultivation by modifying rice fields through building higher dikes around the field and excavating a deeper canal inside the periphery to retain water during the dry season. This makes the cultivation of shrimp, fish, rice and dike crops possible.

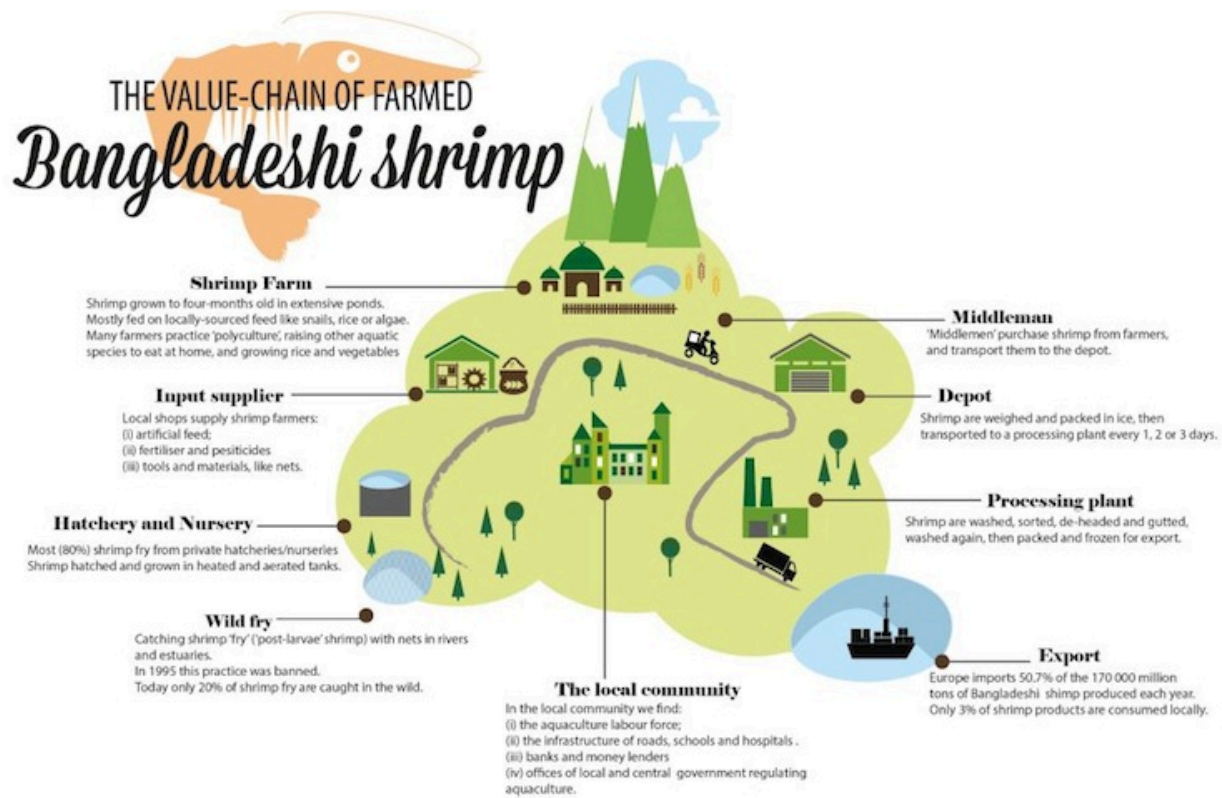


Figure 1 The value chain of farmed Bangladeshi shrimp (Source: SEAT, 2013)

However, since some years shrimp farming has been discussed controversially. Some claim that the shrimp industry has been relevant for the national economy, has export potential, ensures food security and contributes to the income of poor farmers. Others argue that growth of shrimp farming occurs on environmental and social costs and doubts about its sustainability have been raised. The actual shrimp farming debate offers many interesting aspects and open questions, but given the fact that the poverty level in Bangladesh is highest in the southern coastal area and that this region belongs to the areas most vulnerable to climate change worldwide, the leading questions for this essay are as follows: What are the impacts of shrimp farming on the rural poor? How can shrimp farming effectively contribute to poverty reduction?

The first part of this paper examines environmental and socio-economic impacts of shrimp farming and how they affect the rural poor such as small-scale farmers, fishermen, landless and women in the southwest of Bangladesh. The second part aims at analysing challenges which have to be addressed for the rural poor to benefit from shrimp farming.

This essay is based on a review of recent published papers on shrimp farming in Bangladesh and the author's information collection and experiences during field visits to the southwest coastal area in the framework of the NADEL project assignment in the year 2013 in Bangladesh.

2 Impacts of shrimp farming on the rural poor

Negative consequences of shrimp farming are numerous and hinder the sustainable development of this sector. This chapter focuses on environmental and socio-economic impacts of shrimp farming from a perspective of the poor.

2.1 Effects of increased salinity

About 1.2 million ha of arable land in Bangladesh are affected by an increasing degree of soil salinity through tidal flooding, direct inundation by saline water as well as upward and lateral movement of saline ground water (IMF, 2013). The salinity problem has grown over the years owing to the impacts of climate change and human interventions such as India's water management and shrimp farming. Due to sea level rise, spatial coverage and temporal duration of salinity has increased and thus salinity intrusion presents one of the main hydrological hazards in southwest Bangladesh according to Mondal et al. (2013). However, human interventions contribute more to the increasing level of salinity than climate change. The inundation of brackish water for shrimp farming is the key cause for secondary salinisation of coastal lands (IMF, 2013).



Figure 2 Shrimp farm in Mongla (Source: L. Krylowa, 2013)



Figure 3 Ghers in Bagerhat district (Source: S. Morf, 2013)

Shrimp cultivation is contributing to increased salinity through the construction of canals and the flooding of the former rice fields with salt water as shown in Figure 2 and 3. This affects not only the soil salinity of the *gher* but also of the surrounding areas because salt water is channelled through neighbouring land. Soil fertility declines and rice, vegetable or other crop production decreases, which forces neighbouring crop farmers to adapt. Decreased rice production means also reduced availability of paddy straw for cooking fuel, building materials for housing and fodder for cattle. The reduction in available grazing land results in decreased livestock, milk, meat and dung (Ahmed et al. 2008; Ahmed, 2013). Since mainly women are involved in activities such as dike cropping, paddy husking, cattle or poultry rearing, tree nursery and vegetable production in homesteads, their income earning opportunities are affected (Nasrin, 2012).

Due to increased salinity local native fish species and other wildlife have declined (Ahmed, 2013). Therefore, lower availability of local fish and decrease in rice, vegetable and fruit production has nutritional consequences for the poor. According to Paul and Vogl (2011: 207) the contribution of shrimp aquaculture to poor people's nutrition can be neglected because most of the farmers cannot afford to eat the high-value shrimp. Poor farmers are forced to sell their high-value shrimp and buy low-value fish from the local markets for domestic consumption. Especially landless and small farmers might become dependent on buying their food from the market and therefore need a higher income through daily labour (Hensler, 2013). It has been observed that diets in shrimp farming households typically contain less meat, eggs and milk. Accordingly, malnutrition and severe health problems are increasing, whereof children, young girls and women are affected the most (Ahmed, 2013).

2.2 Mangrove destruction and loss of biodiversity

Shrimp farming contributes to the destruction of the mangrove ecosystem through the conversion of mangrove wetlands to ponds or *ghers* for shrimp aquaculture. An intact mangrove forest provides multiple services such as shelter, habitat for fry and brood stock of shrimp and other species, feeding ground and buffers against storm surges, all being under pressure (Paul and Vogl, 2011). Due to the mangrove destruction, biodiversity has degraded and losses of aquatic plants and wildlife are likely (Ahmed et al., 2008a). Since the mangrove

forest is also a source of livelihood for the coastal poor, its reduction has negative impacts on social forestry and the collection of firewood by women (Karim et al., 2006; Nasrin, 2012).

As mentioned above, the forest is habitat for shrimp fry and its collection is an important earning source mainly for women and children. However, the harvesting of shrimp seeds with fine mesh nets leads to high bycatches. Many other shrimp and fish species are wasted during the collection of one targeted species, consequently reducing wild brood stock (Ahmed et al., 2008a; Paul and Vogl, 2011). The current practice of wild shrimp fry collection is not sustainable and has aggravated in the course of climate change. Different climatic variables have had adverse effects on coastal ecosystems, thus determining a decline in the availability of fry and thereby catch (Ahmed, 2013).

The collection of wild spawn in estuaries and coasts and brood stock from deep sea leads to degradation of natural fish species and reduced fish biodiversity. According to Paul and Vogl (2011), shrimp industry uses capture fisheries to produce fish meal, diminishing the wild fishery resources. In most cases, very small fish are collected for making shrimp feed, which directly reduces the chance of getting table fish and thus negatively affects food security of the coastal poor. In addition, traditional fishermen might face unemployment risk due to the decrease in fishery yields.

Another example for overexploitation are the snails used as shrimp feed. On the one hand, snail supply has created employment opportunities. On the other hand, snail population has declined heavily due to overharvesting. Ahmed et al. (2008b: 606) state that the excessive harvesting of snails has also created problems of disposal of large quantity of snail shells, resulting in pollution and blockage of canals, offensive smell in the air and contamination of open water bodies.

These examples show that the coastal poor's future is jeopardized due to the overexploitation of natural resources for the shrimp production.

2.3 Pollution and disease outbreak

For the conventional shrimp production a variety of chemical and biological products are applied. Some products are used in shrimp ponds to treat water or to prevent disease outbreaks, others for the enhancement of natural feed or to increase production. However, the harmful use of agrochemicals, antibiotics and disinfectants can affect soil and water quality and the local ecosystem. Since water exchange in shrimp aquaculture is needed, polluted effluents are often discharged into waterways leading into the sea, with negative impacts on humans, fish and other organisms (Hensler, 2013; Paul and Vogl, 2011). Due to these contaminated effluents from shrimp cultivation ponds, along with salt water intrusion, freshwater supplies for drinking water and irrigation have become scarce. Contaminated water has forced mainly women to walk long distances to collect safe drinking water. Moreover, it has resulted in widespread diarrhoea, dysentery and other water-borne diseases affecting humans. Water-borne diseases affecting fish are often spread by the intake of polluted water from neighbouring farms. As reported by Paul and Vogl (2011: 206), disease outbreak has been recognized as the biggest obstacle to the development of shrimp aquaculture in Bangladesh.

2.4 Land grabbing and social tension

Being one of the most densely populated countries in the world, land has become the scarcest factor of production in Bangladesh (IMF, 2013). Attracted by prospects of high incomes from shrimp farming, mainly investors from outside the coastal area have brought previously used crop or fallow land under shrimp cultivation. These national and multinational investors are highly influential persons or institutions having direct links with government bureaucracy and political parties (Alauddin and Hamid, 1999). They offer money to small landowners to lease out or sell their rice fields to them for the establishment of large shrimp farms. If the landowners refuse, then investors forcibly submerge their fields in salt water leaving small landowners without choice. They either migrate out of the area or accept the investors' humiliating proposals. This forced or illegal occupation of land leads to protests, which often result in violence and killings (Alam et al, 2012; Nijera Kori, 2014).

Besides the outsiders, also local influential people forcibly occupy land of the comparatively weaker smallholders. Moreover, Alam et al. (2012: 47) report the non-payment of lease money

to small landowners and breach of agreements. Another illegal practise is to grab *khas*² land that ought to have been leased to the landless (Alam et al., 2012). Thus, land holdings of small farmers as well as *khas* land have been declining while large landowners have been acquiring more land. The control of large shrimp farms by outsiders and local influential people is the prime cause for social tension. Several authors state conflicts that have arisen between investors and local farmers over land grabbing and denial of access to natural resources and common property (Alam et al., 2012; Alauddin and Hamid, 1999). Ahmed et al. (2008b) mention theft of shrimp and poisoning of *ghers* as a consequence of such unfavourable social environments. A study of Shindaini and Baqui (2012) shows how shrimp cultivation brought negative impacts on social life and changes in social status, dowry and occupation patterns.

2.5 Poor working conditions and income inequality

According to Alauddin and Hamid (1999: 59) “although shrimp farming itself is less labour-intensive than rice cultivation, the overall labour requirement of the shrimp industry (including employment opportunities in ancillary activities) is higher than that of rice production”. Nevertheless, the employment along the shrimp value chain is usually characterized by insecure and seasonal casual labour (Hensler, 2013). Working conditions at the shrimp farms and processing plants are critical. According to Hensler (2013) some women stated that they preferred the work in the rice fields, because the casual labour on the shrimp farms is more physically demanding. Alam et al. (2012) list a number of bad conditions regarding labour rights such as lacking work contracts, absence of labour unions, bad wage rates, long working hours, sexual harassment and physical violence against women, child labour and unhealthy working environment.

In addition, bargaining power of the disadvantaged is very limited (Karim et al., 2006). Gender discrimination and gross inequality in income distribution is widespread. According to a study of SAFE assessing terms and conditions for workers, women are getting only about 60% of the wages of men, particularly in the processing plants where 60 to 80% of workers are female (USAID, 2006). The more profitable selling and auctioning is almost exclusively done by men (Hensler, 2013).

² Land owned or controlled by the government

Shrimp farming itself most heavily affects poor women and landless. Women traditionally worked in agriculture and on-farm work opportunities in aquaculture have been reduced considerably. Consequently, a section of the rural people has lost employment, and these rural unemployed labourers usually migrate to cities in search of work (Alauddin and Hamid, 1999).

3 Challenges for poverty alleviation

We have seen that shrimp farming has a number of negative environmental and socio-economic impacts on the rural poor. This raises the question how a pro-poor shrimp production should look like. Shrimp industry has been undoubtedly boosting the national economy and contributing to the income generation and employment of rural people as shown by data in the introduction. According to the PRSP of Bangladesh, the poverty prone coastal people profit in particular from shrimp aquaculture (IMF, 2013). It summarizes as well that “productive employment is the most potent means of reducing poverty on a sustained basis” (IMF, 2013: 2). However, this sustained basis is not given and “the distribution of benefits from shrimp across different social categories is very unjust and unequal” (Ahmed et al., 2002: 10). Yet much of the potential for further (pro-poor) growth of shrimp cultivation remains to be harnessed due to various ecological, socio-economic and policy constraints (Karim et al., 2006). Many different actors are working on the development of sustainable shrimp aquaculture, but only few actions have reached the poorest. According to ADB (2005), interventions targeting the poor need to mitigate risks to which the poor are particularly vulnerable and to address key barriers for the entry into aquaculture and adoption of technologies.

3.1 Diversified livelihoods

In the vulnerability context of rural livelihoods the seasonality of shrimp farming plays an important role. Diversified livelihood strategies are needed to improve overall livelihood security. Consequently, families in shrimp farming communities should engage in a range of on-farm and off-farm activities (Ahmed et al., 2008; Hensler, 2013). On-farm activities may consist of shrimp farming, fish cultivation, rice production and dike cropping since polyculture offers considerable potential for increasing productivity and farm incomes (Dey et al., 2013; Karim et al., 2006). Due to increased salinity, the implementation of adaptive technologies for aquaculture and agriculture is key. This includes the cultivation of saline tolerant varieties, crop diversification and intensification as well as innovative farming practices. Off-farm activities

along with casual labour in shrimp industry include for example homestead gardening, duck rearing, fishing and petty trade. There is a growing realization that the shrimp industry cannot continue to support the numbers of people currently engaged in this activity, especially during off-season (IMF, 2013). Thus, particularly for the landless, there is a need to identify other opportunities and supply training and resources to enable them to seek alternative income or to overcome barriers for the entry into aquaculture or agriculture.

3.2 Access to land

A key barrier for the entry into shrimp aquaculture is access to land since it is the principal factor of production for shrimp farming (Karim et al., 2006). As shown in chapter 2.4, due to improper implementation of existing rules and policies, land grabbing and the displacement of the poor from their homestead in the *khas* land lead to conflict. Therefore, main challenges are to establish and enforce suitable leasing policies and land rights for the poor (ADB, 2005). Several authors suggest the expansion of aquaculture into *khas* land such as floodplains, roadside ditches and canals. Since these lands are government owned or controlled, it gives the responsible departments the opportunity to ensure access to land of the poor farmers and landless groups (Ahmed et al., 2002; Karim et al., 2006). Binding and long-term agreements are needed to ensure secure access rights including individual and collective titles to land (USAID, 2006). As mentioned in the PRSP “sound land management also has a direct effect on people’s welfare and poverty reduction” (IMF, 2013: 5).

3.3 Access to credit

According to Ahmed et al. (2008b), lack of capital is the most important constraint for the uptake of shrimp farming. Several authors point out that shrimp culture is linked to huge investments (ADB, 2005; FAO, 2014). Many aquaculture activities cannot be effectively performed by small and marginal farmers, due to limited access to financial capital and other livelihood assets (Karim et al., 2006). Consequently, interventions aimed at aquaculture development for the poor should first provide options for credit. USAID (2006) recommends to provide credit through specialized micro-finance agencies together with technical assistance and tied to specific investments. ADB (2005) suggests interventions based on a microenterprise development approach, taking into account access to and availability of rural financial services. As stated by Ahmed et al. (2008b), credit and loans have been provided by different sources

such as banks, moneylenders, shrimp traders and NGOs. However, very often the interest rates are very high and the repayment schedules tight. If the farmers have harvest failures because of flood or disease outbreak, they can fall into a continuing cycle of indebtedness. In addition, it has been reported that the cost for shrimp cultivation has increased significantly in recent years due to higher costs for seed, feed etc. Higher prices for inputs may force extremely poor farmers out of business. Due to the high risk small farmers are facing, more flexible credit repayment schedules and horizons should be offered (USAID, 2006).

3.4 Extension services

Another barrier for the small farmers regarding the development of shrimp farming is access to extension services. Specifically, poor people are unlikely to have the management capacity, technical expertise or marketing know-how in order to run a shrimp farm profitably (Karim et al., 2006). Several authors point out that the productivity of shrimp aquaculture is still low. Moreover, there is huge scope for the adoption of modified and more environmentally sustainable cultivation practices (Ahmed et al., 2002; USAID, 2006). Hence more extension services and technical assistance have to be provided in order to promote and enhance upgrading. Extension services should also include training of farmers to diversify their production in small farms and encourage polyculture of fish and shrimp, including crop and vegetable culturing and homestead farming practices. Extension services along the shrimp value chain and ancillary activities are critical, but therefore adequate resources are needed (Karim et al., 2006). A variety of mechanisms can provide extension services. Meetings with officials of DOF confirmed that there is a clear need for stronger and well-funded government extension services by adequately trained and equipped staff. According to ADB (2005) this should include innovative means to help the poor in partnership with NGOs.

3.5 Supply of quality inputs

Inadequate supply of quality inputs such as shrimp seed and feed supply is an often stated constraint among shrimp farmers. Existing shrimp seed production capacity of hatcheries does not meet the total requirement for Bangladesh and hatchery produced fry are of low quality due to poor brood stock management, inadequate water management and delivery system (DOF, 2013; Karim et al., 2006). Hence shrimp farmers mostly rely on wild shrimp stock, but as seen earlier, the collection of brood stock has negative impacts on the ecosystems. The capacity

of the hatcheries to produce high quality fry should be enhanced and the use of hatchery produced fry promoted. This requires more and professional hatchery staff for proper brood stock management, and for quality control a seed certification system (FAO, 2013; Karim et al., 2006). To avoid negative impacts on the employment of the wild fry catchers alternatives have to be explored.

Regarding Alauddin and Hamid (1999) there is also shortage of artificial shrimp feed. Due to limited capacity of feed mills and poor quality of imported feed, shrimp feed supply is dependent on natural resources having adverse effects as presented earlier. According to BFFEA (2013) more locally produced feeds of higher nutritional value are required to enhance productivity. Using local food ingredients to produce shrimp feed and investing in domestic production are recommended (Ahmed et al, 2002). Consequently, homestead and farm production should be diversified by growing various raw materials as source for shrimp feed. Since shrimp feed supply has been done by women and children, some of these feed inputs should be produced locally by small producers, cooperatives, and women-owned businesses (USAID, 2006). For both shrimp seed and feed, backward linkages to quality inputs will increase and secure employment benefits (Karim et al., 2006).

3.6 Institutions and policies

For a sustainable development of the shrimp sector an enabling regulatory environment is an essential precondition. According to Paul and Vogl (2011: 208), 17 ministries and divisions, 28 departments and agencies and numerous additional institutions are involved in the shrimp sector. Moreover, there are many fishery policies but with a lack of consistency and enforcement (see Figure 4). This is a major reason for the negative impacts of shrimp farming described throughout this paper and probably the greatest challenge.

Without going into details regarding the gaps in the regulatory framework and the weak assertiveness of the concerned institutions, Dey et al. (2013: 113) summarize “while this labyrinth of strategies, policies, regulations, and directives maintains a common emphasis on promoting rice-fish systems to increase fish production and rural incomes in Bangladesh, it also forms an incomplete patchwork of incentives”.

Title of policy/law/rule/act/ordinance	Aspects covered
The Protection and Conservation of Fish Act, 1950	Conservation of fisheries resources as a whole
Embankment and Drainage Act, 1952	Protecting crops, not allowing cuts in embankments (to produce shrimp)
Bangladesh Water and Power Development Board Ordinance, 1972	Develop water management infrastructure for shrimp farming
Territorial Water and Maritime Zone Act, 1974	Conservation of marine fisheries
Marine fisheries ordinance, 1983	Conservation of marine fisheries
Fish and fish product (Inspection and quality control) ordinance, 1983	Quality control of fish and shrimp, mainly targeting export
Fisheries Rules, 1985	Framing rules for enforcement of various provisions of Fish Act 1950
Manual for Land Management, 1990	Allocate unused state (<i>Khas</i>) land to the landless on a permanent or temporary basis
Shrimp Estate (<i>mohal</i>) Management Ordinance, 1992	Allocate suitable state (<i>khas</i>) land for shrimp culture
Shrimp farm taxation law, 1992	Imposing higher tax on shrimp land to cover cost of polder infrastructure
Bangladesh environment conservation act, 1995	Conservation of natural resources and ensure eco-friendly development
Bangladesh environment conservation rules, 1997	Conservation of natural resources and ensure eco-friendly development
Fish and fish product (quality control) rules, 1997	Quality control of fish and shrimp, mainly targeting export
National Fisheries Policy, 1998	Conservation, management, exploitation, marketing, quality control and institutional development
Fish and Animal Food Act, 2010	Safe fish and animal feed production, processing, quality control, import, export, marketing and transportation
Hatchery Act, 2010	Sustainable hatchery development to ensure quality fish and shrimp seed

Figure 4 Relevant fishery policies, laws, rules, acts and ordinances in Bangladesh (Source: Paul and Vogl, 2011)

Ahmed et al. (2002) recommend that limitations of existing institutions and policies should be reviewed and revised for making them pro-poor and pro-environment. According to DOF (2013), the main implementing agency in the fisheries and aquaculture sector, a shrimp policy in a concise form in collaboration with other institutions is currently being elaborated. Moreover, DOF has made significant progress in identifying strategies and policy reforms that could harmonize the existing regulatory framework as well as address some of the environmental and socio-economic concerns (USAID, 2006). Priority areas of interventions in the fisheries sub-sector in the PRSP serve as an example (see IMF, 2013: 31ff). More coordination and collaboration between different key actors like the government and NGOs, private sector entrepreneurs and community based groups is necessary to promote dynamic, sustainable and pro-poor shrimp farming (IMF, 2013).

4 Conclusions

Shrimp farming is a golden fishery resource and relevant for the economy in Bangladesh. Since the poverty level in shrimp producing areas is still high, this essay aimed to examine how environmental and socio-economic impacts of shrimp production affect the poor in southwest Bangladesh and how shrimp farming can effectively contribute to poverty alleviation.

We have seen that the expansion of shrimp farming has contributed to the depletion of natural resources due to increased salinity, mangrove destruction, overexploitation and pollution. The consequences for the rural poor are loss of livelihood sources, food insecurity, scarcity of freshwater and health concerns. Socio-economic impacts of shrimp farming such as land grabbing, poor working conditions and income inequality has led to conflicts, social problems and migration with women and landless being the most affected.

Shrimp farming has economic benefits and creates employment opportunities. However, the gains along the shrimp value chain are distributed unequal. Due to environmental, socio-economic and policy constraints, shrimp farming has not improved the living standard of the poorest. Challenges for ensuring that the poor benefit from shrimp farming are to mitigate the risks of the poor, to overcome barriers for the entry into shrimp aquaculture and to make shrimp farming more sustainable. Livelihood security can be improved by a combination of different on-farm and off-farm activities. Polyculture of shrimp, fish and crops can increase food security, diversify and raise incomes for the rural poor. We have seen that for the development of shrimp farming, access to land, credit, extension services and quality inputs are major constraints for the poor. Progress has to be made regarding land rights and provision of low-interest credit and other financial services. Extension services and quality inputs can improve productivity and contribute to the sustainability of shrimp farming.

An enabling environment including better enforcement of existing policies has to be created to make shrimp cultivation more environmentally friendly and socially just. Pro-poor shrimp production should not endanger local communities' livelihoods. On the contrary, it should increase the opportunities and benefits from a sustained ethical trade.

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