

Development of freshwater fish farming and poverty alleviation A case study from Bangladesh

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Aquaculture development in the last decade

Being a country of rivers and floodplains with a high potential of aquatic resources, fish plays a very important role in the daily life of many people in Bangladesh. The Bengali expression “Mache Bhate Bengali”, or “Fish and Rice make a Bengali,” illustrates this importance. Bangladesh produces 1,400,000 tonnes of fish annually mostly through inland capture fisheries and aquaculture. The development of the fisheries sector in Bangladesh during the last two decades has mainly been “donor driven” and emphasis has always been laid on the improvement and expansion of the aquaculture sector, which received or will receive around 60% of the donor funding over the period 1986-2005.

Table 1: Donor funding in fisheries development, Bangladesh, 1986-2005

Fisheries sub sector	Donor funding (US\$ million)	%
Aquaculture	205	59%
Fisheries	107	31%
Research	34	10%
Total	345	100%

The increase in farmed fish from about 100,000 mt in the early 1980s to 400,000 mt nowadays is impressive, but still, it only accounts for 30% of the total production. In the meantime, we see that the major sources of fish - “capture fisheries” – are in trouble. Riverine fisheries are declining, the major carps are disappearing, and estuarine set bag nets are destroying the juvenile fish in the Bay of Bengal.

Half of the 130 million people in Bangladesh are poor and 30 million are living in extreme poverty. Poverty reduction and improvement of the livelihoods of the poorest of the poor has always been one of the major goals of development programmes in Bangladesh and is a major objective in all the aquaculture development programmes. Whether the benefits of these programmes have been made available to the poor can be questioned, as their basic strategy: “growth of the overall fish production through fish farming” was in most cases not consistent with the socio-economic reality of the rural poor in Bangladesh. We want to illustrate this point with two case studies.

Fresh water fish farming developments in the Compartmentalisation Pilot Project (CPP) and the Char Development and Settlement Project (CDSP).

The Compartmentalisation Pilot Project

The Compartmentalisation Pilot Project is a water management project where a traditional aquaculture development project was conducted from 1993-1998. During this period, all 3,000 ponds in the area were engaged in a simple aquaculture extension programme focused on rearing Indian carp (*Catla catla*, *Cirrhinus mrigala*, *Labeo rohita*) and silver carp. The production was thoroughly monitored and socio-economic data of the participants was collected.



Figure 1: The bulk of fish production is by medium and large farmers.

The programme was successful as the yields increased from 800 kg/ha to 2,100 kg/ha and the total production in the project area increased by about 300 mt/year. However, from the socio-economic data, we learned that the programme had a very limited impact on poverty alleviation. This can be attributed to a large degree to the fact that only 1% of the landless families and 19% of the marginal farmers have access to a pond (Table 2).

Further, the ponds owned by the landless and marginal farmers tend to be small and often do not contain water throughout the whole year, which results in only 60% being suitable for raising Indian carp (Figure 2).

Therefore, the landless and marginal farmers produce only 4% of the farmed fish. Small farmers produce 22%, but the bulk (75%) is produced by the medium and large farmers.

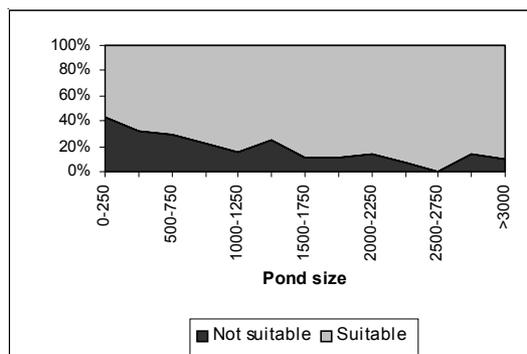


Figure 2: Suitability of the ponds for the farming of Indian carps in the CPP project area

Table 2: Distribution of ponds and the aquaculture production over the different social strata in the CPP project area.

Social strata	No of rural households in CPP	No of ponds in CPP	% of households owning a pond	Pond size (m ²)	% on pond number	% of total pond area	% aquaculture production
Landless	19,890	237	1%	248	8%	2%	1%
Marginal farmer	2,509	475	19%	379	16%	7%	3%
Small farmer	4,589	623	14%	899	21%	22%	22%
Medium farmer	1,362	1276	94%	1073	43%	53%	57%
Large farmer	475	326	69%	1232	11%	16%	18%
Total	28,825	2937					

This highly disproportionate distribution was recognized in the late '90s, and a "Homestead Fish Culture" programme aiming at the poorest of the poor was developed and successfully implemented. This programme was needed; as in the CPP project area, the poorest of the poor do not possess suitable ponds. This in contrast what is generally believed, i.e. that most houses constructed in rural Bangladesh are built on a raised earthen plinth to avoid flooding, and that therefore all households have a pond. This situation is somewhat different in the coastal areas of Bangladesh.

The Char Development and Settlement Project

The main activity of the Char Development and Settlement Project (CDSP), located in the south-eastern part of Bangladesh, is the official settlement of households that installed themselves on the newly accreted coastal lands, the char lands. The project also assists productive development, in particular agriculture, and to some extent aquaculture.

One of the major problems in the coastal belt and the CDSP project area is the shortage of fresh water during the dry season. The shallow ground water is saline and therefore tube wells cannot be used to provide fresh water during the dry season, as is the case in the rest of Bangladesh. To overcome the dry season shortage of fresh water, the digging of ponds for the storage of rainwater is essential for the population in the coastal belt. Because of this, relatively more ponds, on average 85 per square kilometre, are found in the coastal belt if compared with 22 per square kilometre found in the CPP project area. Further, many more of the landless and marginal farmers (38%) possess a pond (Table 3), and small farmers own the majority of the ponds.

In the CDSP project area, medium and large farmers own only 14% of the ponds. The major reason is that there are not

many rich farmers because most of the population are new settlers. The improvement of the ponds for aquaculture could improve the situation of the rural poor. However, the selected strategy of such an aquaculture development programme is very important in terms of its actual impact on poverty reduction.

Another development strategy

It is often assumed that improvement of ponds for aquaculture will automatically lead to an improvement of the livelihood of poorest of the poor. Unfortunately, it is not that simple, because improvement of fish farming in Bangladesh is not "neutral". Owning a pond does not necessarily mean that this pond is suitable for the rearing of fish. On the contrary, the suitability for aquaculture is mainly determined by its size and water retention ability. In most cases, the latter are interrelated; small ponds do not retain water for a long period, while large ponds can retain water for over nine months. Still, experiences in Bangladesh have proved that small ponds can be used for production if appropriate fish species and management systems are selected.

In general, fish ponds can be classified according to production and rearing system as follows:

- Small ponds (100-200 m²), retaining water for less than 4 months. Not suitable for fish (other than African catfish)
- Small ponds (200-300 m²), retaining water for 4-5 months. Suitable for Thai Puti (*Puntius Gonionotus*) and Tilapia, production 600 kg/ha/year
- Small ponds (300-500 m²), retaining water for 5-6 months. Suitable for Thai Puti, Tilapia and common carp, production 700 kg/ha/year.

Table 3: Distribution of the ponds over the different social strata in the CDSP project area.

Social strata	No of rural Households	No of ponds	% of Households owning a pond	Pond size (m ²)	% on number	Pond area (ha)	% on area
Landless & marginal farmers	9164	3912	43%	355	38%	139	28%
Small farmers	6266	5862	94%	500	56%	293	58%
Medium farmers	562	553	98%	1011	5%	56	11%
Large farmers	94	94	100%	1706	1%	16	3%
Total	16086	10421				504	

- Medium-sized ponds (500-800 m²), retaining water for 7-10 months. Suitable for silver carp, Thai Puti and Common Carp, production 1,200 kg/ha/year.
- Medium-sized or large ponds (larger than 800 m²) permanently containing water. Suitable for Indian carp and silver carp, production 2,000 kg/ha/year.

Over the last decade of aquaculture extension, programmes in Bangladesh were aiming at the larger ponds of 1,000 m² or more and mostly the use of Indian carps and silver carp was advocated. Using this traditional strategy again would mean that the poorest of the poor would not be reached (Figure 3).

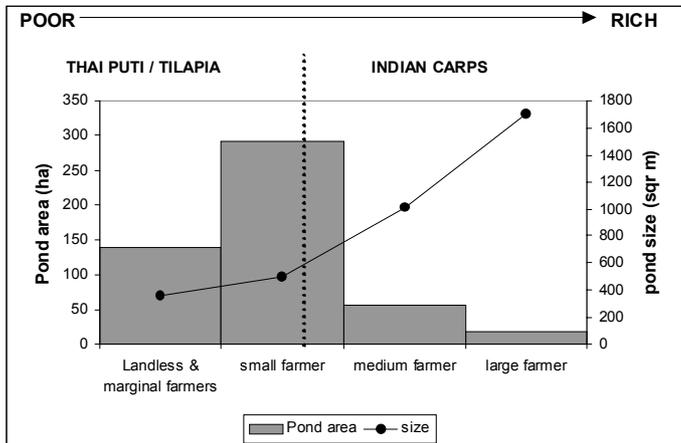


Figure 3: Pond distribution, pond size, poverty alleviation and aquaculture techniques in the CDSP-II project area.

That is because most of the ponds are smaller than 400 m², most of them are seasonal as they dry up in February or March. Due to their size and seasonality, these ponds cannot be used for the rearing of Indian carp. Landless, marginal and small farmers mostly own these. If we consider that poverty alleviation and improvement of the livelihood of the settlers is a major goal then we have to conclude that development of fresh water fish farming has to concentrate on the small and medium-sized ponds owned by the landless and small farmers.

What can be expected of this strategy?

There are about 10,000 ponds in the CDSP project with a total area of about 500 ha, the majority (85%) owned by small farmers. In principle, about 550 mt of fish could be obtained annually from these ponds, taking into account the earlier discussed production system.

The largest part (55%) of the production potential lies with the small farmers as the size of their ponds is reasonable and together they have a large number of ponds (Table 4). Landless and marginal farmers own Twenty-seven percent of the total pond area, but the prospect for improvement is limited as their

Social strata	Annual production (t/year)	% of total production	Kg/family/year
Landless	132	24%	34
Small farmer	309	55%	53
Medium farmer	84	15%	152
Large farmer	32	6%	303
	557		

Table 4: production perspectives of freshwater fish farming in the CDSP project area

ponds are small and they can achieve only 24% of the potential production. This situation also reflects itself in the annual production potential of the individual households.

With 34 kg/family/year incremental production, the impact for the landless seems to be poor; but for the involved families, it will be a substantial improvement as the production means two months of meals with fish for the whole family.

The development dilemma: Growth of fish production or poverty alleviation?

Despite a declining population growth rate, 2.2 million people are added each year to the population of Bangladesh and they have to be fed. Rice production has increased tremendously over the last two decades, and in the early 1990s, Bangladesh became self-sufficient. Over the same period, however, the average per capita protein intake declined from 58 to 40 grams per day. Therefore, it is logical for the policy makers and planners try to stop this downward trend, aiming mainly at the growth of the total fish production through improvement of fish farming. Implementation of such programs is not complicated; results are obtained quickly within 3-4 years. Costs are not high - \$25-50 US per pond owner trained - and a high economic rate of return can be obtained if the larger ponds are targeted with yields of 2000 kg/ha plus. However, it should be realised that despite the growth in farmed fish, the poorer segment of society has no access. It is simply too expensive for them to buy.

If fish farming is being developed in order to alleviate poverty, it should be realized that the poor have only small and relatively unproductive ponds. Aiming a fish farming development programme at this group is from a macro-economic point of view less attractive than aiming at the richer pond owners. This as the investments are still about \$25-50 US per pond owner and the yields will be only 600-1,000 kg/ha, resulting in low economic rates of return. However, for the involved poor, such production has a significant impact as it means two months of meals with fish for the family, or a 5-10% income increase.

Therefore, if poverty alleviation is concerned in aquaculture development, instead of using the traditional criteria, such as total increase in production and total financial or economic value of the increased production, more relative parameters such as growth in availability of protein for the rural poor and relative growth in income of the rural poor should be used. If the major donors take their objective to reduce poverty seriously, then they should take the lead in this aspect and should seriously review the objectives of ongoing and further planned developments in the fisheries sector of Bangladesh.



Small ponds, lower productivity but greater potential impact on poverty.