Floodplain aquaculture in Begumgonj: New horizon for rural livelihoods in Bangladesh

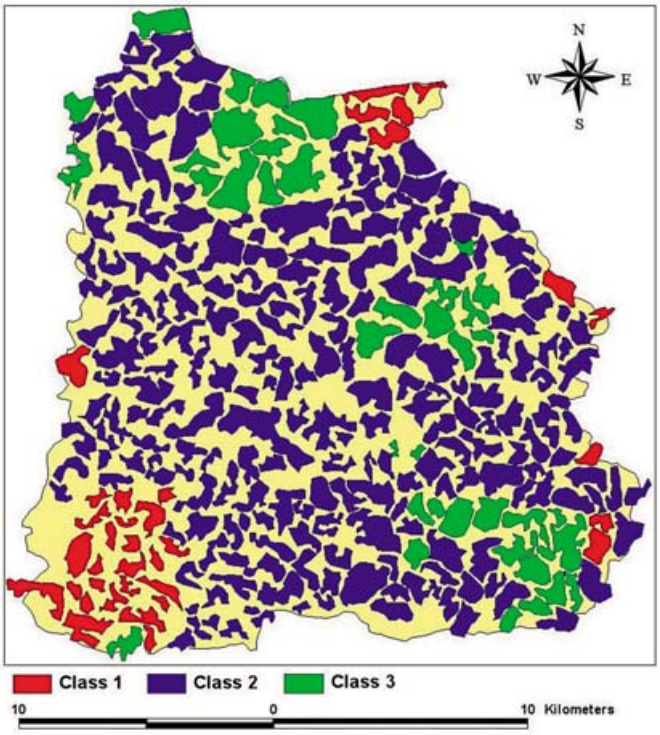
Hossain, M. S.

Institute of Marine Sciences and Fisheries, University of Chittagong, Chittagong-4331, Bangladesh, email: hossainms@yahoo.com

Aquaculture activities have been improved significantly in recent years, although emphasis has been largely placed on increasing production targets. The socio-economic benefits derived from aquaculture expansion include the provision of nutrients, employment and income generation for the poor, diversification of production and generation of foreign exchange earnings through export of high-valued products. Aquaculture also has the potential to compensate or substitute for stagnation of capture fisheries. It can also be a force for the prevention and control of pollution since production depends on the availability of good-quality water resources.

A major feature of the Begumgonj Thana under Noakhali District, Bangladesh is the rice cultivation during the dry season (November to March), but it becomes a vast waterlogged floodplain during the wet season, reducing agricultural productivity. In the absence of livelihood opportunities during the waterlogged period, poor people are forced to move out of their villages to seek alternative employment as day laborers or in such occupations as rickshaw (pulling a van). It is perceived that the seasonal floodplain of Noakhali has significant unrealised potential for aquaculture development, especially for prawn culture[1,2]. Chowdhury *et al*.[3] highlighted the possible environmental impact of stocking prawns on the floodplain biodiversity and its social impact on poor households dependent on aquatic resources to derive their livelihoods during the monsoon season.

The floodplain supports a multitude of aquatic flora and fauna. Fisheries are a major source of employment as well as the main source of dietary protein for the rural poor. The reproduction, breeding and spawning of fish in open inland waters is tuned and adjusted to the rhythm and amplitude of monsoon floods. The floodplains merge the rivers and streams into a single system, facilitating migration by broodstock and young. Our objective was to make an inventory of the seasonal floodplains, map their spatial distribution and classify their suitability for community-based aquaculture development to sustain the rural livelihoods. Rain is the main source of water in the Begumgonj Thana and the general availability of water remains high in most of the areas. Despite this fact, irrigated agriculture draws heavily on groundwater resources during the dry season. Begumgonj Thana has low elevation and water cannot drain out. The early rainfall fills the ponds, ditches and low lying areas and later rains overflow, keeping the area waterlogged for about six months from May to October. As a result, water stagnation is a common phenomenon during heavy rainfall. The highest rainfall occurs in June-August while the lowest occurs in November-January.



Suitability classification of seasonal floodplains of Begumgonj for prawn/fish farming.

Seasonal floodplain of Begumgonj, Noakhali, Bangladesh.

Satellite image (Landsat) and topographic maps were used for the present study, which were provided by the Bangladesh Space Research and Remote Sensing Organization and

Local Government and Engineering Department. The Thana map with union boundary was digitised using ArcView for Windows (version 3.2) developed by Environmental Systems Research Institute Inc, USA. Remote sensing image analysis used ENVI (version 3.4) developed by Research Systems, Inc, USA. Satellite image analysis identified 22,186 ha of seasonal floodplain spreading in 294 polygons that occupy about 52% of the total area. The suitable area for nursing fry was estimated at about 2,000 ha (class 1), with 16,000 ha was identified as suitable for rearing cultivable species to market size (class 2) and 4,000 ha for broodstock rearing and conservation (class 3). Participatory Rural Appraisal was carried out using field observations and community level group meetings with different stakeholder groups on the seasonal floodplain to gather primary information following the approaches of Pido[4], Pido *et al*.[5], Townsley[6], IIRR[7] and Hossain *et al*.[8] to learn about the available resources as well as their importance for community livelihoods. Direct observation prevents rapid appraisal from being misled by myth[9] and it often provides more valid and less costly information than other research methods[10]. Group meetings with local communities are the important way of learning about local conditions and resources[11].

Indigenous fishes, such as clupeids, snakehead, minnows and barbs, eels, and gobies are commonly available in the floodplain. Aquatic plants and water hyacinth grow in most of the seasonal floodplains and are used as cattle feed. The poor strata of the community, those who have no income generating option in the wet season, usually depend on the fisheries and other resources of the seasonal floodplains. They catch fishes from nearby waters for their own consumption and sell the surplus to the market (locally called *hat*), which help them to survive during the lean period. Different local gears are used to catch the indigenous fishes including cast nets, fixed nets, hooks, push nets, and bamboo basket traps (locally called *anta*). Each gear is used for operation in a specific water depth, for example *anta* are used in 20-30 cm depth to catch small indigenous fishes. It was reported by the people that the maximum fish catch occurs in the early morning and the peak time of buy/sell in local *hat* is between 7.00-9.00 am. A second catch occurs from noon to afternoon which is brought to local *hat* from 5.00-7.00 pm. It was reported that during heavy rain, most of the household ponds are flooded and cultured species (mainly carps) escape to the seasonal floodplain. Thus, rohu (*Labeo rohita*), catla (*Catla catla*), mrigal (*Cirrhinus mrigala*), grass carp (*Ctenopharyngodon idella*), common carp (*Cyprinus carpio*), and tilapia (*Oreochromis niloticus*) are additionally available during harvest in the seasonal floodplain. During field surveys we observed that some individuals and cooperatives have used bamboo fences to demarcate the seasonal floodplain into small bamboo pans for carp stocking, which never exceeds 2% of the total seasonal floodplain. The average yield is around 50-60 kg/ha in six months (June-November), lower than typical oxbow lake yields of 689 kg/ha/year[12]. No agricultural activities were reported in the seasonal floodplain during the rainy season due to high water depth and dense aquatic plants. When water depth decreases (October-November) the local communities drain or pump out the remaining water to catch the fishes and then prepare the land for paddy cultivation. Some *robi* crops (green chili, peanuts, radish, bean, arum, tomato, potato, etc) are also been cultivated in the elevated land.

The rainy season suspends most of the activities of poor communities and thus the poorer people face miserable conditions in their daily life. The rural communities usually eat chapatti (locally called *ruti*) at breakfast but sometimes they also eat watered-rice (cooked rice kept in water over night, locally called *hani bhat* or *panta bhat*) with green chili and onion. Rice is the main food during lunch and dinner. In the daily diet, the communities prefer fish than beef and try to arrange fish and beef on alternate days. In Bangladesh the per capita fish consumption has increased from 13.1 kg in 1997-98 to 14.4 kg in 2000-01[13]. On the other hand, the world average per caput fish consumption has been increasing over time, from 8.9 kg in 1961 to 15.8 kg in 1996[14]. The smell of potato and vegetable (either curry or fried) indicate the completion of dining arrangement, particularly in lunch and dinner. Communities reported that they eat seasonal vegetables and fruits almost every day, as these are easily available in their own homestead gardens.

The major activities of the inhabitants are agriculture, fishing, trading, either engaged as daily labourers or as owners of such enterprises. One person may be engaged in two or more different occupations i.e., one family may have agricultural land, a tractor for ploughing and a shop in the locality. Some occupations are seasonal, so a person can take up different activities in different seasons. The daily activities of men are connected with intensive labour for income generation of their family, while the women's activities are solely related to domestic affairs. Men usually pass their time in agricultural work and relaxing with tea breaks. Occasionally they are engaged in husbandry of cattle. During the rainy months they catch fish from the surrounding waters for domestic

Harvesting the last few fishes by hand.

consumption as well as for sale. Most mornings they visit village *hat* either to buy or sell fresh fish and vegetables. They spend their evening time trading, gossiping, purchasing household needs, meeting with friends and relatives at village hat or nearby shops. They also pass their leisure time with family members, neighbours and relatives. Women in rural communities do not participate directly in income generating activities. Usually they look after their families. These include the daily chores of childcare, collecting water, cooking, washing, chicken and duck rearing, homestead gardening, sewing cloths, making handicrafts, child education, and gossiping with neighbours. The dark, soundless village nights give them opportunity for sound sleep and relaxation.

The floodplains of Begumgonj remain relatively unutilised with no economic returns. About 22,000 ha of seasonal floodplains have been identified as suitable for nursing and culture of fish and prawns as well as indigenous brood fish rearing through the establishment of community-based fish sanctuaries for biodiversity conservation. Different types of integrated programs with special emphasis on prawn and fish culture may be undertaken for overall economic strengthening of the local communities by utilising the vast untapped floodplains in this region. Since wild stocks of different fish species including prawn are prevalent in floodplains, it is clear that community-based prawn and fish culture in the floodplains may be an excellent opportunity to stimulate income generation, employment and improve the nutritional status of the communities.

Rural communities need to be empowered economically, personally, educationally and politically to ensure their participation in planning and development process. Empowerment of the people through participation will help improve sustainable development in the floodplain areas. An excellent, comprehensive account of ways to improve fish and prawn farming may be provided in the framework that deals with some important processes involved in the floodplains of Begumgonj.

Women's activities in rural areas, making fuel & selling fish.

In the thrust for rapid aquaculture development, management of seasonal floodplains in the Begumgonj Thana has not been paid adequate attention in the planning process due to the lack of requisite data as well as resource shortages. Community-based aquaculture is a suitable activity for small-scale producers to augment their income and to promote ecologically sound farming in seasonal floodplains. The polyculture of silver carp, grass carp and prawn in seasonal floodplains can ensure sustainable utilisation of the available natural foods that ensure good production. Taking advantage of this situation it is easy to make use of this seasonal floodplain for community-based aquaculture.

References

1. Karim, M. 1989. Present status, scopes and constraints of *Macrobrachium rosenbergii* culture in the greater Noakhali district. Technical findings of a DANIDA-financed mission on identification of the socio-economic feasibility of freshwater shrimp culture in old Noakhali district, October-November 1989.
2. Alam, R. 2001. Feasibility study on freshwater prawn *(Macrobrachium rosenbergii)*. Prospect of fresh water prawn at GNAEP and PBAEP areas. The report of feasibility study prepared for GNAEP and PBAEP, Ministry of Fisheries and Livestock and DANIDA.
3. Chowdhury, A., Uddin K., Halder S., Colavito, L. and Collis, W. 2003. Environmental impact assessment of GNAEC freshwater prawn *(Macrobrachium rosenbergii)* farming promotion. GOB/DANIDA fisheries support unit, Winrock International, Dhaka, Bangladesh.
4. Pido, M.D. 1995. The Application of Rapid Rural Appraisal Techniques in Coastal Resources Planning: Experience in Malampaya Sound, Philippines. Ocean & Coastal Management 26 (1): 57-72.
5. Pido, M. D.; Pomeroy, R.S; Carlos, M.B. and Garces, L.R. 1996. A handbook for rapid appraisal of fisheries management systems (version 1). ICLARM. Manila, Philippines.
6. Townsley, P. 1996. Rapid Rural Appraisal, Participatory Rural Appraisal and Aquaculture. FAO Fisheries Technical Paper No. 358. Rome, Italy, 109pp.

Local fish market at Begumgonj.

7. IIRR., 1998. Participatory methods in community-based coastal resource management. 3 vols. International Institute of Rural Reconstruction, Silang, Cavite, Philippines.
8. Hossain, M.S; Khan, Y.S.A; Chowdhury, S.R; Saifullah, S.M; Kashem, M.B. and Jabbar, S.M.A. 2004. Environment and socio-economic aspects: A community based approach from Chittagong coast, Bangladesh. Jahangirnagar University Journal of Science 27: 155-176.
9. Chambers, R. 1980. Rapid rural appraisal: rationale and repertoire. Discussion paper. Institute of Development Studies, Sussex, UK.
10. KKU (Khon Kaen University), 1987. Rural Systems Research and Farming Systems Research Projects: Thailand. Proceedings of the 1985 International Conference on Rapid Rural Appraisal.
11. Pelto, P. and Pelto, G. 1978. Anthropological Research: The structure of Inquiry. Cambridge: Cambridge University Press.
12. Haque, A.K.M., Middendorp, H.A.J. and Hasan, M.R. 1999. Impact of carp stocking on the abundance and biodiversity of non-stocked indigenous fish species in culture based fisheries in oxbow lakes. In: Middendorp, H.A.J., Thompson, P.M., Pomeroy, R.S. (Eds.), Sustainable Inland Fisheries Management in Bangladesh. ICLARM Conference Proceedings, vol. 58: 141– 148. Manila, Philippines.
13. BBS (Bangladesh Bureau of Statistics), 2004. Statistical pocket book. Bangladesh Bureau of Statistics, Ministry of Planning, Government of the People's Republic of Bangladesh.
14. Ye, Y., 1999. Historical consumption and future demand for fish and fishery products: exploratory calculations for the years 2015/2030. FAO Fisheries Circular vol. 946. FAO, Rome, Italy. 32 pp.