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A green horizontal band with silhouettes of people and a heart.

Common Interests, Private Gains - A Study of
Co-operative Floodplain Aquaculture

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ABSTRACT

In recent years a number of floodplain aquaculture projects have sprung up in the Daudkandi area of Comilla District. Key to this development are a number of unique organisational and financing arrangements which facilitate the development of necessary infrastructure through issuing shares to farmers who have land in the targeted floodplain area.

In February 2007, a short review was carried out to better understand how floodplain aquaculture was affecting a range of local social, economic and environmental issues. The production and economic performance of floodplain aquaculture projects was impressive; and they were obviously having a positive effect on local economies, general security, people's nutritional status and employment and service opportunities. However, this approach, productive though it is, effectively changes a seasonal, open, common property water resource, into a closed, privately owned one and it was found the opportunity for some traditional livelihood foraging activities had been reduced or lost. In general, poorer people in the area were unable to benefit directly from the project share offer.

The review concluded that the newly created embankments were probably restricting the movement of wild fish stocks onto the floodplain, and the internal refuges created were probably not having a significant impact on the dry season survival of wild fish stocks, except in cases where rarer species had been deliberately targeted for conservation and induced propagation. The review recommended that Government funds would be best spent on carrying out a comprehensive zoning exercise to enable the effective, planning, monitoring and regulation of floodplain aquaculture and to avoid potential conflict situations developing between traditional fisher communities and floodplain aquaculture farmers.

INTRODUCTION

Floodplain fisheries are crucial in providing food, income and employment for millions of people in Bangladesh. Inland open waters total more than 4 million hectares in area and are thought to be producing more than 500,000 metric tonnes of fish, annually. Typical yields from these flooded areas are between 150 – 350 kg /ha. However, pressures on these resources are increasing. These pressures include; the construction of flood control, drainage and irrigation projects; over fishing; the indiscriminate capture of brood fish and juveniles; revenue-based management of jamohals; the removal of water from fish habitats for crop cultivation; the discharge of municipal and industrial wastes; the use of insecticides and chemical fertilizers; and the reduction in floodplain area due to siltation and encroachment.

In Bangladesh, aquaculture continues to diversify and develop rapidly and is seen by many as the most realistic way to secure the nation's future fish supply needs. Basic fish production techniques are well understood by many

farmers, inputs such as seed and feed are widely available and thriving service provision and marketing networks exist.

The stocking of large water bodies is now well established in Bangladesh and recent initiatives have shown that large floodplain areas if controlled and managed, can generate significant fish production. Yields from these floodplain aquaculture systems are usually in the range of 1 – 3 t/ha, i.e. 10 times that normally possible from naturally occurring fish production. It is this dramatic increase in productivity that has been driving the development forward.

In February 2007, a short review was carried out in Daudkandi Upazila, Comilla District, Bangladesh, to better understand how recent developments in floodplain aquaculture in the area, spearheaded by the local NGO, SHISUK, were affecting a range of local social, economic and environmental issues. This paper summarises the main findings from this work.

A BACKGROUND TO DEVELOPMENTS IN DAUDKANDI.

Daudkandi Upazila had long been recognized as a food deficit area. In the lowest lying areas, the long seasonal inundation prevents many farmers from growing more than one crop a year. In slightly higher areas an *Aman* rice crop can also be produced, and in the highest areas, Aus, Aman and Boro sequential cropping is possible. Irrigation coverage, through deep tubewells, shallow tubewells and low lift pumps is around 42% of the cultivated area, (BWDB 1994).

Until recently, unemployment and underemployment was common and seasonal out-migration to urban areas occurred during the wet season. September to November was recognized as famine months, when great hardship was experienced by many farming households. At that time of year, fish caught from the floodplain, albeit in small amounts, contributed greatly to maintaining nutrition standards and health, and even provided a modest income if a surplus is caught. As the area was extensively flooded throughout the wet season, the main mode of transport at this time of the year was in country boats, limiting the free movement of goods and people.

In 1992, the area was transformed through the construction of a 45.5 km long embankment that protected an area of about 327 km², (including Daudkandi Upazila) from flash flooding from the Gumti River, and allowed more consistent crop production and settlements to become established. It was this development that created the conditions for floodplain aquaculture to emerge in the area. The possibility of utilizing seasonally flooded private lands for aquaculture had first been considered by a group of landowners in Dhanuakhola Adarsha Matshya Prakaalpa, Charipara in 1987. It is understood that their first attempts were unsuccessful. However, after the Gumti embankment had been constructed, others were encouraged to try. In 1996, there were a number of new attempts to establish floodplain aquaculture in the Daudkandi area but without NGO support. The introduction of a mechanism of issuing shares to landholders and a formal way of conducting

fund transactions through local banks were also unsuccessful. However, in 1996, the Pankowri Fisheries Project was created and this was to become the first successful floodplain cooperative aquaculture project involving local landowners, outside investors, and an NGO.

The NGO SHISUK has been involved since Pankowri's inception and still holds a 20% share in the venture. Production and profitability has increased over the years and records for 2005 show fish production to be around 232 metric tonnes¹. In 1997, the Project was registered as a company, under the Joint Stock Company Act. For its outstanding contribution development, SHISUK was awarded the National Gold Medal in 1999. (CIRDAP 2002)

News of the successes of the Pankowri Project spread rapidly around the surrounding area and by 2004 more than 90 similar projects, covering an estimated 5,000 ha, had been established in Daudkandi and neighbouring Upazilas, (PPRCD 2005). These floodplain aquaculture projects have transformed the local landscape. SHISUK expanded its programme during 2003 and 2004 and developed partnerships with four other floodplain projects in Daudkandi. In these new projects, SHISUK has attempted to develop a more inclusive community approach and has experimented with ways to achieve greater equity and the more significant involvement of women.

The Pankowri Project continues to develop, now guided by their Board of Directors, with SHISUK playing a less active role. The recent purchase of a truck by the Project, to assist with fish marketing, and plans for the establishment of a feed mill and hatchery, suggest that the project is looking to vertically integrate its activities. From the large number of private ponds observed being excavated, there also appears to be some management fragmentation of the cooperative enterprise.

SHISUK continues to modify its approaches, using Pankowri as 'its laboratory'. Aware of some of their limitations, they have recently invited BARC, DOF and the WorldFish Center to help them carry out research on a number of socio-economic, management and technical aspects of their floodplain aquaculture model.

ORGANISATIONAL AND FINANCIAL ARRANGEMENTS

The success of floodplain aquaculture in the area is at least partially due to the unique organizational and financial arrangements facilitated by SHISUK. Following community mobilization efforts, the capital required for the necessary embankment work to make floodplain aquaculture possible, is accumulated through floating shares to landholders in the area, so that they can invest jointly in the enterprise, thereby eliminating the need for development project support.

SHISUK supported projects adhere to a number of core principles including good governance, transparency and accountability. The NGO maintains a

¹ Production for 2006 is estimated in excess of 400 mt.

20% shareholding in the operation and there is a 1% cap on individual share holdings. In some projects a small number of shares, (4-10%) are held in reserve for the landless. The distribution of net profits amongst the members of SHISUK projects is organised as follows; 50% is paid as a dividend to the owner of project shares; 27% is paid out as land rent to the owners of land, and water bodies inside of the project; 20% is kept as reserve (for investment in the following year and contingencies; 3% is spent on social welfare, such as donations to mosques or temples. SHISUK is now planning to test this approach in a number of new areas, including Netrakona, Kurigram, Gaibandha and the Chalan Beel area.

WINNERS & LOSERS

There is no doubt that floodplain aquaculture has a profound effect on the local economy; the Poor; livelihoods; women and the environment. These are now examined in turn.

The Local Economy

A new resource system is created through the process of land enclosure and floodplain aquaculture projects contribute significantly to local economies. Fish production in terms of unit area, has increased by many times. The creation and maintenance of the embankments has created work opportunities and facilitated the rapid expansion and movement of people and goods.

The production and profit figures from Shisuk projects have been impressive. In 2006, the five SHISUK projects produced more than 800 tonnes of fish from 344 ha, (an average fish production of 2.3 tonnes/ha). It is estimated that around 7,500 tonnes of fish are now produced from floodplain aquaculture from an area that traditionally produced around 750 tonnes through conventional capture fisheries. This floodplain aquaculture production would have a value of around 450 million taka, (6.4m US\$).

The local economy can now employ more people and out-migration has been reduced². Incomes earned from the aquaculture projects have boosted the local economy through both backward and forward linkages. The local economy therefore gains from both the direct benefits of the projects (increased production, profits, incomes etc.) and from the indirect benefits that are transmitted through backward linkages (mainly from the supplier of inputs for the fish production). Near to the Pankowri Project Offices, a growth centre, featuring a range of small shops and businesses has sprung up.

It was reported from a number of sources that floodplain aquaculture projects have a calming effect on the local communities. Perhaps because previous desperate measures are no longer necessary, the general law and order

² A number of local people reported that seasonal in migration has replaced the out migration that was common in the area before the projects began.

situation is said to have improved in many areas following floodplain aquaculture projects.

The Poor

Despite the efforts of SHISUK to achieve equity in their share distribution, it appears that the poor are not benefiting equally. Table 1 details the findings from a PRA exercise conducted in 2 project villages and shows share distribution trends suggesting that poor people can only receive direct benefits in a small number of cases.

Table 1: Livelihoods impact from floodplain aquaculture

Village	Wealth ranking	Proportion of total households	Proportion of crop land holding	Proportion of shares held	Proportion of benefit
Khillalpar	Rich	15%	85%	80%	70%
	Middle	55%	15%	10%	22%
	Poor	30%	0	10%	8%
Minardia	Rich	13%	50%	43%	40%
	Middle	66%	50%	43%	40%
	Poor	21%	0	15%	20%

The overall picture may be bleaker than this, as it is by no means clear whether the genuine poor will be able to retain shares over time, even if they are allocated to them at the start of a new floodplain aquaculture project. It seems all too likely that the majority of shares in profitable projects, will end up in the hands of a small number of influential people

Livelihoods

The collection of fish and other aquatic produce from inundated private land has always been considered 'open access' in Bangladesh. However, floodplain aquaculture is a privatisation of the commons and changes a seasonal, open access, common property resource to a year round, closed, private property resource. As a result there are a number of lost livelihoods opportunities. These include floodplain fishing (and access), duck raising, fuel material collection, fodder material collection and jute retting. In addition there are a number of forced changes to traditional agriculture cropping patterns. However, there are many new service provision opportunities that landless and poor people can engage in that result from floodplain aquaculture. Table 2 lists some of these.

Table 2: Service Provision Opportunities in Floodplain Aquaculture

Backward linkages	Forward linkages
Fingerling nursery operators	Ice plant operators
Fish Hatchery operators	Ice supplier / middlemen
Fingerling traders	Ice carriers (transport)

Fish feed sellers	Fish Aratder
Lime traders	Middlemen in fish Arats
Fertiliser dealers	Fish transport truck / trolley owners
Bamboo fencing makers	Bamboo made fish basket makers
Bamboo fencing sellers	Bamboo made fish basket sellers
Rickshaw / Van owners	Rickshaw / Van owners
Rickshaw / Van puller	Rickshaw / Van puller
Cow dung /Poultry litter suppliers	

A PRA exercise carried out in Baronager Project suggested that around 330 man days/ha of employment and direct service provision work were being generated by the aquaculture project. Other livelihood benefits exist including employment during the 'famine months' of September – October.

Women

There were only a few examples found of women being directly involved in floodplain aquaculture activities. These included women nursery producers, cast net fishers and fish processors. SHISUK have facilitated their representation on several project boards and provide micro-credit for a range income generating activities. Women interviewed reported that the projects had greatly enhanced their mobility and the degree of respect they could earn through involvement in the new economic opportunities and activities.

The Environment

SHISUK and other floodplain aquaculture projects claim their activities are having a number of positive effects on the wild fish stocks and the environment. Dry season sanctuaries have been excavated in a number of areas and the free movement of wild fish is encouraged through using large mesh screens on the embankment culverts. Wild fish of between 8-10 species, make up between 5-15% of the total harvest biomass. Their contribution is inversely proportional to cultured fish production. It is likely that wild fish stocks are benefiting from the feed and fertiliser applied; the extended inundation period and the absence of fishing pressure during the grow out period.

In reality though it is likely that water flows and fish migrations are restricted through the embankments established for floodplain aquaculture and increased fishing pressure probably exists outside of the cultured area. The pond-like conditions created for culture mean that many ecological niches no longer exist on the floodplain and the eutrophication of the water body may suit some species, better than others. Overall, it is likely that wild fish and other aquatic animal biodiversity is reduced within floodplain aquaculture, The targeted protection of certain high value fish such as Chital, (*Notopterus chital*) and Aye, (*Mystus aor*) in dry season sanctuaries may however be making a significant contribution to the availability of these species on the floodplain in the wet seasons that follow.

The predominance of between 8 and 10 species of exotic fish species used by most projects may also pose a threat to the environment. Figure 3 clearly shows the high contribution that exotic fish species make to the final biomass.

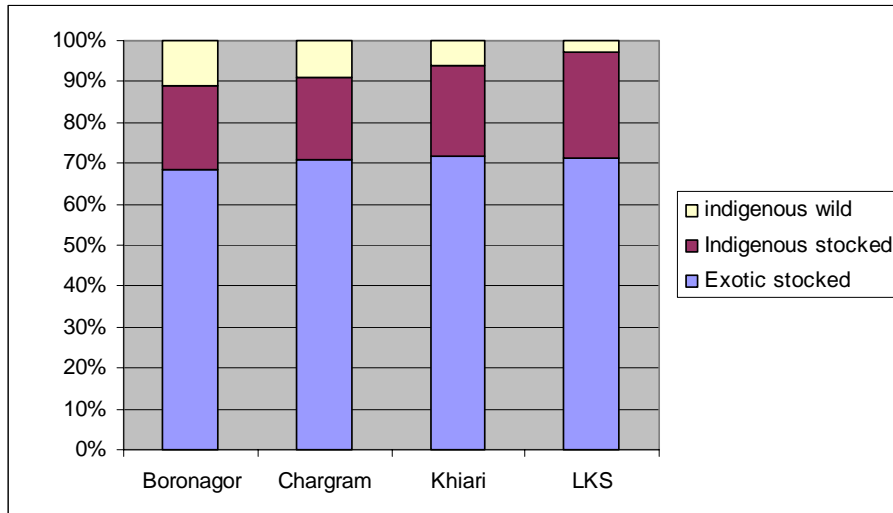


Fig.3. Biomass contributions of indigenous wild, stocked & exotic fish species

Positive environmental benefits were also claimed through the effects of the floodplain aquaculture management on agriculture. There appears to be an increased level of environmental awareness amongst shareholders, many who are adopting IPM principles in their Boro Rice production, in an attempt to protect adjacent dry season fish stocks.

Many farmers are reporting increased rice production of between 10-15% and a corresponding reduction in ploughing, irrigation, weeding, fertilizer and pesticide costs, making rice farming more profitable. These gains, together with the additional income through fish culture may maintain the viability of extremely small landholdings and help reduce pressures on farming families to sell their land.

CONCLUSIONS

This paper has attempted to present a balanced view of the issues facing floodplain aquaculture development and to highlight some the winners and losers that emerge as the development occurs. Positive aspects include the high production and economic performance levels of floodplain aquaculture and its capacity to spread to new areas without a concerted extension effort from a development organization.

The systems of raising funds through share offerings, in order to amass the capital to build the enabling infrastructure appears is inspired and may be key to achieving stakeholder ownership of the projects. Indeed, public funds need not be used to finance floodplain aquaculture infrastructure or input costs.

Floodplain aquaculture cannot be labelled an inclusive community approach, as landholding is the key issue in determining participation. Attempts by NGOs to directly involve the landless and women look token, superficial and unlikely to be sustainable in the long term.

In addition, a number of traditional livelihood opportunities are lost as areas come under floodplain aquaculture, although these should be offset against the significant employment and service opportunities for economic involvement created for a wide range of players. NGOs can play a useful role in aligning their pro-poor and pro women development programmes to the significant service provision opportunities that result.

Floodplain aquaculture cannot really be said to be considered to be enhancing natural floodplain fisheries production or biodiversity except in the cases where selected species are deliberately targeted for protection and propagation. There is a basic incompatibility between floodplain aquaculture and the more conventional community based fisheries management approaches used in Bangladesh and future conflicts between traditional fishing communities and farmers wishing to establish floodplain aquaculture seem likely. To counter this it is suggested that Government carry out a comprehensive zoning exercise to identify priority aquaculture and fisheries areas on the floodplains.

There are a significant number of knowledge gaps which prevent a more complete understanding of floodplain aquaculture development and these include the extent and severity of lost livelihood opportunities, the social, economic and organisational aspects of projects and the design, effectiveness and contribution of dry season refuges to wet season floodplain fish production. Until these and other research issues are better understood, it is recommended that Government adopt a precautionary approach to the development of floodplain aquaculture.

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