Integration of Aquaculture into the Farming Systems in India

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Sustainable Development Goals
No poverty, zero hunger, life below water

Summary
India’s growing population represents 40 percent of the world’s absolute poor. Its agricultural sector accounts for nearly one third of the country’s GDP and occupies two thirds of the workforce. With an increasing food demand and some of its regions, like the eastern plateau region, receiving very little rainfall, aquaculture has been very limited in meeting these challenges. Aquaculture research has not yet adequately addressed the needs of smallholder farmers in rain-fed areas of India, ranging from problems with development and dissemination of aquaculture technological innovation as well as ignoring the multipurpose nature of most surface water bodies and concentrated on systems, excluding other water uses and users. Yet aquaculture has so much potential to support the livelihoods of poor people through improved food security and income generation. Trials with small groups within communities in Eastern India have allowed for improved knowledge on aquaculture, more control over management and increased revenue and food security. Including it in a programme of farming systems technology development in Eastern India, which contains other on- and off-farm activities, have allowed for an improved and more accessible usage of the practice as well as creating a platform for improving the policy-making process on aquaculture. More details can be found on the potential of aquaculture as well as its outcomes and its role in enhancing development impact.

Description
Estimates place India’s population between 1 000 million and 1 100 million, growing annually at 2 percent. With per capita GNP at around USD 300, India has nearly 30 percent of the population of the world’s low-income countries and 40 percent of the world’s absolute poor. The Eastern Plateau region, comprising the rainfed areas of Orissa, Bihar and West Bengal, is characterised by poverty and inequality, land alienation and seasonal migration. The castes and tribes targeted by the project are amongst the poorest communities in India. Agriculture and associated sub-sectors account for nearly one third of GDP and occupy two thirds of the workforce.

India’s demand for food is expected to rise by two-and-a-half fold in the next 30 to 40 years. Increased output from large-scale irrigated areas will not meet India’s food needs and rain-fed farming systems (70 percent of India’s agriculture), which currently produce little more than 40 years ago, will have to contribute significantly.
The eastern plateau region of India is characterised by a short rainy season, limited water storage capacity and a prolonged dry season. Farming systems provide only one rice crop per year. Aquaculture is limited to extensive stocking of fry, mainly in perennial water bodies, with no management practised. The rural population of the plateau region consists mainly of Scheduled Caste and Scheduled Tribes, who can be categorised as deficient, sufficient or surplus.

1. Potential for aquaculture

Where fish forms an important part of the diet, perennial watercourses, springs and/or small-scale surface or groundwater (shallow tube-well) irrigation can be identified as High Potential Systems. These systems represent opportunities for enhancing fish production in such rain-fed areas. The target population has non-exclusive access to both perennial and seasonal surface- and groundwater sources. Typically, a village of 50 families would contain one communal, perennial pond, a communal well (generally perennial) and a few seasonal ponds - again mostly communal, although some are individually owned, but not utilised.

Support for aquaculture in India comes from a number of sources. These include the national and local line agencies, the Departments of Fisheries (DoF), aquaculture support schemes, NGOs and the research and development efforts of the Indian Council for Agriculture Research (ICAR) fisheries institutes and the research of a number of academic departments. However, the aquaculture research needs of smallholder farmers in rain-fed areas of India have not yet been adequately addressed by national research institutions. There is currently little evidence of uptake or farmer participation in the development and execution of research towards intensification and diversification of production.

The Government of India and the state governments are aware of the potential of aquaculture to support the livelihoods of poor people through improved food security and income generation. In addition, they are aware of the need to empower local communities, including disadvantaged groups such as Scheduled Tribes, to manage their own affairs and attain the ownership and sustainable management of their natural resources, including water and fish resources. However, there are important constraints to research, extension and development of aquaculture for poor farm families. Almost all national research and development support available for aquaculture promotes large-scale capital-intensive systems, which require high levels of inputs and aim to maximise production. Both DoF and NGO aquaculture development initiatives tend to make use of research conducted on-station, which is dependent on off-farm inputs and access to perennial water.

The recommendations developed have largely ignored the multipurpose nature of most surface water bodies and concentrated on systems excluding other water uses and users. Problems with the process of developing and disseminating aquaculture technological innovation in India, have been widely recognised since the early 1990s, farmers do not achieve expected yields and there is little consideration given to farmers’ circumstances, their socio-economic context and resource-use priorities. DoF initiatives such as preferential leasing of Panchayat water bodies to tribals and the provision of 50 to 100 percent subsidies for prescribed aquaculture and fisheries interventions,
respectively, are attempts to support aquaculture development for poor groups.

However, farmers can find they have little choice in the aquaculture system they employ, little control over the supply of inputs, the date of harvest, the nature of loan or repayment schedule. Many have no previous knowledge or experience of fish production and receive negligible extension support. Aquaculture was therefore included in a programme of farming systems technology development in Eastern India (EIRFP), which contained cropping systems, agroforestry, soil and water conservation, irrigation, livestock management, and other on- and off-farm activities. Because of the inappropriateness of the aquaculture messages extended to farmers in the area, where aquaculture is extended at all, it was felt necessary to research aquaculture methods suitable for the resource-poor farmers of the rain-fed plateau region. In conjunction with farmers, the research team identified key research requirements within the rain-fed area of the plateau region of eastern India.

2. Outcomes

Trials with small groups within communities demonstrated strong interest in aquaculture by farmers in the project area, especially in the use of under-utilised community seasonal ponds. The adoption of group-based aquaculture in the project area proved significant, with 57 percent of all farm groups within the EIRFP conducting managed aquaculture by the end of the project.

The concept of staged fish production i.e. the production of various stages of fish locally (hatchlings, fry, fingerlings), apart from food fish was also trialled with groups. This demonstrated that decentralised fish seed production was possible and could meet a variety of needs. It also suggested that linkages with current private sector seed networks could be strengthened to benefit a wider range of stakeholders and improve the sustainability of the approach.

New varieties of fish were also evaluated in community seasonal ponds and were demonstrated to complement current strains and species. The project also addressed issues of dissemination, having proposed and tested several costed techniques, including bulletins and drama (including “The Pond of the Little Fish”, a video of a street play - see below under References for contact details). The development of some of these would complement the organic spread of the aquaculture message already observed in villages, especially where farmers produce intermediate stages of fish.

For further information on this work see the technical report by (Immink and Little 2000; Lawrence, et al. 1999).

2.1 Enhancing development impact

The approaches piloted in Eastern India, through DFID NRSP projects R6759 and R8100 (See in 6. Further reading) aim to improve service provision for farmers involving building social capital and participation in technology research and policy development. The awareness of these approaches coincides with and has created, substantial demand across Asia-Pacific for methodologies, decision-making tools and process recommendations. Of particular concern are the “discourse gaps” widely present in the hierarchical relationships between policy-makers and service providers, and
between service providers and recipients (e.g. poor farmers). As a result, only rarely are voices of recipients of policies and services, particularly poor fishers and farmers, sought during the development of policy and the planning of services. Project R8100 raised awareness of the importance of Self-Help Groups, which represent visible, viable units which can expand out to close these communication and service provision gaps. Their existence can empower rural communities to draw down the services they need. This project found that they also represent a platform for improving the policy-making process. Follow-on work has included a further project designed to enhance the development impact of the process tools piloted in eastern India, extending these concepts and tools across a wider part of the Asia-Pacific region.

3. Health and safety
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4. DFID disclaimer
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5. Acknowledgements
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6. Further reading and citations
• Mmink, A. and Little, D. 2000. Integration of aquaculture into the farming systems of the eastern plateau of India. DFID Natural Resources Systems Programme, Final
8. Objectives fulfilled by the project

8.1 Resource use efficiency
The technology has been included in a programme of farming systems technology development in Eastern India (EIRFP), which contained cropping systems, agroforestry, soil and water conservation, irrigation, livestock management, and other on- and off-farm activities.

8.2 Pro-poor technology
The practice supports the livelihoods of poor communities through improved food security and income generation. It empowers local communities and disadvantaged groups leading to ownership and sustainable management of their natural resources.

7. Agro-ecological zones
- Tropics, warm