

Case Study on Shrimp Culture in Satkhira, Bangladesh

Case Material – I

IT WILL BE SHRIMP OR NOTHING!
NOTES OF TRAVELS IN SATKHIRA

by

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I The case for shrimp culture

1. In trying to learn about the evolution of shrimp culture in Satkhira, I first met SK, a large shrimp farmer from Satkhira. SK explained to me that back in 1965 the then Government of East Pakistan, through its Water and Power Development Authority (WPDA), had begun to construct embankments in the coastal districts, essentially to protect the agricultural land from inundation. But what was started as a way to augment paddy growth, in reality turned against it. Due to silting at the draining channel mouths, the paddy lands inside the embankments could not be properly drained and this resulted in lowered yields of paddy. The yields had reduced to such an extent that by 1980 paddy could not be economically grown!
2. The Satkhira region has practised shrimp-cum-paddy culture for a very long time. Embankments were built up around paddy fields with channel access to the river systems. During high tides the channels were opened allowing water flow into the paddy enclosures, along with shrimp juveniles and other finfish fry. The channels were closed off after a sufficient quantity of water/shrimp fish was estimated to have entered and the pond essentially left alone till it was time to harvest using nets and traps. This kind of aquaculture yielded and still yields, about 120kg/ha of shrimp (high quality like *P. monodon*), other shrimp and finfish. And several farmers report much higher yields.
3. With the completion of the WPDA embankments, shrimp culture suffered as it was illegal to cut channels and gates into the embankments and the officials seemed quite serious about enforcing the rule. In 1977 some gates in the embankment of Polder No. 1 were damaged and with the resultant flooding, paddy growing would have been impossible. The local WPDA chief agreed to the requests of the affected farmers that they be at least allowed to use the opportunity to grow shrimp in their fields. What began as an accident became a practice.
4. With shrimp playing a big role in Bangladesh exports and world market prices skyrocketing in the 1970s a broken gate in the channel began a deluge that is still inundating Satkhira. The rapid growth period of shrimp culture and the commercialization and industrialization of shrimp farming had begun.
5. I was curious about where the technology had come from, for obviously with the expansion SK mentioned, new techniques had been introduced – like ploughing and adding lime before flooding, adding raw cowdung, screening the channels to selectively allow preferred species like *P. monodon*, and in some cases supplementary feeding. SK identified two sources of technology. Small and large cultivators with access to information and travel, read about shrimp culture and often ventured out of the country to study how shrimp was grown elsewhere – but the real technology transfer took place informally through over-the-border movement of working people from Satkhira to 24 Parganas in West Bengal, India. Techniques travelled with people and by word of mouth.

6. SK feels that there is an urgent need for research and development like what is being done by the BOBP in Satkhira but he wants more of it and also that it be application oriented. He would like to know more about predator control, feeding protocols (especially whether feeding really helps), stocking procedures, and the type of water management for different hydrological (tidal amplitude) and salinity conditions. He felt he had benefited from the BOBP effort because he knew what he wanted, knew how to ask the right questions and was aggressive enough to corner the BOBP visiting consultants and get what he wanted. Otherwise, he felt the BOBP experiments had yet to have impact on the technology.
7. SK had some interesting suggestions on how extension could be enhanced from R & D projects. He felt that R & D projects should cooperate with local farmers and use the farmers' ponds for experiments thereby including them in appropriate research and learning exercises. In this way, farmers would actually understand the whys and hows of culture, and should the experiment be a success, the extension effort would be dramatically aided by the 'demonstration' and information moving along informal farmers' networks. The very methods that had triggered the shrimp revolution of Satkhira.
8. There was no doubt that it made financial sense to get into shrimp farming provided you could afford it. The way it was described by SK, it was not for the weak of heart and the poor of purse. SK strongly feels that on considering the investment and the scale of operations, you had to think of farms over 100 bighas, and preferably farms up to 1500 bighas, in size if you counted on your investment to yield reasonable returns. He did not clarify what 'reasonable' was.
9. As we talked, I raised the question of conflicts. Had anyone perhaps not benefited from shrimp culture or even suffered from it? He agreed that the very technology of (illegally ?) cutting WPDA embankments to flood the land for shrimp farming made it difficult for an individual to practise anything other than shrimp farming if his neighbours decided to do so. Dissent could be literally flooded out. So, if a few big farmers decided to join together to convert their land to shrimp farming, the other smaller farmers had to follow suit and not as partners but more often as leasers. The smaller leaser had difficulty in extracting his lease from his bigger partner who preferred to pay him in instalments or not at all. Receiving payment in instalments made it difficult for the small farmer to purchase essentials like rice at the best rates during seasonal fluctuations.
10. What had happened to people who cultivated rice and laboured in the fields? SK agreed that labour had been displaced because of the lowered demand for labour in a shrimp farm. But surely since it is shrimp-cum-paddy culture, isn't agricultural labour still around? And this was another surprise, for SK said that shrimp-cum-paddy culture was a dream. It was either shrimp or paddy. More of the former and less of the latter, because while shrimp was paying, paddy production had dropped from 'bad to worse' rather than good to bad'. SK felt that Satkhira had never been a big paddy growing area.
11. SK agreed that economic stratification had occurred but insisted that in absolute terms the poor had benefited. I asked him how he knew of this and he gave me a surrogate index to prove his hypothesis – he said that minor robberies and thefts had decreased in Satkhira since the advent of shrimp in a big way! Of course larger scale dacoities had increased, but that was because hijacking shipments and forced harvests of shrimp farms at harvest time were lucrative enough to encourage such behaviour!
12. He pointed out some other problems. Grazing grounds were fewer than before, and he felt that the livestock situation would deteriorate. Also, there was a very real threat that the quality of ground water which people drink could be affected in the long run.
13. On the whole SK supported shrimp culture and wanted it to become more extensive and intensive and felt that when all was said and done it would help the region more than any other alternative. In fact he felt the market forces would substantiate his claims – a bigha of land for shrimp culture was available for a lease of Taka 300 five years ago; today it would fetch anything from Taka 1800 to Taka 3000 and it is going up, not down. In fact, he felt that a lot of the complaints about the impact of shrimp culture was motivated by share

croppers, who found that absentee landlords had returned to culture their lands and had thus eliminated the 'illegal earnings' of the share croppers. SK felt that actions like making available infrastructure like ice plants, processing plants, better transportation and technical knowhow, ought to be taken to enable shrimp culture.

II. And the case against it

1. At Satkhira I met a local leader, AA, a politician and an ex-MP who was vehemently against the indiscriminate expansion of shrimp culture which he felt had had very harsh effects on the lives of the poor. First he did a simple calculation to show me the impact on labour demand :
 - one acre of T- aman paddy requires 50 man-days for one crop;
 - a 100 acre fish farm requires 10 men working for 90 days, i.e., 900 man-days;
 - the same size of land under paddy would generate 5000 man-days of labour;
 - and, the labour generated in paddy would be widely distributed while labour in shrimp is concentrated;
 - so, while shrimp labour paid more, the few who get it benefit, the others do not get anything.

He went on to describe a local spot where the day-labour gathered to get contracts of work. It used to be that in the worst of times, in the month of Posh, you could not even find destitutes there because they would be out in the fields collecting the fallen grain from harvests. Now the place is full of idlers who have no work.

2. AA pointed out some other interesting labour impacts. The removal of shrimp heads is an important processing activity and most of this is done by women. In a conservative Islamic community, he felt, large groups of women working out of doors and often late into the night, would create social tensions and conflicts. To make matters worse, he said that social outcasts and people of bad character were being singled out to be hired as guards for the shrimp farms and the combination of money, alcohol and women was creating cultural shifts in the social system more rapidly than the community could cope with. He cited an increase in crimes against women in the region and a few cases of beatings and even a few murders (which he felt had resulted from the women-working-at-deheading situation) to justify his concerns.
3. Moving on to the less dramatic but equally important area of farm waste availability he mentioned that with the decline of paddy in the region the availability of fuel, thatching material and feed for livestock had been hit. In particular, this affects the poor who now have to purchase what they used to grow or gather. He cited the fact that many families had educated their children, met religious/festival expenses and even married off their daughters with the earnings from a few head of cattle and poultry. In fact this was the poor man's saving system. With the shrinking of agricultural and grazing lands, this option is finished. AA said that a careful analysis would show that in several poor families a child's education had been stopped about the same time that shrimp culture really expanded.
4. He then went on to talk about environmental impacts. He felt that the soil was getting saline in the region and this in the long run would also make shrimp culture difficult by adversely altering the soil ecology! Soon after the WPDA embankments had been built in the 60s, local people had brought in several species of plants and trees that could tolerate only non-saline and low-saline soils. He said that several of these plants and trees were stunted and dying, indicating an increase in soil salinity. AA also talked about the drinking water supply being affected. In many ways, he felt, this issue was perhaps the most serious because in the long run, it would affect the region's very carrying capacity for human habitation.
5. Satkhira in the past was a rice-surplus region, except in the worst months when, in spite of local availability, cheap rice was brought into the region to cater to the poor. Now there is an inflow of rice at all times except during the harvest. AA sees this as another indication of paddy being displaced by shrimp and even more seriously of paddy being affected by soil salinity. He quoted Kibria's study to justify his arithmetic. He suggested that the shortfall of rice was about 100,000 tons, which was being brought in at the cost of Taka 130 crores
 - because of instances like Polder 6-8 where 3000 acres of shrimp had affected upto 62,000 acres of rice!

6. AA and others who feel strongly about the indiscriminate growth of shrimp culture, have formed a quasi-political group called the Shrimp Culture Resistance Committee. They have the support of the people. They are going to give the system time till December to do something about their demands and recommendations after which they have threatened to take the law into their hands and stop shrimp by 'other means'. The Committee had presented many demands to the District Commissioner :

- no pond culture within 12 mile of any drainage sluice;
- where fish/shrimp is cultured it should be done downstream of paddy;
- drainage channels should not be allowed to be leased out;
- shrimp should be allowed to be grown only where rice growing is difficult;
- shrimp culture should be intensified so that more could be grown in less area.

Until such time as we know more about the impact of shrimp culture it should be stopped completely! The District Commissioner has agreed to the demands in principle and had even issued a memorandum to that effect, but nothing was being implemented. AA felt that the local government officials and even the law and order people were in collusion with the big shrimp farmers who were taking their earnings out of Satkhira and not investing it into the local economy.

7. AA concluded by bringing up two other points that the entire exercise was dependent on export markets and on the availability of natural shrimp juveniles. He wondered what kind of vulnerability this built into the system.
8. In a strange way I realized that AA was not an opponent of shrimp; in fact, he could be a strong supporter of it. His objection was to indiscriminate shrimp culture for the benefit of the few at the cost of many, especially the poor. He seemed to have no opposition to shrimp culture where rice grew poorly, provided it was done in an organizational mode that used the labour of the local poor people, ensured more local value adding and was owned by local collectives like limited companies of poor shareholders.

III. The Middlemen of Satkhira : Naturally for Shrimp Culture

1. Shrimp farmers make money. And big shrimp farmers make big money and there are several who count their shrimp farm size in hundreds and sometimes thousands of bighas. But who really makes the money? I met a leading shrimp dealer in Satkhira, who also is a big shrimp farmer who had adopted BOBP technology and does selective stocking, conditioning the soil, fertilization and supplementary feeding. And then he buys and sells shrimp. The market schematic for shrimp according to him looks something like this :

The farmer at the farm gets	for	The transporter-deheader gets	The dealer sells at
Taka 190/sr	30 ct/sr	Taka 5/kg approx.	Taka 282/kg
Taka 175/sr	40 ct/sr	making about	Taka 258 kg
Taka 135/sr	60 ct/sr	Taka 100/day	Taka 216/kg
Taka 105/sr	100 ct/sr	The deheading women	Taka 128/kg
Taka 44-50/sr	140 ct/sr	get Taka 10-12/day	Taka 66/kg

and the dealer transports it to Chittagong where the processor/exporter gets about US \$13-15 or Taka 325-375 per kg for 60 ct and larger which gives one an idea as to who gets what and where and suggests why.

2. Of course, the shrimp dealer was happy with the growth of shrimp culture. He felt that government could do more to help out but did not. There was not enough ice-making going on in the region and he said he was being exploited by the ice-makers. The roads were so bad that breakdowns were frequent and the resultant losses due to poor transportation were crippling. He also talked about himself as a shrimp farmer. He was quite worried. He felt that a lot more research was needed because they have been noticing dramatic differences in growth rates and yields with no apparent differences in pond quality and other culture protocols which the scientists have not been able to explain. He felt that what was needed was a local fish expert, like the local vet, to give day-to-day advice and help in trouble shooting. All this was critical, he said, because the investment had reached such levels that even the biggest shrimp farmers could not take two consecutive failures and the small farmers would be wiped out by *one!*

IV. Improvers of Technology – the BOBP

1. Right in Satkhira, the BOBP and the Fisheries and Livestock Division of the Ministry of Agriculture have an experimental fish farm where various combinations of paddy and shrimp and various shrimp trials with different input configurations are being tried. The staff feel that while due to fund allocation and staff constraints they have not really undertaken serious extension work, about 10% of the local farmers are beginning to pick up ideas and methods out of contacts and visits. The staff said that the educated, larger farmer was definitely more interested and often took the initiative to get ideas from them.
2. Some of the ideas and methods that have been picked up are selective stocking, predator control by screening the water inflow ponds and nursery rearing of juveniles collected. Ideas like feeding, soil treatment and fertilization while appreciated as important are less frequently adapted. Perhaps there is some justification for this selective uptake of technology because in its own experiments, the BOBP has had yields of 120 kg/ha (70-20 ct/kg sizes) with no culture techniques except screening inflow points for predator control and selective stocking.
3. In the experiments that are being undertaken, the BOBP staff had found that it was possible to grow paddy and shrimp, both sequentially and together, without the feared die-out of paddy. Recently, the BOBP retained a group in Dhaka to study the socio-economic impact of its programming in the area near the farm and the results are awaited. The staff, however, did feel that indiscriminate increase of shrimp farming, especially the extensive instead of the intensive type, had caused social and economic problems and conflicts. They clearly differentiated between the extensive and the intensive – as the latter actually uses more labour than even paddy which would overcome one of the main objections of labour displacement.

V. And finally, the Government

1. Shrimp culture in Satkhira depends on the Government promoting it by creating favourable conditions or by default by looking the other way. A lot of shrimp culture is done on government land and flooded through channel and gates illegally cut through government embankments. It was important to ascertain what those in authority felt about Satkhira and its shrimp industry. So I met the Secretary-in-charge of the Fisheries and Livestock Division of the Ministry of Agriculture.
2. He supported shrimp culture and set aside the arguments of labour displacement and loss of food production (rice) by stating that one, intensive culture would use more labour than rice and at higher wages, and two, that it was necessary to look at things in terms of their international prices – because he would rather prefer that all land in Satkhira be converted into shrimp culture and the high price of shrimp be used to buy (low-cost) rice to feed the people! Having set the policy tone he explained the new and recent decisions the Government had taken to promote and regulate shrimp culture in Satkhira and other coastal regions :
 - Long-term leases would be offered instead of the inhibiting one year lease at present ;
 - for farms of 20 acres and below the lease value would be Taka 1000/acre ;
 - for farms of 20-50 acres Taka 1500 for every acre above 20 acres ;
 - for farms above 50 acres Taka 2000 for every acre above 50 ;
 - the lease for the first year would be subsidized by 50% ;
 - the rent would be reviewed and revised every three years ;
 - industries and private owners will not be allowed to possess or lease farms above 100 acres in size. These will only be allowed as cooperatives ;
 - the FLD intends to promote 10,500 ha of farms in the next 10 years ;
 - saline water intrusion will be allowed by WPDA (WBD) in selected areas dependent on ‘suitability’ of land for shrimp culture (as different from unsuitability of land for rice culture) ;
 - long-term lease of embankment size lands will be allowed.
3. The Secretary went on to say that Bangladesh hoped to earn Taka 180 crores from fish exports and that brackishwater products would form a major component of this, and he felt the target would not only be reached but exceeded, thanks to places like Satkhira.

**Case Study on Shrimp Culture in Satkhira,
Bangladesh**

Case Material II

**EVOLUTION OF SHRIMP CULTURE IN SATKHIRA,
AND ITS IMPACT ON LANDLESS, SMALL AND
MARGINAL FARMERS/FISHERMEN**

A rapid appraisal by

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Objectives

1. The rapid appraisal set out to :
 - a. trace the evolution of shrimp culture in the Satkhira region
 - b. to assess the impact of increasing shrimp culture on the lives of the landless, small and marginal farmers and fishermen, with particular emphasis on its impact on women.

Methodology

2. This appraisal is a sociological/anthropological type of study of the evolution of shrimp culture in the Satkhira region and its impact on the lives of the poor. The study was limited primarily by the lack of adequate data and reliable statistics and secondarily by lack of time, which if available would have enabled the researchers to gather data from the field and fill in the gaps in secondary knowledge. The study is therefore based partly on available literature and existing secondary data (which was not only scarce but often misleading and contradictory) and mostly on in-depth, un-structured interviews with government officials of various sorts, officials of the BOBP, big and small shrimp farmers, farm labourers, beneficiaries of shrimp farming, those who have not benefited from shrimp farming, and an assortment of local opinion makers and residents.

The Setting

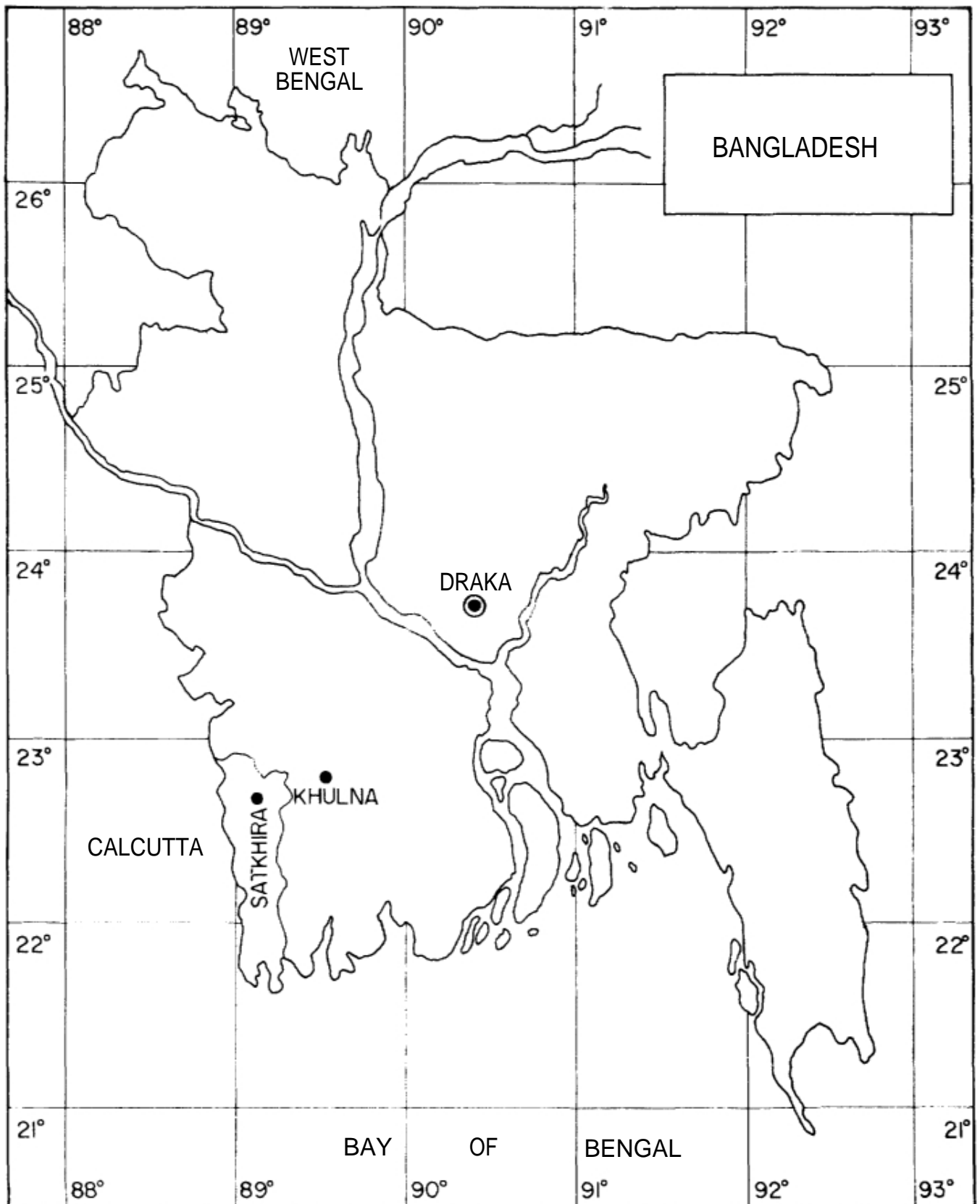
3. Satkhira district forms the extreme south-western portion of Bangladesh and comprises an estimated area of 1451 sq. miles. Physiographically, Satkhira district constitutes a part of the saline tidal flood plain of deltaic origin and is therefore, composed of alluvial soil. The soil is to a great extent uniform in character and varies only by more or less admixture of sand. The percentage of sand is greater, along the river courses and smaller in those areas where deltaic action of the Ganges has ceased. In old *beel* (marsh) areas, the decayed vegetation produces a stratum of black soil.
4. In Satkhira, the tidal effect is much stronger than in non-saline tidal flood plains and in the dry season the river water turns brackish. It has been observed that the tidal flow is strong and the scouring effect is quite noticeable. Satkhira district is criss-crossed by a number of rivers and estuaries which again are connected by innumerable interlacing channels. The area is mostly flat, the surface being only slightly raised above flood level. The banks of the rivers are higher than the adjacent lands, so that the land sloping away from them on either side forms a series of depressions between their courses and there are numerous marshes. Some basins in the interior are deeply flooded in the monsoon. Silt deposition is continuing at the mouth of the larger rivers. The villages cluster along the river banks, but large tracts are swampy and the people who cultivate them are obliged to reside elsewhere and commute by boat or on foot.
5. From December to June, the river water remains brackish but after the rains have set in the salt water is usually driven beyond the limits of cultivation by a volume of fresh rain water and upstream drainage. The river banks are almost invariably higher than the land they enclose, and are cut up by numerous little inlets, by which the water penetrates to the lands within.

6. The climate of the district is similar to that of other districts of the country bordering the Bay with certain locational variations. One of the distinctive features of the climate is the salt-laden air almost round the year, particularly while the winds blow in from the sea. The winter sets in the beginning of December and lasts till the middle of February. These are cool months with a prevailing north west wind and heavy dew at night. The maximum and minimum mean temperatures during the winter season are 79.9°F and 58.3°F respectively. From mid-February the land heats up and southerly winds prevail till the monsoon breaks. The weather becomes very hot in April and continues to be so till the middle of June, when the temperature is lowered by the setting in of the monsoon. During this dry summer, i.e., from March to June, mean temperatures vary from 96°F to 80°F. The rainy season begins about the middle of June and continues till September. During this period mean temperatures fluctuate from 78.5°F to 87.4°F.

Evolution of Shrimp Culture in Satkhira

7. Farmers in Satkhira district have traditionally practised *Bheri* or dyke type aquaculture. They built small enclaves of embankment along the saline/brackishwater rivers to trap shrimp fries and/or juveniles and shell fish that ascended the channels with tidal water. Species like *Penaeus monodon* or Bagda chingri and *Macrobrachium rosenbergi* or Galda chingri were reared in such dykes or embankment enclave fisheries in sequence with transplanted aman paddy. Such shrimp culture practices have evolved over a long time and are still practised in pockets. However, organized shrimp farming as an industry and on a commercial basis is a relatively recent phenomenon. And while it has learnt from the received tradition and adapted it, it is essentially a new technology.
8. Satkhira district contributed, and still contributes, significantly to the total production from coastal aquaculture. The shrimp fisheries of the estuaries is important since roughly four-fifths of the shrimp catch is from this source alone. Satkhira farmers have been practising aquaculture, particularly shrimp culture, for many years in paddy fields within the coastal embankment called polders. With the completion of the phase of the coastal embankment by the Water Development Board/WDB (erstwhile Water and Power Development Authority: WAPDA) in 1965, the practice of shrimp culture in this area virtually came to a standstill and suffered setbacks.
9. There was reportedly no export market for Bangladesh shrimp prior to 1971. It was the post-independence era which saw Bangladesh shrimps exposed to the world market for the first time. During the early years shrimp had the largest share of all fisheries exportable by value and tonnage. Japan and USA were the most important markets for Bangladesh shrimps. In 1972-73, Bangladesh exported shrimps worth Taka 22.60 million followed by increased earnings in successive years. For example, in 1974-75, the shrimp export earning registered a sharp rise to Taka 145 million. As a result, shrimp farming began to expand at a rapid pace and gradually engulfed Satkhira, Kaligonj, Pikegacha, Syamnagar, Asasuni and other areas. Fortunes were made overnight and shrimp farming became temptingly lucrative, inducing increasing numbers of fish farmers and big landowners to take up culture.
10. An extract from the Khulna *District Gazetteer* of 1978 (p.125) gives us a retrospective view of shrimp culture as it prevailed :

"A very lucrative trade in dried shrimps has been established in the district and is carried on throughout the rainy season, chiefly in Satkhira and the Khulna subdivisions. Before the rains set in, drying stations known as 'Kuthis' are established on the banks of rivers where shrimps abound during the rains. The 'Kuthidar,' as the man in charge of the enterprise is termed, arranges with local fishermen to supply him daily with their catch of shrimps. These are caught by stretching a long net, locally known as beutinet, across the river when the ebb begins. The net is hauled in at low tide and the catch is taken to the 'Kuthi'. Several methods are employed for preserving shrimps. They are either fire-dried on a mat platform within the 'Kuthi' or are boiled and then sun-dried and husked. The shrimps are measured by baskets of a standard size, made of holga reed (*Typha elephantina*), a square cubit at the base and four cubits in length; two such baskets are estimated to contain a maund of fresh shrimps. About six fishermen are attached to each 'Kuthi' and the average catch from June to October is about 30 baskets per month. The usual destination of the fire-dried shrimps is Chittagong.



Location of Satkhira

The boiled shrimps are not consigned to their destination by the 'Kuthidar' but are usually bought by a Rangoon broker at the 'Kuthi'. The price varies with the season."

11. **Gher : The Practice of Shrimp Farming**

They call it a Gher, which is the vernacular word for an enclosure (embankment of earth) usually put around paddy fields into which small poyans/channels enter from the river/estuary nearby. Bheri, again a vernacular word, conveys the same meaning. In the beginning of the monsoon, with every high tide, the river water rises and enters into the channels taking with it shrimp fries and juveniles as well as finfish. The channel mouths are closed as soon as a sufficient quantum of shrimp fries and juveniles is judged to have entered. In the rainy season the water level rises and water accumulates in the Gher-enclosed fields, with the remnants of the previous paddy crop. The shrimps and fish grow out in these enclosures and are harvested with nets and traps after October as the fields dry out.

12. It was observed that traditional fish/shrimp farmers did not practise predator control, selective stocking, supplementary feeding, fertilization and water management of any sort. They essentially trapped shrimp and fish washed in by the high tides and harvested them after the grow-out period. In a sense it was just a step removed from capture fisheries.
13. An official document reveals that in spite of the low technology, the estimated production per acre per six month grow out period is about 142 kg of fish and shrimp. High priced *p. monodon* accounts for 15-20% of the catch, other lower priced shrimp a further 30% and fin fish the remaining 50%.
14. Shrimp farming on large blocks of land in Satkhira is at present controlled by a small minority with above average wealth and influence, having connections with the local power structure. Generally, a few such people form a group and take all the private plots within a polder on lease from the land owners during the culture season. The size of such operations can range from several acres to literally a thousand acres. Medium and marginal land owners have no choice but to go along as they cannot use their lands for independent shrimp culture. It is technically and economically not viable to do so. More importantly, due to lack of organization, neither can small farmers join together and practise cooperative farming of shrimp. The annual lease value of the land is usually substantially more than what farmers expect from paddy and other agriculture and this is a further temptation for the small farmer to go along with the big.
15. The Bangladesh Water Development Board/BWDB lands are also leased out on a yearly basis, and the organization claims that people of limited means can and do compete for such lands to practise shrimp culture. However, in spite of getting the lease, small farmers often do not have the short-term liquidity to invest in shrimp farming and practise an inefficient aquaculture that makes their earnings much less than that of their well endowed fellow big farmers.

The Area under Shrimp Farming

16. An official document says that the narrow strips of land, 50 to 100 feet wide, between polder embankment and the river bank is suitable for paddy-cum-shrimp production. Such land presently amounts to nearly 247,000 acres. In order to protect agricultural lands from saline/brackish water, the Water Development Board/WDB (erstwhile Water and Power Development Authority/WAPDA), over the years, has almost completed the construction of a colossal embankment enclosing a wide range of areas in Satkhira district. In late 1984, the total length of the embankment was 253 miles. Polders have been developed covering a gross area of 260,000 acres so far, which includes 221,724 acres of cultivable land. The people of Satkhira region have for years been alternatively growing paddy and practising dyke aquaculture in the fields now within the embankment, but a systematic invasion of the polders by shrimp farmers began around 1977. One official who prefers to remain unnamed, said that while the construction of the polders was meant to keep out brackishwater and augment transplanted aman paddy growth, in a way the polders have created just the right conditions for controlled and scientific brackishwater shrimp culture in the region.
17. The acreage brought under shrimp farming under the Satkhira Water Development Division-I was 8,816 in 1979-80, 11,104 in 1980-81, 12,066 in 1981-82, 18,286 in 1982-83 and ultimately 25,952 in 1983-84. Thus, in terms of coverage, shrimp culture accounts for 10.34% and 12.16%, respectively, of the total gross and total cultivable or benefited areas of the four polders under

WD Division-I in 1983-84. But where do these constantly increased acres of land brought under shrimp culture come from? The answer is simple from the agricultural sector, precipitating a perturbed productive relationship coupled with a deranged wage-employment pattern by contraction of paddy acres in the polder areas.

18. The following table presents the shrimp culture facts and figures of the polders under Satkhira Water Development Division-I, as a whole. The table shows the gross and cultivable/benefited land areas, all polderwise, as well as the distribution of Gher shrimp farms with acres and percentage.

Shrimp Culture Facts and Figures/Satkhira WD Division-I						
Polders Upazilla areas		Gross polder areas (acres)	Areas of cultivable/ benefited land (acres)	No. of Gher/ shrimp farms	Total area of Ghers (acres)	% of Gher with respect to cultivable land (Col.4)
1	2	3	4	5	6	7
1	Satkhira, Debhata, Asasuni	70,100	52,224	103	13,800	26.43
3	Debhata, Kaligonj	45,400	42,000	83	8484	20.11
5	Syamnagar Kaligonj	1,36,500	1,20,000	101	4678	3.90
15	Syamnagar	8,200	7,500	2	25	0.33
Total		2,60,200	2,21,724	289	26,987	12.16

Source : Satkhira WDB Division-I

19. However, this table does not represent the complete picture, because apart from the polders under Satkhira Water Development/WD Division-I, there have also been some other polders harbouring shrimp farms under WD Division-II. There are 159 Gher shrimp farms located in the polder areas under Satkhira WD Division-II. These Ghers occupying 4905 acres in aggregate, amount to 3.29% of the cultivable land of the polders. The following table accumulates shrimp culture facts and figures relating to Satkhira WD Division-II.

Shrimp Culture/Satkhira WD Division-II						
Polders Upazilla areas		Gross polder areas (acres)	Areas of cultivable/ benefited land (acres)	No. of Gher/ shrimp farms	Total area of Ghers (acres)	% of Gher with respect to cultivable land (Col.4)
1	2	3	4	5	6	7
2	Satkhira, Asasuni	35,500	25,000	25	850	3.40
4	Asasuni, Kaligonj	25,500	18,000	20	2,000	11.11
6-8	Tala Asasuni	84,400	54,000	35	1,400	2.59
711	Asasuni Syamnagar	9,600	7,000	20	120	1.71
7/2	Asasuni	2,69,000	19,000	40	300	1.58
13-14/2	Koyra	36,200	26,000	19	235	0.98
Total		288,100	1,49,000	159	4,905	3.29

Source : WD Division-II, Satkhira.

20. As many as 448 Gher shrimp farms of various sizes and significance exist with a total coverage of 31,892 acres of land of the polders in Satkhira district. In aggregate, cultivable or benefited land area of the polders measures 3,70,724 acres. Thus, total shrimp farm areas account for 8.60 % of the total cultivable or benefited land of the polders.

Issues and Impacts

21. The shrimp culture scenario in Satkhira is beset by a complex socio-economic configuration.
22. Mokabber Hossain of Alipur village is a shrimp farmer. Both Galda and Bagda chingri are cultivated in his *Gher*. He owns a *Gher* comprising 367 acres of land which is particularly meant for rearing Bagda chingri. In fact, he is not alone; he has formed a group of nine farmers. The *Gher* includes lands of several small and marginal farmers. But they do not share the ownership of the *Gher*. It is interesting to note that despite being share-holders of the *Gher*, some group members who come from far-flung areas do not have rights to shares of shrimp. They have just leased out their lands and that is all! They participate neither in production nor in the management of the *Gher*. Of course, they have been paid the lease value, at the rate of Taka 3000 per acre, for the inclusion of their lands in the *Gher*. This payment of lease value is made in two equal instalments, at the commencement of production and after the harvest is over. When we visited the *Gher*, the water had receded down to the channels surrounding the *Gher*. Land had surfaced high above the water level. But the farmer did not prepare for cropping paddy on the assumption that salinity had rendered his land non-conducive to good paddy cultivation. All his other neighbours also maintain similar views regarding paddy cultivation. Neither aman nor aus is grown here anymore!
23. Another shrimp farmer of the same village has cultivated Galda chingri and paddy simultaneously and in sequence with his *Gher*. He is rather happy with the yields of both the crops. He believes that cultivation of Galda chingri does not affect the paddy field. A Debhata shrimp farmer reflects his insight gained over years while talking about his experience. According to him, *Gher*s 20-25 years old are suitable for shrimp farming only, and not for paddy-cum-shrimp cultivation. Shrimps grow better in these *Gher*s in terms of both quantity and quality. And the shrimp farmers owning these *Gher*s earn more too. This Debhata farmer, however, opines that poor farmers hardly benefit from shrimp culture since they do not have any share of the shrimp produced. Breach of contract takes place often and yet they fail to assert their rights.
24. Khodabaksh, an agricultural labourer, was previously a farm labourer. He had a piece of land measuring about 0.33 acres. He used to crop this land and the yield was 15 -- 20 maunds of paddy per year. Apart from cropping his own land he also worked for other farmers as a farm labourer. He heads a 7-member family, and is the only employed person in his family. But now, the family is struggling hard for its very survival. Khodabaksh has leased out his land to a cooperative engaged in shrimp farming. As lease value, he has got Taka 500 for the first year of contract from the cooperative; but this amount of money is hardly enough for buying five maunds of paddy. Moreover, he does not find work as a farm labourer to earn his living. And now he is moving around Satkhira town in search of work. A wage labourer who has been working in a shrimp farm for the last four years says that, "Shrimp culture is extremely profitable, the shrimp farmers are earning a lot by selling fish. But what about us? We have lost our work, and are getting nothing." Many people think that Satkhira, once a food surplus area, has turned into a deficit area due to shrimp culture alone. In the not too distant past the landless poor, small and marginal farmers and even some farm labourers could afford to store rice for consumption during the aman and aus seasons. But now the situation has changed altogether and the plight of the poor has worsened. Even skilled labourers are not getting work due to acute unemployment. They contend that had a plot of land been cropped for both Aus and Aman paddy they could get work for two successive seasons in a year. But shrimp culture required barely one-fourth of the labour force employed in agriculture, with the land acres remaining the same for both the crops. For example, according to their estimates, one acre of land required 93 to 108 man days for cultivating Aus and Aman while 25 to 30 man days suffice for shrimps.
25. A study conducted by a group from the Chittagong University has revealed that 70% of the labourers involved in agriculture have gradually lost their employment upon the introduction of shrimp culture and in its aftermath. The database for the study included Debhata, Kaligonj and Syamnagar upazillas.
26. As a consequence of the pervasive expansion of shrimp culture, hundreds of agricultural labourers have been thrown out of the production process. And they are afraid that in all probability it will not be possible to generate sufficient employment for those agricultural

labourers in the foreseeable future. This they apprehend with a sense of pessimism since there is no rehabilitation plan forthcoming for the unemployed agricultural labourers.

27. A farm labourer of the village Padmobil said that poor farmers become panicky as the shrimp culture season sets in. They do not even dare to crop IRRI in their lands because in the dead of night their lands are often inundated with brackishwater. This is done by cutting the embankments; IRRI or whatever may be the crop, is damaged deliberately with little concern for the law since law-enforcing agencies are allegedly in collusion with the rich farmers.
28. Poverty is stark, naked and very deep. Landlessness and land concentration have been increasing at an alarming pace. The existing land-holding system in this area presents extreme inequality in the ownership and control over land which is characterized by a small minority monopoly. Thousands of farm labourers have been rendered jobless, and a large number of share-croppers have been evicted from their lands.
29. Here is a story told by a poor woman. She was married three years ago. Her husband owned about an acre of land. He used to produce about 16 maunds of paddy, Aman and Aus combined, from this land and somehow managed to pull on. He leased out his bits of land for shrimp culture in the very year they were married. He was supposed to get Taka 1800 as the lease value every year. In the first year he received Taka 500 and in the next year, Taka 400. And that was it! The shrimp farmer stopped paying him. Two years have elapsed since he left home for town. She heard that her man had married once again. On one occasion she went to the shrimp farmer for the lease money, only to be maltreated and insulted.
30. It appears that share croppers have been among the worst sufferers of shrimp farming. With the dramatic expansion of shrimp farming, share cropping has declined drastically, hitting the small and marginal farmers hard. Almost as a rule most small and marginal farmers are share-croppers too. Large farmers, and sometimes absentee land owners, could not manage and utilize their lands. Both the groups could afford to lease out their lands to others for share cropping. However, thanks to the present state of shrimp culture in the Satkhira area, these groups of people are no more in a "either crop the land yourself or give it to others" type of situation. Now, they are fortunate enough and have their options. And hence the crisis for share croppers.
31. *Employment impact*
Some of the impacts of extension of shrimp culture on the employment pattern of the region are as follows :
32. *Employment in shrimp farms*
Agriculture is labour-intensive, while shrimp culture is not. Shrimp farming has itself evolved as a source of employment in the non-agriculture sector. A relatively large number of fishermen and wage earners has been working in shrimp farms. However, shrimp farming seemingly robs wage labourers of their jobs first and then absorbs some of them, often a tiny fraction.
33. Here is a comparative case study illustrating the employment paradigm in a shrimp farm. Kumarikuni Gheri is a 50 acre shrimp farm which has been in operation for the last few years. A total of 268 man-days has been spent to construct the ring embankment around the Gher. It took 20 man-days to make a sluice box, 10 ft. in length and 3 ft. in breadth, required for water control. Guarding against the poachers is an important activity in a shrimp farm. Eight people are employed to guard against poachers for a period of nine months. The salary contract was effected on a monthly basis. Apart from keeping poachers away, the guards were made to maintain and repair the embankment, remove pests, as well as catch and sell the shrimps. Thus, 8 x 9 x 30 or 2160 man-days of employment were generated.
34. Bamboo trap making is another major activity in shrimp farming. During the production period as many as 40 bamboo traps were used. It took 2 days for a labourer to make one trap. Thus, for 40 bamboo traps, employment generated was 80 man-days.
35. In addition, the farm required 60 man-days of employment for work related to maintaining and repairing *Gher* embankments. The total shrimp yield (mostly Bagda) was 60 maunds, and the farm last year earned about Tk. 440,000 from the sale proceeds. The total labour demand was 2,588 man-days.

36. In contrast the employment need to cultivate 1 acre of paddy within the Gher is :

<i>Production Phases</i>	<i>Man-days</i>
Land preparation (including seed bed making)	18
Plantation	18
Weeding (no weeding was done)	
Harvesting and threshing (manually)	35
Total	72

Paddy cultivation on one acre of land claims about 72 man-days in all. Thus a total of 3312 man-days of employment was required for cultivating paddy in approximately 46 acres of land constituting the shrimp farm. The difference in demand is 724 man-days – quite a sizeable figure. Therefore, a given farm area remaining the same, the man-days required for paddy cultivation are significantly more than that required for shrimp. Paddy cultivation in a *Gher* in sequence with shrimps, results in a single crop being taken out of the land. The instance cited above relates to uncropped land. The loss of employment would be proportionately higher if double or triple-cropped lands are brought under shrimp cultivation.

37. *Wages Rate Impacts*

Wages of the *Gher* shrimp workers have also become a critical issue. These workers are mostly drawn from among the landless agricultural labourers and fishermen. Some of them are recruited from among the small and marginal farmers who ceased to be share croppers when their lands were included in shrimp farms. Landless wage labourers account for about 70% of the total, while land-poor villagers including fishermen account for 20%. In the Debhata area, children between 8 and 14 years of age reportedly account for 8% while womenfolk and skilled labourers account of 4% and 20%, respectively of the total work force employed in shrimp farming. Employed in a *Gher* shrimp farm, a worker usually earns Tk 600 per month. We talked to a number of such shrimp workers. However, it is only workers employed on a regular basis who earn such a wage. In most areas, the daily wage rate of labourers varied from Tk 10 to 12. It may be mentioned here that the minimum wage rate as determined by the government for agricultural labourers is the market price equivalent of 3 ¹/₂ seers of rice which amounts to Tk 27. Wage rates in Satkhira are much lower than even the average wage rates prevailing in the greater Khulna district.

38. Deheading of shrimps is primarily a processing task. It is usually women who are employed in this work. Engaged in deheading of shrimps, they earn Tk 10 for a 8 hour work day. A large number of women are employed in deheading. They are destitutes, disgraced and mostly from the lower social strata. Some of them had no other options, some are unmarried and have no hopes of getting married. Widows and abandoned wives too are in their midst.
39. Some opinion makers felt that the presence of such women in the labour force was responsible for the higher-than normal occurrence of sex crimes reported in the region!

Kadbanu is a wage worker. She has been deheading shrimps for a living for the past two years. Her father was an agricultural labourer. And Sattar, her husband, was an agricultural labourer too. Some 14 years had elapsed since the couple arrived from afar and settled in Sultanpur village near Satkhira town. They have four children. Some four years ago Sattar had an affair with another woman and eventually married her. He has since stopped supporting his family and has been living with his second wife. Kadbanu was forced to go out and earn a livelihood. She managed to find work as a maid servant and get a similar job for her young daughter too. Two years ago she switched to deheading of shrimps, and started earning Tk 10 for an 8-hour workday. Though this is more than what she earned earlier, it is not enough to sustain a family of five. A workday has two shifts : 10 a.m. to 1 p.m. and 3 p.m. to 8 p.m. During the peak season Kadbanu often works right through the night to earn a little extra. Virtually abandoned by her husband, Kadbanu is not yet divorced.

41. *Self-Employment Generation*

Some poor folk, including women and children, have taken to catching shrimp fry for rearing farms. This activity, seen more and more during the past 3 4 years, is relatively rewarding: the reward varies from place to place and fluctuates from season to season. But Tk 100

per day is perhaps the average. And women and children earn just as much. Yet the fry collectors do not get a fair price for their catch and are exploited by middlemen who make enormous profits.

42. *Development of Small Industry*

With the growth and expansion of shrimp culture, some small industries have been set up in the local areas. The most important of these is a modern shrimp processing plant at Satkhira. Others include ice factories and cold storage plants aimed at transitory preservation of shrimp and fish product. Obviously these plants and factories have become workplaces for a considerable number of local people including women.

43. *Non-Party Politics of Shrimp Culture*

Shrimp culture has become a question of crucial concern to the Satkhira people. On this pivotal issue, not only the parochials but also the politicals have got polarized into two groups. Processions and demonstrations have been organized here for and against shrimp farming, and several confrontations have taken place even leading to loss of life.

44. The non-agriculture sector is overwhelmingly dominated by shrimp farming, which in turn is characterized by big land owners' hegemony. Very often, the big shrimp farmers constitute the most powerful political lobby as well. It is quite evident that big shrimp farmers with various party/political affiliations belong to the same social classes and represent identical power bases.

45. Recently a committee has been formed to resist further expansion of shrimp farming. A professedly militant forum, this committee draws its members mostly from democratic and petty bourgeois left wing political parties including the Awami League, Communist Party of Bangladesh/CPB (with a fairly strong base in the midst of the farm labourers), Jatio Samajtantrik Dal/JSD and others. Mr. Abdur Rahim, a lawyer, previously associated with the radical left, and Mr. Alauddin, an Awami League leader and ex-M.P., have been leading the 23-member committee. A prominent member (a young CPB member and college teacher) of this Committee told us that they would fight to keep shrimp culture within rational limits, they were not for doing away with it altogether. They would also campaign for planned shrimp farming, upholding the interests of the resource-poor, he added.

46. *Conclusion*

For the fisheries sector, the development thrust stressed accelerated production of shrimps to augment export earnings and to increase employment opportunities for the rural poor, amongst other objectives. It was expected that Bangladesh would be exporting shrimps worth Tk 108 crore during 1982-83. In fact, by December 1982, that target had already been exceeded. And Satkhira district had contributed significantly to the production from coastal shrimp culture. Ironically, however, this did not mean increased employment opportunities for the rural poor in Satkhira.

47. None, not even the staunchest critic of shrimp culture, demands that shrimp culture should be stopped completely, since it has had some positive impact. But the benefits have not trickled down to the lower strata of society and have been cornered by a few at the top. Most farmers who entered shrimp culture were already well-established in local society – and the benefits are being eaten up by them. Shrimp culture has aggravated income differentials, thereby further worsening the already precarious social resources imbalance situation. In some areas of shrimp farming concentration, lack of employment opportunities has affected a large number of villagers – share croppers in general and landless labourers in particular. It is clear that there is no easy solution. A proper approach could be arrived at only on the basis of a thorough analysis of the conditions. And for real development to take place, nothing short of a total approach to reality is required.

48. Yield of *Bagra chingri* in Bangladesh is the lowest among the shrimp producing countries of the world – only 60 kg per acre. And this is mainly due to the old and unscientific system of cultivation which still dominates the Satkhira shrimp scenario. Optimistically, it was envisaged that introduction of simple improvements in the existing culture system, e.g., predator and competitor control, selective stocking of more desired species, species and stock manipulation and appropriate water management, could greatly augment the production. Research and development should be stressed and streamlined in order to promote intensive rather

than extensive shrimp culture. Augmenting shrimp production is of course very desirable, provided it is done by adopting appropriate technology, is ecology conscious and is tuned to the genius of local people – and not simply by bringing in more acres of land under shrimp cultivation indiscriminately.

49. We could read the following manifest preferences of the local people with regard to shrimp culture :
- a. No more land should be brought under shrimp cultivation. Intensive and not extensive cultivation is preferred for increased production;
 - b. It is very important to rehabilitate the landless agricultural labourers thrown out of the production process and the small and/or marginal farmers practising share cropping evicted from their lands;
 - c. Organization of the landless agricultural and shrimp farm labourers would be a crucial precondition to implementing such rehabilitation programmes if undertaken;
 - d. Khas lands, *bils* and depressions hitherto forcibly and illegally occupied by the big shrimp farmers should be reclaimed and distributed amongst the landless labourers and fishermen, the latter being already on the verge of total extinction as a community. This has reference to the expressed government policy decisions regarding *Khas* lands.
All our efforts should be to ensure that this effort is not frustrated by the vested interests;
 - e. Organised properly and given some initial government support in the form of loans on soft terms, technical know-how, etc., the small peasants could be directly involved in shrimp farming for their own benefit;
 - f. Planned and ecology-conscious shrimp farming addressed to the betterment of the local society at large is needed.

GLOSSARY

Bil	:	Low lying lands under water, marsh/swamp depression
Chingri	:	Prawn, shrimp
Seer	:	A little less than 1 kg or equivalent to approximately 2 pounds
Maund	:	A weight measurement equivalent to 82 pounds
Gher	:	Enclosures (embankment of earth) particularly erected for shrimp farming
Khas land	:	Government owned land
Khet Mojur	:	Farm labourer
Taka	:	A unit of Bangladesh currency equivalent to 4 or 5 U.S. cents

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Case Study on Shrimp Culture in Satkhira, Bangladesh

CASE DISCUSSION GUIDE

1. Satkhira is really quite different from the other cases being considered in this Consultation. It does not involve an agency that planned development and extended technology. The people of Satkhira responded to market conditions, and using a slightly modified version of a technology that they had used for years, and which they spread on their own through informal farmer-to-farmer contact, tapped an environmental opportunity made especially unique by an embankment which was built to keep out brackishwater but which ended up containing it.
2. The two notes on the evolution of shrimp suggest that the impact of the development of shrimp culture in Satkhira has been quite large and good or bad depending on whose side you are on. It is also obvious that the government is in favour of what is happening and that the BOBP is interested in improving the yields by introducing essentially simple technology inputs.
3. The questions before the case discussion group are :
 - (i) What has been the impact of the growth of shrimp culture on various groups, especially on the poor?
 - (ii) What are some of the problems that may grow out of this expansion of shrimp culture and how do you see it affecting the growth of shrimp culture in turn? How would it affect various socio-economic stratas of people?
 - (iii) Should the government regulate the activity to ensure just and equitable development? How should it do so?
 - (iv) Why would the government think in terms of regulation? What forces, if any, could move it to do so and what is the potential for such forces to arise?
 - (v) Should an agency like the BOBP be approached to support, promote and enhance shrimp culture growth in Satkhira. how should it go about trying to determine social feasibility? And for whom?

Case Study on the Expansion of Shrimp Culture in Satkhira, Bangladesh

CASE DISCUSSION SUMMARY GROUP

1 Objectives

The Government of Bangladesh wants to promote prawn culture to earn foreign exchange, in the environmentally suitable coastal regions. The *Bay of Bengal Programme* wants to develop a more efficient and intensive technology for prawn culture in Satkhira for the small-scale farmer. The use of simple techniques would not only increase productivity but also increase labour demand and therefore employment

2 Shrimp culture for whom?

Marginal and small-scale farmers and the landless poor should a/so benefit from the expansion of shrimp culture. There should be a possibility for groups like landless women who are not in the mainstream of the activity to benefit from ancillary activities like seed collection and processing.

3 Social changes

The apparent social impact of the shrimp culture expansion are

- (a) reduction of the area under paddy culture and the subsequent loss of work opportunities for the landless farm labourers; paddy farming apparently demands more labour per hectare than extensive shrimp farming;
- (b) several new employment options have been generated by shrimp culture expansion, such as processing, seed collection, support industries like ice making and transportation. However, there is not sufficient data to indicate whether this new employment generation compensates for the reduction in labour use suggested above. So it is difficult at this stage, to judge the real impact on labour opportunities and labour demand patterns;
- (c) The case material does indicate qualitatively that the poor in the region have been affected adversely.

4. Other changes

- (a) further expansion of shrimp culture will increase the demand for seed, which seems to be already under pressure as indicated by increasing prices.
- (b) there will be increasing need for hatcheries, feed formulation units, and processing plants which would increase labour demand (of a special nature) but may have several other social and economic impacts.
- (c) the increasing emphasis on shrimp culture and its increasing demands for fertilizer/feed/labour may deprive people and other occupations of their inputs and needs.
- (d) it is difficult to identify the groups who will be most affected by these changes and the extent to which they will be affected with the given database.

5. Strategy

The Government of Bangladesh in order to benefit the poor and ensure equitable development in the region should :

1. ensure fair access to land/water areas/rights;
2. make available credit to the poor to promote their involvement in shrimp culture;
3. promote cooperative ventures in government owned land/water areas;
4. make available technical training and extension.

The Bay of Bengal Programme should :

1. undertake a detailed socio-economic survey of the Satkhira region to understand how the expansion of shrimp culture has affected various strata of society and recommend socially feasible programmes to ensure benefit to the poor of the region;
2. develop technologies and test them to ensure transfer of shrimp culture to the poor.

Case Study on the Expansion of Shrimp Culture in Satkhira, Bangladesh

CASE DISCUSSION SUMMARY : GROUP II

Impact of the growth of shrimp culture on various groups, especially the poor

Groups of people in the Satkhira area who are involved in shrimp culture or are affected by it are :

- land owners turned shrimp farmers;
 - absentee land owners;
 - small land owner/paddy cultivators;
 - landless share croppers;
 - women of the poor group
2. It is obvious from the case material that the landowner turned shrimp farmers group has benefited financially from the innovation due to favourable export markets.
 3. The absentee land owners also benefited from shrimp culture as they received lease rent which is higher than their usual profit from share cropping.
 4. The groups most affected by the expansion of shrimp culture are the poor and some of the adverse effects are :
 - there is displacement of labour as the small land owner/paddy farmer and the landless share croppers are no longer able to engage in paddy cultivation. There is an indication that the total job availability in the region has been reduced as extensive shrimp culture requires less labour inputs;
 - there is a change in the occupation pattern among the poor; their income has become more unstable and uncertain; some migrated to towns to look for jobs and some cases of dislocation of family ties resulted;
 - the poor were deprived of the by-products of paddy planting, i.e., paddy straw for fuel, thatch for houses, and feed for cattle;
 - the displaced poor no longer produce their own rice and have to depend solely on purchases;
 - poor women were forced into independent non-family jobs and were often subject to harassment.

5. On the other hand, some of the positive effects were :
 - creation of new jobs related to shrimp culture such as seed collection, ice making, prawn processing, basket making, etc., which often specifically benefited women and children; by-products of shrimp farms such as fish and crabs were made available in the local market thus increasing the community's protein food intake;
 - increased incomes led to surpluses which were locally invested thus stimulating the local economy.
- 6 Some of the environmental impacts were :
 - reduced availability of drinking water due to saline intrusion;
 - change in suitability of land for agriculture;
 - change in vegetation -- economic vegetation replaced by non-economic saline resistant species;
 - possible effect on marine capture fisheries resulting from seed collection.

II *Possibility of social conflict*

7. The people of Satkhira seem divided into two distinct and opposing camps over the shrimp expansion issue : there is a pro-shrimp farming group and an anti-shrimp farming group. The pro-shrimp group, made up of the landed rich, have government backing and are motivated by increasing profits while the poor are being drawn to the anti-shrimp group. The anti-shrimp group is not so much against shrimp farming, as it is against the exclusive hold that a few have over the process.
 If the government does not regulate shrimp farming to ensure a more equitable expansion and growth there is a very real possibility of social conflict of a violent nature. In fact, there already have been violent incidents. Such conflicts will adversely affect all the parties concerned including the government

III. *Should the government regulate shrimp farming?*

8. The Government of Bangladesh would like to promote shrimp farming to earn much needed foreign exchange. However, it cannot ignore the social infeasibility of the present mode of expansion which not only adversely affects the poor but may eventually lead to violent social conflict. There is a strong case for government intervention and regulation.
9. The government could contemplate the following actions :
 - existing minimum wage regulation should be enforced to enable the poor to get their rightful share;
 - land belonging to the government suitable for shrimp culture should be made available to the displaced farmers with government providing financial and organizational support;
 - ensure fair negotiation on lease rent and ensure actual payment of lease rents by the shrimp farmer;
 - provide protection to women employees;
 - set-up extension efforts to promote intensification of culture and the practice of shrimp culture/paddy planting rotation system to create more jobs and retain paddy production in the area.

IV. *Should BOBP be approached to support, promote & enhance shrimp culture growth in Satkhira?*

10. The major problems resulting in the poor feeling deprived are the displacement of occupation and loss of jobs.
 Technically this problem can be lessened by :
 - upgrading of existing extensive shrimp culture method into a more intensive shrimp culture method to increase productivity and create more jobs;
 - reintroduce, wherever possible, the technique of shrimp culture/paddy planting rotation as demonstrated by BOBP experiments.
11. BOBP being a development promoter should participate actively in the demonstration and transfer of technology and the undertaking if successful, will benefit all in the region, especially the poor.

Case study on the expansion of shrimp culture in Satkhira. Bangladesh

CASE DISCUSSION SUMMARY GROUP III

Structure of discussion

1. Vote on the aquaculture as practised now in Satkhira.
2. What instruments are available to government to Intervene in such a situation?
3. Feasibility of such intervention.
4. Issues to resolve.
5. Overall strategy of intervention.
6. What could BOBP's role be in the strategy.'
7. A final vote on shrimp culture expansion in Satkhira.

The initial vote

Generally in favour of aquaculture	5
Generally opposed	3
Abstention (don't know)	2

The instruments available to government

There are a number of things that, theoretically, government could do to influence the situation **either** to promote or to regulate aquaculture These can be grouped under various headings :

regulation of land holding tenure:

- regulation of land use:
- protection of *the* rights of certain social groups:
- changes in policy environment to influence incentives;
- provision of inputs and funds;
- community development and mobilization;
- changes in structures of marketing /processing;
- further research in the area leading to better understanding of the problems;
- creation of employment and income opportunity.

These instruments might be technical and/or socio-economic. They might be **used** for production of prawns and/or distributing its benefits in society.

Feasibility of intervention

There were limits on doing anything to redistribute benefits : the powerlessness of the **poor**, difficulty faced by the government in enforcing laws, the sheer dynamism of the historical process. However, some small cooperative efforts in Satkhira and the developmental experience from other parts of the world makes the group hopeful that redistribution may be a real possibility. The group, however, felt that it needed to know a lot more before it could judge the reality of this particular situation.

Issues to resolve

We reached a tentative assessment of the issues as follows :

- (a) Income
 - shrimp has a high income generating potential for the area;
 - the income is mainly earned by landowners;
- (b) Employment
 - shrimp has a high employment potential if made intensive;
 - the present pattern of employment however causes concern:

(c) Land use

- a system of shrimp culture is prompted by various technical and economic factors;
- there is some technical advantage in the system;
- there is concern that shrimp monoculture is socially regressive;
- multi-species aquaculture plus rice may be more positive;
- there is concern over environmental damage in the long term;
- there is concern over long term land use pattern.

Overall strategy

1. Start with extension work among poor farmers, lease holders, the landless and the share-croppers to establish :
 - a. the groups and their location;
 - b. their resources;
 - c. their needs and demands.
2. This would lead to motivating/organizing the poor to :
 - a. ensure that inputs reach them,
 - b. resolve conflicts that emerge.
3. To adopt this strategy we would need to :
 - a. assess political feasibility;
 - b. consider other determining factors (e.g., proposal for a technical project in the area).

BOBP's role

1. Small farm research in different zones to establish methods to intensify production.

This would necessitate defining "small farm" locations in relation to zones and channels, land use zones in consultation with people.
2. The lease of government water/land areas to the landless, share croppers and lease holders, could be promoted.

This would necessitate a study of their resources and of the trends in relationships with other groups. Zoning was felt to have a role in limiting the extent of the adverse impact on some of these groups.
3. There is a need to seek out appropriate organizational forms for channelizing the benefits as required.
4. A study of the impact of changes on society is required. There might be a need to provide means of protecting women while encouraging the positive aspects of the changes.
5. To implement a strategy for the poor there might be a need to provide a technical/managerial advisory service for them. Fees could be charged for such services.

The vote again

The group had changed by the end, so results are not directly comparable. However, those who had been against were now convinced to try to set up a project. The newcomers to the group also felt the same. Two people modified their vote from "against" to "abstain".

There is one dissident. Although we could design a project in the classroom, the likelihood of transferring such a scheme with so many imponderables to rural Bangladesh seems remote.

Whilst the majority felt it was worth a try, we were not able to consider whether there were better schemes elsewhere for BOBP to spend their money on.

Appendix 7

Case Study on Shrimp Culture in Chilka Lake, Orissa, India

Case Material

CONFINED TANK SHRIMP CULTURE FOR THE ECONOMIC REHABILITATION OF THE RURAL POOR : HAVING THE RIGHT MAN AT THE RIGHT PLACE HELPS

by

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Socio-Economic Cell

DANIDA Drinking Water Project

I. The Process : Evolution of Brackishwater Culture in Orissa

1. In a state where brackishwater resources are abundant and where a substantial percentage of the total fish production comes from brackishwater capture fisheries, why is it that brackishwater culture fisheries came to be evolved only in the early '80s? This is the question that motivated a study of the evolution of brackishwater culture in the region.
2. There have been occasional attempts at brackishwater culture by the Department of Fisheries, starting from its earliest days.
 - In 1958-59, some attempts were made at tidal fed culture of mullets and shrimps in Paradeep; these were thwarted by hydraulics and crab damage to bunds;
 - In 1962-63, confined tank culture of mullets and shrimps was attempted in Keshpur, Ganjam district; it did not do too well;
 - In 1975-76, confined tank culture of mullets and shrimps was revived under the ICAR-funded All India Coordinated Research Project on Brackishwater Fish Farming;
 - In 1981-82, some minor cage culture experiments were undertaken in Keshpur and Balugaon; all it did prove was that the potential existed to produce as much as 1300 kg/ha in Orissa.
3. In 1978-79, every-thing changed. The Government of India, encouraged by rising prices of shrimp in the world market and constrained by high fuel costs in capture fisheries, was promoting brackishwater culture. Money became available under the Sixth Plan and the head of the department, an IAS official, leaned towards brackishwater culture. The time was right and the fisheries department initiated a detailed study of the state's brackishwaters (SBW). The effort went on till late 1983, covered 16,000 ha in the four coastal districts and identified about 14,000 ha as suitable for brackishwater culture. Most of this land was government owned and only 6-7% was privately owned. The SBW also estimated that the availability of shrimp post-larvae in the state per year was about 970 million which was considered enough to stock the possible 14,000 hectares.
4. Meanwhile the FD was actively promoting fresh water aquaculture especially through the Economic Rehabilitation of the Rural Poor Scheme (ERRP) that attempted to help the very poorest by making available tanks/ponds and inputs. In one such exercise, the Assistant Director of Fisheries, M G Rao, in the Polur Canal region of Ganjam, came across a few ponds with saline soil, which of course, ruled out major carp culture. Not wanting to disappoint the beneficiaries, he took a chance and stocked the saline tanks with *P. monodon* juveniles which were abundant in the Polur canal and found to his surprise that they grew quite well. The surprise was due to the fact that it was assumed then, as now, that in confined tanks salinity would rise and fresh water would have to be pumped to rectify the situation, thus affecting cost-effectiveness. M G Rao had disproved it. The time was late 1981. He reported his findings to the SBW and the Fisheries Department and was, soon after, transferred.

5. Obviously there were enough brackishwater development enthusiasts in the upper regions of the department. The findings were discussed in the department, particularly at the SBW District Review Meeting which suggested that a 3 pond/3 crop trial should be undertaken to test the new technology. The problem of course was that there were no funds to do so. Undaunted, Mr Badapanda, the new Assistant Director of Ganjam and his superintendent, Mr. Patnaik, persuaded the ERRP beneficiaries with saline ponds to allow their use for controlled experiments and in course of time found that the technology not only worked but also had very encouraging production rates. The Fisheries Department was rightly proud of its finding and the Rector took the Finance Minister along to look at the experiment. In fact he saw to it that a catch of *P. monodon* was shown to the Chief Minister when he had visited the College of Fisheries in Gopalpur.
6. At the end of 1982, there was a high level meeting in Bhubaneswar to review ERRP programme. Obviously the Chief Minister was not very pleased with its performance. Fisheries programmes in ERRP had done better than the others provided you were satisfied with relative positions. The Chief Minister, whose pet project the ERRP was, wanted to see if the project could not be given a shot in the arm. He remembered being told about the shrimp farming in Polur area and ordered that 3000 such ponds be taken up in the same year under the ERRP followed by another 2000 the next year.
7. The Fisheries Department, with limited funds and its brackishwater staff already stretched thin in the SBW, took up the task and tank excavation began in Puri and Ganjam districts in February-March 1983 and stocking of few ponds was undertaken in August 1983 and the first harvests came in November 1983. It had been exactly 2 years since M G Rao had quite by accident come across the possibility.
8. Even as the work had been begun, the Director of the Fisheries Department and his colleagues had realized that a government department with its bureaucratic rigour and financial constraints and administrative regulations was not the best engine for such development work. They suggested to the government that a new agency be created, funded by a planned budget and manned by the fisheries department officers, and essentially under the technical guidance of the fisheries department, but as an independent and autonomous agency with a multi-organizational board to undertake the development of brackishwater fisheries. The government, or perhaps the Chief Minister, okayed it and the BFDA came into existence in August 1983. With the creation of the BFDA it became possible to offer subsidies to brackishwater , culture the same way as FFDA did for fresh water aquaculture.

II. The project

9. The fisheries department implemented the ERRP scheme by giving technical help and inputs through the SBW while identification of beneficiaries and the financial and executive support came from the Block Development Officer. In the new BFDA, the fisheries department still gave the technical guidance but through officers deputed to the BFDA who answered to a Chief Executive Officer who in turn answered to a board at the district level. The Board has the Collector as its chairman plus representatives from the fisheries department and all other concerned departments and from nationalized banks. Four BFDAs were planned, one each for the coastal districts, but for the time being only two have been formed, each with two districts under them.
10. There are essentially five modes of brackishwater culture promotion in which the BFDA is involved. But only two of them are completely executed by the BFDA. In other cases the BFDA monitors and provides inputs of one or the other sort. They are :
 - (a) Area Development Approach Programme (ADAP) aimed at marginal farmers. The pond is constructed free of cost to the beneficiary and 25% of the working capital is provided as subsidy for a fixed period, usually the first year. The size of ponds is usually 1.25 acre. The schemes are financed 50% by the Government of India and 50% by the Government of Orissa. The programme is monitored by the BFUA.
 - (b) Integrated Rural Development Programme (IRDP) implemented by the DRDA. The scheme is aimed at small and marginal farmers and provides 33 $\frac{1}{3}$ % subsidy for the, scheduled castes and a 50% subsidy for the scheduled tribes on capital investment and working capital,

and the rest is offered by banks under DRI of 4%. The scheme offers 0.5 acre ponds. The BFDA monitors the scheme.

- (c) Economic Rehabilitation of the Rural Poor (ERRP). The programme is implemented by the Block Development Officer and is aimed at the poorest, those whose earnings per year are less than Rs. 1200 and who own no economic assets like land. The pond is given free of cost and the first year's inputs are covered by 100% subsidy. This programme is monitored by the BFDA. Pond size is 0.5 acre.
 - (d) Bankable scheme. Implemented directly by BFDA, this scheme is open to anyone at all and offers a 25% subsidy on capital cost and helps in getting soft loans from the nationalized banks.
 - (e) Own Resources Scheme. Implemented directly by BFDA, this scheme is open to anyone who has his own resources. BFDA offers a subsidy of 25% on capital cost and technical support.
11. The latest available figures of accomplishment in these schemes to which BFDA offers technical, financial and other services are (October 1984 figures) :

Scheme	No. of beneficiaries	Area (ha)
1. ADAP	7	4.00
2 . IRDP	80	18.63
3. ERRP	540	134.98
4. Bankable scheme	89	57.74
5. Own Resources Scheme	34	73.94
Total	810	289.29 ha

The ERRP scheme is the largest, covering 66 % of the beneficiaries and 46% of the land.

12. It must be pointed out that the Government of Orissa, at the suggestion of the Fisheries Department, has frozen all land identified by the SBW as suitable for aquaculture, exclusively for shrimp culture. Alternative use would require the permission of the Fisheries Department. Further, it has reserved 75% of this land for the ERRP programme.

Considering the fact that a majority of the programmes will be under the ERRP and considering that this programme caters to the very poorest, this case study will concentrate on the ERRP and restrict itself to the efforts in Puri district, where most of the activity has taken place.

III. The Technology : Confined Tank Shrimp Culture

13. The way it should be :

When the waters recede in the Chilka Lake, excavation of ponds begins. A metre of soil is removed and used to build dykes all around. Surrounding a cluster of ponds is a protection embankment faced with stone. The pond bottom is ploughed. In June-July the rains come and fill the ponds. After 3 days, 50 kg of lime is added. All numbers are for a 1/2 acre pond. Soon after, 650 kgs of raw cowdung, 10 kg of single super phosphate, and 10 kgs of urea are added. The pond is stocked with about 4000 25-40 mm P. monodon juveniles. The feeding consists of groundnut cake and chopped snail meat in the following protocol :

(0.25 kg of cake + 0.25 kg of snail meat)/day for 30 days.

(1 kg of cake + 1 kg of snail meat)/day for 30 days.

(2 kg of cake + 2 kg of snail meat)/day for 30 days.

In three months, the shrimp reaches 180 mm size (or 40 counts per kg) and the production is expected to be about 62.5 kg and sell for an average of Rs. 65/kg.

14. The way it is :

During the first culture when all inputs are paid for :

no one ploughs the pond bed;

cowdung is used but very few use fertilizer usually because supply and availability is erratic;

- snail meat is fed in excess because they believe it fattens the shrimp; Chilka Lake mud is also fed (and the logic seems sound considering the benthic algae in the mud!).
- Upon harvest the sales take place to middlemen under the supervision of BFDA officials who ensure proper rates. The farmers are required to set aside half their earnings in post office savings banks to be used for the next culture's working capital when subsidy ceases.
15. During the second culture, when subsidy and inputs cease :
 - no one ploughs;
 - time is added if available and affordable;
 - cowdung is added if available
 - no fertilizers are added'
 - the groundnut cake ratio is reduced and often stopped altogether;
 - snail meat is increased.
 16. The actual implementation goes somewhat like this :
 - (a) Village level workers enumerate the community to fit criteria;
 - (b) The BDO with village leaders selects beneficiaries at meetings in the village;
 - (c) The BDO's office gives out contracts for pond construction and this is supervised and certified by fisheries department/BFDA engineers;
 - (d) MPEDA arranges 5-day training camps for beneficiaries where participants are given an allowance of Rs. 5/day;
 - (e) BFDA with MPEDA support arranges for inputs of fertilizers and feed;
 - (f) The fisheries department supplies seeds at 20 p/seed;
 - (g) Fisheries department/BFDA offer technical backup in the field;
 - (h) BFDA supervises harvest/sale/savings.

After the first harvest, all this ends and the farmer has to fend for himself though he still can and does seek technical help from BFDA/Fisheries Department.
 17. Very few beneficiaries undertake soil preparation and treatment with fertilizers because they are not completely convinced of its necessity, especially since, they say, shrimp in Chilka Lake seems to grow well without treatment. Some are convinced when problems arise and are overcome by timely treatment with fertilizers.
 18. The five-day training often ends up as little more than two to three days of lectures in batches of 50, and the allowance of Rs 5/day is paid till resources last. MPEDA claims it has very little funds; the fisheries department claims it has no funds for such activities. The main points retained from the training are that if you add cowdung and lime and stock and feed the shrimp, provide shade during the moulting period, and call the fisheries department/BFDA man at the sight of trouble, all will be well. Symptoms of trouble are juveniles coming to the top or near embankment, juveniles being carried by adults and change in water colour/taste.
 19. The fisheries department is prompt with help. Earlier the solutions were to fertilization, agitation and oxygenation or harvest to make the best of a bad deal and shift to a new pond. These days one makes the best of a bad deal and tries one's luck the next year in the same pond.
 20. Harvesting is done with traps and leaders. The technology is very similar to the traditional 'jano' culture where areas are enclosed with dykes and bamboo fences and flooded as high tide (along with fry + seed) and dosed for culture and harvested. One finds that the new technology is being transferred freely among the people and being adapted. Protocols are rarely followed but one notices a learning process in action. The attitude of the farmers towards shrimp seems the same as towards domestic animals. They share their food with the shrimp and choose to live near them.
 21. Some of the technical problems that have already arisen and that may arise are :
 - a shortage of juveniles; already they are being transported across the state and local juveniles sell at 2 to 3 times the cost of Govt. supplied juveniles; the need for a hatchery seems obvious;
 - there have been some questions about the long-term viability of confined tank culture in terms of soil salinity sustenance and soil ecology;

- some questions have been raised about the impact of the ponds and seed collection and collection activity on the lake shore ecology and on the capture fisheries;
- dyke erosion is a serious problem and will, if not checked, reduce the life of ponds;
- there seems to be a need to develop water management technologies that will make possible two crops/year.

22. Financial viability

The financial viability of a 1/2 acre confined tank/pond is estimated (without subsidy) to show its essential feasibility. A second crop calculation is done to show why it is necessary to try and develop second crop capability. The labour is assumed to be a family contribution and in practice is. The labour demand, daily and seasonally, is such that it can be, and is an activity complementary to existing fishing activity and does not substitute or clash with present activity.

23. Costs and returns of 1/2 acre confined tank shrimp farm (1 crop)

(a) Capital investment

		Expected life
(a) 1. Earth work :		
1350 m ³ /Rs 307/100 m ³	4144.50	10 years
450 m ³ /Rs 335.60/100 m ³	1510.20	10 "
(a) 2. Harvesting gear		
10 traps/Rs 10 each	100.00	1 year
5 bamboo fences/Rs 20 each	100.00	1 "
40 poles/Rs 0.70 each	28.00	1 "
(a) 3. Guard Hut	100.00	
Total	5982.70	
Depreciation annual	893.47	
(a) 4. Pond maintenance 30 m-d at Rs. 8	240.00	
(a) 5. Depreciation + repair + maintenance	1133.47	

(b) Operational costs

(b) 1. Lease value of 1/2 acre water area	
D.875 composite area @ Rs. 250/acre/year	218.75
(b) 2. Fertilizer	
(a) Lime 50 kg @ Rs. 2.5/kg	125.00
(b) Single super phosphate 25 kg @ Rs. 1.5/kg	37.50
(c) Urea 25 kg @ Rs. 1.5/kg	37.50
(d) Cowdung 1250 kg @ Rs. 50/1000 kg	62.50
(b) 3. Prawn seed 4000 @ Rs. 0.20	800.00
(b) 4. Feed (.25 kg groundnut cake + .25 kg snail meat) x 30 days	
(1 kg groundnut cake + 1 kg snail meat) x 30 days	
(2 kg groundnut cake + 2 kg snail meat) x 30 days	
Groundnut cake @ Rs. 2.60/kg snail meat @ Rs. 0.40 kg	
Composite cost at 1 : 1 mix Rs. 1.50/kg 195 kg @ Rs. 1.50 kg	292.50

(b) 5. <i>Labour input to culture</i>	
(contributed by family at no cost)	
Fertilization (purchase + activity)	9 m-d
Seed (purchase + stocking)	1 m-d
Purchase of feed	6 m-d
Feed preparation and collection	25 m-d
Harvesting	10 m-d
Purchase of gear	1 m-d
Hut construction	1 m-d
<i>Total</i>	<u>53 m-d</u>

Opportunity cost of 53 m-d @ Rs. 8/m-d = Rs. 424

Total operational cost 1997.75

(c) *Total costs* 3131.22

(d) *Returns (60% survival 40 cts/kg)*

(e) *Net income* 1243.78

24. *Costs and returns of ½ acre confined tank shrimp farm (2 crops)*

(a) *Capital investment* 5982.70

Depreciation + repair + maintenance 1133.47

(b) *Operational costs*

(b) 1. **First crop** 1997.75

(b) 2. **Second crop** 1779.00

(c) *Total costs 3776.75 + 1133.47 =* 4910.25

(d) *Returns*

4375.00 x 2 8750.00

(e) *Net income* 3839.78

IV. The people

25. The programme of ERRP in confined tank shrimp culture in Puri District is restricted mostly to Krushna Prasad and Bhrangiri Blocks along the Chilka Lake coast (north-east coast of the largest brackishwater lake in India). Six clusters of ponds were studied, which included 203 beneficiaries from 17 villages and two hamlets which included 10 interior villages. Of the total beneficiaries 107 (52.7%) belonged to fishermen's castes and practised fishing; 41(20.19%) belonged to non-fishermen's castes and *also* practised fishing and 55(27.09%) belonged to non-fishermen's castes and did not practise fishing.

26. Almost none of the beneficiaries owned any land; the few who did, owned patches of less than half an acre and did not cultivate their lands themselves, preferring to lease them out to share croppers. The predominant occupation was fishing and the non-fishing occupations were share cropping, agricultural labour, general labour (road work, pond construction), and odd jobs like running errands, collecting firewood, bamboo basketry and trap making. Almost none of the families owned cattle though a few of the agricultural families did have a cow or two.

27. The only outside influences the community is exposed to is the visits and contacts with middlemen/traders and contacts made at tea shops, freezing plants, markets and during trips to Puri. Government officers, extension workers, radio and the print media seem to have little or no influence on the community.

28. The seasonal routines are :

Chilka Lake fishing goes on all year and the peak seasons are April-June and November-December. Jano fishing also goes on all year but peaks during October-December.

29. **Daily Routines**

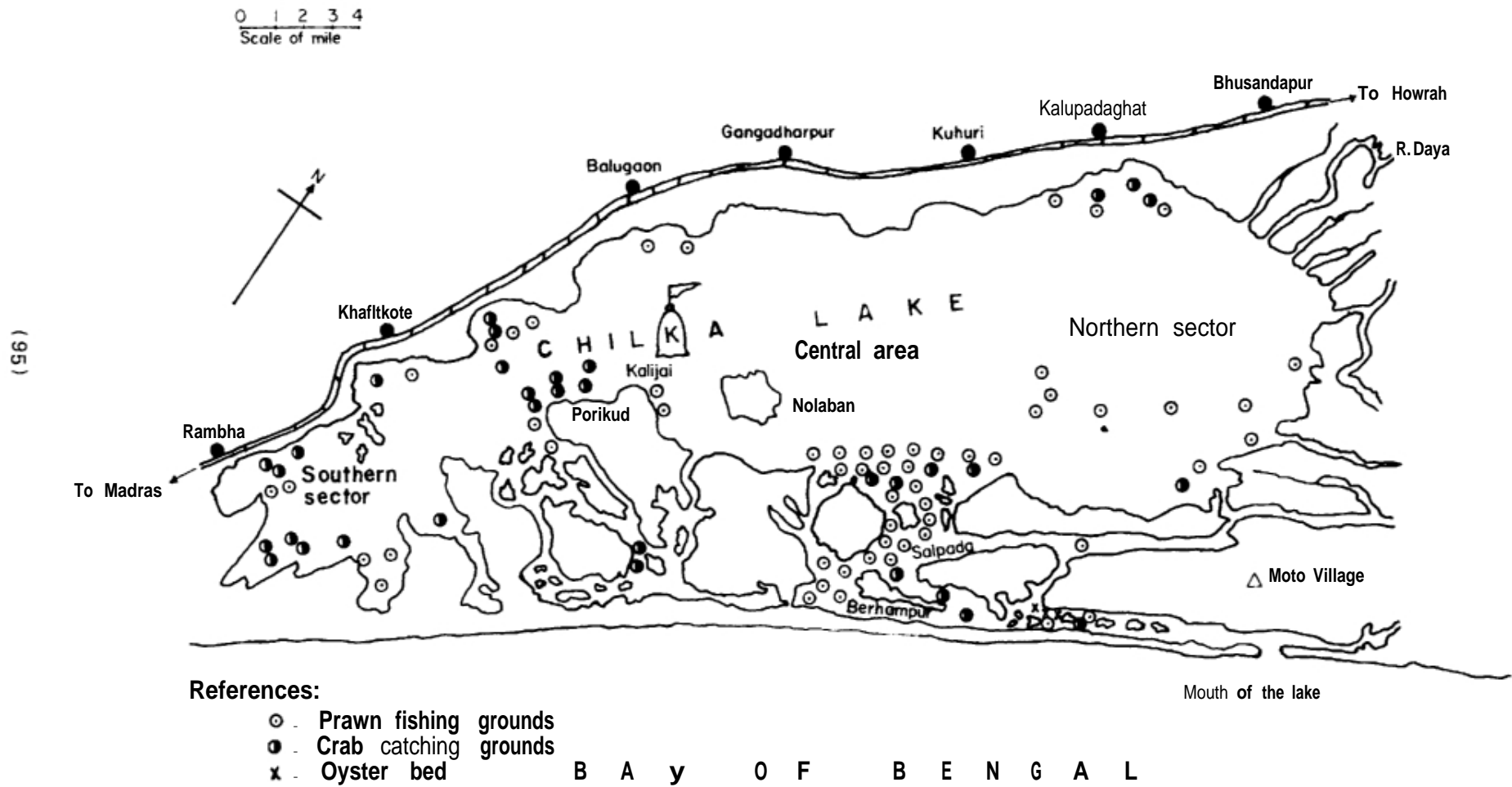
The fishing activity consists of going out to Chilka early in the morning for a few hours before sun-up to collect traps and going out again late in the evening to lay the traps. Occasionally, especially so after the advent of mini-trawls, some of the fishermen stay back to prevent

destruction of their traps. The rest of the time is spent in leisure and a little time in repairing traps and boats. The men spend most of their leisure playing cards and gossiping. Women collect firewood and help out with oil seed gathering from the wild and, of course, look after domestic chores. They also concentrate on marketing the catch at the local markets. Children usually drop out of school at the age of 10-12 when they begin to practise their profession in earnest.

30. Houses are thatched with mudwalls and common possessions include bicycles, radio sets, some silver jewellery, aluminium vessels; the odd man wears a watch. The economy is overwhelmingly dominated by fishing and fishing-related activities. A small percentage, less than 5% owned boats, which they shared freely with others, to reach the traps. A large majority owned traps, often 40-100 of them per family and a small majority had no assets and worked as labour. Interestingly the gear usage in Chilka area is castewise and the communities studied are exclusively trap users.
31. Indebtedness is a common and accepted phenomenon. Some loans are handed down through generations, others are acquired for celebration of rituals, to finance purchase of fishing assets, and often for medical expenses. The sources of loans are primarily moneylenders who are the upper caste traders/middlemen. The moneylenders in this region do not charge a direct interest. Instead they acquire exclusive buying rights of produce at rates less than market rates which can be as little as Re. 1/kg for ordinary shrimp to Rs. 10/kg for *P. monodon*.
32. The market chain begins at the lake shore to middlemen and passes through at least two levels before it gets to urban markets and exporters/processors. The margins, as expected, are phenomenal.
33. With 60 days a year on an average lost to bad weather and festivals, trap owners and boat owners (who also own traps) were making Rs. 20-25 minimum per day and as much as Rs. 60 Rs. 150 during the peak season adding up to Rs. 10,000, while labourers made about Rs. 12 a day or a share of the catch that put them in the Rs. 3500-6000 income bracket. While they cannot be classified as well-to-do, they are definitely not the poor that the ERRP seeks. However, the difficulty in computing incomes and a lack of land holdings affords easy entry with ERRP schemes. Major expenditures are marriages (Rs. 5,000) and festivals which can cost as much as Rs. 500/family for clothes and ritual costs and buying fishing gear.
34. When asked what they did with savings and what they would do with increased earnings, the people said they would repair and upgrade their houses, buy agricultural land and slowly shift to agriculture because they see no future for Chilka Lake fishing due to environmental damage of silting/pollution/overfishing.
35. The fishermen practise two types of fishing : traps in Chilka lake and Jano fishing (enclosing near shore areas with dykes and bamboo fences and doing tidal-fed pen culture). The former accounts for 75% of the fishery and is individual/family based and the latter community run and fished individually and often shared equally. Jano fishing accounts for about 25% of the fishery. Jano earnings are often used for community activity, feasts, rituals and for temples. Most Jano lands and several parts of Chilka need a lease for fishing and this is taken by cooperatives from the revenue department. Sharing of lands is traditional and informally negotiated by villages and trespass is dealt with swiftly and ruthlessly.
36. The ERRP scheme directly affects the Jano culture. Where the Janos are not productive there is no conflict in the conversion. But well-organized villages with productive Janos want their areas untouched and the conflict level is high and tensions exist.
37. The restriction of 75% of the land for ERRP does not seem to concern anyone as with unreliable income data and no land holdings all of them are technically acceptable into the ERRP scheme and the Fisheries Dept/BFDA does seem to have spread the word that eventually all will benefit. So selection has not generated any conflict. Also the swiftness of the implementation did not give much time to opinion-and-influence-peddlers to get into the act. Should enough allocations not be available in the future, this is a potential high-conflict issue because the people insist that all should benefit and that productive Janos should be left alone. With the allocation of Jano lands to the BFDA programme, community rituals and activity have been affected, and the community does feel upset about this. Even with increased incomes they are unorganized and are unable to collect funds for such activities.

38. There seemed to be no reservation about undertaking new culture activities, as the people felt that this was merely an improvement over Jano culture and they also felt attracted to the financial return as the programme was completely free, at least for the first crop.
39. The community has a good working relationship with the Fisheries Dept/BFDA and is not afraid to express its views. Its feelings are not so cordial to other departments.
40. Some of the positive and negative impacts of the new culture method were identified as :
 - (a) people, especially agriculturists, are beginning to object to free gathering of snails from their property. With increasing demand, the price of snails and the conflict potential may increase. On the other hand, people report that relatives are coming closer together by helping out with snail collection.
 - (b) Cowdung gathering is also becoming difficult. There are conflicts with those who have other uses for cowdung. With little livestock resources, this is a factor that can limit rapid expansion.
 - (c) Seed collection has become a thriving occupation and adds substantially to people's income; even children participate in this activity.
 - (d) The time taken to stock ponds is increasing because of seed scarcity.
 - (e) People complain that technical support from BFDA/fisheries department during the second culture period is poor.
The shift from daily earnings to deferred earnings is causing some problems. There is a tendency to overspend, then use up the savings kept aside for the second crop.
 - (f) The elderly are getting closer to the family as they are seen as economically useful providers of watch and ward and not merely as dependents. People, especially the elderly, seem very happy about this.
 - (g) On the one hand, the hold of moneylenders on people is loosening, as higher earnings help people pay up their debts in cash instead of buying rights; on the other hand, it delivers those who face an emergency into the clutches of the moneylender. The people feel that the enterprise is risky and they need some programme (insurance?) to help them out when in trouble.
 - (h) Illegal pond construction is going on, often blocking shore access and fishing access, thereby leading to conflicts.
41. The people were asked what their needs were. Their response :
 - (a) better road connections,
 - (b) drinking water,
 - (c) electricity for their villages,
 - (d) soft loans for working capital during subsequent crops,
 - (e) local depot for inputs,
 - (f) that everyone should be allotted ERRP and that their Janos should be left alone.
42. Finally some of the factors that might mitigate conflict were identified in in-depth discussions and they were :
 1. The people being poor as a rule, there is not much variation in lifestyles and earnings.
 2. The proposed new activity is similar to their present activity (fishing), so no new status is attached to acquiring new technology.
 3. Everyone believes they will get it eventually.
 4. The community is poorly organized and politicized unlike in Ganjam where the conflict level is higher, especially in selection of beneficiaries.
 5. Single-caste villages and small communities.

Chilka map showing the prawn fishing and crab catching grounds and the oyster bed



Case Study on Confined Tank Shrimp Culture in Chilka Lake, Orissa, India

Case Discussion Summary

Structure of Discussion

The following plan **was followed** :

1. Explanation of technical and socio-economic aspects
2. Questions of success on social terms
3. How to expand the project

Is the project a social "success"?

A number of issues were raised :

- proportion of inhabitants who benefited
- effect on family income
- tensions arising in society
- changes in land tenure
- subsidies and self-reliance
- benefits to middlemen

This led to questions of criteria for success

- are there time boundaries?
- is it a numbers game?
- does tension imply failure?
- is it a process leading to other positive developments?

The group concluded that the Orissa experiment did seem relatively successful and worthy of expansion

Design for socially feasible expansion

The Department requests funding for 2000 ha expansion. To ensure that this is socially feasible we recommend :

Appointment of extension staff :

- to survey villages
- to assist with the technology transfer
- to assist in processing lease forms

Better management of funding :

- a search for an appropriate organizational form to ensure that loans are timely and the loan recovery good (cooperatives? village committees?)
- title to the ponds could be mortgaged to the banks

Rethinking of land tenure

- need to study the likely effects of the project on 'jano' land
- study the ways in which 'jano' is managed and income from it is generated and utilized
- there might be a need to consider compensation to the community for use of jano land how would that operate?

Other forms of expansion be considered :

Expansion might not just be on a geographical basis. We should also consider :
inclusion of other social groups

- intensification of present scheme, including a hatchery
- integration of scheme vertically with marketing/or seed collection.

There may be trade-offs between these ideas and geographical expansion.

The government should further explore social consequences in the pilot scheme before expanding it.

Appendix 8

CASE STUDY ON EXTENSION OF CAGE AND SHELLFISH CULTURE IN PHANG NGA, THAILAND

Case Material I

PLANNING NOTES ON COASTAL AQUACULTURE IN PHANG NGA, THAILAND

by

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Policy Background

The project to extend cage culture and shell fish culture to small fishermen in Phang Nga has to be looked at in the context of the characteristics of Thailand's economic development policy. Fish is one of the most important items of the Thai diet, second only to rice. The Government has accorded a very high priority in its national development policy to the twin tasks of enabling development and the improvement of the socio-economic conditions of the rural poor, and of providing adequate supplies of important food items at the lowest possible price to its citizens. Thailand is one of the very few developing countries which (being basically an agricultural country) has not only been able to produce enough to feed its population but also has become a major exporter of food.

Fisheries Development

Fishing, both in terms of capture and culture, has had a long tradition in Thailand. Until quite recently, in fact until the Second World War, fishing was a subsistence activity in which people participated to provide fish for their own consumption rather than for trade. The main activity was in inland waters while the fishing along the coastal region was limited. Two factors predominated in converting fishing from subsistence to a production activity. On the one hand, with increases in population and therefore demand, there was a need to intensify fishing technology and effort to increase the catch: This called for full-time rather than part-time activity, which led to fishing as an occupation. On the other hand, during the post-Second World War period, Thailand, caught up in the world development trend of industrialization of fisheries, went into joint ventures and for considerable investment on modern fishing craft and gear. The focus was on the marine sector and away from inland fisheries. Marine production increased dramatically until there were too many craft and gear exploiting a limited resource. Commercial fishing moved out to sea to overcome resource depletion in the coastal areas. But the small fishermen remained and their socio-economic conditions were severely affected.

Why Aquaculture in Phang Nga?

The situation was unusual. Larger commercial craft which wanted to go out to overcome resource depletion in coastal waters were constrained by energy costs. The large numbers of small fishermen and farmers who did, and do, contribute substantial amounts to the total landings, found themselves being edged out of fisheries which was depleted to a level where economic exploitation was not possible.

In Phang Nga, incomes of fishermen declined far below the national average, and this forced them more and more to switch to manual labour in tin mines or into various tourism-based operations, and fishing activity receded. The government wanted to rehabilitate the poverty-stricken fishermen by providing them with viable fishery-related alternatives. And this was the beginning of the process that resulted in the coastal 'aquaculture' project being executed by the Department of Fisheries in collaboration with the BOBP.

The Planning Process

The aquaculture project in Phang Nga set out to develop fishermen and fisheries. This, at the time, ran counter to trends. Most small-scale fisheries development projects were either developing technologies or testing them for their techno-economic viability. Very few of them saw beyond the technology stage or for that matter had the funds to move into action programmes of technology transfer to actually take the technologies into the mainstream of fishing communities in order to benefit them.

Four Basic Questions for Planners

The formulation of the Phang Nga Project addressed itself to four basic questions that would establish the viability of the project :

1. Who is the beneficiary of the project?
2. Who will implement the project?
3. Who will plan the project?
4. Who will make the decisions?

Who Makes the Decision?

While it was obvious that in the case of Phang Nga, being a Government project, the planning and implementation would have to be undertaken by the Department of Fisheries personnel, the crucial first question was to understand the decision making structure which ultimately would decide on the project plan and its content. Most decisions are taken by politicians who are responsible and accountable to their constituencies. So it would seem that working on a rural aquaculture project to benefit poor fishermen would fit exactly into the needs of such decision-makers and, therefore, into the Government's guidelines. Unfortunately, the voices of the poorer groups, in spite of their large numbers, are not strong enough to influence their leaders. So the fisheries development officer's role had to expand to include a form of advocacy on behalf of the beneficiary to his or her superior, to persuade them to take the "right" decisions. Thus a need was felt to carefully consider the political decision-making structure during planning to ensure that the effort and the resources would benefit the beneficiary group maximally.

For Whom is the Project?

The project set out to benefit small fishermen of Phang Nga. Closer viewing of this group by the planners made them realize that socially, economically and culturally, small fishermen were not a homogenous group and there was a need to understand them and their needs at the village level. For, only out of such understanding would the project be able to evolve technologies to answer their needs, fit their environments and abilities and successfully blend into the mainstream of their lives. Two socio-economic surveys were undertaken for the planners by independent groups of social scientists to give them a better understanding of the beneficiary groups.

The Concept of Advantage

Several issues surfaced as the planners went about understanding the problem and trying to evolve solutions and programmes. First was the concept of advantage. The planner looks at the productivity and the efficiency of economic rent of land, labour, capital used in the project, as well as its viability and profitability. Small fishermen were found to have a different way of determining the advantage to themselves. They worried about what the technology would make for them (rate of return), the amount they would have to invest, how long would it take to recover their investment, what would be the risks. While the perceptions of the planner and the fishermen are reasonably compatible they differ dramatically in terms of priorities of concern. And it was realized that the success of the plan would depend on how well the planners/implementers would be able to communicate to the concerns of the fishermen. This of course would require not only an understanding of the fishermen's perspective but more importantly rapport and credibility. There was a need felt to get the fishermen to have faith and confidence in the planner/implementer to ensure the success of the project.

Technology Transfer : Seeing and Doing Helps!

Seeing is believing. And practical and visible demonstration (without recourse to too much abstract calculation) of profit and returns was found to be necessary to convince fishermen of the economic viability of the scheme.

The technical staff decided on some basic criteria to decide on the species and the technologies : the species had to be a fast growing one; fish seed had to be easily available either from the wild or from hatcheries; the species had to be disease resistant and easy to raise in confined areas; the fish species had to be in demand and had to fetch high prices. Considering the environment and the market conditions, the technicians selected seabass, grouper and shell fish like cockle, mussels and oysters, all of which were and are in high demand in the Thai internal market and fetch competitive prices. The culture technology was also well known. Knowing and doing are quite different. Fishery technologies are site ecosystem specific and require local demonstration, debugging of problems and development of technologies. Consequently fisheries technologists must work with fishermen to see the technologies to success. This aspect was found to be crucial. Doing creates confidence. Once the fishermen learn by doing and realize that the process is vulnerable to their management they will make it their own. However, there was found a need to assure the fishermen that fisheries technologists would be always accessible to them in case of special and unforeseen problems. The combination of doing all trials and tests on-site with fishermen and promoting self reliance by slowly handing over activities to them on the one hand and ensuring the facility of referral for special problems were found to be the key factors leading to successful technology transfer in Phang Nga.

Interestingly, when gross harvest data after the first harvest turned out to be dismal, making the planners seriously reconsider the viability of the technology, it was the fishermen who noticed that gross aggregate figures hid the occasional success stories. They studied the reasons why a few of them had done well, adopted the methods and overcame the problems. Non-involvement of the fishermen in the research and development process would have in all probability led to a closure of the programme or at least to change of technologies!

One Technology, Many Problems

As the project evolved, the planners noticed that while the technology was being adopted and was increasing incomes and producing fish, several socio-economic needs of the people were going unmet. Problems like poor sanitation and, lack of health services, drinking water, education, family planning or diversified employment, were eroding the benefits that the fishery programmes were bringing in. The planners realized that they had to go beyond the functional confines of their department and help make available a variety of technologies and services in order to help fishermen and not just the fishery. This needed a modification and expansion of the programme to ensure holistic development.

Flexibility and Continuity

Learning by doing was the main approach of the project. That not only made it possible to involve fishermen in technology development but also made extension easier because success spread from fisherman to fisherman. Learning by doing also required a certain flexibility in planning as new problems came up, requiring new solutions and mid-course changes.

The project is still in progress, and problems are arising as the technology and the community are evolving - problems like a tendency for the benefits to be concentrated in few hands; environmental problems of aquaculture; the effect of the sites on water traffic; the non-availability of some types of seed; shortages of cheap feed; diseases of certain species; and the control of the marketing by a few middlemen. But we hope that in working with and for the fishermen we will be able to evolve solutions and apply course corrections so that the basic objectives of the project are met.

Case Study on Extension of Cage and Shellfish Culture in Phang Nga, Thailand

Case Material II

SCRIPT OF AUDIO-VISUAL ON PHANG NGA AQUACULTURE DEMONSTRATION PROJECT

Note : This *script* was written for an audio-visual *prepared* early 1983 and reflects project *progress till then*.

Visuals	Voice and Sound Effects
1. Bay of Bengal Programme presents (text superimposed on waves)	Surf sound and music
2. Aquaculture demonstration project at Phang Nga, Thailand (Text super-imposed on aquaculture shot)	Music
3. Map	Phang Nga bay lies in the south of Thailand, bordering the Bay of Bengal.
4. Scenic shot	It is known for its scenic beauty, and attracts many tourists.
5. Limestone rock formations	The bay is dotted with numerous islands. Some of them are just limestone rock formations jutting out of the tranquil waters.
6. Mangrove vegetation	The land fringing the southern shores of the bay is covered with dense mangrove vegetation.
7. Wide-angle shot of the villages: on shore and in tidal zone	Quite a number of villages are found here, either on the shore, or on stilts in the tidal zone.
9. Fisherfolk portraits	More than 8,000 people live in these villages. Many of them make their living by fishing in the bay.
10. Fisherfolk	Their catches are poor, their incomes and living standards are very low. Now, thanks to a new project, this unhappy situation is changing.
11. Map of villages <i>Text slide :</i> Ko Pan Yi Ko Khiam Sam Chong Ko Mak Nai Ko Mai Pai Bang Patana	Why? Because six of these villages – Ko Pan Yi, Ko Khiam, Sam Chong, Ko Mak Nai, Ko Mai Pai, Bang Patana – are the site of an “aqua- culture demonstration project”.
12. Happy fisherfolk	This pilot project seeks to provide a model for rural fishery development and for improving the living standards of poor fisherfolk.
13. Text slide : Thailand Department of Fisheries in coopera- tion with FAO/SIDA Bay of Bengal Project	It is being executed by the Thailand Department of Fisheries in cooperation with the FAO/SIDA Bay of Bengal Project which provides external funding.
14. Close-ups of finfish, oyster, cockle, mussel	Following studies from a survey, four fish species were recommended as suitable for fish culture in the area : finfish, oyster, cockle, and mussels
18. Cages	The goals of the project include setting up of pilot pens, cages or rafts for aquafarming

Visuals	Voice and Sound Effects
19. Demonstration	Practical demonstrations of modern aquafarming techniques and training of villagers are essential for the project.
20. Villagers in assembly hall	Stimulating community development through self-help and collective action is also essential to the project.
21. Cage culture	Cage culture of finfish has been the biggest success of the project so far.
22. Long shot of cages	At present, finfish are being cultured in more than 500 cages in six Phang Nga villages.
23. Sketch Masses of finfish; cash	So far the finfish yield in Phang Nga has exceeded 30 tons. Their total farm gate value is nearly 1.5 million baht or about 60,000 dollars.
24. Cage	A typical cage measures 3m x 3m x 3m and is made of synthetic webbing. It is rigged to a floating raft built of <i>sawn</i> timber and polyfoam floors.
25. Sketch	This is how the cage looks under water.
26. Fishermen constructing cage	The fishermen make the cages themselves. Material needed includes timber, webbing anchor, floats and anchoring ropes.
27. Raft of six cages	A raft consists of six cages.
28. Sketch of intelligent Phang Nga fish farmer	Normally a cage should cost more than a hundred and fifty dollars, but the Phang Nga farmers have shown great ingenuity in bringing down the cost.
29. Mangrove poles	They use mangrove poles available in the area in plenty to build rafts.
30. Float shot	Polystyrene (discarded by tin mines in the near by Phuket area) is used as floatation material.
31. Trash fish	The trash fish (they catch in their regular fishing operations) is used to feed the fry and thus is a "zero-cost" item.
32. Money	These innovations have made fish cage culture profitable at Phang Nga.
33. Text slide : seed -- feed -- space -- market	What factors influence the growth of finfish cage culture? They are four – seed, feed, space and market.
34. Seabass fry	For seed, the project gets seabass fry from government hatcheries in the area.
35. Grouper fry collected through traps	But grouper was also artificially spawned last year at a hatchery in Satut province. This promises to be a new source of supply.
37. Close-up of trash fish	Trash fish is caught by using dipnets and push nets and used for feed.
38. Expanses of water	As for the third factor, space, there are large expanses of water spread suitable for cage culture.

Visuals	Voice and Sound Effects
39. Guard cottage on raft	But the cages have to be set up close to the villages to ensure regular feeding and to safeguard against poaching.
40. Restaurants -- people eating finfish	Seabass (plakapong in Thai) is one of the most popular table fish with the Thai people.
41. General shot of oyster trays	Let us now turn to oysters. These are cultured in trays suspended from rafts. This is known as the "hang drop" method.
42. Oyster culture on rocky bed	Here we see oyster culture on the rocky bed at Ban Ko Khiam village.
43. Trays housing oysters	A tray (1 m x 2 m) in size can house 200 to 300 oysters.
44. Oyster spat	The oyster spat or seed (that is cultured to marketable size) is caught or lured by using spat collectors.
45. Close-up of oyster spat	A deposit of oyster spat forms on the collectors in course of time.
46. Transfer of spat collector	The spat collectors are later transferred to the rafts for culture.
47. Oyster after one year of growth	Here's cultured oyster after one year of growth. It is 7-12 cm in size.
48. Oyster culture by private agencies	Progress of oyster culture at Phang Nga has not been spectacular. But the project work has generated interest in oyster culture among some private agencies.
49. Close-up of cockle	Cockle culture was the first success achieved by the Phang Nga project.
50. Cockle culture	There was a good cockle harvest from a 3,000 sq.m demonstration plot in 1980. It fetched more than 20,000 baht.
51. <i>Text slide:</i> \$90,000 for cockle culture development	The provincial government of Phang Nga then provided \$90,000 for further development of cockle culture.
52. Cockle farms	At present cockle farms like this one cover 180 acres in six villages.
53. Fishermen and cockle culture sites	Fishermen are shown here demarcating their cockle culture sites.
54. Transfer of cockle seeds	Cockle seeds are being transferred from truck to boat for culture.
55. Poaching sketch	Last year the harvest was lower than expected, partly because of poaching.
56. Private parties : cockle plots	But the viability of cockle culture is not in doubt. Private parties have now received permission from the government to set up cockle plots.
57. Mussels on poles	Mussels are cultured on poles.
58. Spiking of mangrove poles	To collect mussel spat, mangrove poles from the area are spiked at various water sites but collection so far has been meagre.

Visuals	Voice and Sound Effects
59. Transplanting of mussels	Large quantities of new green mussels have therefore been transplanted into Phang Nga to increase spat fall.
60. Transport of mussel spat	Poles with mussel spat are transported to the culture site.
61. Community hall	The Phang Nga project has also tried to improve the basic facilities available in the area through "collective action"
62. Windmill and	A wind-mill driven water pump, a water tank, a shallow well, jetties and walkways – these were constructed with the help of voluntary labour.
63. Walkways	
64. Engineer in discussion	Here we see an engineer discussing (with fisheries biologists) a suitable site for a fresh water tank.
65. Equipment for tank	Villagers are helping to move heavy equipment for a fresh water tank.
66. Discussion slide	Following the success of the Phang Nga project, BOBP and the Thai Department of Fisheries agreed to extend it beyond 1981, when the first phase terminated.
67. Aquafarming	In the second phase which started in October 1981, more stress is being laid on extension of aquafarming activities.
68. Satul (map)	A second aquaculture demonstration project has also been launched, based in Satul province.
69. Cage culture at Satul	Here are some glimpses from the Satul project : – cage culture shows good promise.
70. Community hall	A community hall has been provided for the project at Ban Bakan Koei village. It serves as the base for culture trials there.
71. Training courses	Study tours and training courses will also be held for project staff at various levels.
72. Map Krabi and Trang in relation to Phang Nga	Finfish cage culture is now spreading to two other provinces – Krabi and Trang.
73. Fishermen shots	"We have encountered numerous problems" says Cdr. Swarn Charenpol, Director General of the Fisheries Department, "but we have proved with this project that even an indifferent fisherman can increase his earnings by 50 per cent. An able and energetic fisherman can more than double his earnings."
74. Happy fisherfolk	In other words, the Phang Nga project has made good progress in fulfilling the objectives of BOBP – of a better quality of life for fisherfolk.

Case Study on Extension of Cage and Shellfish Culture in Phang Nga, Thailand

CASE DISCUSSION SUMMARY

The group understood that :

1. The project objectives were to increase incomes and to improve living conditions,
2. The beneficiaries were identified as small-scale fishermen in Phang Nga Bay of whom there are about 1400 households. The project presently involves 300 households in fish cage culture and 200 households in shell fish culture.
3. The benefits accruing to the fishermen are, initially, increases in income and employment which would reduce the need to migrate to Malaysia for work. Subsequently the project has evolved to include community benefits like non-formal education, family planning and public health schemes, drinking water facilities and cottage industries.

The group felt that the feasibility of the project would depend on

A. *Environmental aspects such as :*

- siltation where mussels are cultured, as experienced with similar schemes in Northern Panay, the Philippines
- cages obstructing navigational waterways
- overcrowding of cages and cockle/mussel farms resulting in productivity drops

B. *Technical aspects such as :*

- the shortage of grouper seeds which have become quite scarce in the wild
- disease problems of seabass which may affect the success of cage culture
- the inadequacy of trash fish availability for feed purposes with rapid expansion in cage culture.

The group felt that the project was *socially feasible* for the particular social situation in Phang Nga and felt that the community had accepted the project.

Recommendations

The group felt that :

1. there was a danger that the cages would become concentrated among a few owners and recommended that the cage culture development be regulated by an equitable scheme of licenses and permits
2. there was a need for research on
 - nutritional requirements and pelleted feeds for seabass and grouper
 - diseases of sea bass
 - hatchery technology for groupers
3. there was a need to monitor and study the environmental impact of cage culture and shell fish culture on a continuous basis
4. there was a need to monitor and study the socio-economic impact of the project on a continuous basis
5. there was a need to promote some group technologies and that the community development efforts be continued.

Appendix 9

BIBLIOGRAPHY ON SOCIO-CULTURAL, ECONOMIC AND INSTITUTIONAL ASPECTS OF TROPICAL AQUACULTURE AND SMALL-SCALE FISHERIES

Compiled by

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CLASSIFICATION

1. Aquaculture
 - a. Socio-cultural Aspects of Aquaculture
 - b. Socio-economic Aspects of Aquaculture
 - c. Technology Transfer in Aquaculture
 - d. General Issues of Aquaculture Development
2. Selected References on Social, Economic and Institutional Aspects of Capture Fisheries
3. Bibliographies on Socio-economic Aspects of Aquaculture and Small-Scale Fisheries

INTRODUCTION

Published material on the socio-cultural aspects of aquaculture is scanty, as the following preliminary bibliography shows. The staff of the International Center for Living Aquatic Resources Management (ICLARM) conducted a search of its own library holdings, previously published aquaculture bibliographies, personal collections of the staff and literature retrievable from the Aquatic Science and Fisheries Information Systems (ASFIS). This search was confined to tropical aquaculture, both coastal and inland.

Social feasibility of development projects has long been a subject of inquiry in aquaculture and rural development. No attempt has been made to incorporate this large body of literature into this bibliography.

That so little literature directly related to the social feasibility of aquaculture was uncovered by this search is not surprising. It reflects the fact that technical and economic issues get priority when aquaculture potential and project feasibility are assessed. Moreover, many aquaculture feasibility studies conducted by development banks and governmental planning agencies are never published and thus are very difficult for outsiders to retrieve.

After turning up so few references directly related to social feasibility of aquaculture, it was decided to broaden this bibliography to include :

1. Socio-economic aspects of aquaculture : This category primarily includes financial and economic analysis of aquaculture. Some of these make token references to socio-cultural issues.
2. Technology transfer in aquaculture : This category includes a small number of references that deal with the process of technology transfer in aquaculture. It does not include the very large number of available references on aquaculture technology per se.
3. General issues of aquaculture development : This category includes broad regional or country overviews that assess the current status and potential of aquaculture systems. These generally deal primarily with technical, economic and institutional aspects, though occasional mention is made of socio-cultural issues, usually related to consumer preferences.

Coastal aquaculture systems and projects often have special impact upon coastal fishing communities. Therefore, a further category was included in this bibliography :

4. Selected references on social, economic and institutional aspects of capture fisheries. References included are limited to small-scale fisheries and fishing communities. The primary focus is on the Asian and Pacific regions.

This fourth category is certainly not complete, as numerous studies of individual fishing communities are not yet included. ICLARM staff plan to continue their literature search in this category and to publish a more complete bibliography at a later date.

The final category includes a listing of previously published bibliographies on the socio-economics of aquaculture. These include references on both tropical and temperate zone aquaculture.

Individuals who have difficulty obtaining locally available copies of any references in this bibliography may contact :

ICLARM's Selective Information Service
MCC P.O. Box 1501
Makati, Metro Manila
Philippines

ICLARM can provide up to 50 pages of xerox copies of desired articles free of charge. This will be forwarded via surface mail. The charge (including surface mail postage) is U.S. 90.20 per page for each page exceeding 50 pages. If you wish to receive your requested materials via air mail, ICLARM will bill you separately for the actual cost of postage.

Suggestions for additional references to include in this bibliography are more than welcome.

Norma I. Jhocson
Ian R. Smith
ICLARM, Manila
October, 1984

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