

Strengthening pro-poor management in floodplains

Validated RNRRS Output.

Policy makers are drawing heavily on new guidelines for managing floodplains that emphasise stakeholder involvement. The fierce competition for floodplain resources—land and water—means that it's critically important prevent exploitation but, at the same time, make sure that millions of poor inhabitants don't lose out. National, basin and local needs must be reconciled. The guidelines help people work through the co-management process systematically. Bangladesh is already applying co-management principles to its Inland Capture Fish Strategy. In India they are being used in the middle Ganges to reconcile fishery needs with water flow through irrigation barrages. NGOs and development agencies are among the quickest to adopt these strategies, indicating that they have great potential to make a major impact.

Project Ref: **FMSP09:**

Topic: **7. Spreading the Word: Knowledge Management & Dissemination**

Lead Organisation: **MRAG Ltd, UK**

Source: **Fish Management Science Programme**

Document Contents:

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Description

FMSP09

Research into Use

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Geographical regions included:

[Bangladesh](#), [India](#),
[Indonesia](#),

Target Audiences for this content:

[Fishers](#),

A. Description of the research output(s)

1. Working title of output or cluster of outputs.

In addition, you are free to suggest a shorter more imaginative working title/acronym of 20 words or less.

Tools for managing floodplain fisheries

2. Name of relevant RNRRS Programme(s) commissioning supporting research and also indicate other funding sources, if applicable.

Fisheries Management Science Programme (FMSP)

3. Provide relevant R numbers (and/or programme development/dissemination reference numbers covering supporting research) along with the institutional partners (with individual contact persons (if appropriate)) involved in the project activities. As with the question above, this is primarily to allow for the legacy of the RNRRS to be acknowledged during the RIUP activities.

R no	Institutional partners	Current contact persons
R8486	SCALES Inc, Barbados; International Institute for Environment and Development (IIED), UK; Aqua Sulis Ltd, UK; Centre for Natural Resource Studies (CNRS), Bangladesh; West Bengal Department of Fisheries, India; Bangladesh Centre for Advanced Studies (BCAS)	Dr Dan Hoggarth Dr Saleemul Huq Dr Ashley Halls
R8210	International Institute for Environment and Development (IIED), UK; MRAG Ltd, UK; Bangladesh Centre for Advanced Studies	Dr Saleemul Huq Dr Ashley Halls
R7917	Institute of Aquaculture, Stirling Imperial College London Natural History Museum, UK Gramin Vikhas Trust, Bangladesh Intermediate Technology Development Group, Bangladesh Research Institute for Aquaculture No 1, Bangladesh Department of Fisheries, Thailand Department of Fisheries, Cambodia Asian Institute of Technology Aquaculture Program IACR Rothamsted, UK	Dr Kai Loenzen

R7043	MRAG Ltd, UK Central Research Institute for Fisheries, Indonesia Provincial Fisheries Offices (Dinas Perikanan) of South Sumatra, Jambi and West Kalimantan provinces, Indonesia	Dr Dan Hoggarth
R6494	MRAG Ltd	Dr Ian Payne
R5953	MRAG Ltd, UK Central Research Institute for Fisheries, Indonesia Bangladesh Agricultural University, Mymensingh	Dr Dan Hoggarth Dr Ashley Halls
R5485	MRAG Ltd, UK University of Patna, India University of Garhwal, India University of Allahabad, India Bangladesh Centre for Advanced Studies	Dr Ian Payne
R5030	MRAG Ltd, UK University of Coventry, UK	Dr Ian Payne

4. Describe the RNRRS output or cluster of outputs being proposed and when was it produced? (**max. 400 words**). This requires a clear and concise description of the output(s) and the problem the output(s) aimed to address. Please incorporate and highlight (in bold) key words that would/could be used to select your output when held in a database.

Floodplain river fisheries provide a crucial livelihood asset and a source of animal protein, for many millions of farmer-fishers in South and Southeast Asia. The diversity of the floodplain environment provides many opportunities for natural resource use but also stimulates over-use and destruction when different users compete for access. Although valuable, floodplain river systems are thus highly vulnerable and in urgent need of good management.

Since 1992, the FMSP has produced a series of outputs about the management of floodplain river fisheries and the wider floodplain production system. The cluster of eight FMSP floodplains-related projects initially investigated the dynamics and management needs of the fisheries, and subsequently focussed on a number of key management options and their wide communication to key target institutes and other stakeholders.

Projects in the early to mid 1990s (R5030, R5485 and R5953) provided a baseline understanding of the ecology of floodplain river fisheries, including the impacts of **flood control** measures on fish production in the modified floodplains of Bangladesh. The research ranged from local community level issues up to the level of whole **river basin management**, using the Ganges basin with its very large numbers of poor people as an example. The knowledge from these early projects was published in 1999 as FAO Fisheries Technical Paper 384, covering the 'Why', 'What', 'Who' and 'How' of managing floodplain fisheries. This paper includes recommendations both on the alternative technical tools which may be used to manage these fisheries, and on the institutional factors required for their success. Management responsibilities are allocated both hierarchically

and spatially, and checklists are provided on the potential roles of national, catchment-level and local-level stakeholders in the management process. The guidelines also emphasize the importance of adopting participatory and **adaptive co-management** approaches.

Between 1997 and 2003, three FMSP projects then produced detailed guidelines on specific aspects of managing floodplain fisheries: on the use of **harvest reserves** or **fish sanctuaries** for sustaining fisheries production (R7043); on the benefits of **self-recruiting species** (SRS) in aquaculture and their role in rural livelihoods (R7917); and on the **integrated management of sluice gates** and water levels in modified floodplains for the benefit of fish catches as well as agriculture and flood protection (R8210).

Finally, in 2005, project R8486 synthesised the key messages from each of the above projects and promoted them using a range of communication pathways and media. The materials include PowerPoint slide shows that may be used in their current form or integrated with other materials to run a variety of **training** workshops. There are also leaflets that summarize the key messages from the projects and provide sources of further information. For Bangladesh, a range of traditional cultural media was also used to promote the messages, including pot songs, bill boards, and theatre performances. A new 6-page Managers Guide providing a concise summary of the management planning process was produced in both English and Bangla versions.

5. What is the type of output(s) being described here?
Please tick one or more of the following options.

Product	Technology	Service	Process or Methodology	Policy	Other Please specify
X			X		Management guidelines and training presentations

6. What is the main commodity (ies) upon which the output(s) focussed? Could this output be applied to other commodities, if so, please comment

The tools focus on the management of fisheries resources of floodplain river systems, as a key livelihood asset within the broad land-water interface system.

7. What production system(s) does/could the output(s) focus upon?
Please tick one or more of the following options.
Leave blank if not applicable

Semi-Arid	High potential	Hillsides	Forest-Agriculture	Peri-urban	Land water	Tropical moist forest	Cross-cutting
					X		

8. What farming system(s) does the output(s) focus upon?

Please tick one or more of the following options (see Annex B for definitions).

Leave blank if not applicable

Smallholder rainfed humid	Irrigated	Wetland rice based	Smallholder rainfed highland	Smallholder rainfed dry/cold	Dualistic	Coastal artisanal fishing	Inland fisheries	Deep sea fisheries
	X	X					X	

9. How could value be added to the output or additional constraints faced by poor people addressed by clustering this output with research outputs from other sources (RNRRS and non RNRRS)? (**max. 300 words**).

Please specify what other outputs your output(s) could be clustered. At this point you should make reference to the circulated list of RNRRS outputs for which proformas are currently being prepared.

This Output provides specific guidance on the management of floodplain river fisheries. Clearly, these resources are but one element of the wider floodplain river system, covered at a more integrated, holistic level by the Land-Water Interface programme of the NRSP. NRSP Outputs that focused on the floodplain resources of Bangladesh or India are listed in the table below. Potential also exists for linkages with other non-RNRRS floodplains research in Bangladesh and India, although this has already happened to some extent with the adoption of the Outputs in several current development projects (see Q 13).

Other FMSP Outputs relating to capture fisheries (and some related to aquaculture) may also be usefully clustered with this Output as listed below. To strengthen management procedures, the floodplain-specific guidance provided in this Output, may be combined with the more generic guidelines produced by the FMSP 'Fisheries stock assessment and management', 'Data collection...' and 'Adaptive co-management' Outputs. The 'Tools for assessing and managing fisheries in data limited situations' (ParFish approach) are also particularly relevant to a compartmentalised floodplain situation where co-management is supported.

FMSP outputs
Simple empirical models for lake and river fishery assessment (and the African Water Resources Database)
Policy relevant messages on CPR fisheries: Understanding fisheries dependent livelihoods
Climate change and fisheries
Data collection guidelines for co-managed fisheries
Fisheries stock assessment and management – A collection of tools for assessing fisheries, and simple guides to their use and to writing a management plan.
Tools for assessing and managing fisheries in data limited situations
Adaptive co-management: Supporting co-managed fisheries
Training courses in fisheries stock assessment and management

Natural Resources Systems Programme (NRSP)

Participatory action plan development

Institutional arrangements for CPR use

Integrated floodplain management

Participatory irrigation management and Participatory Technology Development

Aquaculture and Fish Genetics Research Programme

Integrated aquatic production for rural livelihoods

*Validation***B. Validation of the research output(s)****10. How** were the output(s) validated and **who** validated them?

Please provide brief description of method(s) used and consider application, replication, adaptation and/or adoption in the context of any partner organisation and user groups involved. In addressing the "who" component detail which group(s) did the validation e.g. end users, intermediary organisation, government department, aid organisation, private company etc... This section should also be used to detail, if applicable, to which social group, gender, income category the validation was applied and any increases in productivity observed during validation (max. 500 words).

Validation of the Outputs was achieved by developing, testing and adapting the various materials with developing country partners (usually fisheries departments and research organisations) in most of the different projects. With each project in the series, the strength of the collaboration with local partners evolved. In addition to working closely with the main collaborators listed under Question 3, projects have used consultation workshops to determine the demand for follow up activities, and to add local relevance and knowledge to the guidelines produced. In the most recent R8486 project, for example, the 2-day project inception workshop was attended by 48 Bangladeshi delegates. The specific communication products were subsequently prioritised at a second materials testing workshop, by a core group of project collaborators, including representatives of each of the major target institutes in Bangladesh. The various papers published in journals were also validated by independent peer-review using recognised authorities in the field.

Many of the recommended management processes, particularly those relating to co-management, have also been adopted by international agencies. This is indicated, for example, by FAO's 1999 publication of the FMSP knowledge as Fisheries Technical Paper 384; by DFID's 2004 publication of the 'Guidelines for Fisheries Management'; and by the widespread uptake of the recommendations in development projects in Bangladesh.

11. Where and when have the output(s) been validated?

Please indicate the places(s) and country(ies), any particular social group targeted and also indicate in which production system and farming system, using the options provided in questions 7 and 8 respectively, above (**max 300 words**).

For the Bangladesh inland fisheries system (which includes elements of the 'irrigated' and 'wetland-rice' based systems), the outputs of project R8486 were developed in consultation with target institutes, as described above, and further validated at a national FMSP Sponsored seminar at the Bangladesh Department of Fisheries' (DOF) Fish Fortnight, on 8 August 2005 (see R8486 Final Technical Report) The outputs from earlier projects in the series were validated using similar approaches, and during their adoption by development projects such as the DFID-funded Fourth Fisheries Project (FFP) and others.

In Indonesia, the process for the selection and management of harvest reserves, developed by project R7043, was developed and tested over a series of workshops in South Sumatra, Jambi and West Kalimantan provinces, in April 2000, with lessons learnt and adopted at each stage. The final guidelines were translated into the Indonesian language by the national collaborators, CRIFI and distributed widely in country.

The output from early project R5485 on the management options for the Ganges Basin based on a three nation survey (Nepal, India, Bangladesh), was submitted by the national partners as planning material to assist the Government of India in developing the Ganga Masterplan (1995) for amelioration and improved resource management within the whole river. It was also used as a source document for the negotiations between India and Bangladesh which led to their historic water-sharing agreement of 1997.

Current Situation

C. Current situation

12. How and by whom are the outputs currently being used? Please give a brief description (max. 250 words).

Local partners report that the Floodplains Outputs are being used by target institutes in a number of different ways, as relevant to their work. These include:

Building awareness/capacity: Governments and NGOs are using the Outputs in training, orientation and awareness-building activities for a range of stakeholders, including capacity building for staff members, and in the development of community based management plans.

Providing planning support: Users are providing technical support to agencies and projects in planning and guiding fisheries management in floodplain rivers. Most significantly, much of the Outputs have been included in the 2005 Bangladesh Inland Capture Fisheries Strategy (ICFS) that was developed by the Bangladesh Department of Fisheries (DOF) with the technical support of the

DFID FFP, and other partners. This adoption means that many future floodplain management activities of DOF should draw heavily on the FMSP floodplains Outputs as such approaches are extended from the project level to national application.

Source/baseline material: A current WWF project has consulted the team and is using the outputs in detailed work on the middle Ganges in India regarding fishery management and water flow regulation by the numerous irrigation barrages and their impact on people and environment (2006 ongoing).

Developing proposals: The Outputs are also being used in developing proposals relevant to the extension of plans for fish sanctuaries/fish harvests; integrated management of sluice gates; and general floodplain fisheries management.

13. **Where** are the outputs currently being used? As with Question 11 please indicate place(s) and countries where the outputs are being used (**max. 250 words**).

Uptake has been most significant in countries with the most sustained project activity, notably Bangladesh and Indonesia, but also more recently in the middle Ganges and West Bengal, India. The guidelines for the management of sluice gates are most applicable in Bangladesh and West Bengal, where much of the floodplain has been compartmentalised under flood control schemes.

Examples of uptake in Bangladesh are listed below:

The Department of Fisheries (DOF) has incorporated most of the Output recommendations in their new Inland Capture Fisheries Strategy (ICFS), now under implementation at a national level (see Q 22 below).

IUCN-Bangladesh include the guidelines on sluice gate/fish pass management in their training orientation program for senior officials of the Bangladesh Water Development Board (BWDB). IUCN is also currently using the Outputs in developing proposals for the management of Tanguar Haor (a Ramsar site) and Hakaluki Haor.

The Intermediate Technology Development Group (ITDG-Bangladesh) are using the Outputs on fish sanctuaries and SRS in their working districts (Jamalpur, Faridpur and Gaibandha)

The Technological Assistance for Rural Development (TARA) NGO provides training in floodplain management, partly based on the FMSP guidelines, to the staff of the Community Based Resource Management (CBRM) project of the Local Government Engineering Department (LGED) in Sunamgonj Haor area.

The Bangladesh Agricultural Research Council (BARC) strategy for supporting fisheries research to organizations includes the conservation and management of floodplain fisheries, and is currently coordinating a study on the impact assessment of fish sanctuaries/reserves being funded by DFID through the Bangladesh Fisheries Research Forum (BFRF).

In Indonesia, the series of projects raised particular awareness on the importance of harvest reserves and of adopting an 'adaptive co-management' approach for their selection and management. Since 2001, local partners report that the Directorate of Fisheries Resources (under the Directorate General of Capture Fisheries (DGCF) Department of Marine Affairs and Fisheries (DMAF) has allocated a significantly increased budget for developing improved collaborative

arrangements for inland fisheries management in several provinces, including those of the original FMSP study sites (South Sumatra, Jambi and West Kalimantan).

In West Bengal, India, the Outputs are now included in the training on flood plain management provided by the State Level Department of Fisheries Training Centre at Kalyani, Nadia. Initiatives have also started in Nadia and 24 Parganas (North) Districts to constitute sluice gate committees for integrated water management. Proposals are also being developed to support wider promotion by the West Bengal Department of Fisheries, and in the mid Ganges in India, there is also the ongoing WWF project.

14. What is the scale of current use? Indicating how quickly use was established and whether usage is still spreading (max 250 words).

As noted above, the Outputs are currently used most in those countries that hosted the original project activities, where the target institutes participated in the research and development, and have since carried on with their own promotional activities. In Bangladesh, the Outputs have been taken up by key target institutes, and applied in many local co-management initiatives within a series of development projects. The LGED is reported to have been quick to adopt floodplain fisheries management guidelines in their CBRM Project in Sunamgonj district. CNRS and its two local NGO partners have used the outputs in the UNDP-GEF funded Coastal and Wetland Biodiversity Management (CWBM) programme at Hakaluki Haor and have now been asked to prepare proposals for a further extension of 3 years (2007-09). Use of the Outputs is now poised to expand from the local to the national level, following the adoption of the new Inland Capture Fisheries Strategy (ICFS).

The pace of uptake has varied among stakeholders. ITDG reported that acceptance (adoption and practice) of the outputs at the community level (CBOs, individuals, villagers) is rather faster and higher compared to some secondary stakeholders such as in DOF, where some staff still consider commercial stocking of floodplains as the main solution. NGOs and development projects are thus generally faster in testing and adopting new knowledge than government agencies. In the long term, the successes of projects such as the FFP, the Community Based Fisheries Management 2 (CBFM2) project, and the Management of Aquatic Ecosystem through Community Husbandry (MACH) project are expected to stimulate further community level uptake, especially as this is now supported strongly at the policy level (see Q 22).

15. In your experience what programmes, platforms, policy, institutional structures exist that have assisted with the promotion and/or adoption of the output(s) proposed here and in terms of capacity strengthening what do you see as the key facts of success? (max 350 words).

The programmes and projects of international development agencies including DFID have acted as conduits for the use and uptake of research outputs, as intended by the RNRRS. The DFID-funded FFP, for example, has supported the Bangladesh DOF in its development of the new ICFS which provides policy-level support for much of the FMSP outputs (see Q 22 below). Likewise, other major projects of different government institutions, including MACH, CBFM2, CWBM and CBRM,

have incorporated the outputs into their project activities, and thus paved the way for the gradual internalization of outputs into the agencies' own long term strategies and plans.

Recent steps have also been made in Bangladesh towards policy integration among the different agencies involved directly or indirectly in floodplain fisheries management. Institutional capacity of the focal agency in fisheries is particularly important in this area. With the new ICFS, DOF has now taken the lead role in streamlining floodplain fisheries management, and in raising awareness of fisheries needs among other relevant agencies working in the agricultural and water resources sectors.

Current Promotion

D. Current promotion/uptake pathways

16. *Where* is promotion currently taking place? Please indicate for each country specified detail what promotion is taking place, by whom and indicate the scale of current promotion (max 200 words).

In 2005, project R8486 packaged and promoted the Outputs using a range of communication pathways and media, especially in DFID focus areas in Bangladesh and India. Following these recent activities, several of the local collaborators and target institutes are now continuing to promote the key messages from the cluster in their new projects and development activities. Previously, the outputs had been incorporated into the FAO and DFID publications, as indicated above, which greatly facilitated their dissemination

Most significantly in Bangladesh, the DOF have incorporated all key elements of the FMSP floodplain Outputs in their new ICFS as described in Q 22 below. DOF's proposals for implementation of the ICFS have been endorsed by the Ministry of Fisheries and Livestock (MOFL) and DOF is now developing project concept notes and contacting donors for future funding to support national level uptake and mainstreaming. Such projects will provide a strong pathway for use of the FMSP Outputs and achievement of livelihood benefits at a national scale.

Project R8486 also promoted uptake of the floodplains Outputs at a global level by the use of key fisheries websites. Electronic versions of the various management guidelines and training materials have thus been provided for free download on the FMSP Project R8486 web page (see www.fmsp.org.uk); on the STREAM website (<http://www.streaminitiative.org/Library/organizations/index.html>, scroll down to the R8486 section); and through an FMSP Floodplains 'Topic' webpage on the FAO oneFish portal (see <http://www.onefish.org/id/290438>).

17. *What are the current barriers preventing or slowing the adoption of the output(s)? Cover here institutional issues, those relating to policy, marketing, infrastructure, social exclusion etc. (max 200 words).*

In researching this question, some stakeholders observed that the attitude of the senior staff dealing with policy and planning is critical to uptake and eventual adoption. Even where positive attitudes exist among the primary stakeholders to adopt the Outputs, successful implementation also requires the support of the national government agencies, and the coordination of those agencies involved in managing different aspects of the floodplain system. To some extent, this problem is now being overcome in Bangladesh, with the recent high-level endorsement of the new Fisheries Policy.

Another important barrier reported in Bangladesh is the absence of a 'learning culture' that would promote the internalization of new knowledge. Where there is no regular communication or sharing between the different staff responsible for implementation, planning and training, for example, valuable field experiences are being lost.

18. What changes are needed to remove/reduce these barriers to adoption? This section could be used to identify perceived capacity related issues (max 200 words).

Since the main messages have now been adopted in Bangladesh and elsewhere at the policy level, the main need now is for coordinated support for implementation activities at local levels, and for capacity building within key target institutes towards this end. Government agencies in particular require training and communications assistance in order to extend these management approaches from current field sites (mostly those supported by international development projects) to other sites around the country. Assistance is now being requested for the action priorities drawn up by the Bangladesh DOF for implementation of its ICFS (see Q 22).

Where there is still a perceived need to change the attitudes of senior policy and program planners, as reported by some respondents, this could be achieved by a range of communication actions, such as round table discussion meetings, knowledge sharing, exposure visits and policy briefings.

To improve the learning culture in key agencies, it was also suggested that communication units with feedback loops should be urgently developed. Lessons learnt may thus be properly documented, internalized and incorporated into future programs. Future capacity building should emphasise communication, learning, training and process facilitation among the organizations concerned, in order to achieve better adoption of research outputs.

In the wider Asian region, and especially the Mekong where English is often limited, it has also been suggested that better uptake could be achieved by providing translations of key materials into local languages.

19. What lessons have you learnt about the best ways to get the outputs used by the largest number of poor people? (max 300 words).

These Outputs are primarily targeted at intermediary organisations and policy makers. They aim to create an enabling environment that through implementation will deliver benefits to the poor.

Whilst they have not been designed to be used directly by poor fishers, it is important that fishers participate in the management process and receive feedback on their inputs. The Outputs in this cluster all emphasise the need for participation and the development of strong institutional arrangements. Combining these Outputs with other FMSP guidelines, such as those in the Adaptive Learning cluster should further increase participation and improve results.

In the sense of getting effective management into local use, the best way to provide benefits to the largest numbers of poor people may be to encourage adoption of the basic recommendations at a national policy level, and to support the mainstreaming of such policies at relevant locations across a country, while allowing for their specific local needs. The basic approaches recommended in the FMSP guidelines have now been tested and validated by a number of large development projects in Bangladesh (e.g. FFP, CBFM2, MACH). Extension of these approaches to the many remaining floodplain areas in Bangladesh is one of the overall goals of the new Fisheries Policy, now moving into the implementation stage. Significant livelihood gains should be achieved with this step.

Impacts On Poverty

E. Impacts on poverty to date

20. Where have impact studies on poverty in relation to this output or cluster of outputs taken place? This should include any formal poverty impact studies (and it is appreciated that these will not be commonplace) and any less formal studies including any poverty mapping-type or monitoring work which allow for some analysis on impact on poverty to be made. Details of any cost-benefit analyses may also be detailed at this point. Please list studies here.

There have been a number of impact studies for the FMSP that have included individual tools in the cluster of projects that contribute to this Output:

Arthur, R.I., E. Fisher, R. Mwaipopo, X. Irz, and C. Thirtle, (2005). Fisheries Management Science Programme: An overview of developmental impact to 2005, Final Technical Report., MRAG Ltd. (www.fmsp.org.uk Search Project Database, Project R4778C; http://www.fmsp.org.uk/Documents/r4778c/R4778C_FTR.pdf;

Halls, A. S. & Arthur, R. (2006). Assessment of the Impact of the FMSP: A summary of the assessment of impact from the perspectives of key fisheries institutions and researchers. Report to the DFID, London, MRAG Ltd. http://www.fmsp.org.uk/Documents/r4778c/R4778C_Rep1.pdf;

Fisheries Management Science Programme: assessing developmental impact, Policy Brief, March 2006, http://www.fmsp.org.uk/Documents/r4778c/R4778C_Brief.pdf

21. Based on the evidence in the studies listed above, for each country detail how the poor have benefited from the application and/or adoption of the output(s) (**max. 500 words**):

- What positive impacts on livelihoods have been recorded and over what time period have these impacts been observed? These impacts should be recorded against the capital assets (human, social, natural, physical and, financial) of the livelihoods framework;
- For whom i.e. which type of person (gender, poverty group (see glossary for definitions) has there been a positive impact;
- Indicate the number of people who have realised a positive impact on their livelihood;
- Using whatever appropriate indicator was used detail what was the average percentage increase recorded

The FMSP Floodplains Outputs aimed to create an enabling environment delivering livelihood benefits through the interventions of intermediary organisations and changes in fisheries policy and management. This is necessary for fisheries because of the scale at which management decision-making is required for these common pool resource systems. The impacts of the Outputs on the livelihoods of the poor is harder to quantify in the case of capture fisheries, than for more focussed research such as in agriculture or aquaculture, where the outputs (such as new seed varieties) may be adopted directly by the target beneficiaries. Good management of floodplain fisheries can clearly contribute to ensuring that livelihoods based on these resources are sustainable. However, even where improved management is achieved, external factors may still affect the system to the extent that any measured impacts can not be attributed directly to a given management intervention, or any other single cause or event.

Partly for the above reasons, although there have been some attempts at direct impact assessments of different management interventions on floodplain fishers' livelihoods, there is no reliable quantification of the benefits. In Indonesia, FMSP Project R7043 found that fish stocks in community-managed reserves were 5-21 times more abundant, comprised up to 31 more species and were 5-6 times larger by weight, than at a nearby, unmanaged comparison site that was fished with poison in the dry season. The resulting benefits for stakeholders living in surrounding villages depend on the specific ecological conditions at each site and the current levels of fisheries exploitation.

Moving back up the potential 'impact chain', these Outputs have clearly achieved significant positive impacts in terms of changes in knowledge and attitude at the policy and management level (e.g. as measured by Knowledge-Attitude-Practice surveys conducted in Bangladesh at the start and end of project R8486). Many of the FMSP recommendations on floodplain fisheries management have now been incorporated into the new Bangladesh ICFS. The overall impact of the programme may best be assessed by comparing the current very positive strategies now in place in Bangladesh (emphasizing adaptive co-management with strong local involvement in planning, monitoring and enforcement), with the largely technical measures (especially stocking) that were being used at the start of the FMSP activities in the early and mid-1990s, often with minimal benefits for the poor. Although other donor activities have clearly been influential, the FMSP Floodplains Outputs may claim to be at least partly responsible for the new Bangladesh ICFS,

and may significantly help with its implementation.

In the other focus countries, such as Indonesia and India, similar situations exist, with notable gains in knowledge transfer and in the attitudes of policy makers and managers, but the extent of local testing and policy adoption is less advanced than in Bangladesh.

Environmental Impact

H. Environmental impact

24. *What are the direct and indirect environmental benefits related to the output(s) and their outcome(s)? (max 300 words)*

This could include direct benefits from the application of the technology or policy action with local governments or multinational agencies to create environmentally sound policies or programmes. Any supporting and appropriate evidence can be provided in the form of an annex.

Better management of floodplain fisheries should result in sustainable fish production, increased biodiversity and the maintenance of a range of ecosystem functions. There would be more and larger fish. Management measures such as habitat restoration and river reserves should have positive benefits both for the environment and fisheries production.

Where these approaches have already been put into use in Bangladesh over the last 10 years, it has been observed that local stakeholders have coped well with the environmental changes that have occurred. Correspondents report that harvest reserves have provided more fish in fishing areas, as intended. Livelihood support programs and micro-credit facilities have also been provided to assist fishers over the dry season period, where this has been used as a closed season to support fish breeding.

25. *Are there any adverse environmental impacts related to the output(s) and their outcome(s)? (max 100 words)*

It is not anticipated that better fisheries management would result in any negative environmental impacts. Of far greater risk, is the danger to the floodplain resource if improved management is *not* supported. With continued increases in human populations, the pressure on unmanaged inland fisheries resources will in turn continue to rise, leading to degraded fish stocks, extinctions of the largest and most valuable fish species, and losses in both the value of production and food security.

26. *Do the outputs increase the capacity of poor people to cope with the effects of climate change, reduce the risks of natural disasters and increase their resilience? (max 200 words)*

The FMSP has recently commissioned an evaluation of the impacts of climate change on fisheries associated livelihoods, which is the subject of a separate proforma. Climate change is anticipated to have effects on fisheries associated with particular habitat systems, including floodplains and coral reefs, and on fish migrations (e.g anchovies) associated with ocean currents that may be affected by changes in cyclical climatic events such as El Nino. Adaptive responses of communities to variable conditions and the need to build adaptive capacity to climate change are described more fully in that proforma. Better management of fisheries is a key element of building adaptive capacity. It will help build resilience into the system and help to limit the detrimental effects of climate change. Integrated management responses must be developed linking fishing departments and policy makers with risk reduction planners and disaster control agencies. These Outputs applied together will thus increase the capacity of poor people to cope with the effects of climate change, and increase their resilience. They will not, however, reduce the risks of natural disasters.
