GRASSROOTS VOICE

CONTENTS

Editorial

Indigenous Knowledge (IK) is the local knowledge unique to a society, community or culture. For generations, the village farmers and natural resource users have accumulated knowledge very patient to their environment and society through practical experience and have passed it down to their descendants orally or through practice and demonstration. With the development of modern knowledge. IK was regarded as an academic concern in the past, limited only to social anthropologists But now it has been realized that the model of development generated only through modern science and technology can not provide sustainable development.

As recognition of IK is growing rapidly, it has become very important that the IK in different local communities be gathered and documented before much of this knowledge is irretrievably lost. The Centre for Indigenous Knowledge for Agriculture and Rural Development (CIKARD) was established in Iowa State University in 1987, following which there is now a Global Network of Centres focusing on the study, documentation and analysis of IK and related information systems. The ultimate aim is to make this vast body of knowledge available to the development professionals, scientists and decision-makers. *Bangladesh Resource Centre for Indigenous Knowledge* (BARCIK) has been initiated to achieve the same goal in Bangladesh.

The Journal has endeavoured to publish observational and analytical reports on IK. The Journal will stimulate discovery and inquiry, explore research methodologies and community issues on IK for the benefit of sustainable development.

All the active researchers and practitioners in the field are requested to submit their contributions to the BARCIK. Your ideas, insights, shared experiences will help us to develop even more.

Thanking you all.

The Editor

INDIGENOUS KNOWLEDGE RESEARCH ON THE FLOODPLAINS OF BANGLADESH: THE SEARCH FOR A METHODOLOGY

Paul Sillitoe,[1] Peter Dixon[1] and Julian Barr[2]

ABSTRACT

While it is increasingly recognised that there is a need to incorporate poor farmer's resource knowledge and management into the development process, a reliable methodology to facilitate this has yet to be devised. A generic model is needed that goes beyond the particularly of one populations IK while remaining sensitive Socio-Economic Methodologies (SEM) research project to further this work, entitled Methodological research into the incorporation of indigenous knowledge into natural resources research in Bangladesh floodplain, working in close collaboration with DFID project where natural scientists are researching the production strategies of different floodplain users, both terrestrial and aquatic, aiming to improve resource management. It is necessary to advance a methodology that facilitates communication of IK findings through direct collaboration, to foster their incorporation in research more appropriate to local people's perceptions of their needs. It means confronting the inter-disciplinary and institutional constraints that hinder the effective integration of IK in NR research projects.

INTRODUCTION

The time has come for indigenous knowledge (IK) in development. There is a growing consensus among development practitioners that due regard should be paid to indigenous knowledge when appropriate to projects. Several international development agencies are now showing an interest in its contribution to development. Britain's Department for International Development (DFID) is funding an innovative Socio-Economics Methodologies (SEM) research project on the floodplains of Bangladesh to further understanding of IK in development, as part of its systems research programme in the natural resources (NR) sector. The project is entitled "Methodological research into the incorporation of indigenous knowledge into natural resources research in Bangladesh floodplain production systems".

IK relates to any knowledge held collectively by a local population. which informs understanding of the world. It may encompass knowledge of any domain, including that pertaining to natural resources. It is culturally relative, being informed by people's socio-cultural tradition and history. of which it is an integral aspect.

The project aim is to advance a methodology to further the incorporation of this knowledge into NR development research. We are working in close collaboration with another DFID project where natural scientists are working to develop a model of the floodplains production system. to advance an integrated systems understanding of both terrestrial and aquatic aspects of farm enterprises broadly featuring rice-fish production, focusing particularly on small and landless producers and seeking to identify researchable production constraints.

The major developmental problem addressed by the SEM project is defining, and demonstrating, the potential and role of IK in development and development research. While it is increasingly recognised that there is a need to incorporate the knowledge that small-scale farmers have of their resources and their management into the development process, a reliable methodology to facilitate this incorporation has yet to be devised, particularly given the socio-cultural and epistemological gulf that separates local and scientific perspectives. We are confronting the inter-disciplinary and institutional constraints that hinder the effective incorporation of indigenous knowledge in NR research projects.

[1] Department of Anthropology, University of Durham. U.K.
[2] Department of Agricultural and Environmental Science. University of Newcastle. U.K.
[3] Contact details for BARCIK: 3/7, Block-D. Lalmatia. Dhaka-1207, Bangladesh.

THE SEM IK PROJECT AND BARCIK

The SEM IK project intends to assist in the establishment of the Bangladesh IK network under the auspices of the 'Bangladesh Resource Centre for Indigenous Knowledge' (BARCIK), to promote the sharing of experiences by those working in the indigenous knowledge field. There are a number of IK resource centers throughout the world (current listing in Indigenous Knowledge and Development Monitor) which gather IK research results and networks through newsletters, and there is a need for a similar centre in Bangladesh, and an informal network between development institutions. It is our intention to contribute to the establishment of such a network, similar to the Center for Advanced Research of Indigenous Knowledge Systems (CARIK) in India, for the exchange of information and ideas between anthropologically aware researchers and natural resources scientists on IK, traditional management practices and socio-economic factors relating to NR production systems, facilitating local ownership and management of the network under the umbrella of REPPIKA (co-ordinated by IIRR), and CIKRD.

INDIGENOUS KNOWLEDGE IN DEVELOPMENT

Interest in indigenous technical Knowledge (ITK) in development dates from the late 1970's (Howes & Chambers 1979, Brokensha et al. 1980, Chambers 1983, Richards 1985, Slikkerveer et al. 1991). The main argument of these writers is that farmers have an intricate and detailed knowledge of the environments from which they gain their livelihoods, that they both experiment and innovate, and that such indigenous knowledge (IK) should not be viewed as a constraint on development (as it was in earlier 'top-down' interventions) but can be a positive resource for NR development (and for social development in promoting participation and empowerment). Since the 1980's there has been a growing recognition that indigenous peoples have their own effective 'science' and resource use practices, that is their own ITK, developed over many generations, and that this knowledge can be built upon by development practitioners. However, to progress this goal and improve productivity, it is first necessary to understand indigenous knowledge and management practices, that is to grasp the rationale behind these practices with a view to determining NR development constraints within their socio-cultural context. As a number of writers have suggested (Warren et al. 1995; Richards 1985; Walker et al. 1995), one functional justification for IK research in development contexts is that appropriateness and uptake of technical interventions based on our scientific understanding of the world is likely to be enhanced if IK is taken into account. Another justification is that, together with participatory practice, appropriate and sustainable technical interventions can be developed that empower local populations, giving them a high degree of 'ownership' of the technologies.

The IK approach explicitly sets out to make connections between local peoples' understandings and practices of natural resource use and management and those of development workers in the NR sector (Rhoades 1984, Brokensha et al. 1980, Chambers et al. 1989, Altieri 1995). IK studies are currently very heterogeneous in their approaches, and it is difficult to assign them to any single intellectual school of thought, but they generally show some affinity to ethnographic and geographic descriptions of production systems. In general there has been a concern to emphasise that local peoples frequently have a more detailed understanding of physical interrelationships in their farming systems and have different goals (eg. intercropping as opposed to monoculture) than do natural resource scientists. As such it is suggested that the main thrust of research should be to capture this IK and evaluate its validity for development purposes, both with a view to realising the comparative advantages of science and IK (see Farrington and Martin 1988, Warren 1991; Fairhead 1993), to forestalling inappropriate technology transfer (as in the vertical transfer of technology (ToT) approaches previously favoured by development agencies and extension workers), and to identify local technologies which may be appropriate in other development contexts (horizontal ToT between developing areas).

A review of indigenous knowledge in NR sector research reveals a need for indigenous knowledge research to progress beyond ethnographic documentation and database compilation through surveys, case studies and so on (Blaikie, et al. 1997, Sillitoe in press). The implicit assumption to-date is that

we can capture indigenous knowledge in a database package and pass it 'up' to interested parties (e.g. NR researchers), analagous ToT approach passing technological packages 'down' to beneficiaries. The DFID projects researching indigenous agroforestry knowledge in the forestry programme are premised on this approach (Sincair et al. 1995, Walker et al. 1991,and Thapa 1994).

While there is a need for the capture and representation of IK through descriptive methods not least because they promote participation and empowerment, they can be expensive in financial and temporal terms. Additionally, while development constraints may be identified, there is a danger that description may take precedence over their analysis and identification of opportunities to overcome them, in other words that the NR system may be seen as being in equilibrium and any interventions. since they disturb this equilibrium, as having potentially negative consequences, rather than seeing such equilibrium as the result of previous management practice involving a variety of trade-offs which can be altered in future according to farmers needs (Warren et al. 1995)

INDIGENOUS KNOWLEDGE IN NATURAL RESOURCES MANAGEMENT IN BANGLADESH

Recent strategy documents of the Government of Bangladesh (GoB) for environmental management and agricultural extension indicate that it wishes IK to be taken into consideration more, particularly as it relates to natural resources management. The National Environmental Management Action Plan (NEMAP 1995) states that in relation to land resources, recommended actions include: "study on indigenous land use practices, to increase efficiency of production system and its application". The New Agricultural Extension Policy (NAEP 1996) states that: "It is recognised that farmers' own Indigenous Technical Knowledge is often environmentally sustainable. and efforts should be made to support and learn from farmers, as well as the formal research system" and that "The New Agricultural Extension Policy also recognises that farmers themselves are actively engaged in their own experimentation, as part of their daily agricultural lives. Efforts to learn from and strengthen such informal research should be made".

There is a longstanding tradition of anthropologically informed research in Bangladesh, and Bengal generally (Hartmann & Boyce 1983; Gardner 1995; Arens & Van Beurden 1977). However until very recently the administration of development has been 'top-down', with development workers informing producers about western science and using participatory practice only as a functional tool to promote introduced technologies (e.g. the rice field ecology Participatory Action Learning modules promoted by CARE on its INTERFISH projects). Research undertaken by the NARS has followed a top-down approach, reducing its relevance to poor producers, as BARC recognises (Chowdhury 1992), although the very active NGO sector compensates in some measure. While many of the macro-level constraints to productivity in Bangladesh are well recognised (including agro-chemical pollution of water systems, groundwater depletion by overdrawing tubewells. and deleterious impacts of the implementation of FCD/I schemes - over which there has been widespread donor and NGO concern (Huq et al. 1990; Huges et al. 1994; FAP studies; Dalal-Clayton, n.d.; Yakub 1994). these are defined at a high level. and there is need to improve the responsiveness of research to needs identified at farmer-level.

The subsistence character of the Bangladesh rural economy is largely overlooked with GoB policy heavily weighted towards food grain production while the contribution of other activities like homestead horticulture, fishing, fuelwood gathering, and so on to livelihoods is down played. There is evidence of a need and demand for greater IK research and dialogue between farmers and NR technicians to achieve synergy. Rahman (1994) for example calls for "breaking the monopoly of knowledge in the hands of the elites, i.e. giving the people their right to assert their existing knowledge to start with.... In this reflection-action-reflection process of the people (people's praxis), professional knowledge can be useful only in a dialogue with people's knowledge on an equal footing through which both can be enriched". The Bangladesh floodplain is a region where there is both a need for an IK input to development and one where there is emerging recognition of the need.

For instance, while the various Flood Action Plan (FAP) studies (particularly FAP12 (FCD/I Agricultural Study), FAP 16 [Environmental Study EIA], and FAP17 (Fisheries Studies and Pilot Project) confirm that the FCD/Is have achieved their objectives of increasing the yields and *security* of rain-fed and irrigated agriculture (Khan 1994), and have increased the potential for culture-based fisheries by providing a more controlled aquatic regime, they have also had some negative impacts on capture-based fisheries and poor producers. Conclusions to be drawn from these studies are that a systems approach, that considers different stakeholder's needs, is required in floodplains planning and development, and further that an IK approach linked to participatory practice may lead to a greater and more equitable natural resource development.

In Bangladesh both Islam (1991) and Karim (1994) indicate that research aimed only at technological solutions is unlikely to lead to the development of sustainable livelihood systems. Research into IK issues can assist in integrating technical research into the wider socio-cultural and agro-ecological environment. Communication is poor between researchers and farmers, which inhibits the flow of information that could better target research activities and the development of solutions to agricultural problems of mutual interest to both parties (Brammer 1980). It is necessary to integrate social science into the research of bio-physical scientists to access the farmer knowledge side of this equation. As one authority notes "social science, especially in the anthropological tradition, is especially equipped to access this knowledge and participate in the wider policy process" (Wood 1994).

INDIGENOUS KNOWLEDGE IN DEVELOPMENT RESEARCH: THE TEND FOR A METHODOLOGY

Although ethnographic research has a long tradition in anthropology, it is recognised that there is an urgent need to explore methodologies that link this effectively to applied NR research in fields like agriculture, forestry and fisheries. A difficulty with much local knowledge research as currently conducted is that it is predominantly descriptive ethnography of others' productive systems. Little is analytical regarding these systems, as stated above; there is a need to build systematically on that work that has been framed to help identify and address researchable constraints that limit their productivity (Bentley 1989, 1992; Riches et al. 1993; Fairhead 1993). The methodological problems facing the communication of indigenous knowledge findings to natural scientists, so that they can *devise* appropriate research strategies, are considerable and not to be underestimated (involving epistemological and theoretical issues regarding peoples' knowledge and management of their natural environments). The absence of a coherent indigenous knowledge intellectual paradigm that might interface effectively with our scientific and technological traditions is a limitation demanding research (until scientists and technicians can see how to relate effectively to local knowledge, the debate over participation will have limited impact and the establishment of collegiate interaction between farmers and researchers will be restricted - Okali et al. 1994).

The work of Sinclair, Walker, Thapa and others at the University of Wales (see Walker et al. 1995, Thapa et al. 1995, Thapa 1994, Sinclair et al. 1993, Walker et al. 1991) on a DFID- funded project on IK and agroforestry has concerned the formal capture and representation of IK by means of computer software and the development of reasoning tools to facilitate the analysis of that knowledge (eg. the development of an Agroforestry Knowledge Toolkit - AKT). This has been developed across a range of cultural and biophysical contexts and has indicated that key ecological processes are widely and generally understood by respondents, that knowledge distribution is only weakly related to socio-economic, gender and cultural descriptors, and that IK is generally more sophisticated than extension services generally allow. However , while respondents had a better awareness of causal relationships in some fields than scientists, they had more superficial knowledge of the important processes that are difficult to observe (eg. competition for water and nutrients among trees and crops). This general observation, holding across different cultural and biophysical contexts, has suggested to these authors that there is an opportunity for NR scientists to focus their research on constraints in those areas where IK is weak.

The same point is made by Bentley (1989, 1992). Riches et al. (1993) and Warburton (1994). Bentley's research in Honduras suggests that IK is highly uneven with local people understanding some processes and not others, and he proposes that IK may be classified according to two (formally derived) variables (Importance and Ease of Observation) generating four classes displaying different characteristics. Bentley concludes that farmer participation in NR research and development is constrained not just by sociological differences (a point made by political-economists such as Agrawal 1995a, Scoones & Thompson 1994) but knowledge deficiencies since they had different depths of understanding of different kinds of knowledge. Riches et al. (1993) in their study of insect and parasitic weed problems confirm this point in an African context (Malawi). Some relations between pest problems and other factors are well recognised by farmers while others are not, even though the latter have a direct bearing on control measures. In their research the authors concentrated on those factors less well understood by farmers and where they felt science had a role to play. They conclude that providing information about the underlying causal relationships is essential for techniques being developed to be sustainable. Further that planning control of pests should include education on why and how control measures should be developed, and thereafter the development of choices for local solutions. Warburton (1994) in her report on farmer's perceptions and the management of disease in rice in the Philippines comes to similar conclusions concerning IK.

The suggestion is that there are domains where IK has an important functional role to play in informing and correcting externally-derived technical interventions (ie. a role for IK in adaptive technology transfer), significant domains where IK is deficient and where science can take the lead (ie. a role for science), and others where a shared input from both would seem appropriate (ie. a synergistic partnership). They argue that there are critical gaps in farmer's technical knowledge which science can help to fill, and interventions could be profitably directed towards the identification of these knowledge gaps, and the development of information and education which allows farmers choice in tackling these development constraints. In this they are following those development theorists (eg. Chambers, Richards) who argue that all that farmers need is access to scientific technology (here information) and they will experiment and develop their own solutions. The emphasis is on empowerment.

Earlier studies concerned with the capture of IK in an encyclopedic fashion gave priority to IK and while invaluable, have tended to contain rather piecemeal IK insights for development practitioners. The three above-mentioned approaches have taken a significant step beyond these in identifying domains of knowledge and their relative value in scientific terms. They suggest more generic models can be developed to assist the targeting of research into knowledge constraints, and suggest there is still a place for technology transfer (informational), though in a participatory fashion which promotes empowerment. In this they follow the dominant perspective in recent IK research in interpreting and testing the validity of beliefs and practices so that science and IK can be brought together and the comparative advantage of each be realised (see Chambers 1983, Farrington and Martin 1987. Warren 1991). A potential problem, however, is that this interpretation and testing is in our terms (eg. importance, ease of observation etc.) and thus divides up local experience and knowledge according to our categories. In doing so this reproduces our dominant worldview and in some authors' opinion may be misleading as well as inimicable to empowerment (see Thrupp 1989. Long 1989, Fairhead 1993). It may also encourage a resumption of ToT approaches where farmer's deficiency of knowledge rather than, as in earlier ToT approachers, farmer's 'erroneous' knowledge, is seen as a development constraint.

INDIGENOUS KNOWLEDGE: THE DEVELOPMENT OF A METHODOLOGY

Our project is building on this previous work, attempting to inform indigenous knowledge with scientific understanding, uncovering potential IK gaps as researchable constraints. It differs in placing equal emphasis on informing natural science with a local knowledge perspective, and attempting to advance formally on the now current idea of a dynamic socio-culturally-sensitive methodology. In terms of Blaikie et al.'s (1997) knowledge-in-action distinctions it will focus first on 'knowledge negotiated'. We accept the need to take into account the socio-political context in which knowledge is

embedded and from which it gains its sense. The social has too frequently been seen by science as 'residual', 'metaphoric' and unimportant (see Fairhead 1993). However there is also the need to develop more generic models that go beyond the particularity of any population group's IK while paying attention to local categories. The difficulties in producing a formal model from a variety of substantive data are familiar to social anthropology but not ones, which have been easily or satisfactorily resolved. As in other knowledge encounters, various trade-off have to be made according to the goals of the different stakeholders. The present study is a problem-centered ethnographic investigation relating to NR concerns. What constraints, how and by who the constraints are identified, and the existence of and implications of a social differentiation of knowledge, will be as much a part of the investigation as the participatory development of potential solutions to those constraints. The goal being development of a methodology for incorporating IK into NR research across a number of sectors and for NR scientists and farmers (and other local people) to interact effectively to identify and resolve researchable constraints.

The project is contributing to methodological problems by working on two broad interrelated fronts, namely 1. The advancement of a methodology to further the incorporation of an indigenous knowledge perspective in NR research and development, and 2. within the context of a particular NR project of which it will be an integral part, aiming to redress the tendency of current interventions in Bangladesh largely to misrepresent small and marginal farmers' needs because of a general failure to take into account the complex socio-cultural and ecological interactions in floodplain production systems. We are developing an indigenous knowledge methodology, both specifically within the context of the Bangladesh floodplains production system and more generally to other NR production systems. While the problems that attend the translation and analysis of indigenous knowledge in terms understandable, accessible and relevant to natural scientists and other outsiders, like planners and policy-makers, are considerable, given the current receptive climate to IK in development, the prospects of overcoming them are realistic. It is probable that the projects will contribute to improvements in the design of NR development projects on the Bangladesh floodplains following dissemination of results, the NR sector, both bilateral aid funded and NGO, being generally responsive to research results. At this level there are few barriers to uptake and the prospects are good for furthering better-targeted and more relevant development initiatives responsive to farmer's needs and demands. We envisage that the project will make a contribution across a range of institutions to the growing debate over the place of indigenous knowledge in the development process, both within and beyond Bangladesh. We are specifically targeting DFID's research programmes in the NR sector, advancing a methodology for indigenous knowledge research and incorporation in development. One of the key features to this work, central to its success within context of the NR programme, is to develop a methodology that facilitates communication of indigenous knowledge findings to natural scientists through direct collaboration, so that they can devise more appropriate research projects and interventions, more sensitive to local people's perceptions of their needs (i.e. small farmer demand). The collaborators will be working in multi-disciplinary teams, fostering an all-important appreciation of indigenous knowledge within a demand-led systems-based research project.

Our methodology differs in recognising that indigenous knowledge is not static nor uniform, and cannot be documented once-and-for-all, but is subject to continual negotiation between stakeholders according to their different goals, the weight they give to different elements of knowledge (scientific, ITK or indigenous and formal socio-economic knowledge) will vary according to context and the interests, strategies and goals of the different stakeholders, and we need to explore these factors influencing the dynamics of IK . As Agrawal points out (1995b) 'archiving IK reifies knowledge as existing and evolving in an objective unbiased fashion' (as though it were a closed system) and ignores the dimension of power which is inherent in all social encounters. One aim is to develop a methodology that facilitates a dynamic perspective. Further, we have a 'problem-oriented' approach to knowledge (knowledge in relation to development constraints), in order to generate potential options for clients to pick and choose/reject (which relates to the idea of a problem-determined system-Ison et al. 1996:14), rather than the encyclopaedic collection of data. This demands an iterative research strategy that closely links NR scientists researching production constraints to on-going indigenous knowledge investigations with the intention of producing generic models with a

broader application than the specific locale in which they are produced. This is a goal that recent research has begun to move towards.

We are following two avenues of research to develop the methodology: i.) research to develop anthropological methods that yield NR-related IK, but more quickly that traditional long-term participant observation (i.e. within a 3 years project cycle; ii) research to develop methods whereby IK can be effectively communicated to NR scientists and incorporated in their research programmes. We are undertaking the research in the 'action research' mode, whereby the method will be advanced through cycles of reflective practice. Ethnographic inquiry and methodological reflection are proceeding together and through each other, whereby action (the next step in the IK-NR research) will be assessed by appraising the methodological implications of the research and the level of understanding and collaboration achieved.

The project aims to work with closely collaborating local/European field researchers with differing disciplinary backgrounds. This is anthropologically innovative but parallel the NR model for investigative collaboration. Using this method attempts to define a midway path between the long-term fieldwork necessary to obtain in-depth cultural insights of anthropological investigation and the more rapid techniques, which cannot fully engage the gamut to IK within its socio-cultural context. The outsider will provide the disciplinary framework and NR linkage, the local partners will facilitate the short-cut into the cultural context (language, social customs etc.) In our problem-centred ethnographic investigation we are examining different modes of interaction between anthropologists and farmers and anthropologists and NR scientists, testing and developing them to formulate reproduceable and generic methods that incorporate IK into NR research, and to promote IK and NR researchers interacting effectively. Different modes of interaction between anthropologists and farmers and anthropologists and NR scientists will be examined, tested and developed. To this end, of investigating and promoting interaction across the knowledge interfaces, we are using researchers with different backgrounds in anthropology and the natural sciences, to view both the socio-cultural and bio-physical perspectives looking across the divide, in the manner suggested by Ison et. al. (1996) who argue that while the different paradigms cannot be reconciled nonetheless it should be possible to devise a methodology for the exchange of information across the gap.

The problem-focused IK studies (ITK) centre on topics of concern to NR scientists, e.g. land-use systems (fertility management, labour allocation, crop varieties, husbandry techniques, traditional soil and land classification systems) , use of aquatic weeds (control, ethnobotany, ownership) , floodplain fisheries (ethno-ichthyology, indigenous fisheries technologies). The techniques we are using range from participant observation and in-depth interview to focus group discussion and problem census/survey. We are analysing and appraising the speed and reliability of different techniques to determine the preferred ones for use in a generic methodology. We are also investigating, through testing and evaluation, the utility of integrating into the methodology some less focused, more informal approaches originating from both the schools of traditional ethnography (experimentalism, 'snowballing' etc.) and management consultancy ('brain-storming', Delphi technique, etc.) in order to capture relevant, but more lateral IK.

The ethnographic studies are establishing the socio-cultural framework of the NR-focused IK studies. We are using similar techniques to those above, but the approach is socio- economically, culturally, gender , and age stratified to determine the biases relating to the IK obtained in the problem-focused studies . This area of investigation will enable researchers to better understand the context of the IK, to be able to place weightings and reliability factors on the IK data and to relate different pieces of IK to different key stakeholder groups. NR scientists will be able to evaluate wider socio-economic issues pertinent to the effective implementation of research findings, such as cultural constraints on the uptake of innovations and social factors that can distort them. NR topics which will particularly benefit from this approach include problems relating to differential access to markets for natural resources, conflict in natural resource use, IPR issues, and labour use patterns (gender, age etc.) We are devising a tool, based on IK database, for creating a matrix of IK relating to different NR topics by socio-cultural differentiation of respondents, and meeting with NR scientists to test and evaluate the IK-by-stakeholder database.

We are attempting to assess the extent to which the methods used to build IK databases are extractive tools and on the other hand the extent to which they best allow farmers and fishers to contribute and participate in the design and implementation of NR research. We are trying to determine which methods and approaches provide the most effective avenues and opportunities for these people to communicate their ideas and knowledge to NR scientists in a iterative cycle of feedback that facilitate IK-informed FPR. The aim is to develop a methodology that facilitates a dynamic perspective.

We are aiming to develop protocols for NR scientist-anthropologist joint meetings, testing different formats for presenting IK to NR scientists, including structured IK reports/summaries on NR problems, oral presentations, and computerised databases. Problem-tree sessions with NR scientists to define focus of NR production constraints. Problems will be related to farming and exploitation of terrestrial resources, and fishing and exploitation of aquatic resources. An iterative cycle of interaction and sharing of information, data and insight between the ethnographic team and the perspective of IK and traditional management practices. This will contribute to the development of guidelines for formulating research teams with anthropologists and NR researchers receptive to IK issues. Following the method developed for NR scientist-anthropologist collaboration, and working towards an IK informed FPR paradigm, we are also developing guidelines for researcher-farmer/fisher interactions. The aim is to interact at a deeper socio-cultural level than just obtaining farmer's views on technological interventions proposed by NR scientists. We are constantly reviewing stakeholders' positions to examine the empowerment issues related to incorporation of IK into research programmes, and thence development activities.

CONCLUSION

The project described here will contribute to furthering a systems understanding of poor farmers' and fishers subsistence strategies which depend to different degrees on a complex matrix of crop and fish production on the floodplains of Bangladesh, thereby improving the targeting of applied NR research on production constraints and consequent NR development. The positive impact of development interventions is reduced, and even sometimes is negative, because of a failure to take account of the complex interactions, both bio-physical and socio-cultural, that characterise floodplain production systems. Small and marginal Bangladeshi farmers' needs are consequently poorly addressed and they are experiencing declining sustainability and income (the calorific intake of 50% of the population is below the poverty line and 40% are landless). The project is part of the contemporary wave of participatory approaches to development, contributing to a needed grass-roots, systems perspective of development constraints to counterbalance the current heavy commodity focus and top-down technology transfer ethic.

This work on the Bangladesh floodplains is to be the best bed where we shall develop the generic IK methodology. We aim to promote the integration of an indigenous knowledge component in NR research through iterative collaboration with natural scientists researching production constraints, biodiversity and sustainability. We thus hope to advance the IK methodology and practice in the context of furthering understanding of the implications of incorporating local agricultural, fishing and environmental perceptions and knowledge into on-going and potential technology development in the floodplains production systems of Bangladesh.

The sister NR project has a series of workshops programmed throughout it, to be targeted at various audiences, and the IK project will play in integral part in these, intended to make outputs available in a participative manner. Further stages needed to advance the goals of the project include piloting and developing on the indigenous knowledge methodology elsewhere. Within Bangladesh it is envisaged that further stages may be appropriate to expand geographical coverage of the floodplain, validating conclusions in a range of systems and over longer time farmers, in addition to filling in further details.

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GLOSSARY OF ACRONYM AND BENGALI TERMS

BARC	Bangladesh Agricultural Research Council
BARCIK	Bangladesh Resource Centre for Indigenous Knowledge
BARI	Bangladesh Agricultural Research Institute
BRRI	Bangladesh Rice Research Institute
CARE	Co-operative for Assistance Relief Everywhere (intl. NGO)
CIKARD	Center for Indigenous Knowledge for Agriculture and Rural Development
DAE	Department of Agricultural Extension
DFID	Department for International Development (UK)
FAP	Flood Action Plan
FCD/I	Flood Control & Drainage and / or Irrigation
FPR	Farmer Participatory Research
FSR	Farming Systems Research
GOB	Government of Bangladesh
HYV	High Yielding Variety (of rice)
IIRR	International Institute of Rural Reconstruction (in the Philippines)
IK	Indigenous Knowledge
IPM	Integrated Pest Management
IPR	Intellectual Property Rights
IRRI	International Rice Research Institute
ITK	Indigenous Technical Knowledge
NARS	National Agricultural Research System
NGO	Non-Government Organization
NR	Natural Resources
NRSP	Natural Resources Systems Programme
PRA	Participatory Rural Appraisal
PTD	Participatory Technology Development
REPPIKA	Regional Program for the Promotion of Indigenous Knowledge in Asia

AN INDIGENOUSLY DEVELOPED POND AQUACULTURE SYSTEM IN BANGLADESH

Wajed A Shah[1] and Philip Townsley[2]

ABSTRACT

The pace of aquaculture development in Bangladesh has been disappointing in spite of apparently great potential. A range of technical, social and economic constrains are commonly identified as explaining this poor performance. In the case study, a community of traditional fish traders and fishermen in central Bangladesh has developed, without intervention from extension agencies a system of carp polyculture making intensive use of existing waterbodies and well-adapted to local conditions, although very different from the methods recommended by most experts. Some of the social constraints regarding multiple ownership of ponds and tenure have been overcome, at least temporarily, by the development of innovative arrangements for profit sharing and leasing of unutilised waterbodies. The more general implications of the case are discussed.

INTRODUCTION

The enormous potential for increasing fish production in Bangladesh through the development of aquaculture in the many underutilised ponds, ditches and small waterbodies in the country has often been noted. Estimates put the total area of "culturable" waterbody in the country at about 150,000 hectares of which only about 50 percent are said to be utilised for aquaculture of any sort (Nuruzzaman, 1992). A particularly attractive feature of many of these waterbodies is that they are often located close to people's homesteads and may be owned by households that are otherwise landless (FAP 17,1993).

However, in spite of this apparently great potential for supplying high quality animal protein and increasing the protein consumption and incomes of rural households, aquaculture development has been sluggish and has not lived up to expectations in spite of considerable efforts by development and extension agencies. This paper describes a locally innovated pond aquaculture system, which throws light on the process, which encourages aquaculture development, and how people deal with problems, which have widely been identified as constraints on the widespread development of fish culture.

The case study presented below illustrates an aquaculture system developed by a community on the floodplain of the Jamuna River. No extension inputs or activities by external agencies were involved, but a flexible system has developed which is responsive to local conditions and to the technical capabilities and requirements of its practitioners. In particular, it seems to overcome some of restraints perceived by outsiders.

STUDY SITE

Saturia Thana is located at central Bangladesh about 50 kilometers north-west of capital Dhaka. The area is one of the most densely populated areas in Bangladesh (and therefore in the world). In a predominantly agricultural economy, levels of landlessness stand at over 50%.

1. Former Senior Researcher, Bangladesh Agricultural Research Institute/ Lead Researcher, Aquaculture Systems, FAP – 17

2. Former Senior Social Anthropologist, FAP – 17, Fisheries Resources Centre, Dhaka.

The twin villages of *Bhatara* and *Char Bhatara* are connected by road with the main Dhaka *Aricha* highway. About 300 households live in two villages. The villages are made up of several distinct groups. About 200 households live primarily by farming, but a large group of about 100 households within the village has worked for several generations as *nikari* or fish traders. It is within this latter group that aquaculture has, over the past decade, taken root.

Many members of the fish trading community have, over the last 15-20 years, become involved in fishing. This probably started when many of the traditional Hindu caste-fishermen in the area left the country for India in the 1950s, leaving an employment niche vacant which *Bhatara* people, already involved in the fisheries sector, were quick to fill. The complex of wetlands which surround the village are still extensively fished by villagers, but are steadily disappearing due to siltation and changes in flooding pattern due to roadways and settlement.

START OF FISH CULTURE

In the 1980s a more or less chance combination of events initiated the development of aquaculture in the community. One of the villagers who had some exposure to fish culture while living in another district was repaid a loan in the form of fish fingerlings. After some early experiments (with many failures), a system was developed which seems to function remarkably well, given the types of waterbody available in the area. It has spread, not only within the community, but also to other neighbouring villages.

FISH CULTURE SYSTEM

The fish culture system developed by the villagers of *Bhatara* and *Char Bhatara* is notable for the degree to which it makes intensive use of existing water resources and integrates the production potential of some types of waterbody with the input requirement of others. While some households have been able to carry out all the different stages of the fish culture cycle in a variety of ponds and ditches, others have specialised in particular species of the cycle. The activity, whether producing fingerlings or fish for consumption obviously integrates well with the fish trading activities of constitute the "traditional" livelihood of many of the households in the community. Like most pond acquaculture systems in Bangladesh, the system in *Bhatara* is based on the polyculture of the Indian major Carps (*labeo ruhita, cirrhinus marigala, catla catla*).

The fish culture system, as it has developed in *Bhatara* , can be divided into two stages. First, the nursery stage aiming at the production of fish fry or fingerlings for stocking in other ponds. In *Bhatara* , the nursery stage is itself subdivided into a primary stage (raising fish spawn to fish *fry*) and secondary stage (raising fish fry to fingerlings). The subsequent grow-out stage aims at the production of fish for consumer market. The basics of the various culture systems in practice are outlined below, followed by a discussion of some of the constraints on the system and local approaches to dealing with these constraints.

PRIMARY NURSERY SYSTEM

The nursery systems in the village generally utilise very small ponds located close to homesteads. Often these are simply the borrow-pits from which soil for the raised homestead mounds was excavated, to render them suitable for pond production. The average size of waterbody used for primary nursery production was 0.032 hectares. Most nurserers carry out multi-species fry production at the primary nursery stage although some concentrate on single species.

The most commonly followed steps for primary nursery production are as follows:

- Dewatering of pond was done in early April, at the end of dry season. Ponds are left dry for about 15-20 days;
- Where irrigation is available, water in then pumped into the pond to the depth of 1.5-2 feet. Otherwise, pond operators wait for the first rain in late April or early May ;
- Ponds are poisoned for predatory insects and, the following day, limed at a rate of 16.46 kg/ha ;
- Again the following day, ponds are fertilized with urea at 110 kg/ha and manured with oil cake at 38.42 kg/ha ;
- A week after fertilization , the pond is netted to remove frogs and insects ;
- Fish spawn are stocked after netting.
- Fries are fed and reared for 16-20 days in the primary nursery, then sold to other culturists or used for stocking the owner's secondary ponds.

Spawn collected wild by fishermen, including those in *Bhatara* itself , in the Jamuna River (about 25 kilometres west) is used. Different villagers use numerous variations on the steps and methods outlined above. There seems to be a considerable degree of experimentation carried out by nurserers to identify the best methods for their particular ponds and to establish the relationships between rates of stocking and mortality, depth of water and survival, feeding patterns and the growth fries.

Some nurserers had, needless to say, experienced serious losses in fry production but the number of nurserers is increasing steadily. This is in response to demand as more local people take up culture activities and due to the fact that the nursery activity can be carried out in smaller ponds, which are more commonly available. Fingerlings grown-out from wild-collected spawn are generally regarded as superior to hatchery-produced fry, which are in any case in short supply.

SECONDARY NURSERY SYSTEM

The secondary nursery production in *Bhatara* utilises essentially the same methods used in the primary nursery system, but stocking fry, either caught from the wild or raised in primary nursery ponds, and raising them to fingerling-size for further stocking in grow-out ponds. Ponds are prepared in the same way, eliminating predators by poisoning, and the study villagers. Followed by liming and fertilization, netting and stocking of fry. The methods applied in fingerling production differ from that generally recommended by extension agencies. Nurserers reported that the "recommended" nursery technology is expensive and technically difficult to implement in rural conditions. Their management methods for secondary nursery production have been developed primarily through experience and observation. The size of secondary nursery ponds ranges from 0.08 to 0.16 hectares. The water depth in secondary nursery ponds is higher than in primary nurseries. The importance of proper pond preparation has apparently been fully appreciated through the experience of high mortality in fry-to-fingerling production by some culturists.

Secondary nursery production is utilised both for the stocking of grow-out ponds within the same household culture system and for sale to other fish culturists. Respondents noted the risks associated with nursery production. In the event of success, the returns are far higher than crop production from equivalent the land area. If something goes wrong, a considerable capital investment can be wasted. In spite of the risks, it seems that few culturists abandon the activity once they have started and the two-stage nursery production outlined above has expanded to the point that the village has become an important local center for fish fry and fingerling supply.

POND CULTURE TECHNOLOGY

The grow-out stage of the fish culture cycle is generally more familiar to more people in the area and is widely carried out, using a variety of input levels and stocking and management regimes. The exact steps and methods seem to depend as much on individual households' economic possibilities at the time as on their technical knowledge. Multi-species pond culture stocking fingerlings from local nursery ponds or caught by local fishermen is most common. Overstocking (according to conventional standards) seems to be the rule but no set standards seem to be followed. Nevertheless, results seem to generally satisfy those involved even if they may not represent the optimal yield with the resources available.

CONSTRAINTS AND LOCAL SOLUTIONS

After many years of research and extension work in aquaculture in Bangladesh (Rahman, 1986; Mazid, 1993; Gill and Motahar, 1982), it seems now to be accepted that the primary constraints on aquaculture development are social and economic rather than technical . A recent workshop on NGO involvement (ITDG, 1993) in the promotion of pond fisheries and aquaculture in Bangladesh identified the following principle obstacles to widespread fish culture development:

- supply of fish fry and fingerlings at farm level ;
- technology transfer;
- access to ponds and waterbody resources;
- multiple ownership of ponds.

SUPPLY OF FISH FRY AND FINGERLINGS

Villagers in *Bhatara* seem to have been able to overcome the first of these obstacles more or less on their own. Their background in fisheries may have been of some assistance in acquiring the necessary understanding of the biological cycle of culturable species. The relative vicinity of a good supply of wild spawn as a primary input is also important. In the long-term, the viability of dependence on natural sources of fish spawn is doubtful. However, in some other areas of Bangladesh, small-scale hatcheries have already developed in response to the growing demand from fish culturists and there is every reason to believe that a similar process will spread to other areas as the demand increases.

TECHNOLOGY TRANSFER

Overwhelmingly, it would appear that the best vehicle of technology transfer, in the case of *Bhatara*, has been the success of the technology and better earnings for its practitioners. The adoption of culture has been rapid since its introduction eight years ago and seems to be gaining pace.

WATERBODY ACCESS

Undoubtedly the principle factor limiting the spread of aquaculture, in *Bhatara* as elsewhere in Bangladesh, is the availability of waterbodies. This seems to contradict the widely perceived surfeit of "unexploited" waterbodies mentioned at the beginning of the paper. Several factors need to be born in mind.

Firstly, the floods affecting large areas of lowland Bangladesh are a severe deterrent to investment in aquaculture. This by no means signifies that flooded ponds or ditches are "unexploited". The vast majority of these seasonally flooded waterbodies are left, after the flood recession, with wild stocks of floodplain fish, which are subsequently very thoroughly exploited by people living around them. In

some cases, these stocks are "improved" by adding fish feed, providing artificial shelters for fish and even by additional stocking of fingerlings.

Once these flood-prone ponds are removed from the equation, the availability of waterbodies considerably reduces and, in villages like *Bhatara* , a point rapidly seems to be reached where there are few if any unexploited ponds available for further development. When the first household took up fish culture in the village, there seems to have been an embarrassment of choice of ponds of all sizes and configurations which were unutilised and unexploited. Already, however, the owners of ponds are beginning to see the potential of these resources. The terms of rental or leasing for people seeking out waterbodies to culture are becoming less and less advantageous and the lease-periods are becoming shorter. Often owners only want to lease the pond to local fish culturists for one year so that he will re-excavate and improve it, and then he takes it over himself.

In the long term, many small and medium landowners will probably acquire the skills necessary to manage their ponds themselves, but experience in Bhatara suggests that possibilities for experienced non-pond owners to become involved in culture activities may persist beyoned the point where available pond resources are fully utilised. The tenure arrangements discussed below highlight this point.

MULTIPLE OWNERSHIP

Another commonly encountered "constraint" in the area is that of multiple ownership of ponds. To outsiders this is perceived as a potentially serious deterrent as disagreements over sharing of benefits and management responsibilities are common where joint ownership of the waterbody extends to joint ownership of the fish culture enterprise taking place in it. While problems have undoubtedly occurred in *Bhatara* with regard to both these points , it seems that local people are generally able to work out arrangements which overcome tenure problems. Altogether, some 16 different tenure arrangements for culturable ponds and ditches were encountered in the village of *Bhatara* alone. However, in terms of their essential characteristics, they can be reduced to four principle systems.

1. **Share system:** The share system for pond fisheries found in the study village essentially mirrors existing arrangements for share-cropping in agriculture ; all the production costs for fish culture, and all labour are provided by the fish culturist / share-cropper and the harvest is shared between the pond-owner and the share-cropper. There is no cost involved for the pond-owner. The exact rate at which the crop is shared between the two parties varies considerably depending primarily on the condition of the pond. If it requires much work in order to make it usable for culture, the owners share decreases. The maximum and minimum shares going to the pond-owner are generally 50% and 25% respectively

2. **Kot system**: The word kot is a local term for each contract. The contract period ranges from one to six years. The pond-owner or owners decide the terms of contract. It was reported by the kot-holders that pond-owners rent out under this arrangement only those ponds which require investment like redigging, pond embankment raising and so on before stocking. Pond owners' interest essentially to have the pond prepared for him to take up culture activities him at a later date. As mentioned above, the period of these contracts is steadily reducing.

3. **Lease system**: In this system, government-owned *khas* ponds are given on lease to private parties, generally through an open auction. Preferential bidding rights can be given to special groups, such as cooperatives, community groups or landless associations, but most are given to the highest bidder . In bidding, contracts with local bureaucracies and political influence tend to dictate who may obtain the lease to *khas* pond. While much has been made of the potential to redirect the benefits from

aquaculture towards disadvantaged groups such as the landless (and some very successful programmes have been instated) the real scope for this is limited by the relatively small number of *khas* ponds available.

4. **Dow ani system**: This system appears to be a local innovation by the fishermen and fish traders of the study area. The word *dow* means two and *ani* comes from *anna* meaning one-sixteenth of a taka. Thus *dow ani*, meaning one-eighth, refers to the share taken by the fish culturist under this arrangement. In this system, the fish culturist is essentially selling his expertise and labour in return for his 12.5% share of the total harvest while the pond-owner bears all the costs of production. The *dow ani* share holder guides and advises to the pond owners as from of a consultant. This system seems to be gaining popularity in neighbouring villages.

ECONOMIC PERSPECTIVE

Table 1 shows the cost and returns for one pond operator carrying out all these stages of the culture system in different ponds (primary and secondary nursery and grow-out).

Table 1. Cost and return analysis of integrated primary/secondary nursery and grow-out operation in *Bhatara* village: 1993

Fry production	**Taka/acre**	**Fingerlings**	**Taka/acre**	**Grow-out**	**Taka/acre**
Clean & dewatering	577	Pond preparation	1,250	Pond preparation	1,707
Poison & Liming	375	Fries	8,756	Fingerlings	8,176
Fertilizer & netting	756	Feeds and	634	Feeds and	
Spawn egg	4,000	fertilizers		Fertilizer	3,300
Feeding	346			Netting & caring	2,200
Rent of pond	1,900			Rent	10,000
			10,640		
Total cost		**Total cost**	24,000		
Gross Benefit	**7,954**	Gross Benefit	**13,360**	**Total cost**	**26,184**
Gross Margin	18,900	**Gross Margin**	1.25	Gross Benefit	159,950
BC ratio	**10,944**	BC ratio		**Gross Margin**	**133,766**
Rearing 1 month	1.37			BC ratio	5.0
		Rearing 1 month		Rearing 9 month	

PROSPECTS AND OPPORTUNITIES

The development of fish culture in the *Bhatara* area seems to illustrate several important points regarding the development of aquaculture.

Firstly, while there are technical and social problems involved, where there is a market for fish, availability of inputs and suitable environmental conditions for aquaculture, it will probably develop by itself. Concern about the "slow pace" of aquaculture development probably betrays an unrealistic set of expectations among development workers rather than reluctance or tardiness among potential fish farmers.

While social problems, notably concerning pond tenure and multiple ownership, correctly been identified as important constraints, it would seem that such problems can be overcome when the people involved can clearly see the benefits to be gained. Local fish culturists in *Bhatara* recognise the problems, mentioning the political and social maneovres sometimes necessary to obtain access to waterbodies.

Problems regarding access are liable, in the long-run, to create difficulties for landless people and non-pond owners who want to become involved in fish culture. As soon as the potential benefits of aquaculture become apparent, pond owners are liable to become directly involved in culturing their own ponds. However, the development of the *dow ani* system in *Bhatara* shows that potential may exist for trained and experienced landless people to make a living through their technical expertise in aquaculture. The potential for using such experienced local people as extension agents is also worthy of consideration.

While many of the factors influencing the development of fish culture in *Bhatara* are probably specific to the area and the people living there, the case provides indicators regarding the progress of aquaculture development in the country as a whole and the resourcefulness of rural people when they perceive clear benefits from a new activity.

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INDIGENOUS KNOWLEDGE (IK) ASSOCIATED WITH TRADITIONAL MEDICINE AND SUSTAINABLE USE OF BIODIVERSITY IN BANGLADESH

Dr. M.I. Zuberi

Indigenous Knowledge (IK) : Like all other knowledge and wisdom. IK ultimately originates from human practice based on the simple process of trial and error. The different categories of knowledge differ in organization. After its origin. IK is maintained, transmitted. augmented and elaborated almost entirely during the course of its application in practice. it lacks a codified. formal or institutionalized process of handling it. As such. IK is very sensitive to changing relationship of people to their own environment and natural resource base. Like many countries in the tropical region. Bangladesh have been endowed with vast resources of plants and animals. The people living here too has developed a rich body of knowledge on the diverse use of this biodiversity over the generations for their food. fuel. medicine. fibre and other needs. The very intimate relationship between human society and the environment with the generation of IK even continues today in many rural societies.

IK in Bangladesh: As in many parts of the world, in Bangladesh as well. plant-based medical practices have been developed as IK and had formed the basis of primary health care system for both man and his animals. In many less-developed countries including Bangladesh. the introduction of modern medical practices began in the early twentieth century and its overwhelming pressure has gradually eroded and replaced the IK based traditional systems. Through ignorance and wrong ideas. the IK based systems were looked down upon being unscientific. primitive and inferior to modern medicine. As a result. though many traditional practitioners have abandoned their age-old profession. many rural herbals are still trying to survive with their knowledge and profession.

Apart from the herbals, a large proportion of the village community throughout the country even today plan, co-ordinate and run their everyday activities with nature-based production system following the traditional ways according to their IK through calendars. customs. and beliefs. The influence of days, stars, moon (*paksha, tithi eg ekadashi, panchami etc.)* in the livelihood activities like land preparation, seed sowing, tree plantation, crop harvesting. animal care. all are planned and executed following their tradition and IK. The knowledge, attitude and practice of all village people are determined by the social environment and IK where he has been brought up.

A base line survey supported by the IDRC (Canada) in about 200 villages in North-western Bangladesh indicated hardly a village be found without any herbal practitioner. A total of 461 folk medicine practitioners including 19 women were located giving an average of 2.23 herbals per village. In another pilot survey in ten villages of Southern Bangladesh. more than 30 percent of the ailing persons reported to use herbal medicine. Of the 150 medical practitioners in these villages,38 percent were herbals (Zuberi, unpublished). According to a WHO (1978) report , there are over 5000 registered and more than 3000 unregistered traditional medicine practitioners in Bangladesh . The IDRC backed survey (Zuberi, unpublished) indicated far more herbals operating in Bangladesh than the WHO report. Of all these herbals, only 540 are institutionally qualified, the rest are all folk medicine men depending entirely on IK

The folk medicine in Bangladesh is a diverse stream based on IK, which is ecosystem and ethnic community specific. The system exists in all rural communities with different localities having different characteristics. There are:

a. elderly ladies, grand mothers and housewives administering plant-based home remedies. special foods, nutrition diets based on IK; they could be millions in number:
b. Herbals and folk medicine men or *kaviraj* offering plant-based remedies and spiritual recommendations, taking small amounts of money or items in exchange:
c. bone-setters. the traditional orthopaedics specializing in treating broken bones;

Professor & Team Leader, Department of Environmental Sciences. Gono Biswabidhyalay.
P.O - Mirzanagar, Dhaka -1350, Bangladesh.

d. the poison specialists, experts in treating snake bites, dog bites etc.

e. traditional birth attendants or *dai* responsible for normal home child birth; and

f. the ethnoveterinary practitioners treating cattle, goats and other domestic animals.

In addition to herbal medicine for treating human diseases, another important IK based medical system that has developed in thousands of villages in Bangladesh is the ethnoveterinary system treating the domestic animals through the use of local plant diversity. This large wealth of knowledge has been confined to families in the villages, the IK propagating from generation to generation as a family tradition. Again this IK is not documented and codified, though in many countries especially in India and China intensive research and survey is going on to conserve this scattered undocumented and eroding IK, which has generated worldwide interest.

A pilot survey in five villages of the Northwestern Bangladesh (Zuberi, 1997) indicated that there are an average of 5.5 ethnovet practitioners per village. They reported treating 17 diseases mostly of cattle, using 47 local plant species, 18 of which could be identified quickly. All these herbals reported good success in treating diseased cattle but complained about lack of opportunities for training, support and disappearing plants.

Documentation of IK and need of training: The preliminary survey of IK associated with traditional medical practitioners indicates that there are many misconceptions and essentially wrong ideas about living systems, disease and cure. Many herbals are alarmingly ignorant about human physiology and cause of diseases. Such knowledge deficiencies are one of reasons why many educated people are afraid to adopt herbal system. Some of the herbals know some of the diseases and remedies but deficient in others. Especially many complicated diseases are mis-understood by many traditional practitioners. Thus, there is a clear need to document IK of this traditional practitioner and a systematic effort to fill in the gaps in the perception's and treatment practices of the herbals. It is also noticed that the herbal practitioners themselves are aware of their deficiencies and are very much willing to receive training and methods of modern scientific methods. But there exist no opportunity open for them to do so.

Social set-up: The existing social condition is importance for the exposure and training of the village young to the intricate and vast world of IK which begins very early in the childhood with the parents and associates determining livelihood strategies in the backdrop of local environment. In the environment, they grow up acquiring specialized IK and associated skills very specific to that environment in the very dynamic process of adjusting actively all the time. They learn the IK related to identification, use and conservation of local plants used for food, fibre, medicine, fuel, fodder etc. Following the father to the field he learns about soil types, crop suitability, soil water, land preparation, sowing of seed etc. During fishing with his uncle, he learns how to fish, what should not be caught, how to allow fish to reproduce and so on. All these are incorporated in the IK and are thus imprinted in the natural resource user; they learn to come so close and intimate to the environment that they refer the environment as a 'living person' like himself. Thus, for example the soil can be 'hungry' or 'starving' or 'dead', the water of the *beel* (shallow water bodies) can be 'sick' and they can 'read' and 'feel' the land, climate or crop. This holistic approach of IK makes it unique, efficient and sustainable, while the modern 'reductionist' view of the fast science separates the components of environment thus destroying the 'system' or interrelated nature of our environment. With traditional view, the concepts of utilization, management and conservation are implanted in the IK together as inseparable and thus implemented in a single step during resource use.

The socio - economic condition of the IK - based traditional practitioners is also important in sustaining the system and can be a good indicator. Preliminary results of the IDRC supported field survey indicates that of the 461 herbals interviewed, 33 percent are illiterate, 57 percent had primary education and 10 percent had completed school. Of all the herbals, 80 percent had another major profession, 57 percent are farmers. As much as 45 percent are land-less. 26 percent had land below 1.5 acres. More than 39 percent live below poverty line. 29 percent are poor and only 32 percent consider themselves economically solvent. Of these 461 herbals, 30 percent had families with 2 to 4 members, 51 percent has 5 to 8 and 18 percent has more than 8 members. Thus socio-economically

the practitioners of IK based traditional medicine are in a difficult situation. Due to their poverty under the present socio-cultural condition and the neglect from the government and the elite society, the herbals are ignored in their own village and their livelihood is under threat.

Another aspect, which had negative impact on the IK, based traditional system and has probably arisen from the neglect and insecurity, is the widespread tendency of the healers to associate their IK to supernatural sources. Often claiming the knowledge to originate from 'dreams' or from the instruction of the 'spirits' they tend to attach undeniable importance to their activities making it too difficult for the poor, illiterate and simple villager to ignore. In their own set up they do succeed drawing some kind of respect, and many of them very easily persuaded to confess the real situation regarding the infiltration of the spiritual side and express their willingness to further the plant-based remedies only.

The existing socio-cultural set-up has inherent gender bias in documenting some IK based systems. For example, the traditional practitioners are often male dominated especially in case of herbal medicine. As the women are traditionally involved in home management and looking after healthcare of the family and the livestock, they naturally have more knowledge on these. But seldom the IK of the women are recognized or recorded; world-wide such projects are run by men and mostly work with male. In Bangladesh there are barriers preventing women gaining access to the activities of development such projects which are very rare indeed, so there is a obvious dearth of information of women based IK and their role in traditional systems. Direct participation of women thus is needed.

IK and the young: Another very serious aspect on the IK which became apparent from the ongoing survey on traditional medicine in Bangladesh (Zuberi, unpublished) is that the elders in the society were found to have a more detailed knowledge and appreciation of the IK and its use, but the young generation of the villages has only very vague idea and very limited knowledge on the traditional systems. Most of the young are very skeptical about the efficacy and appropriateness of the IK based remedies and other activities . It is also apparent from the data, among the 461 herbal practitioners located and interviewed, only 7 percent were below 30 years of age, 52 percent were between 31 to 50 years and 41 percent were above 50 years. The herbals very often reported that they do not have candidates within or outside their family willing to have the herbal practice as profession.

As the methods involving documentation, description and validation of IK based systems (if needed) are technical, the appropriate anthropological approach and methods must be adopted. It essentially to involve the village community through active participation in all stages of the process. For example, during the course of the survey of the traditional medicine it was realized that the local enumerators were able to document more efficiently than outside educated researchers. The local people are more willing to talk to and share experience with someone they know as member of their own community. also the entire process of dealing with IK generates a lot of attention and interest among the local people, the forgotten tradition becomes the subject of discussion and debate. The researchers involved in the project often find it very appropriate to assert and advocate for adoption and re-introduction of the IK in the recent world-wide re-awakening of traditional systems. Another important aspect of the local participation is the involvement of the young as local enumerators, thus the younger generation interact with the research personnel and in the process they begin to appreciate the importance of their own IK and the natural resource base they inherited. They are observed to discuss this with their young friends and often renewed interest in the community was noticed about the potential of their IK and resources results.

Potential of IK based traditional system: The IK based traditional methods especially the primary healthcare system offer a great potential for sustainable development, the poor and rural people are primary beneficiaries in all activities that can be envisaged. The IK based approaches are more appropriate, cheaper, readily available and easier to adopt than the introduced options. Moreover, according to the local demand, IK based practices can be improved, modified or even blended with outside technologies if felt essential.

Unfortunately such attitude is lacking and the appreciation of the role of IK based traditional practice is yet to be generated among the development planners, policy makers and the NGO workers. Our

state run (or private) medical training and delivery systems, NGO run development and community healthcare efforts, the formal animal care system and village-based poverty alleviation projects do not include any IK based traditional approach into consideration. Even no research project has been undertaken to evaluate the potential role of the IK based traditional system in sustainable development.

Thus, the need of serious attention to document and re-vitalize IK and conserve the biodiversity is very urgent. One reason is that the present-day IK based practitioners are very elderly. most of them are in remote villages with no followers, so there is a grave danger that the IK will be lost with them another point is that the existing IK based traditional system has an extensive net-work in all the villages linking the poor, rural community can be easily used to develop into an inexpensive but very effective community based service delivery system of primary healthcare and education. Proper training of these herbals will affirm and conserve their own IK and skills, will add and improve their ability to address the need of the present society and will save their livelihood. Yet another point is the fact that by early 1970s the goodness of the IK based natural healthcare has been realized. on the other hand, some short comings of the modern system such as dangerous side effects were noted. This 'green wave' generated a high demand for natural products for drugs, cosmetics, health food. dyes and tans etc. all over the world. New phytochemicals and new drugs are coming up almost everyday. examples like artemisnin, gossypol. taxol are assuming huge markets. The IK and the biodiversity of any region and country have immense importance in these.

A new world-wide wave of research and intervention activities are going on. long term anthropological, ethnobotanical, phermaceutical and medical research being carried on. WHO has recently published guidelines for the assessment of herbal medicine taking into account the long and extensive usage of them (WHO 1991). Intellectual Property Rights is another aspect, which has direct implications on IK and biodiversity. India for example has very recently has forced the US Patents and Trademarks Office to revoke a contentious patent it had granted a couple of years back to an American research group on the use of powdered turmeric *(halud)* for wound healing. This patent claim and its successful denial indicate the far reaching consequences of protection of our IK. because India, has backed up her arguments with documents from ancient *ayurvedic* literature on home remedies using turmeric to win this case. Thus documenting our IK, preservation and use of our biodiversity can prevent biopiracy

In the present-day backdrop of relentless biotic and anthropogenic pressures resulting in vanishing of ecosystems and species, loss of genetic diversity, disappearance of IK and loss of livelihoods. the conservation of our IK, biodiversity and natural heritage assume paramount importance. WHO's launching of the 'Health for all by the Year 2000' and the national governments of all the less-developed countries adopting it, the urgency of the need for an easily accessible, affordable and efficient health care system has made it imperative to revitalize the use of IK for primary healthcare. A concerted effort of the researchers, GO and NGO workers. the IK users and the village community through active participation can initiate activities without delay to achieve this.

BOOK REVIEW

Authors: David J. Lewis, Geoffery D. Wood and Rick Gregory / Reviewer: Adri Kater

Trading the silver seed

Adri Kater
Anthropologist
Heidestein 2
3971 ND Driebergen
The Netherlands
Tel.: 31-343-516 179.

The major contribution that book makes to our understanding of specific indigenous knowledge - the knowledge possessed by travelling traders working within a functioning system of fish culture - makes it a remarkable publication, says reviewer Adri Kater, who, however, urgently calls for follow-up research.

The "silver seed" in this publication's title refers to the very young fish (fry, or hatchlings ,and fingerlings) from which pond holders raise fish for sale or consumption. The research on which this book is based was part of a project funded by Britain's Overseas Development Administration (ODA) and carried out by the government of Bangladesh in the northwestern part of the country. The project was aimed at promoting fish pond culture in order to increase the protein in local diets, and thus to improve the situation of the poor as well as the rural economy.

By writing this book, the authors hoped to make a practical contribution as well as a contribution to methodology. The practical contribution was to evaluate the assumptions on which the project was based. The methodological contribution concerns "the ways in which the analysis of how market behaviour across wide physical space contributes to our understanding of evolving structure and culture" (p.4). For the ongoing discussion of indigenous knowledge, the methodological issue is more important by far.

The authors analyze the aquaculture market in terms of the network of actors involved in this trade: owners of hatcheries, fingerling growers, owners of ponds, fishermen, netmakers, and above all, traders. They illustrate their analyses with a number of individual cases which illuminate the roles of the different types of traders in fry, fingerlings, and fish for consumption.

The system the authors describe is in transition. Fishponds have been common as long as people can remember, but the 'seed' has traditionally been collected from the rivers. Hatcheries are now developing, but they do not yet function technically as prescribed in the international models. This is due not so much to a lack of knowledge, as to the fact that fish culture at present is only part of the household economy, and market forces are not yet in full operation.

The silver seed goes through many hands before it reaches the final ponds. The small traders are the distributors. They transport the fish by hand, travelling by train bicycle or on foot. Wholesale traders are stationary, staying in markets or railway stations.

Fish, especially hatchlings and fingerlings, are a vulnerable commodity. The travelling traders absorb most of the risk of loss. Among the actors in the system, they are also the poorest despite the fact that their clients consider them to have expert knowledge. It certainly requires skills to keep the fingerlings alive and in good condition. Moreover, the traders have better insight into what is going on in the business than the pond holders, for whom aquaculture is only a secondary occupation. Some of the pond owners produce not for the market, but for family consumption and social purposes.

The authors draw our attention to the fact that the actors in this network are related through no other ties than the network itself. They do not belong to the same local community, are not linked by ties of kinship,and do not even share the same religion. The network has its own culture: unwritten rules for behaviour, a great deal of mutual trust, and no sanctions other then the disapproval of the others.

Despite the general tendency to demand that research have practical implications, I think that the clear description of a specific market culture is the major contribution of this book. It also casts light on the human ability to make use of opportunities that a situation offers, technically as well as socially. This is an ability often overlooked by interventionists.

The book's last chapter is devoted to application. It is not the most convincing one because it is limited to the project's attempts to use the travelling traders as extension agents. This is a clear example of the influence of research results on a project's approach. It was found that the trader's knowledge was poor according to 'modern' standards, and the project gave them some training. The first results looked positive. But we would like to know more about this aspect of the project. May be it is still too early to tell how these extension workers will function over a longer period.

The traders' knowledge can rightfully be considered indigenous knowledge. It is bound to the system of fish culture as it functions at this moment. On what knowledge is the system based? How is it evolving ? What are the various actors' shares in this process ? Hopefully the authors will be in a position to do some follow-up research on the interaction between this indigenous knowledge system and the scientific or academic konwledge represented in the project. To what extent is the indigenous knowledge indeed something that can be incorporated into the scientific knowledge, and visa versa, as so many readers of the IK Moitor claim or hope is possible ?

IF a second edition is being considered, the publisher would be wise to have the entire book edited again, especially with an eye to eliminating unnecessary repetition.

Book reviewed

Lewis, David J., Geoffrey D. Wood and Rick Gregory (1996) **Trading the silver seed. Local knowledge and market moralities in aquaculture development.** 195 pp . ISBN 1-85339-342-8. f 16.95.

Published by Intermediate Technology Publications, 103-105 Southampton Row, London WCIB 4HH, UK, in association with University Press Limited, 114 Motijheel C/A, Dhaka-1000, Bangladesh.

Source: Indigenous Knowledge and Development Monitor, Vol. 5 Issue 3, December 1997.

Events just completed:

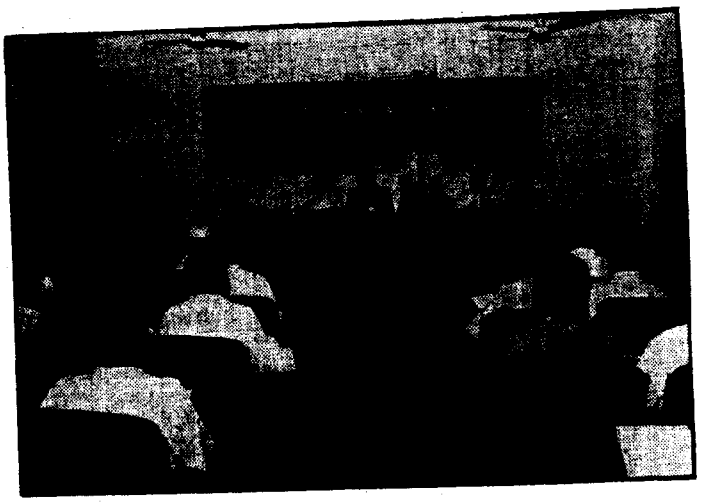
A National Workshop on " The State of Indigenous Knowledge in Bangladesh" was held on the 6 – 7, May 1998 at Dhaka, organized by Bangladesh Resource Centre for Indigenous Knowledge-BARCIK and supported by DFID – UK, the Workshop has generated a wide interest among 65 (sixty five) participants from home and abroad. Professor Paul Sillitoe, Head of the Department of Anthropology and Peter Dixon from Durham University and Mr. Julian Barr from Department of Agricultural and Environmental Sciences, New Castle University participated in the workshop.

Researchers from the Bangladesh Agricultural University- Mymensingh; Dhaka, Chittagong, Jahangirnagar, Khulna universities; Gono Biswabidhyalay, Bangladesh Agricultural Institute, Bangladesh Agricultural Research Institute (BARI), Bangladesh Agricultural Research Council (BARC), Bangladesh Rice Research Institute (BRRI), Department of Forestry, Swiss Development Cooperation (SDC), ICLARM, ITDG- Bangladesh, Association of Development Agencies in Bangladesh (ADAB), five NGOs from Khulna region, one from Mymensingh region.. two from Bogra region and seven from Dhaka region participated.

As many of 19 (nineteen) papers were presented on Indigenous Knowledge, a stakeholder analysis was conducted, the need assessment on IK research was done. A National Network on Indigenous Knowledge was initiated and elaborate conduct research and documentation on IK its adoption for sustainable development and natural resource management was planned.

Those who are interested for further information may contact

BARCIK / IARD
3/7 Block-D, Lalmatia, Dhaka # 1207
Tel: 32 36 22, Fax : 81 55 48
E-mail: iard@bdonline.com



Professor Paul Sillitoe of Durham University, UK delivering speech in the Workshop.

Coming Workshop/Conference:

"First International Conference on Indigenous Knowledge and Biodiversity of Medicinal Plants"

Dhaka (Bangladesh)
5 – 6, February 1999

The following aspects are primarily selected, suggestions are welcome:

- Present state of traditional medical system : indigenous knowledge ;
- Rural communities, herbals and traditional medicine : socio-economic issues ;
- Biodiversity ; medicinal plants ,
- IK, property right and development.

For details contact

Organizing Secretary
First International Conference on IK and
and Biodiversity of Medicinal Plants,
Department of Environmental Sciences
Gono Bishwabidhyalay
P.O.: Mirzanagar, Dhaka -1344
Tel: 880-2- 813811, Fax : 880-2- 866719
E-mail: gbidyala@citecho.net

Study on " Investigation and conservation of the plant biodiversity and ethnobiological studies in the forests of Chittagong, Chittagong Hill Tracts and Cox's Bazar"

A Biodiversity Link Project entitled "*Investigation and conservation of the plant biodiversity and ethnobiological studies in the forests of Chittagong, Chittagong Hill Tracts and Cox's Bazar*" has been established between Aberdeen University, UK and Chittagong University, Bangladesh for three years from 1 April 1997 with the following objectives:

- assessment of naturally occurring plant diversity in the forests of Cox's Bazar, Chittagong and Chittagong Hill Tracts to highlight potential sources of economic value.
- documentation of local knowledge of, traditional uses, collection, preservation, proper identification of plant specimens, biomedical investigation of locally known medicinal plants for confirmation of active chemicals against the diseases;
- to build up local expertise by overseas training in the field of biodiversity in order to promote teaching material and research activities.

Dr. CC Wilcock, Department of Plant and Soil Science, University of Aberdeen is the UK Co-ordinator and Dr. M.A Rahman, Department of Botany, University of Chittagong is the Bangladesh Co-ordinator of the project. The British Council, Dhaka is funding the project.

For more information, contact:
Professor M.A Rahman
Department of Botany
University of Chittagong, Chittagong – 4331, Bangladesh
Tel: 88 - 0 2 -62 20 46 Fax: 88 – 02 - 61 03 26.
mailto:m.a.rahman@netlink2.com

(**Source**: Biodiversity Newsletter, Vol. 1 No. 1).

Study on " *Indigenous Knowledge of Fish and Fisheries*"

The study is a part of the Community Based Fisheries Management (CBFM) project carried out by International Centre for Living Aquatic Resources (ICLARM) in cooperation with the Department of Fisheries (DoF)/Government management of Bangladesh and several NGOs, which is funded by the Ford Foundation. One of ethe objectives of the CBFM project is to develop community-based fishers management that ensures sustainable exploitation of open water fish resources as well as an equal distribution of benefits. Indigenous knowledge of fish and their ecology forms the basis for existing pattern of exploitation and is also the basis for CBFM.

Field research is carried out in two project sites : *Moisharkandi – Boronpur* is a flowing river and forms a segment of the river *Ghora Uthra* in *Mithamon* Thana under *Kishorgonj* District. The water area ranges between 75 and 200 ha. *Kali Nodi* is a flowing river throughout the year connected to the river *Meghna*. The water area varies between 800 and 1200 ha.. Both sites are freely accessible for fishing.

For information, contact: Md. Nurul Islam, Antonia Reihlen, and Paul M. Thompson
ICLARM
House # 75, Road # 7, Block – H, Banani
Dhaka # 1213, Bangladesh
Tel: 880 -2 - 87 32 50, Fax: 880 –2- 87 11 51
E-mail:iclarm@dhaka.agni.com

Bangladesh Resource Centre for Indigenous Knowledge (BARCIK)

With a view to preserve, document and for dissemination of Indigenous Knowledge in the field of agriculture, health care, environment conservation, food preparation and other development area, Bangladesh Resource Centre for Indigenous Knowledge (BARCIK) was established in April 1997 by Integrated Action Research and Development - IARD, a national level development organization. The goal of this centre is to document and disseminate indigenous knowledge and to make it available to local communities, grassroots organizations, development professionals and scientists. The BARCIK has been collecting indigenous knowledge by conducting study, developing relation to other like-minded development organizations, research institutes or individual researchers.

BARCIK has been developed for providing the following services:

- Acting as clearing house for collecting, documenting and disseminating information on agriculture, environment, medicinal plants, natural dyes, indigenous medicine, and rural development knowledge;
- Developing methodologies for recording this knowledge;
- Conducting training courses and designing materials on indigenous knowledge for development workers, extension workers and professionals;
- Publish a quarterly journal on Indigenous Knowledge in Bengali and English.

BARCIK has already been associated with globally and regionally developed resource centres like as - Centre for International Research and Advisory Networks (CIRAN)-Netherlands, Centre for Indigenous Knowledge for Agriculture and Rural Development (CIKARD)- USA, Regional Programme for the Promotion of Indigenous Knowledge in Asia (REPPIKA) - Philippines, Centre for Advanced Research on Indigenous Knowledge Systems (CARIKS) - India.

In view of the above, it needs support not only for the growth and development of BARCIK but also for the greater interest of the nature, people and the society.

For further information please contact

Sukanta Sen
Director
Integrated Action Research and Development- IARD
3/7 Block - D (Ground Floor), Lalmatia, Dhaka -1207, Bangladesh
Tel: 880-2- 32 36 22, Fax: 880-2- 81 55 48
E-mail:iard@bdonline.com