

R6383 Project Final Technical Report

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| Title of Project | Preliminary Investigation of Agricultural Diversification and Farmers' Practices in Bangladesh Floodplain Production Systems Involving Rice-Fish Production - a Whole Farm System Approach. | |
| R Number | R6383 | |
| RNRRS Programme | Natural Resources Systems Programme | |
| RNRRS Production System | Land/Water Interface | |
| Commodity Base | Rice, Fish | |
| Geographic Focus | Bangladesh Floodplains | |

This report is supplementary to the Project Research Report previously submitted, which forms the main report on this project. In a preliminary project of this nature, run over a short period, and with only one substantial output (the Project Research Report), a synthesising report is not necessary. This Final Technical Report is thus a brief summary report.

1. Executive Summary

This project responded to concerns expressed at a LWI planning meeting, in RNRRS, by the ODA NR country strategy for Bangladesh, and in GoB planning documents. The project undertook to:

- characterise the whole farm system and its resource base from contrasting floodplain sites
- develop a conceptual model of livelihood strategies of floodplain producers reliant on rice and fish
- identify major constraints to the productivity of these floodplain production systems

These objectives were principally achieved through a group of six field studies of different floodplain production systems, undertaken by teams of local researchers from Universities, NGOs, NARCs and ODA development projects. The collaborators were selected using a competitive proposal system. The field studies used a range of participatory techniques and questionnaires to characterise the systems and elucidate those constraints of concern to the producers. These field studies were linked to an initial briefing workshop and a final meeting for the presentation of results and discussion groups. Desk studies on rice-fish systems were commissioned to complement the field work.

The characterisation and problem definitions have been published in a report on the final workshop. This is combined, in the Project Research Report, with an analysis of the research, including a generalised conceptual model of floodplain production systems, and a series of recommendations for further research. This follow-up research will develop a strategy for more sustainable and stable production systems for small and marginal floodplain producers. It will address, in a systems manner, their main concerns over declining production from aquatic and terrestrial resources, which are: problems associated with biomass shortage, problems of water management, and loss of biodiversity in the production system.

2. Background

Floodplain resources are fundamental to the livelihoods of the majority of Bangladeshis. Floodplains and deltas make up 80% of the land area, and monsoon flooding inundates 64% of net cultivable land. Bangladesh is still a primarily rural country, and of the current population

(in excess of 111 million), 79.9% are rural dwellers, and 68.5% are employed in the agricultural sector. However over 40% are classed as functionally landless, having access to less than 0.2 ha for cultivation, and thus have distinct problems securing an agriculturally based livelihood. These people have traditionally depended on fishing in common access areas, but there is a declining trend in production from fisheries. Supply has dropped from 11kg/capita/annum in 1970 to 7.5 kg/capita/annum.

The decline in fisheries is attributable to two main factors, the increasing pressure on terrestrial resources forcing more people to rely on fishing, and the impact of flood control measures reducing habitats and blocking migration routes. Flood control has been strongly promoted on the basis of providing a more secure agriculture, and in this it has largely succeeded, Bangladesh now being self-sufficient in food grains. However this has been achieved at the expense of a diverse system of production. Agriculture has become increasingly dominated by monocrop rice, particularly high yielding varieties. The importance of productive rice systems in the rural economy is recognised but this narrow production base faces a number of problems. These include the inability of small farmers to purchase necessary inputs due to supply and credit constraints, loss of biodiversity, increased risk, modification of the floodplain for rice production at the expense of fish, and reduction of production opportunities for the landless and rural poor. These constraints may be addressed by integration and diversification of production systems, particularly for marginal producers who rely on a balance of terrestrial and aquatic resources. It is providing a framework for addressing these constraints that this project has aimed to provide.

Previous work in the NR sector has primarily centered on either terrestrial or aquatic resources, rather than taking an integrated approach. Programmes of the NARS are commodity focused - rice research, fish research, vegetable research, with only a few notable forays into intensive rice-fish systems at Fisheries Research Institute and Bangladesh Rice Research Institute. The Flood Action Plan (FAP) studies have taken a single resource perspective (FAP 12 - agriculture, FAP 17 - fisheries). The most holistic approaches have come from ICLARM, with their bio-resource flow modelling in integrated agriculture-aquaculture systems (but not open floodplain).

Demand for this project stems initially from needs identified by the ODA Natural Resources and Fisheries Advisers in the Aid Management Office, Dhaka (AMOD). This demand is articulated in two ways. The problems that constrain the management and/or development of the renewable natural resources sector in Bangladesh, and would be amenable to research solutions, are presented in the Renewable Natural Resources Research Strategy (RNRRS) of ODA, in this, ecology and efficiency of rice/fish integrated systems, opportunities for crop diversification, and cropping systems are listed as priority concerns. Secondly, this need is expressed in the ODA Country Strategy Paper for Natural Resources in Bangladesh. This states that areas of high priority are support to integrated development of the whole farm system, especially where this integrates land and water based activities. It does however stress the need to avoid "quick-fix" approaches, thereby indicating the need to incorporate also the socio-economic factors affecting floodplain dwellers. This demand is also reflected in the Government of Bangladesh Fourth Five Year Plan, and by Bangladesh Agricultural Research Council (BARC) in a position paper for floodplains agriculture, which give as objectives the need for better and more balanced utilisation of aquatic and terrestrial resources.

At the Land/Water Interface Planning Workshop in 1995 (LWI, 1995), it was agreed that there was a need for a short-term, preliminary study that should focus broadly on rice/fish co-production systems on Bangladesh floodplains and incorporate elements on crop diversification and farm management strategies for systems on the floodplain. The studies in this project aim to address directly this identified need for a preliminary study.

3. Project Purpose

The project objective was to develop an holistic understanding of the whole farm system associated with various floodplain production strategies based on broadly-defined rice-fish systems, and elucidate and prioritise key researchable constraints within the system.

It was considered necessary, as agreed at the LWI planning workshop, to characterise and develop a better understanding of whole Floodplains systems prior to undertaking more narrowly focused research with the aim of improving the production system. The studies in this report aim to make a significant contribution to this.

4. Research Activities

Activities within this project may be grouped into four categories: inception and identification of sites and collaborators, workshops, field studies, and desk studies.

4.1 *Inception and identification of sites and collaborators*

A project inception mission was undertaken in September/October 1995. This involved wide-ranging consultations in order to refine the areas of demand for floodplain research as conceived by donors, researchers, NGOs, managers and planners. The objectives of the visit included:

- Review local institutional capacity for systems research.
- Develop new collaborative links with research partners and target institutes, and strengthen existing ones.
- * Expand dialogue with AMOD and establish links with BAFRU.
- Visit on-going NR sectoral projects.
- Appraise potential project sites and floodplain issues of interest.
- Develop a strategy for appraisal of natural resources and livelihood strategies on floodplain sites.
- Identify potential collaborators from institutions such as Universities, NGOs, development projects and governmental research institutes to undertake studies on floodplain sites of interest using multidisciplinary teams.
- Collect literature and other information on Bangladesh floodplain production systems

A strongly participatory strategy for resource assessment and appraisal of livelihood systems was developed, with close collaboration from Professor Zuberi (Rajshahi University), the principal local collaborator. This strategy was participatory at the grass-root level **in** order to identify demand at this level, in addition to the researcher and planner levels. It was also participatory in that it involved a large and diverse range of Bangladeshi researchers from different institutions. The strategy involved a series of field studies on floodplain sites of interest, undertaken by local teams, an accompanying group of more narrowly defined literature reviews, and workshops to co-ordinate these studies.

Much attention was paid to the selection of field teams, an activity that became a larger focus than originally proposed, but one that yielded worthwhile results. A number of factors led the UK-based team to consider that, despite having existing collaborative links with a number of institutes, it would be most beneficial for the study to investigate the possibility of collaborating with as wide a range of institutions as possible. Initial contacts were made with a long list of institutes with potential to carry out participatory field studies with the project. Those where there was positive feedback during initial contact, and where there was felt to be the ability to undertake demand-led systems-oriented research, were given a briefing document

and asked to submit an appropriate proposal detailing how they would conduct the field study. Seventeen proposals were invited. From the proposals that were submitted, six were chosen, and these teams executed the studies, reported in the Project Research Report. Thus a three stage selection procedure was employed, whereby a short list of the better or more appropriate institutions who had a clear understanding of the land/water interface issues, and those with the ability to respond to new research initiatives was first identified through discussion and consultation. The competitive proposal-bid mechanism further refined down the list of potential research collaborators, since only those genuinely interested in this research submitted a proposal. Finally the teams with the best quality research proposals were selected.

By utilising this mechanism, the potential research collaborators were exposed to some of the rigours of competing for funds and responding to strategic initiatives that will inevitably become a feature of the funding process in Bangladesh. The teams selected were from Farming Systems and Environmental Studies, Bangladesh Agricultural University; Rice Farming Systems Division, Bangladesh Rice Research Institute; ODA Northwest Aquaculture Development Project; BARI Regional Agricultural Research Station, Ishurdi; Centre for Environmental Research, University of Rajshahi; Social Development Project, Rajshahi; and Intermediate Technology Bangladesh. Universities, NGOs, NARCs and ODA development projects were represented, creating a strong set of linkages and some new working relationships between institutions. A wide range of expertise and experience was as represented.

4.2 *Field studies*

The field studies undertaken by these teams aimed to characterise the livelihood systems and its resource base from contrasting sites and identify major production systems constraints, thereby directly addressing project Outputs 2 and 4. The sites themselves were selected on the basis of review of literature, analysis of the physical resource base of Bangladesh as a whole, and consultation with various floodplain stakeholders. Three principal topics of concern were identified: impacts and management of flood control schemes, production systems in natural water bodies, and introduced rice-fish technologies. The six studies were grouped around these concerns:

Flood Control Schemes:

- Flood control scheme (FCD/1¹) at Pabna
- Previously inundated area of *Heel*² Dakatia

Natural Water Bodies:

- + Mohanpur *Beel* on the unregulated floodplain, near Rajshahi
- Hamidpur *Baor*³ and its environs

Intensive Rice-Fish Systems:

- Simultaneous rice-fish system (INTERFISH) near Saidpur
- Alternate rice-fish system *in baid* waterbodies, near Mymensingh

Although these are the focus topics, the objective of the field studies was to characterise the whole farm system or livelihood strategy associated with these areas and issues. These topics stretched the scope of the project wider than had originally been conceived. Originally the project was more narrowly directed towards 'rice-fish'. It rapidly became apparent that 'rice-

Oxbow lake (generally perennially flooded), and with a connection to the river for at least some part of the year.

¹Flood Control & Drainage and/or Irrigation - type of flood control scheme

²Natural depression in the floodplain, perennially, or nearly perennially flooded

³

fish' was conceived of in Bangladesh as a rather narrow set of rice-cum-aquaculture technologies, and this did not reflect the holistic approach of studying complete livelihood systems, desired by the project researchers. Nor did it reflect the range of traditional rice-fish combinations practised on the floodplain.

The teams were directed in the 'invitation to submit a proposal' document to undertake the field study in a participatory mode, though the precise choice of field methods was left open to the teams. This allowed an appraisal of the effectiveness of different methodologies for this type of research, and of the teams' ability to apply them. The majority of teams used an approach of PRA plus questionnaire. The PRA techniques used a variety of diagramming, discussion and farm walk methods, and produced useful results. Questionnaires were of variable length, with the longest finding problems of respondent fatigue. Teams had problems analysing data from the questionnaires into a digestible format, but overall the field studies met their objectives, particularly when assessed as a group, since each had strengths and weaknesses.

4.3 Workshops

The project held two workshops in Dhaka. The first, over two days in November 1995, was for the selected field teams, prior to commencing the field work. They were further briefed about the project and its anticipated outcomes. It served as a forum 20 participants from the teams to discuss and refine the proposed field studies, and examine in greater depth the methodologies to be used in participatory resource appraisals with farmers. The workshop spent one of the two days on PRA training with a specialist PRA trainer from the Bangladesh NGO PromPT.

The second workshop, held in May 1996, was the final activity of the project. It was the forum for the field teams to present and discuss the results of their studies. The objectives were to:

- report on the field studies
- form working groups on:
 - methodologies for farmer participatory research in Bangladesh
 - defining floodplain systems
 - systems constraints identified in the six studies
- identify those constraints common across the six systems, which would serve as the focus for further, in-depth research.

4.4 Desk studies

A series of desk studies were commissioned from Bangladesh partners to complement the field work. These desk studies aimed to review activities relating to integrated rice-fish production in the fields of research, extension and planning, and the impact of these activities.

5. Outputs

The anticipated outputs, as proposed in the project Logical Framework were:

- A review of published information and currently available data **on** floodplain production systems, based on rice-fish.
- Characterisation of the total farming system and its resource-base from contrasting sites on the floodplain, primarily employing using participatory data collection.
- An outline conceptual model of livelihood strategies of marginal and landless producers on the floodplain.
- A summary report on the major constraints to productivity in the system, with proposals for further systems-based research and links with other project and programme activity.
- Dissemination in different forms, together with an in-country seminar/workshop **in** concert with collaborating institutes. Active promotion of research products to target institutes.

These outputs were achieved by the project. The culmination of the project in a final workshop resulted in four of the five outputs being completed together. The field studies, undertaken between November 1995 and March 1996, and the combined presentations at the workshop achieved Output 2. An analysis of the field studies, presented in the Project Research Report, yield a generalised conceptual model of livelihood strategies (Output 3). The working groups and plenary session at the May workshop were able to identify the main production system constraints, and these were summarised in the Project Research Report. The report contains proposals for addressing these constraints with further systems-based research, and a research proposal which takes these constraints as its core issues has been submitted to the Land/Water Interface for funding (Output 4). The project has generated a further research proposal, submitted to the Socio-Economic Methodologies programme. As noted in section 4.4, desk studies on rice-fish have been undertaken. The three better studies meet the objectives of producing a review of rice-fish information and data in Bangladesh (Output 1). Output 5 has been achieved through various activities, including the May workshop, the presence of observers from key institutions at the workshop, and the planned circulation of the Project Research Report to these and other institution in Bangladesh and the UK.

The full list of project outputs and products is:

- LWI Bangladesh floodplains briefing document and invitation to Bangladesh research teams to submit a proposal for a field study.
- Report on one month project inception visit to Bangladesh by multidisciplinary team.
- Presentation materials for the briefing workshop in Dhaka in November 1995.
- Seminar for Centre for Land Use and Water Resources Research / Land/Water Interface research seminar series.
- Paper for LWI annual internal review workshop.
- Desk studies on research and extension for rice-fish production in Bangladesh.
- Combined final workshop report and report on field studies. Report also contains an outline conceptual model of floodplain livelihood systems, an analysis of the major constraints common in floodplain production systems and summary of research needed to tackle these constraints.
- Concept note and RD1 for research to address priority constraints identified by the project.
- Concept note and RD 1 for research to develop methodology for incorporating indigenous' knowledge into natural resources research, using floodplains production systems research as it basis.

6. Contribution of Outputs

The project was planned as a preliminary study with the objective of developing an understanding of the whole farm production systems on the floodplain, and elucidating and prioritising researchable constraints within the systems. The outputs have achieved this. They have contributed to ODA's development goals for the sector by providing a solid foundation from which further research can develop more sustainable production systems for small and marginal farmers and the landless on Bangladesh floodplains, and more diverse systems that are better able to cope with environmental variation and instability. Taking the terminology of Kolb's experiential learning cycle, and Checkland's soft systems methodology, this project has largely been a phase of concrete experience and reflective observation, culminating with abstract conceptualisation. It has perceived a problem, described a situation, defined transformations required and developed models. A phase of assimilation and acquisition of experienced-based knowledge. This has generated the insight and understanding to avoid a

poorly adapted or 'quick-fix' solution in further research. This further research would rapidly progress to an active experimentation mode.

The outputs contribute to both RNRRS and AMOD goals by taking a systems approach and addressing issues of multi-resource use, and promoting them in the Bangladesh research community, thereby building institutional capacity. Over the comparatively **short** life of the project, widespread dissemination of research findings has not been possible. The research was only presented and analysed at the end of the project. The aim is to now disseminate the results outside the direct group of researchers, and to produce a synopsis of the work suitable for journal publication and conference presentation.

The project has established promotion pathways for its outputs, and these are largely by direct contact to the target institutes, particularly the research institutes and NGOs it has collaborated with. Other promotion pathways have been identified any further research, to ensure research products impact at the resource user level. These pathways involve target institutes such as the well networked NGO Bangladesh Centre for Advanced Studies, ICLARM, and mechanisms such as the District Extension Programming Committees.

Further research has been understood to be necessary since the planning stages of this project. This project has enabled the researchers to define, in concert with a range of stakeholders, what that research should be. This follow-up research will develop a strategy for more sustainable and stable production systems for small and marginal floodplain producers that addresses, in a systems manner, their main concerns over declining production from aquatic and terrestrial resources due to problems associated with biomass shortage, problems of water management, and loss of biodiversity in the production system.