policy brief

number 1
March
2005

Integrated Floodplain Management (IFM): Better Options for Sustainable Livelihoods

Agriculturalists view floodplains as rice production fields. The fisheries sector sees floodplains as fish production grounds. Overall the national emphasis has been to produce more rice ignoring other benefits and products, thus converting natural wetlands into rice fields. To the community dwelling in and around a floodplain it is their livelihood not just a rice field. Floodplains provide many products and services which have been utilized by many people in rural communities for generations. Wetlands also are significant for the local and regional environment, including for biodiversity conservation.

Policy Conclusions

- Floodplains are multiple resource systems used by different stakeholders including fishers and farmers;
- Sustainable management of floodplain resources necessitates participation of all stakeholders and integration among them;
- Integrated floodplain management (IFM) focus on balanced use of water for fish, crops and vegetation in the system to ensure sustainability of the goods and services we get from floodplain wetlands;
- Based on lessons learned over the last 10 years from various projects and studies, fishing effort control (sanctuary, closed area, closed season and gear restriction), cropping pattern management (crop diversification to reduce the area of water hungry boro rice cultivation and increase dry season water conservation), fish friendly regulator/sluice gate management, and land retirement are tested and proved options for more sustainable floodplains management. They result in environmental benefits and overall higher returns from floodplains;
- A new professionalism involving changes in development agencies and personal values to recognize the need for peoples' participation and a systems approach is required to motivate the user communities. To this end, Government and NGOs should come forward and work together along with the floodplain communities;
- The country urgently needs land use plans to protect floodplain resources. Concerned government agencies should endorse IFM as the guiding principle for all development interventions in floodplains.

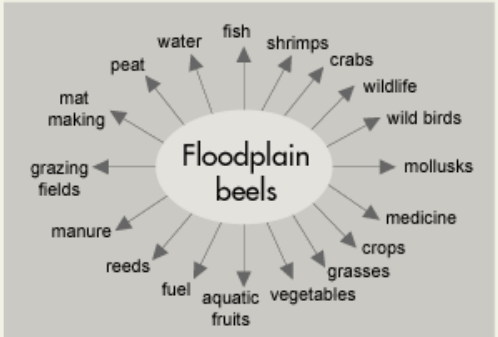
Floodplains and Rural Livelihoods

The livelihoods of Bangladeshi people, especially the rural poor living around floodplain beels, are largely dependent on diversified floodplain resources. Their nutrition, incomes and other day-to-day needs are fulfilled by the nearby floodplain beels. Semi-natural diverse floodplains are highly productive ecosystems providing important benefits that exceed the productivity of intensive agricultural systems. The economic value of Hail Haor wetland has been estimated to be over Tk. 40,000/ha/y as opposed to Tk. 18,000/ha/y for boro rice fields. These benefit sometimes described as 'goods and services', include the functions of ground water recharge, pollution abatement and soil fertility. Wetland products include fish, fuel wood, wild plants for food, medicine, thatching, and fodder. Wetlands are also an important aesthetic component of the landscape. Floodplains have many other uses and benefits that are essential to communities, and to industrial and agricultural activities. Studies reveal that 4 out of every 5 rural households are dependent on various wetland products for their livelihoods to varying degrees.

Thus floodplains are multiple resource systems with many different types of users and stakeholders.

Poor households still receive more than 50% of the direct benefits and share many of the remaining benefits from wetlands

Integrated floodplain management (IFM) options can be a better solution for sustainable production and secure rural livelihoods in Bangladesh. IFM options better ensure the production systems, peoples' access and use of resources, as well as the ecological integrity of floodplains.



Diversity of floodplain resources

Putting research knowledge into practice

What are the Systems Problems in Floodplain Management?

Present human practices concerning harvesting and utilizing floodplain resource systems result in:

Over Fishing

Over and destructive fishing causes loss of brood fish and limits natural recruitment, as a result fish stocks and production decline in the open water bodies.

Obstruction of Fish Migration

Construction of embankments and regulators cuts off wetlands from the larger floodplain-river system to produce rice safely. The conversion of wetland to farmland obstructs fish migration, destroys biodiversity and finally reduces fisheries productivity.

Increased Boro Rice Area

Irrigated dry season rice cultivation in the floodplains has many effects. Firstly, a tendency to drain out water as early as possible; secondly, it uses remaining surface water for irrigation; finally, farmers delay the entry of river water in beels to protect rice before harvest. All these activities make the wetland more vulnerable, its products and benefits reduced, and ultimately encroachment and loss of wetlands takes place.

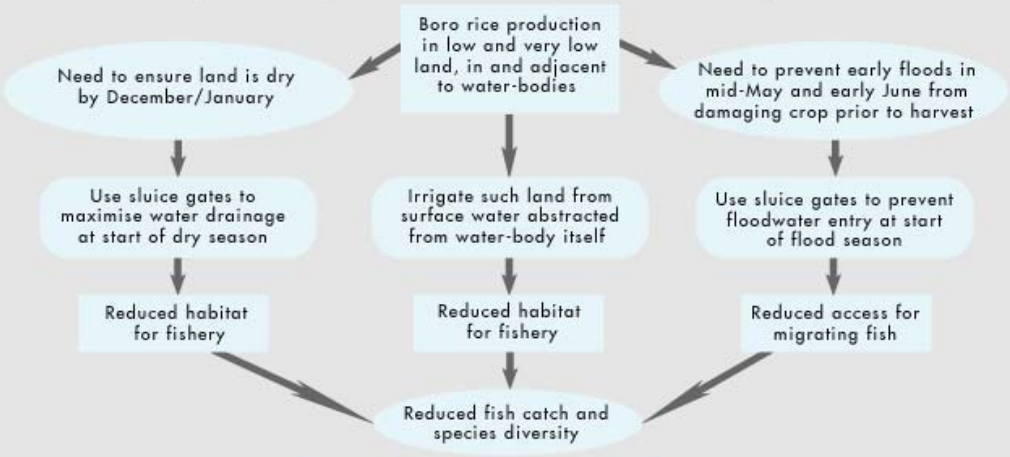
Siltation

Due to high rates of siltation many wetlands have been losing their depth - decreasing dry season water retention, connectivity and ultimately the whole system is being degraded. The causes are largely human activities beyond the wetlands.

Watershed Degradation

Though outside the wetlands, still unsustainable activities in the hills create a catastrophic impact on wetlands. The issues are inappropriate and unsustainable cultivation in the hill slopes, degraded riparian and hilly vegetation resulting in landslides, soil erosion and pollution.

The systems implications of lowland boro rice production



Recommended Systems Solutions

- **Cropping pattern management:** Reduce dry season water use, ensure adequate water for fish production;
- **Modified sluice gate management:** Allow required water flows for fish at critical times;
- **Fishing effort control:** Reduce fishing pressure and stop destructive fishing;
- **Land retirement:** Leave very low lands in beel basins for fishery;
- **Habitat rehabilitation:** Excavation to maintain required volume of water in the dry season for over wintering fish, as well as to reestablish connectivity between floodplains beels and rivers;
- **Reintroduction of locally threatened species:** Reestablish and ensure availability of locally lost fish species;
- **Watershed management:** Sustainable landuse (soil conservation and tree planting) in watershed to reduce siltation while ensuring more water in wetlands.

Why Cropping Pattern Management?

- Boro rice is a water hungry crop - it requires 10,000 cubic meters of water to irrigate a one hectare boro field per season;
- It requires early drainage of wetlands in the post-monsoon and to prevent early flooding in the pre-monsoon, both adversely affect fisheries;
- In many places wheat, maize, potato, onion, garlic, and other rabi crops with less water needs are attractive alternatives for low and medium-high land instead of boro rice cultivation;
- Dry season water area can be substantially increased by adopting cultivation of alternative rabi crops;
- Fisheries gain is substantial from increased dry season water extent.

Water requirement of boro rice and possible alternative rabi crops

Rabi crop	Irrigation water demand (mm)
HYV Boro	835
Wheat	200
Maize	240
Brinjal	320
Onion	175
Potato	190
Garlic	150

Source: Biswas and Mandal (1993) see Shankar (2002)

Why Modified Sluice Gate Management?

- Allowing entry of water in the early monsoon to facilitate fish migration;
- Retaining more water in the late monsoon to facilitate fish growth.

To be effective this requires:

- Agreements not to catch fish migrating through sluice gates;
- Adoption of short duration dry season boro rice varieties;
- Representation of fishers in regulator/sluice gate management committees.

Growth duration and yield of some important boro varieties

Variety	Growth duration (days)	Yield (t/ha)
BR 28	140	5.8
BR 36	140	5.5
BR 26	145	5.8
BR 14	160	6.0
BR 29	160	6.5
BR 11	165	6.0
BR 16	165	6.0
IR 8	170	5.5

Sources: Jashim and Chowdhury (2001); Salam (1992), FAP 20 (2000), BRRI (1997) see Shankar (2002)

Why Land Retirement Management?

- Boro crops in very low land (beel bottoms) are at high risk of flood damage due to early rains/flash flood;
- Rice yield is poor in very low land compared to low and medium-high lands;
- Rice in very low land also demands irrigation which often comes from surface sources, further reducing dry season fish habitat;
- Instead of rice, very low land can be left for fish, aquatic plants, and to maintain a minimum water extent.

Why Reintroduction of Threatened Species?

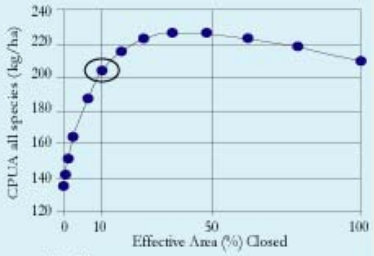
- Enhance biodiversity and total fish production for the benefit of ecosystems and local communities;
- Reintroduction of lost fish species into their old locations can result in successful reestablishment when coupled with restoration of habitat, sanctuaries, fishing norms that protect fish at vulnerable times.

Why Habitat Rehabilitation?

- Both natural and fishing mortality is high in the dry season as most parts of floodplain wetlands become dry by then;
- Excavation to maintain required volume of water in wetlands in the dry season to protect the parent stock of fish in situ, this is the key for sustenance of floodplain (fish) productivity through natural recruitment;
- Reestablish connectivity between river and floodplain beels to ensure timely migration of fish to their desired habitats for performing various biological functions (viz. spawning, nursing, feeding and growth);
- Habitat rehabilitation is a proven intervention that positively contributed to increased floodplain fisheries productivity and biodiversity.

What are Fishing Effort Controls?

- **Closed area:** declare certain areas that retain water year round as no fishing zones - fish sanctuary; keeping 30-40% of dry season water area as sanctuary produces the best result but 10% of dry season water area is sufficient to sustain fisheries production;
- **Closed period:** declare a certain period (days, weeks, months) for no fishing of dry season water. Usually 1-2 months in the early monsoon is enough for protecting the parent fish when breeding;
- **Selective gear restriction:** identify and restrict certain gears (e.g., moshari jal, current jal) which target small fish - can be for a certain period or in certain locations;
- **Ban destructive fishing:** stop or reduce fishing by complete dewatering and barriers that completely block migration routes.



10% of dry season water area as sanctuary can increase fish production by 50% Source: FIRDP, MRAG

Why Watershed Management?

- Degraded watersheds are causing soil erosion and filling the wetlands rapidly, as a result, wetlands are loosing habitats for fish and other aquatic resources;
- Introduction of sustainable cultivation practices (contour cultivation in hill sides, crop diversification) in watersheds can substantially reduce the rate of siltation, protect fertile top soil, and ensure long-term sustenance of wetlands and their productivity;
- Planting trees and hedges along rivers and streams can ensure bank protection, reduce siltation and act as a wildlife corridor to enhance and maintain biodiversity.

Sustainable resource use: diversified rabi crops, water saving, fish reserves, fishing effort controls and balanced production of fish and crops

References and Further Reading

Barr, J. J. F. 2000. Investigation of livelihood strategies and resource use patterns in floodplain production systems in Bangladesh. Project R6756 final technical report to DFID-NRSP.

CNRS, 1999. Community-based Fisheries Management and Habitat Restoration Project, phase-1 completion report.

de Graaf, G. J., Born, B., Uddin, K.A., and Marttin, F. 2001. Floods, fish and fishermen. Dhaka: The University Press.

Halls, A. S., Kirkwood, G. and Payne, A.I. 2001 A dynamic pool model for floodplain-River fisheries, unpublished manuscript.

Halls, A. S. 1998. Impact of flood control schemes on river fish migrations and assemblages in Bangladesh. Journal of Fish Biology 53:358-380.

Hoggarth, D. D., Halls, A.S. 1997. Final Report: Fisheries dynamics of modified floodplains in southern Asia: Project R5953 ODA.

IUCN. 1993. Freshwater wetlands in Bangladesh: Issues and approaches for management. Dhaka: IUCN.

Ministry of Water Resources, 2000. National Water Plan. Dhaka: Water Resources Planning Organization.

Shankar, B. 2002. Final Report: Maximization of Joint Benefits from Multiple Resource Use in Bangladesh Floodplain, Project R7868 NRSP, DFID.

Soussan, J. 2000. Final Report: Sustainable Local Water Resource Management in Bangladesh - Meeting Needs and Resolving Conflicts - Project R6755 NRSP-DFID

Tsai, C.-F., and Youssouf Ali, M. 1997. Open water Fisheries of Bangladesh, Dhaka: University Press Ltd.

This policy brief is prepared based on research findings of various projects aiming at improved floodplain resources management.

NRSP www.nrsp.co.uk | IIAD www.iiad.com | MRAG www.mragltd.com | WorldFish CENTER www.worldfishcenter.org | CNRS www.cnrs-bd.org

Further Information

Center for Natural Resource Studies (CNRS)
House 14 (2nd floor), Road 13/C, Block-E, Banani, Dhaka-1213
Tel: 9886514, Fax: 88-02-9886700
Email: cnrs@dominox.com, Web: www.cnrs-bd.org

Plan & Design: CNRS Resource Unit

This publication is an output from a project funded by the UK Department for International Development (DFID) for the benefit of developing countries. The views expressed are not necessarily those of DFID.