Scoping study for mud crab farming in Bangladesh – Part 2

Colin Shelley, YH & CC Shelley Pty Ltd

Disclaimer

This report is based on information gathered from personal interviews and consultation, telephone discussion, published information and other materials. The report is believed to be accurate however it contains evaluation of future events and the company takes no responsibility for the information herein and readers should make their own enquires to satisfy themselves on all matters.

C. Shelley, YH & CC Shelley Pty Ltd. March 2013
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Front cover: Experimental mud crab pens established in ponds at the Bangladesh Fisheries Research Institute, Paikgacha
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Executive Summary

A review of the ‘Study of status of mud crab seed collection and fattening in Bangladesh’ identified some areas in which the report could be improved, however it provided some useful baseline information for future planning purposes.

A visit to Fisheries Department staff in Khulna identified that it has yet to effectively engage with the mud crab farming sector, however there appeared to be interest in rectifying that situation.

It has been identified that there are excellent facilities available for mud crab farming research at the Bangladesh Fisheries Research Development Institute at Paikgacha and that some useful mud crab research has already been undertaken there. In addition, there are staff and facilities available at Khulna University that can also actively engage in mud crab aquaculture research if funding becomes available.

A hatchery, that has been used as both a freshwater prawn and shrimp nauplii hatchery (Anamika), was identified as a possible facility to be developed for mud crab hatchery operation (Attachment 1). There is a significant cost involved in upgrading this facility. An alternative is to use a shrimp hatchery in the Cox’s Bazar to develop mud crab farming technology. It appears that most shrimp hatcheries there would have the necessary equipment and water quality treatment installed that a mud crab hatchery requires. However there are pros and cons for redeveloping a mud crab hatchery in either location. A budget and slight variations to its design to
convert the Anamika hatchery to a mud crab hatchery has been provided, to operate it at half its maximum capacity.

Designs and rough budget estimates were prepared for both a demonstration scale mud crab hatchery and a commercial scale mud crab hatchery, providing options for the WorldFish Center to consider how best to introduce or support mud crab hatchery development in Bangladesh (Attachment 2).

An economic feasibility study examining the likely cost and benefits based on demand for crab ‘seedstock’ was undertaken in collaboration with FtF AQ staff. This provides some support for the pursuit of mud crab hatchery development in Bangladesh to support the long-term development of the industry.

Current training needs for the mud crab fattening and farming sector have been listed, demonstrating a significant demand for the development of extension services to support this fast growing agribusiness sector.

During this trip, further support for the concept of producing an industry development plan for the next few years for the mud crab farming sector was provided by GIZ, the NGO Shushilan, the Fisheries Department and research providers, Khulna University and the Bangladesh Fisheries Research Institute. GIZ has identified May this year as an opportune time for a workshop to produce such a plan.
Introduction

In August 2012, an initial ‘Scoping study for mud crab farming in Bangladesh’ was undertaken and the following recommendations made:

1. Introduce an extension and training program for mud crab farmers to improve mud crab husbandry practices.

2. Undertake a socio-economic study to determine the importance of mud crab farming to coastal communities and to demonstrate the growing value of mud crab farming to the country.

3. Government agencies and relevant NGOs should run a facilitated consultation process and workshops to review management arrangements for the country’s mud crab stocks and how they can be improved to sustainably manage the resource.

4. A monitoring program be established to provide on-going fishery independent information on the status of the country’s mud crab populations.

5. Hold training courses in processing, packing and handling of mud crabs for regional dealers and exporters should be held to decrease mortality rates and improve product quality.

6. To support the growth of the mud crab farming sector in Bangladesh in the medium-long term government, NGOs, the private sector or a mix of these should invest in demonstration mud crab hatchery facilities to produce crablets for farmers. As farmers are often hesitant to change their practices, funding for hatchery development should be for a period of some years (5 years recommended) and include an extension program to support farmers working with hatchery-produced stock.
7. To determine where best to establish mud crab hatchery facilities, either at Cox’s Bazaar or in the southwest of the country, at somewhere like Mongla, a feasibility study should be undertaken to examine the relative economics of the two locations and also look at the cost of developing a new mud crab hatchery, compared to adapting an existing shrimp hatchery.

8. To obtain an accurate picture of the current and future potential of mud crab farming in Bangladesh a coastal survey needs to be carried out and aquaculture planning undertaken using a GIS to plot potential areas for mud crab pond and mud crab culture in mangrove pens.

9. To demonstrate the potential for farming mud crabs in mangrove pens, 4 or 5 demonstration units of 5 hectares each should be established in different parts of the coast and operated for 3-5 years to demonstrate their economic potential and be able to be used as training sites for new farmers.

10. A small taxonomic survey and DNA screening study be undertaken to confirm the species of mud crab present in Bangladesh, their distribution and representation in the fishery and their availability for farming.

The WorldFish Center undertook in-house work on the local mud crab industry and a ‘Study of status of mud crab seed collection and fattening in Bangladesh’ was completed.

This report summarises further work undertaken to:

- Review the ‘Study of status of mud crab seed collection and fattening in Bangladesh’.
- Visit Department of Fisheries in Khulna to discuss report and plan of work
- Visit Khulna University and discuss the present status of crab culture in the region and ongoing research activities.
- Visit several existing prawn hatcheries pre-selected by FtF-AQ in the South West of Bangladesh and identify the most suitable hatchery for conversion to a crab hatchery.
- Prepare a design concept and draft budget for a new mud crab hatchery.
• Prepare a design and budget to convert one selected existing prawn hatchery into a crab hatchery.
• Prepare an economic feasibility study for a mud crab hatchery based on operating cost and demand for crab seed in cooperation with the National FtF AQ staff.
• Visit crab fattening areas in SW of Bangladesh to assess different methods of production in pond, pen or cages and assess scope for improvement and training need.
• Visit Bangladesh Frozen Food Exporters Association (BFFEA) and discuss crab market and need for improved post-harvest packaging and handling.

1. Review the ‘Study of status of mud crab seed collection and fattening in Bangladesh’.

As this work was focused on a survey to collect information on mud crab ‘seed’ collection and fattening, the structure of the questionnaire had a few irregularities, in that some questions could only be answered by a sub-set of those interviewed e.g. ‘Fiscal year wise export volume’ and some questions weren’t questions at all e.g. scoping for establishment of crab hatchery. The other problem with the report that whilst some summary information was provided, summary results for most questions asked were not e.g. breeding time of mud crab (month). Such information would be extremely valuable. If the raw data from the survey was still available and could be summarised this would strengthen the report considerably.

The report confirmed many of the findings from the ‘Scoping study for mud crab farming in Bangladesh’ and several passages and phrases from that report were repeated in this further report, without reference. Several of its recommendations were just copied from the previous report, word for word.

The executive summary includes one recommendation that is I believe not appropriate at this time, this is with regards to stocking natural waterways with mud crabs from a hatchery. Whilst possible, restocking or stock enhancement operations are notoriously extremely expensive. It is also very difficult to measure their success
and careful control of the genetics of stock released is required to minimise the risk of impacting on the local genetic make-up of the stock. Japan has the worlds largest publically funded stock enhancement program, which has been operated for many decades, but with variable success. As has been the case for the shrimp industry in Bangladesh, it should be possible for hatchery produced mud crabs to gradually become an increasingly important component of the ‘seed supply’ for the mud crab farming industry and in time reduce the dependence on limited wild stocks of mud crabs for farming. I consider this to be the best use of hatchery reared mud crabs in Bangladesh.

The report stressed the importance of managing the wild fishery to maintain biodiversity. I think it can be more forcefully argued that the resource needs to be managed to prevent the crashing of populations to levels that will no longer sustain the existing industry and which may take many years to recover. In some parts of the Philippines, overfishing for farming purposes has resulted in the crashing of wild populations. So whilst a dramatic reduction in mud crab numbers will impact on biodiversity to a degree, it is more appropriate to focus on ecologically sustainable development of the fishery.

‘Ecologically Sustainable Development (or ESD) is a dynamic concept that seeks to integrate short and long-term economic, social and environmental effects into the decision-making of government and industry. Ecologically Sustainable Development (or ESD) is a dynamic concept that seeks to integrate short and long-term economic, social and environmental effects into the decision-making of government and industry.’

National Fisheries (Australia) ESD Website

The report estimated the demand of crablets to stock 200 ha per crop (the estimated area of mud crab farms in SW Bangladesh) at 2000-2500 pieces per ha, is 400,000 – 500,000 per crop. If there are approximately 7 crops per year, then 2.8 m – 3.5 m crablets are required. If the average mud crab ‘seedstock weight’ is 115 g this equates to 332 tonnes – 402 tonnes of ‘seedstock’ required per year. This estimated
demand enables the potential for hatchery production to be evaluated, from an economic and practical perspective.

Whilst the survey apparently collected data from Barisal division, it was not included in the report, other than to say that costs of ‘seedstock’ and trash fish were both cheaper than in the Khulna division. The survey data from Barisal would be a useful addition to the report.

For farmers that usually only hold crabs for 2 weeks or so, it is a concern that 30-40% die during that period as reported. For such a short period of time this figure is very high. The causes of this should be investigated as this is significantly impacting on the profitability of these farms. Previous research in Bangladesh (Begum, 2009) has indicated that mortality rates of less than 15% are possible for short-term fattening.

The report demonstrates that net profits of fattening mud crabs in ponds and pens for an average farmer were 360,000 BDT to 336,000 BDT per year, which is considered an above average rural income. This explains the increasing number of farmers opting to convert to or develop mud crab farms.

Links between the recommendations and the information gathered by the survey are unclear and as such difficult to treat seriously.

The report would have been of greater value if the consultant had stuck to the TOR, provided a detailed data set and could have refrained from plagiarism. In addition the copy of the report I was provided with had a problem with it’s formatting, such that many pages consisted of words that were joined together without spaces, making it difficult to read. This should be fixed before the report is given wider circulation.

2. Visit Department of Fisheries in Khulna to discuss report and plan of work

I visited the District Fisheries Officer in Khulna, Mr. Profullah Kumar Sarker. He is responsible for the Fisheries extension program in the region. He noted that many shrimp farmers are converting to mud crab. However it was surprising to find out that Fisheries has yet to do any work on mud crab, either from an extension or
statistical collection perspective. There is currently no routine survey or monitoring of mud crab stocks in Bangladesh, so their status is unknown.

We discussed in general terms, key findings from the local consultant’s report and sought his opinion on them. However as his agency has not had any significant engagement with this sector, it was probably difficult for him to respond to our questions.

He considered that it would be timely to develop an industry development plan and have a workshop(s) to further this. Such a plan and the need to implement it might leverage some resources to support the mud crab farming sector from the Department. He mentioned that Fisheries has an extension and R&D groups and that the Director Generals of both organisations should be sent an invitation to any proposed workshop.

Mr Kabir kindly translated a 1 page fisheries document on mud crab that the District Officer provided to us. “The total exports of mud crab are considered to be 1500m BDT (US$18.75) of which 700m BDT (US$8.75) comes from SW Bangladesh. In addition to the mud crabs he referred to a freshwater crab that is consumed by locals in some parts of country. 90% of cultured crab is assumed to be harvested from ponds / farms with 25% from the wild (115%?). 150,000 farmers are involved. In the Sundarbans 50-60,000 involved in mud crab fishing. In rivers near the Sundarbans a fisher with a baited hook and line can harvest 20-30 kg per day. June – July is considered to be the peak breeding season and is considered to spawn in the Sundarbans and estuaries. Advised that mud crab farming common in Khulna, Shatkira and Bagarhat divisions. Techniques include fattening, growout of small crablets and cage culture. Suggested that 6-7000 kg per hectare was possible, translated from 900 kg per decimal (note: seems highly unlikely!). Boxes of 21 cu. m. with 60 holes have been used for fattening. Crab feeds used include eel, snail and trash fish. Trash fish 15-20 BDT per kg (note: all other reported prices much higher). Export sized crabs, 200-250 g, are sold at 300-400 BDT per kg, up to 900 BDT sometimes. Paikgacha has 300 farms. Estimates a 30 decimal farm produces 150,000 BDT per year. Markets China, Taiwan, Hong Kong, Malaysia, Singapore and Thailand.
Salinity of the land is increasing in mud crab areas. In 1997 the Government banned the collection of crabs, however the decision was overturned after 2 months because of human right concerns (i.e. poor making a living). After 20 years of this industry development, no government resources to support it. It is not a recognised export commodity category by the government agencies. There is no government extension for mud crabs, although fisheries officers provide unofficial advice to fishers who seek it from the agency. No fisheries permit is required by farmers, whereas it is for shrimp and fish.”

The District Officer was uncertain if Barisal has good prospects for mud crab culture, as had been suggested in the FtF AQ local consultant’s report. He considered that a freshwater crab may be more prominent in that area, although as some areas are close to the sea, access to marine stocks of mud crab might be good.

At present in each sub-district there are 3 fisheries extension officers, so 75 in total for the 25 sub-districts.

I also met with Mr Rashed, the Deputy Director, Fish Inspection & Quality Control in the Department of Fisheries. He has been a district fisheries officer in many areas in SW Bangladesh and had some interesting information on the industry based on his personal experiences.

He believed that a side effect of collecting crabs is that with some gear fish fry are also taken and wasted. He was strongly for a) development of hatcheries b) a locally made feed (as trash fish supplies under huge pressure) and c) training in rearing crabs more effectively.

He considered that poor coastal people, who are still illegally collecting shrimp from the wild for farming, could convert to crab farming, offering them an alternate legal occupation. This was dependent on the future growth of the hatchery sector to provide stock to meet farmers demand at a reasonable price.

His Inspection and Quality Control Group would only get involved with crabs if frozen, chilled or cooked. Live products currently required no testing or checking. Although he mentioned that for export of seafood different countries require
different paperwork. A licence to export is required from the Export – Import Directorate, in addition to customs clearance, to export live crabs, but nothing at this stage from Fisheries.

3. Visit Khulna University and the Bangladesh Fisheries Research Institute to discuss the present status of crab culture in the region and ongoing research activities.

**Khulna University**

Two meetings were organised with Professor Nazmul Ahsan, the head of the Fisheries & Marine Resource Technology Discipline at Khulna University. We discussed issues including the sustainability of mud crab populations, the rapid growth of crab farming, extension, financial support for farmers, economics, feeds (trash fish problems) and many other related issues. Looking toward the future he fully supported the concept of producing an Industry Development Plan for Mud Crab Farming in Bangladesh with all key stakeholders. From an R&D perspective this would enable industry and others to provide clear direction to the research community as to what work was required and what were priority areas. He considered a workshop approach was a good way forward and indicated enthusiasm to take part in such a gathering.

Microfinance, in particular the PKSF scheme operated by the national Government was discussed which is focused on micro financing. It lends at 6% to NGOs and other groups, but they the use these funds and charge higher interest to their clients (30% plus). Such interest rates are not meeting the demands of farmers for low-interest rate finance. It was suggested that the program is in urgent need of a review, which would hopefully lead to more constructive funding arrangements.

Whilst discussing the shortage of trashfish in Bangladesh it was noted that shrimp feed (which can be used for mud crab Growout) in Bangladesh costs 130 BDT per kg (US$1.64). It is supplied from India and Thailand, as well as from local mills.

A brief history of the University’s involvement in mud crab culture was provided.
• 2000-1: Kuakata, Barguna a significant fishing area, some work done on wild resource management, but the researcher died before completing his studies.

• 2004: collecting of mud crabs for farming commenced and an M.Sc. thesis on the pen culture of crabs was undertaken.

• 2007-8: The British Council and other environmental groups worked on value chain mapping for the mud crab sector.

• DANIDA undertook some work in Barguna. A group approach was taken to training farmers in the fattening of crabs

It was thought in 2004 that mud crab stocks were becoming exhausted; however now in 2013 the situation is obviously far worse. In the past there were more crabs taken from rivers, however it appears that most now come from the Sundarbans

It was mentioned that crabs were initially a by-product of shrimp culture, the crabs just getting into ponds and being grown out with the shrimp.

The Forestry Department manages crabs in the Sundarbans. However it was considered that they are primarily interested in trees and only the revenue from crab permits seemed to be of significant interest.

Khulna University has recently obtained a hatchery facility near Paikgacha that it would like to develop as a research facility, but currently it does not have enough funds to set it up and operate it.

Aquaculture is one of 5 branches of the Fisheries & Marine Resource Technology Discipline at Khulna University. It has a significant number of staff and students. There are research facilities at the University in Khulna including some ponds (freshwater) and several laboratories including one that has a PCR to undertake disease testing and equipment to undertake a range of genetic studies.

Professor Ahsan is interested in resource management, including the management of mud crabs. In addition he has undertaken work on shrimp disease, some of which has been with Matt Briggs, an expert in this field in Southeast Asia.
I also met Dr Md Golam Sarower who has undertaken some preliminary work on mud crab culture, some years ago and has recently studied the biochemical composition of mud crabs in Southwest Bangladesh.

**Bangladesh Fisheries Research Institute (BFRI)**

I visited BFRI in Paikgacha and met with Dr Saha, the head of the institute and discussed their work on mud crabs. They have been involved in different aspects of mud crab research for many years. They have produced some materials on mud crab farming. At present they are undertaking work on the development of a formulated feed for mud crabs and have done some preliminary trials. The driver for this work is that the availability of trash fish is almost non-existent and that mud crab farmers are now using small tilapia as the main source of crab feed. Initial indications are that a feed with 38% protein would be useful for grow-out. They have also developed a mud crab fattening box using plastic, rather than split bamboo, which is commonly used at present.

Dr Saha mentioned that the Export Development Board is keen to promote mud crabs as an export commodity.

At present he has just one scientist with a technician working on mud crab research. BFRI has 30 hectares of well-constructed brackish water ponds, which are ideal for research on mud crab farming. Work on stocking densities, feed development, feeding rates, different pond and water treatments, the effect of shelters on stocking density and other important work to improve the productivity of mud crab farming can all be undertaken in this world class facility. BFRI also has good quality accommodation for staff and visitors and a small but useful brackish water hatchery complex.

BFRI has a very small research budget, which currently limits the work they can undertake on mud crab farming. With adequate funding and human resources this should become the major centre for work on mud crab farming, from crablets to harvest. This is a very important asset for the future of the mud crab farming sector.
in Bangladesh. BFRI could also become a centre for post-graduate research into mud crab aquaculture.

Figure 1. Dr Saha (right) and myself at the ponds being used at BFRI to develop an artificial feed for mud crab fattening.

4. Visit several existing prawn hatcheries pre-selected by FtF-AQ in the South West of Bangladesh and identify the most suitable hatchery for conversion to a crab hatchery.

This is combined with work item 6. in Attachment 1. In addition to ascertain the status of shrimp hatcheries in the Cox’s Bazar area, as I was unable to visit them as a result of travel problems caused by a 2-day national strike, I held a phone conference with Mr Hadi, a pioneer in that field. A copy of that phone conference can be found in Attachment 1a.

5. Prepare a design concept and draft budget for a new mud crab hatchery.

This is Attachment 2 of this report.

6. Prepare a design and budget to convert one selected existing prawn hatchery into a crab hatchery.

This is combined with work item 5. in Attachment 1.
7. Prepare an economic feasibility study for a mud crab hatchery based on operating cost and demand for crab seed in cooperation with the National FtF AQ staff. This is Attachment 3 of this report.

8. Visit crab fattening areas in SW of Bangladesh to assess different methods of production in pond, pen or cages and assess scope for improvement and training need.

A crab fattening system based on floating boxes was visited in Kalbari, Shyamnazar, Shatkira. This box system was being promoted and supported by Oxfam in partnership with the local NGO, Shushilan. The system consisted of floating boxes constructed from split bamboo, divided into 50 individual chambers in which one crab for fattening was kept in each container. The floating boxes were floated in brackish water channels feeding nearby mud crab pond farms. Crabs we saw in the system were below a size that depot owners would buy, so the system may also in fact be used to grow crabs through moults to a size that can be sold. This is a relatively small component of a program supporting various agribusiness opportunities to make a living in Bangladesh.

Figure 2. Floating mud crab fattening box system constructed from bamboo

Figure 3. Box system on floats in channel to other mud crab farms

In the same district we visited a few shrimp PL nurseries that would be suitable for mud crab nursery as well. Each tank holds approximately 120,000 PLs. They make 50 BDT profit per 1000 PLs., even though their mortality rate is 20-25%. They use high quality Japanese Higashimuru larval feed. So the hatchery operator makes 4500 BDT (US$57) per batch (assume 25% mortality), typically holding the PLs for 3-5 days.
Figure 4. A typical shrimp PL nursery in Southwest Bangladesh

In a visit to a mud crab depot in Paikgacha it was demonstrated how they use a bright light to test for eggs in females and for the fullness of crabs generally.

Figures 5. The photo left above shows an empty female. The light through the shell shows a gap between the shell edge and the muscle (meat) and also a pale gap where the ovary is, showing it to be empty. Figure 6. Right above, no gap can be seen between shell edge and meat, plus the area where the ovary is found is also opaque.
Depot owners won’t buy female crabs unless they are full of eggs and meat. A farmer can purchase an empty female with no eggs for 100 BDT and sell it when full of eggs and meat after a couple of weeks for 200 BDT a piece.

In Paikgacha we discussed 3 grow-out techniques that are being used in the local area with a local mud crab farmer. The first is where quite small mud crabs of 70 – 80 g are purchased, on-grown for 25-30 days until they moult to become 200 - 250 g crabs. These crabs are not tied during their culture. Secondly, soft shell, empty or female crabs without eggs are fattened for 2 weeks until hard shell and full of meat and eggs. The final method, which had not been reported during my first trip to Bangladesh was that some shrimp farmers are buying small crabs at 1200 BDT per 1000 pieces, which he thought weighed about 500g. So these 1000 crablets would weigh approx 0.5 g each. These are grown out for 2-3 months in ponds in polyculture with shrimp. This potentially indicates that mud crabs from the very smallest to the largest that occur in the fishery are being harvested. In passing it was also mentioned farmers had received up to 1200 BDT per kg for their mud crabs for a short period of time prior to this year’s Chinese New Year.

During this trip it was noted that many farmers keep their crabs tied during the fattening process. This has two implications; firstly that the crabs cannot use their claws to feed properly during fattening, which is therefore likely to take longer. Secondly, if the farmer should wait too long, the crab may try to moult whilst tied. If the crab is tied the moult may be unsuccessful and result in the crabs premature death.

From visits to farms during this trip and the previous one, a range of training needs for mud crab farmers has become apparent (Table 1.).
Table 1. Training needs of mud crab farmers in Southwest Bangladesh

<table>
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<th>Area for improvement</th>
<th>Training Required</th>
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<td>Basic record keeping</td>
<td>Provision of a basic record keeping system for the different systems of farming, pond, boxes and polyculture</td>
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<tr>
<td>Pond preparation</td>
<td>Training required with regard to pond preparation after draining prior to restocking. What sort of chemicals at what concentrations should be added.</td>
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| High on farm mortality rates          | • When buying mud crab ‘seedstock’ farmers need to be able to undertake basic health checks of their stock, to ensure they don’t waste money on poor quality ‘seedstock’  
                                       | • Basic mud crab husbandry techniques can be provided to farmers including recommended feeding rates                                             |
| No mud crab farmer organisations      | Advice on establishing local farmer groups to share information and potentially buy in bulk items such as feeds, fencing and netting for their farms. |
| Water quality management              | Training in how to better manage water quality in their ponds can help farmers increase productivity and decrease losses resulting from poor water quality. |
| Setting up a crab farm                | For new farmers, pond construction, mud crab farm preparation (fencing, netting), construction of mud crab fattening boxes.                         |
| Selling mud crabs to depots           | How to best tie, pack and present mud crabs to dealers in mud crab depots                                                                         |
| Stock control on farm                 | How to manage different sized stock within a farm to minimise mortalities, maximise growth and make the best use of their farm area.              |
| Financial management                  | Basic financial record keeping, advice on how to deal with depot owners and others, providing loans at high interest rates, saving strategies.     |
9. Visit Bangladesh Frozen Food Exporters Association (BFFEA) and discuss crab market and need for improved post-harvest packaging and handling.

In discussions with local staff it was agreed that discussions with the Bangladesh Frozen Food Exporters Association were premature. This group would only be interested in mud crabs if dealing with a frozen product such as soft-shell crabs. As a result this group was not visited during this trip.

10. Industry development discussions

During this trip to Bangladesh, in meetings with GIZ, the Fisheries Department, BFRI, Khulna University and the NGO Shushilan, all supported the concept of development an industry development plan for the mud crab farming industry. GIZ and Shushilan were also actively considering such an initiative or similar actions to further support for industry. In particular GIZ itself has been considering the need to actively support the development of mud crab hatcheries in the country. There appears to be a consensus regarding the value of establishing a plan for the next few years, so that all stakeholders can optimise their investments in this sector, whilst providing opportunities for other funding agencies to contribute. GIZ has suggested May, 2013 as a possible time for a workshop to develop an industry development plan.