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Management of flood control, drainage and irrigation (FCDI) sluice gates

SUMMARY:
Many floodplains have been compartmentalized to give more control over water for rice growing. This in turn has restricted access to fish, which would normally contribute significantly to resources available to poor communities. Sluice gates are used to control water in the compartments. An improved regime for the operation of sluice gates, for the mutual benefits of fish and rice is devised for Bangladesh and described as a guideline. This method can be replicated in other modified floodplains. It is important to involve the farmers in this regime and ensure that decisions are made by common agreement. In some areas this might be more difficult to achieve than in others.

KEYWORDS:
Floodplains [1]
fisheries [2]
Fishery management [3]
Rice [4]
water management [5]

CATEGORY:
Fishery & aquaculture [6]

COUNTRIES:
Bangladesh

DESCRIPTION:

Introduction

Most people living on floodplains in Bangladesh fish at some point in the year. At least 75 percent of the floodplain catch is taken by occasional or part-time fishers as a supplementary activity to rice farming. Over 40 percent of the Bangladesh floodplain has been modified and compartmentalized in order to give more complete control over water for rice growing upon which the country depends. In doing so, access to fish, which would normally contribute significantly to the resources available to poor people on the floodplains, is restricted.

Improved water management

The dynamics and timing of the discharge from sluice gates controlling water in the compartments in relation to migratory behaviour of the fish are understood. Therefore, a regime for the operation of the sluice gates for the mutual benefits of fish and rice can be devised. As a result the natural stocks within the compartments are enhanced. The options for the regime were introduced to the local committee controlling the sluice gates who were involved in the study and whose priorities and decision-making processes also need to be understood and factored into the regime. Ultimately, the access of poor full-time and part-time fishers to fish on the floodplains is increased and assured, with more commercial and nutritional options, whilst rice production is unimpaired or even increased by 5?10 percent as indicated by successful rice/fish culture developments. There is also a generic usefulness of the technical data that transcends the immediate social and institutional context and could contribute to development in other modified floodplains, e.g. the Mekong in Asia and the La Plata or Amazon in South America. In order to develop an area-specific regime the following steps can be taken to improve the understanding of the effects of using sluice gates:

1. Water management and hydraulic investigation ? Firstly, hydraulic operations associated with sluice gates need to be assessed over an annual cycle in order to determine the purpose of each water exchange in relation to rice growing and how this compares with seasonal movements of fish.
2. Fish and fishery observations ? Record movement of major fish species in the vicinity of active sluice gates using catch monitoring and mark-recapture techniques, to determine how recruitment of adult fish to compartments can be enhanced by alterations in sluice gate operations and design.
3. Examination of fisher/farmer livelihood choices in relation to water management ? A community-based participatory research approach can be used to examine patterns of fishing and rice growing inside and outside compartments in order to determine relative dependency on agriculture and fisheries. Existing decision-making mechanisms related to sluice gate operation need to be investigated and methods of improvement and incorporation of findings into the decision making process assessed.

Guidelines
Guidelines are available for development of a procedure for the optimal operation of sluice gates. These guidelines take account of both the need for irrigation water and the requirements of the fisheries, and seek to integrate the two. The guidelines aim to achieve uptake of best practice procedures by local communities via promotion to intermediary NGOs and government agencies.

The guidelines describe:

- When to operate sluice gates
- How to operate sluice gates:
    - maximize the flow of water (volume of water per unit time) into the flood control scheme during the rising flood period
    - maximize the frequency of gate openings
    - minimize the turbulence of water outside the gate
    - ensure that ebb flow velocities do not exceed the maximum sustainable swimming capacities of fish
    - try to create ebb flows that attract the most fish to towards the sluice gate
    - control fishing activities along channels connecting the gate to the main rivers.
- Institutional, economic and social issues

Further reading
For more information see theProject Summary document[7], and Technical Reports for projectR8210[8] andR8486[9]. For additional information see the reports on 'Fisheries Assessment and Data Collection Methodologies', by (HALLS 2003[10]), the 'Final Sociological Report' by (BCAS & IIED 2005[11]), and Methodologies for Understanding Institutional, Economic and Social Aspects of Sluice Gate Management' by (BCAS & IIED 2003[12]). To view summarised guidelines,click here[13].

IIED (2005). The Use of Sluice Gates for Stock Enhancement and Diversification of Livelihoods. DFID Fisheries Management Science Programme, Final Technical Report, Project R8210. International Institute for Environment and Development (IIED).
IIED, BCAS & MRAG (2004)**.** The Use of Sluice Gates for Stock Enhancement and Diversification of Livelihoods. DFID Fisheries Management Science Programme, Project Summary, R8210. Bangladesh Centre for Advanced Studies (BCAS), the International Institute for Environment and Development (IIED) and Marine Resources Assessment Group Ltd, London, UK.

BCAS & IIED (2005)**.** The Use of Sluice Gates for Stock Enhancement and Diversification of Livelihoods. Final Sociological Report. Bangladesh Centre for Advanced Studies (BCAS) and the International Institute for Environment and Development (IIED).

HOGGARTH, D.D. and HUQ, S. (2005) Promotion of FMSP guidelines for floodplain fisheries management and sluice gate control, DFID Fisheries Management Science Programme, Final Technical Report, Project R8486. Scales Inc, Barbados.

HALLS, A.S. (2005). Flood control impacts on fisheries: guidelines for mitigation. PowerPoint presentation. Aquae Sulis Ltd (ASL), UK.

HALLS, A.S. (2003). Fisheries Assessment and Data Collection Methodologies. Marine Resources Assessment Group Ltd, London, UK. View (398Kb) Report.

BCAS and IIED (2003). Methodologies for Understanding Institutional, Economic and Social Aspects of Sluice Gate Management. Bangladesh Centre for Advanced Studies (BCAS) and the International Institute for Environment and Development (IIED).

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Evidence of validation
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http://www.fmsp.org.uk [16].

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