

Socioeconomic assessment of shrimp farming in relation to local livelihoods in the south-west coastal Bangladesh

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Abstract

Nine different categories of stakeholders in shrimp farming industry were assessed to show the socioeconomic impact of shrimp farming in south-west Bangladesh. Among all the stakeholders the shrimp farmer's average own land was 4 ha whereas the seed collectors and *faria*'s had lowest amount of average land, 0.1 and 0.5 ha respectively. The shrimp farming positively impacted to the livelihood of stakeholders. Income of the coastal people, sanitation, working facilities of women, employment, health condition and the literacy rate increased due to shrimp farming. On the other hand shrimp farming had negative impact on the rice production, livestock, drinking water supply, and social conflict and violence had increased due to shrimp farming. There were internal conflicts between different stakeholders; the *farias* conflict with the *depot* owners and shrimp farmers, marginal farmers' conflict with the rich shrimp farmers about leasing lands and saline water control, the rice farmers conflicts with the shrimp farmers about agricultural crop production.

Key words: Shrimp farming, Socioeconomic, Livelihood

Introduction

Shrimp farming is not only earnings of foreign exchange but also losses the gross domestic product (GDP) of Bangladesh (Bhattacharya 1999). Shrimp is an industry where a chain of stakeholder is being worked from shrimp PL collection/production to export it into the international market. Among the value chain the relationship between different stakeholders is an important factor for its business, socioeconomic and overall benefits from the product. Sometimes the relation is remained well between some stakeholders, but in most cases the experience of such relationship is very worst. Internal conflict and socioeconomic situation of shrimp farming and existence of "mafia, musclemen and cycles of poverty, debt and dependency in shrimp value chain has been raised a perennial questions of boycott of shrimp product from Bangladesh by the international buyers (Rosenberry 2007b). Conflict between shrimp farmers and rice

farmers is existed in Thailand (Lebel *et al.* 2002), as well as in Bangladesh (Islam *et al.* 2002) due to salinity intrusion, shortages of animal feed (Ahmed 2006). However, relationship between different stakeholders in shrimp value chain has been done indiscriminately and information regarding it is still scares (Hoq *et al.* 1995). In the above context, the present study assessed the socioeconomic impact of shrimp farming and its implications for local livelihoods in south-west coastal Bangladesh.

Methodology

Study area and selection of the shrimp farming stakeholders

The study areas were selected from the south-west part of Bangladesh, mainly in Satkhira and Khulna districts where the majority shrimp farming activities are concentrated. According to their involvement in different activities of the shrimp industry, nine categories of stakeholders were selected for data collections (Table 1).

Table 1. Sampling design and distribution of shrimp farming stakeholders

Sl. No	Stakeholder	Sample size	Description
1	Shrimp farmers	30	Year round only shrimp farming
2	Alternate rice and shrimp-prawn farmers	30	After rice culture; shrimp-prawn culture together
3	Rice farmers (control)	30	Rice farming in shrimp growing area
4	Depot owners	10	Depot: Local shrimp processing factory
5	Depot workers	10	Worker in the shrimp processing factory
6	Shrimp farm laborers	20	The laborers are working either whole day and night or part time
7	Faria-Shrimp traders	10	Buying shrimp from shrimp farm and selling it to depot
8	Land lessors	10	Leasing their land to the rich shrimp farm
9	Shrimp seed collectors	10	They collect the Post Larvae (PL) from the river
Total stakeholders		160	

Simple random sampling techniques were applied for selecting the respondents of rice farmers, shrimp farmers, and alternate rice and shrimp-prawn farmers. For applying the technique, at first the list of rice farmers, shrimp farmers and also the alternate rice and shrimp-prawn farmers were collected from the Upazila Agricultural office and Upazila Fishery Office of the selected upazila and then random number table was used for selecting the sample units. The sample of shrimp farm laborers, depot

owners, depot workers, shrimp seed collectors and land lessors were selected by purposive method.

Questionnaire design and survey of the study area

One draft questionnaire was designed to survey the socioeconomic issues due to shrimp farming and implications on local livelihood. The preliminary survey focused on the shrimp farmers', rice farmers' and other shrimp farming stakeholders' recent socioeconomic conditions. During August 2007 the data were collected by the pre-tested draft questionnaire from the two respondents of each category. Then the questionnaire has been finalized for collecting the necessary data through interview method. The data collection period was from Sept 2007 to February 2008.

The survey method was followed through direct interview from the different stakeholders. For determining the socioeconomic impact of shrimp farming “before and after” and also “with and without” methods were applied. The respondents were asked about what were the socioeconomic situations were before and after the shrimp farming practice at the study areas. The information were also collected about the earlier traditional social structure and livelihoods of shrimp farming stakeholders were changed or not due to shrimp farming. Intra-generational changes in the case of sustainability of livelihood framework such as human, social, physical, natural and financial capital assets were also analyzed by DFID (2000) for determining the impacts of shrimp farming development at the coastal area of Bangladesh. Data was collected through direct observation and transect walk (informal surveys and this participatory studies known as a walk over the transect of an area for the observation and documentation of the similarities and differences of socio-economic and bio-physical features described by PPM&E (2004). Data were collected through interviews (questionnaire) by grouping of all stakeholders in to following groups.

- Group 1 was for three categories such as rice farmers, shrimp farmers and alternate rice and shrimp-prawn farmers and
- Group 2 was for six categories such as *depot* owners, *depot* workers, shrimp farm laborers, *faria*, land lessors and for shrimp seed collectors.

The data were also collected by oral history method. Oral history is an interview method by which the researcher collects about the past events and ways of life. The beginning history of the shrimp farming, the mangroves were present at the shrimp farming area or not and also the agro-ecosystem gradually destroying or not were obtained from the very old aged people at the coastal areas by this oral history method. In this case the respondents were more than sixty years old. The selected respondents were different categories like shrimp farmers, shrimp seed collectors and shrimp farm laborers and land lessors of very near the mangroves region of the coastal area.

Data analysis

The data from the questionnaire were grouped and categorized according to the different stakeholders of the shrimp farming. The whole data were entered into the MS Excel program and in the tabular form in the computer. Mainly the tabular and graphical methods were used for analyzing the data. Independent sample T-test was applied for assessing whether the differences of income from different types of farming activities are significant or not. Most of the data were formed in the histograms, percentage, pie chart and mean value.

Result and discussion*Conflicts between different stakeholders*

The internal conflicts were found from the different shrimp farming stakeholders as depicted in the table 2 on the basis of the respondent's reports. Around 81 percent *faria*, shrimp farmers and depot owners reported that they had internal conflicts about buying and selling rate of shrimps in the shrimp farm and depot. Around 78 percent rice producer and shrimp farmers have agreed that they have conflicts about the paddy culture in their area because paddy cannot grow in saline water. The Thai shrimp and rice farmers also have conflicts due to salinity intrusion for shrimp farming (Lebel *et al.* 2002). The shrimp farming is not so profitable for the marginal rice farmers because their land amount is very small even if they want to do shrimp culture they will not get proper saline water from the narrow canals which are controlling by wealthy farmers.

Table 2. Conflicts between different stakeholders

Different stakeholders	Aspects of the conflict	Number of respondents
<i>Faria</i> and shrimp farmers & depot owners, (n=80)	On the selling and buying rate of shrimp in the shrimp farm and depot	65 (81.25)
Rice producer and shrimp farmers (n=90)	The rice producers could not grow rice due to salinity water in the surroundings	70 (77.77)
Marginal farmers and rich farmers, (n=90)	The rich farmers were controlling the saline water from the canal	50 (55.55)
Depot workers and depot owners (n=20)	Low salary amount and part-time wages	10 (50)
Livestock producers and shrimp farmers (n=90)	The cow, goat, sheep and buffaloes were decreased due to decreasing of rice field	45 (50)
Land lessors and shrimp farmers (n=40)	Sometimes the poor farmers are bound to lease their land to the rich shrimp farmers.	15 (37.50)
Shrimp farm laborers and shrimp farmers, (n=80)	Low salary amount and part-time wages	20 (25)

Figures in the parentheses indicate percentages of total.

Around 56 percent marginal farmers and rich farmers have been reported that the rich shrimp farmers are controlling the saline water from the canal of the river. Sometimes the rich farmers are selecting the middleman who will buy the shrimp from the marginal farmers cheaply. The clashes are also occurring between the villagers (marginal farmers) and the illegal rich shrimp farmers about the possession of shrimp farms (Rosenberry 2006b). The wealthy land owners have been converted the polders into the extensive shrimp ponds and the marginal farmers have nothing to say against the powerful illegal politicians and powerful market players (Samarakoon 2004). In Bangladesh hundreds of thousands of coastal people have been displaced sometimes the land seizures involving use of force (EJF 2008).

About 38 percent land lessors and marginal shrimp farmers have been claimed about the conflict of leasing land with rich shrimp farmers. The marginal farmers and land lessors want to culture agricultural crops but due to saline water they cannot do it. Even they cannot do the shrimp culture because they do not get enough saline water from the canal due to insist of the rich farmers and finally the land lessors leasing their land to the rich shrimp farmers. So, the poor land lessors are becoming poorer by losing their lands for shrimp farming. The land lessors are not benefited from the shrimp farming at the coastal area (Islam *et al.* 2000).

Problems of shrimp farmers and alternate rice & shrimp-prawn farmers

The problems affected by the shrimp farming and other causes were estimated on the basis of the respondents reports in percentage term (Table 3). All the stakeholders (100 percent) reported about their problems that saline water, excess river siltation destroying shrimp farms, less depth of river and canal, salinity fluctuation, post larvae transportation problem from Coz's Bazar to Khulna, lack of available shrimp seed, virus problem by WSSV, lack of training and irregular electricity. About 75-83 percent stakeholders reported that weak shrimp seed, shrimp farm looting and breaking down of river embankment. Around 60-70 percent stakeholders reported that communication problem, land fertility decreasing, loan problem, connection from river or canal to the shrimp farm and they also about the drinking water problems in the region.

Table 3. Problems of shrimp farmers and alternate rice & shrimp-prawn farmers

Different types of problems	Percentage of respondents reported		
	Shrimp farmers (n=30)	Alternate rice and shrimp -prawn farmers (n=30)	Over all n=60
Proper saline water is not available for shrimp farm	100	100	100
Excess river siltation destroying Shrimps farms	100	100	100
Less depth of river and canal	100	100	100
Salinity fluctuation	100	100	100

PL transportation problem	100	100	100
Lack of available shrimp seed (PL-post larvae)	100	100	100
Virus problem (White spot disease by SEMBV)	100	100	100
Lack of training	100	100	100
Irregular electricity	100	100	100
Unknown for viral contamination	80	86.66	83.33
Weak shrimp seed	83.33	80	81.66
Breaking down of river embankment	80	73.33	76.66
Shrimp farm looting	80	70	75
Loan problems	60	80	70
Communication problems	76.66	60	68.33
Land fertility decrease	53.33	80	66.66
Connection from river or canal to the farm	66.66	60	63.33
Drinking water problems	66.66	53.33	59.99

Problems of rice farmers and land lessors

Problem of rice farmers and land lessors has been presented in Table 4. Rice farmers and land lessors had reported that the saline water was harmful for agricultural crop and saline water also decrease their land fertility. The livestock production (cow, goat, buffalo etc.) decrease due to decreasing of agricultural lands for saline water intrusion in their region. About 65-70 percent respondents reported that grazing land decreased, the land lessors became poorer and sometimes they are bound to lease their land to the rich shrimp farmers.

Table 4. Problems of rice farmers and land lessors

Different types of problems	Percentage of respondents reported		
	Rice farmer (n=30)	Land lessors (n=10)	Over all (N=40)
Saline water is harmful for agricultural crop	100	100	100
Land fertility decreasing	100	100	100
Decreasing of livestock- cow, goat, buffalo etc.	100	100	100
Decreasing of grazing land	30	100	70
Bound to lease their land to the rich shrimp farmers	40	100	65
Land lessors becoming poorer	0	100	65
Drinking water problem	76.66	30	56.66
High input price for paddy	63.33	50	53.33
Fuel cost of shallow machine (water pump machine).	80	30	55
Loan problem	80	50	50
Lack of training	70	30	50
Low rate of leasing money	0	100	50

Problems of depot owners, depot workers, farm laborers, faria and fry collectors

According to the table 5 all the *depot* owners reported about the irregular electricity or power problems and for this reason they did not get enough ice from the ice factory. About 30 percent depot owners reported that they did not get enough training for shrimp processing and HACCP. All the depot workers and farm laborers claimed about their low and fixed wage amount and gender wage gap. All the *faria*'s problem was that their selling rate of shrimp sometimes was too low in the *depot*.

Table 5. Problems of depot owners, workers, farm labourers, faria and fry collectors

Stakeholders	Problems	% of respondent
Depot owners	Ice problems	100
	Irregular electricity	100
	Lack of training	30
Depot workers & farm laborers	Low wage amount	60
	No part time wages, salary fixed	100
	Gender wage gap	43.33
Faria	Shrimp selling rate lower than buying rate	100
	Drinking water problem	50
	Communication problems	60
Shrimp seed collectors	Govt. ban the seed collection	50
	Resettlement and rehabilitation problems	100
	Low rate of collected PL from river	100

Most of the problems discussed here are due to shrimp farming in the coastal areas, but some other problems of local livelihoods also have mentioned. On the other hand, not all the problems are directly affecting all the stakeholders. According to the table 3 the shrimp farmers and the alternate rice and shrimp-prawn farming stakeholders have reported about their problems that the proper saline water is not present in the river, excess river siltation and the less depth of the canal and rivers, lack of available shrimp seed (post larvae-PL) for their shrimp farming, PL transportation from Cox's Bazar to Khulna is very costly, salinity fluctuation, lack of training and irregular power causes the ice problems which are drastically harmful for shrimp preservations. Power shortage and load shedding are badly affected the shrimp processing units (Rosenberry 2006e) which earns valuable foreign currency for the country. Most of the shrimp hatcheries are in Cox's Bazar region, the shrimp farmers transport the PL from Cox's Bazar to Khulna and Satkhira by helicopters which are very costly. All the stakeholders of shrimp farms and alternate rice and shrimp farms have mentioned the insufficient depth of the connected rivers and canals gradually decreasing due to soil erosion, even in some areas the depth of the canal is less than the shrimp farms depth. The vegetables and rice production also have decreased due to saline water intrusion for shrimp culture in the coastal area. The soil also contaminated by the use of fertilizer and medicine in the shrimp farm of Ecuador (Nolting and Schirm 2003).

All the rice farmers and land lessors have claimed that the land fertility is gradually decreasing due to saline water intrusion in their lands and the paddy culture also extinct from the study areas. The land lessors cannot do anything to their small amount of land because of saline water of large shrimp farms so, they are leasing their lands to the rich and wealthy farmers. All the *depot* owners and *depot* workers have claimed about their ice problems due to irregular electricity or power in their area and they need more training about HACCP in their processing plants. The depot worker and shrimp farm laborers want higher salaries and if they work more than 8 hours they have claimed the part-time wages. The female workers have demanded about the same wage amount as male workers on the daily basis; they don't want any gender wage gap. Around 50 percent of the laborers are women whose are working less amount (US\$ 0.71/day) of wages than male worker (US\$ 01/day) (Rosenberry 2007j). All the *farias* have claimed that sometimes the selling rate of shrimp in depot is too low.

About half million coastal people are involved for shrimp seed (post larvae or fry) collection from the estuaries. Shrimp fry collection is ecologically destructive because the mesh size of the net of fry collection is very small and for this why all kinds of fishes (wanted and unwanted) are captured by the net. Bangladesh government has banned the post larvae (PL) collection in 2000, but the fry collectors do not obey/care the law because they are very poor and they have no other sources of income. Bangladesh government does not enforce the law maybe because of resettlement and rehabilitation cost for the shrimp fry collectors.

All the shrimp fry collectors have claimed that the *faria* and shrimp farmers buy the shrimp PL from them by very cheap rate (1000PL /5 \$) whereas they buy from the hatchery at higher rate (1000PL /10\$). Most of the fry collectors do not want to collect the fry but they have no alternate way for their income. So, they want to get the government help for their resettlement and rehabilitation facilities. The resettlement and rehabilitation systems, credit facilities, poverty are the most important influences of shrimp fry collection from the river.

Impact of shrimp farming on different stakeholders

Shrimp farming has positive and negative impacts along the south-west coastal area of Bangladesh. The shrimp farmers and farm laborers, seed collectors, feed mill owners and mill workers, *faria*, local processing plants (*depot*) and large processing plants owners and plant workers, alternate rice and shrimp-prawn farmers and the shrimp seed collectors have been benefited from the shrimp farming (Fig 1). Employment opportunities, socioeconomic situation, education, available food intake, communication and health condition are increasing due to shrimp farming practice in the coastal area. On the other hand the shrimp farming is negatively affected for the land lessors, fish farmers, rice farmers and marginal farmers. The social conflicts and social violence have increased, freshwater fish, livestock production, agricultural crops have decreased due to shrimp farming.

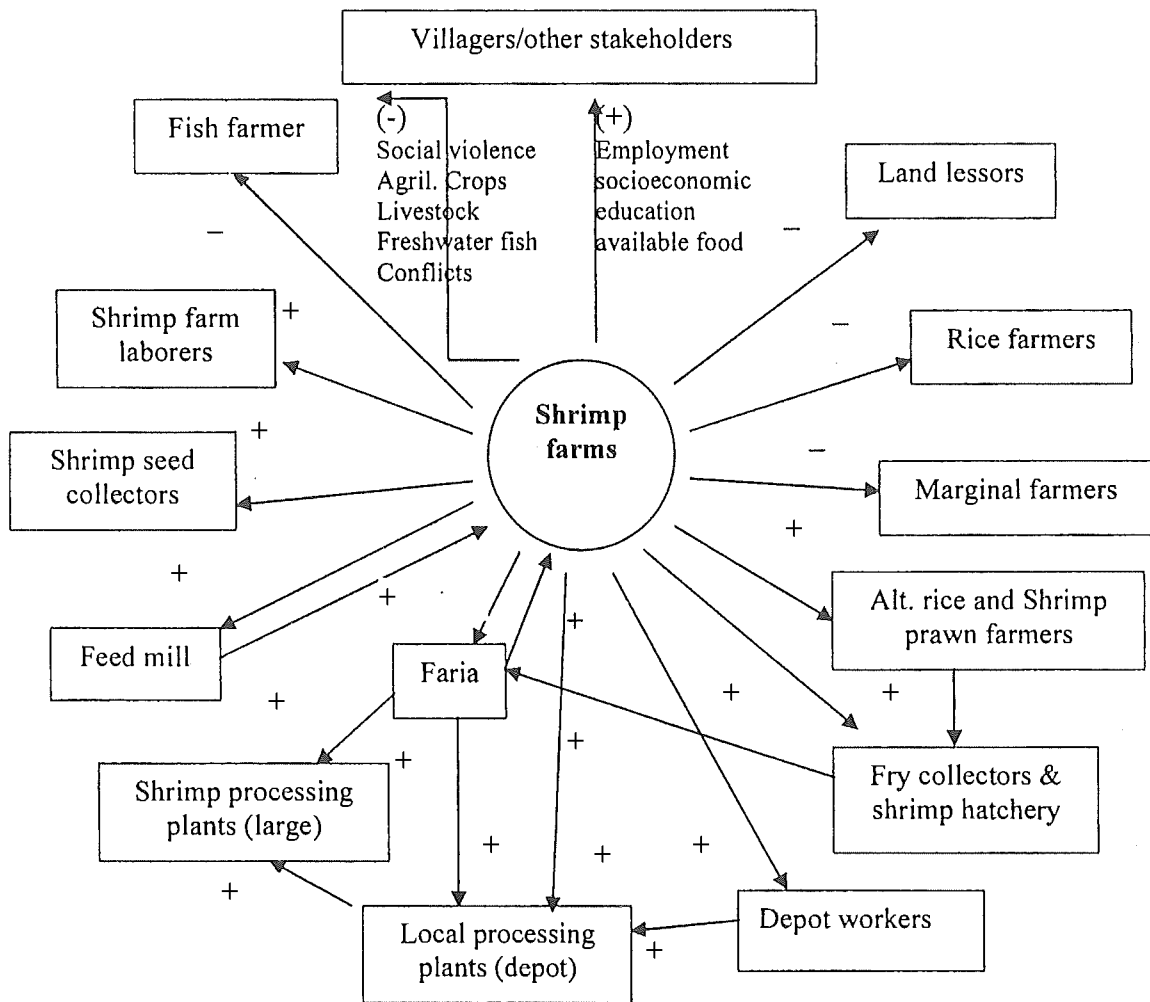


Fig. 1. Schematic diagram of relationship of different shrimp farming stakeholders

Solution suggested by the stakeholders

The survey has been conducted to identify the solutions and recommendation about the problems of shrimp farming by stakeholders in the southwest coastal area of Bangladesh (Table 6). All the shrimp farmers and alternate rice and shrimp-prawn farmers have suggested about the well dredging of connected river and canal because they need more saline water. They want more shades and high embankments for cyclone & flood protection. Almost every year the cyclone and floods are attacking to the coastal people. In November 2007 during the period of data collection about 3167 coastal people have died and 10,000 shrimp farms were washed away by the cyclone (Rosenberry 2008a).

Most of the rice farmers and land lessors are marginal. They want to rear domestic animals but there is not enough grazing lands also the rice farming area is reduced in

the coastal areas due to saline water intrusion for shrimp farming. All the land lessors have reported that the new shrimp farm should be restricted or even that all shrimp farming should be banned from their region. Most of the land lessors have lost their lands to the rich shrimp farmers though they are getting a tiny amount of leasing money. The land lessors want to get higher amount of leasing money which should be at fixed rates, and that they want an administrative (public) management for the leasing systems.

Table 6. Suggestion of different stakeholders

Stakeholders	Suggestions	% of respondents
Shrimp farmers and alternate rice and shrimp-prawn farmers (n=60)	Well dredging of connected river and canal	100
	Shade for cyclone & flood protection	100
	More training for the shrimp farming stakeholders	100
	Viral disease specialist in the shrimp farm area	100
	Govt. hatchery and supply healthy, strong PL	100
	High embankment for flood & cyclone protection	88
	Ensure - connection of shrimp farms to the rivers or canals	83
	Mangroves destroyers should be punished by the govt. rules	60
	Shrimp farms should be banned where mangroves may grow	60
	Loan to marginal farmers and other stakeholders	54
Rice farmers and land lessors (n=40)	New shrimp farm registration should be restricted	83
	Grazing land should be fixed for livestock production	72
	Administrative management for land leasing system	64
	Shrimp farm should be postponed from this area	60
	Land leasing amount should be higher and fixed rated	60
Depot owners (n=10)	Continuous electricity supply in the coastal area	100
	Antibiotic testing equipment in the processing plant	100
	Training on HACCP in the processing plant	100
	Shrimp farmers should supply shrimp directly to depot	100
Depot workers and shrimp farm laborers (n=30)	Part-time wages if it is more than 8 hours	100
	Daily wages should be higher	100
	Should ensure the availability of drinking water	54
	No gender wage gap	50
Faria (n=10)	Selling and buying rate should be negotiated (for fixed rate)	100
	Communication	100
Shrimp seed collectors (n=10)	Resettlement & rehabilitation of shrimp seed collectors	100
	River PL selling rate should be higher	70

Electricity or power supply is the main problem for local processing factory (*depot*) owners. Maximum time the power is absent due to load shedding for this reason they cannot get enough ice and sometimes their shrimp are spoiled so, they want continuous electricity supply especially to the processing plants area. Antibiotic testing equipment

is necessary in the shrimp processing plant. The shrimp processing plants owners are sending their shrimp samples to Singapore for antibiotic testing (Rosenberry 2006g) which is very expensive for them, so they suggest antibiotic testing equipment in their processing plants area. They also suggest more training about HACCP (hazard analysis and critical control point) in the shrimp processing plants and the shrimp farmers should supply their shrimps directly to the depot.

Bhattacharya (1999) has proposed some solutions for shrimp farming in Bangladesh such as effluent charge on pollutants of water, mixed rice-shrimp and clear land zoning, licensing of shrimp farms, mandatory mangrove development, a ban on shrimp catch by trawlers, strengthening of property rights, and a rationalizing of current laws. He also has emphasized that “in Bangladesh, a major requirement is that all stakeholders, especially local communities must be involved in the decision making process.” The indigenous and local knowledge holders should be included in co-management committees regulating practices and service delivery on designated lands or in designated communities and these committees could make decision regarding biological resources, environment, natural resources, land-use planning, fisheries and oceans, agriculture, health or any other sectors (The Crucible Group 2001). For increasing the production rate farmers training is essential. Education and experience can provide the increasing rate of production and shrimp farming sustainability mentioned by Saengnore and Lebel (2001).

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References

- Ahmed, Z., 2006. Profile and livelihoods of shrimp producers in Bangladesh. In: *Shrimp Farming and Industry: Sustainability Trade and Livelihood* (eds. A. Rahman, B. Pokrant, A.H.G. Quddus and M.L. Ali). Bangladesh Center for Advanced Studies: The University press Limited. pp. 341-353.
- Bhattacharya, D., 1999. *Shrimp industry in Bangladesh: Trade liberalization and the environment*, A synthesis report on lessons learned from Bangladesh, Chile, India, Philippines, Romania and Uganda. UN, New York and Geneva. UNEP. 5p.
- DFID, 2000. *Livelihood Assessment of Communities and Households and Technical Assistance of Aquaculture Technologies and Methods*. Northwest Fisheries Extension Project-2, Livelihood Review. Vol. I, DFID, Dhaka, June 2000.
- EJF (Environmental Justice Foundation), 2008. *Farming the Sea- Unregulated shrimp farming, the environment and people*. Social implications and human rights.
- Hoq, M.E., M.A. Mazid and G.C. Haldar. 1995. *Socioeconomic Impact and Constraints of Shrimp Culture in Bangladesh*. *FRI Technical Reports No. 11*. Fisheries Research Institute, Mymensingh.

46 p.

- Islam, M.S., M.A. Wahab, and A.A. Miah. 2002. Socioeconomic impact of alternate shrimp-crop farming in Bangladesh. Paper presented at the World Aquaculture 2002 Conference, held at Beijing, China on 23-27 April, 2002.
- Lebel, L., N.H. Tri, A. Saengnong, S. Pasong, U. Bautama and L.K. Thoa. 2002. Industrial transformation and shrimp aquaculture in Thailand and Vietnam: Pathways to ecological, social, and economic sustainability? *Ambio*, 31(4): 311-323
- Nolting, M. and B. Schirm, 2003. Shrimp production in Ecuador-New ecological and quality standard. Deutsche Gesellschaft for Technische Zusammenarbeit (GTZ) GmbH. Div-Agriculture, Fisheries & Food, Eschborn, Germany.
- PPM&E (Participatory Planning Monitoring and Evaluation). 2004. Managing and Learning for Impact in Rural Development. Wageningen University Research, IAC. <http://www.thedailystar.net/2006/01/31/d60131070286.htm>
- Rosenberry, B. 2006b. Shrimp News International. Previous free news, country reports-Bangladesh. Clubs, Machetes, Brickbats and Crowbars.
- Rosenberry, B., 2006e. Shrimp News International. Previous free news, country Reports, Bangladesh, Losing Power. URL last date: 06.07.2008.
- Rosenberry, B., 2006g. Shrimp News International. Previous free news, country reports, Bangladesh, Will Set up Antibiotic Testing in Dhaka. <http://www.shrimpnews.com/FreeNewsBackIssues/FreeNewsAug200611.html>
- Rosenberry, B., 2007b. Shrimp News International. Previous free news, country reports, Bangladesh. <http://www.shrimpnews.com/FreeNewsBackIssues/FreeNewsApril200720.html>
- Rosenberry, B., 2007j. Shrimp News International. Previous free news, country reports Bangladesh, Gender Wage gap. <http://www.shrimpnews.com/FreeNewsBackIssues/FreeNewsDecember200714.html>
- Rosenberry, B., 2008a. Shrimp News International. Previous free news, country reports, Bangladesh. <http://www.shrimpnews.com/FreeNewsBackIssues/FreeNewsApril200811.html>
- Saengnong, A. and L. Lebel, 2001. Experience, Knowledge and the Technology Choice of Shrimp Farmers in Thailand and Vietnam. Chiang Mai University, Thailand. 11p
- Samarakoon, J., 2004. Issues of Livelihood, Sustainable Development, and Governance Bay of Bengal, Royal Swedish Academy of Science.
- The Crucible Group. 2001. Seedling Solutions. Volume 2: Options for National Laws Governing Access to and Control over Genetic Resources. Section 2: Survey of National Policy Options. Co published by the International Development Research Center (IDRC) and the Dag Hammarskjöld Foundation (DHF), 243 S. p 49. www.biodiversityinternational.org/publications/pubfile.asp?ID_PUB=689

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