Cascading knowledge: training fisheries trainers

RIU

Validated RNRRS Output.

Programmes to train trainers can cascade knowledge and skills through a system quickly and strengthen independence—there's no longer the need to rely on trainers from outside. So, to boost skills in fish stock assessment and fisheries management, workshops were held to develop cores of trained people. The trainee trainers also received quality training materials, such as presentations, course outlines and guides to writing fisheries management plans, to help them pass on their knowledge and skills to others. Leading national training centres—universities, and national training and research institutes—in East Africa, South East and South Asia, and the Caribbean are now using the training materials in formal courses. Plus, the materials are also widely used and spreading in grass-roots training.

Project Ref: **FMSP12:**
Topic: **7. Spreading the Word: Knowledge Management & Dissemination**
Lead Organisation: **MRAG Ltd, UK**
Source: **Fish Management Science Programme**

Document Contents:

Description

Research into Use
NR International
Park House
Bradbourne Lane
Aylesford
Kent
ME20 6SN
UK

Geographical regions included:

Cambodia, India, Kenya, Tanzania, Vietnam,

Target Audiences for this content:

Fishers,

FMSP12

A. Description of the research output(s)

1. Working title

Training courses in fisheries stock assessment and management for capacity building.

Short title: Capacity building in fisheries assessment and management

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

Fisheries Management Science Programme

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
R4778G: Training of trainers courses in fish stock assessment	MRAG Ltd; University of Nairobi, Fisheries College #4 Hanoi.	John Pearce.
R8360: Synthesis and uptake promotion of FMSP stock assessment tools and guidelines	SCALES Inc; Marine Resources Assessment Group (MRAG); College of Fisheries, Mangalore; Central Marine Fisheries Research Institute, India; Food & Agriculture Organisation, Rome (FAO)	Dr Dan Hoggarth; & Dr Chris Mees
R8468: Capacity building in the use of FMSP stock assessment tools and management guidelines	SCALES Inc; MRAG; Caribbean Regional Fisheries Mechanism (CRFM); Field Studies Council, UK; Centre for Environment Education, India; Department of Fisheries, Andhra Pradesh, India; West Bengal Department of Fisheries; Orissa Department of Fisheries	Dr Dan Hoggarth; & Dr Chris Mees

FMSP Output Proforma 'Fisheries stock assessment and management – A collection of tools and guides for assessing fisheries writing management plans' details a number of other projects that contributed to the development of the tools that form the basis of this training and capacity building material.

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.*

Fisheries stock assessment tools and **management guidelines** are the subject of a separate proforma (see Q3). The target audience for them is intermediary organisations that will, through use of the tools, develop and implement better fisheries management and **governance** that will ultimately deliver livelihood benefits. However, there is frequently a lack of capacity within those organisations that have a mandate for **fishery management**, whether a lack of experience of what is required to undertake a stock assessment or of how to use the information from an assessment to inform management. The current Output aimed to address this by **developing capacity** through regional **training programmes**, and through developing materials that can be used by local training organisations to further develop capacity. **Training of trainers courses** not only trained people in the use of FMSP stock assessment tools (Length Frequency Data Analysis, LFDA; Catch and Effort Data Analysis, CEDA; Yield software; ParFish) but also provided materials for trainers to use.

The outputs consist of:

- Tutorials related to and provided with each of the software tools (LFDA, CEDA, Yield, and ParFish); and,
- PowerPoint training materials (describing the tools, and then going step by step through how to use them, and placing them in the context of the Framework guide to the use of FMSP stock assessment tools, published by FAO in 2006 as Fisheries Technical Paper 487) for use in developing locally applicable training materials;
- The paired set of guides 'A Guide to fisheries stock assessment using the FMSP tools' and 'How to Manage a Fishery', and a set of PowerPoint training materials that accompanies them;
- Experienced and qualified training personnel to conduct training courses, workshops and training of trainers programmes.

The tutorials were developed at the same time as the software in projects between 1995 and 2005. The Powerpoint training aids were developed and refined between 2003-2005. The Framework guide to the use of the tools was developed in 2004 and the training in 'How to Write a Fishery Management Plan' and the associated guides in 2005.

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***
XX	*X*	*XX*	*X*	*X*	

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

Fisheries – inland (lakes, rivers, floodplains, reservoirs etc); coastal; and, high seas.

The training materials for the stock assessment tools are specific to fisheries. The training programme and guide to writing a management plan could be adapted and developed for managing other natural resources, but in their present form they are specific to fisheries.

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 fisher-ies***
						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**).*

To date, training courses and training materials have only been developed for certain of the FMSP software tools – LFDA, CEDA, Yield and ParFish. An interactive training course related to the Guide 'How to Manage a Fishery' was also developed in West Bengal, in parallel with the testing of the outputs. However, most other FMSP Outputs have engaged in some form of capacity building, and there is merit in further developing that material to develop a capacity building programme for fisheries management. Such a programme should include a number of learning approaches from formal training to learning by doing, with continued external support over the period of the RiUP.

Most FMSP outputs aim to create an enabling environment, developing the capacity of intermediary organisations to deliver better management that will ultimately deliver livelihood benefits to the poor. Developing local capacity that will bridge the gap between assessment and management, and can incorporate best practice relevant to the local circumstances is the best way to achieve implementation of best management practices and policies. Thus by clustering the existing Outputs with other FMSP outputs value can be added.

Outside the RNRRS, the South West Indian Ocean Fisheries Project (SWIOFP), headquartered in Kenya Marine

Fisheries Research Institute, Mombasa, plans to use FMSP stock assessment tools and requires capacity building. By linking with this Project the scope for uptake and adoption of the outputs will be increased.

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.

Directly relevant

FMSP outputs
Simple empirical models for lake and river fishery assessment
Improving policy for fisheries management; maximising potential for economic growth and poverty reduction
Vulnerability of fisheries to climate variation and options for response
Accessing fisheries information and data: a better bargaining position for the poor
Fisheries stock assessment and management – A collection of tools and guides for assessing fisheries and developing management plans
Managing fisheries with limited data: technical and participatory approaches
Adaptive co-management: Supporting co-managed fisheries
IUU and control of foreign fishing
Tools for managing floodplain fisheries
Fisheries Enhancement Decision Support Tools: EnhanceFish
Fish aggregating devices (FADs) for enhancing coastal artisanal fisheries.

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)**.*

The original stock assessment tools on which these training and capacity building materials are based were validated through adaptive research and peer review of the technical content. The tools are the subject of a separate proforma. The primary mechanism for validating the tutorial material accompanying each stock assessment tool has been through peer review of Project Outputs. These materials were also tested and adapted during a training workshop held in Pakistan in 1993. They were updated when the software was revised and placed into a Windows® format in 2002. PowerPoint training materials were developed and applied during a

training of trainers course held at the University of Nairobi in Kenya in February 2003, with participants from Kenya, Tanzania, Mauritius, Seychelles and the Maldives who were national fisheries officers, trainers and researchers, fisheries directors etc.. The final session of this course was a feedback session on the structure and content of the course, and was used to revise the training materials for a second training course held at Fisheries College #4, Hanoi, Viet Nam in June 2003, to which participants from Viet Nam, Laos and Cambodia were invited. A similar feedback session was held. A Framework guide to the use of FMSP stock assessment tools was independently developed, reviewed by FAO and others, and was then incorporated into the training materials and tested in a workshop format in Mangalore, India in 2004 and repeated in Bangladesh in 2005. ParFish software was also added to the training course and materials at that time. Demand for a simple step by step manual or guide to the use of the stock assessment tools and also to implementing management actions based on their outputs led to the development of two such guides in 2005. A one-week training session on 'How to write a fishery management plan' was held in Calcutta in August 2005, and feedback was sought.

It is the application of knowledge gained during training that will ultimately lead to impacts on productivity. The aim of the training and validation exercises therefore was not to increase fish productivity, but to increase local capacity for stock assessment and management to ultimately deliver beneficial livelihood and environmental impacts. Validation and training was applied to trainers from Universities and national fisheries education centres and research centres. End users of the stock assessment tools and guides (i.e. scientists from fishery departments, research institutes and NGOs) also participated. Capacity development directly attributed to the training and validation process occurred for 17 people from East Africa and 20 from South East Asia. 23 Indian participants and two from Bangladesh attended the Mangalore Workshop, and 28 attended the Calcutta workshop many of whom had attended that in Mangalore also. There were 13 participants at the Bangladesh training course.

*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)**.*

Validation and training was applied to trainers from Universities and national fisheries education centres and research centres, and to end users of the stock assessment tools and guides (i.e. scientists from fishery departments, research institutes and NGOs). As indicated in Q 10, validation occurred in Pakistan in 1993, in Nairobi for participants from East African countries in 2005, in Hanoi in 2003 for participants from South East Asian countries, in Mangalore in 2004 and Calcutta in 2005 for Indian and Bangladeshi participants and in Dhaka in 2005 for Bangladeshi participants.

This Output relates to the land water interface production system and is relevant to coastal artisanal fisheries, inland fisheries and deep sea fisheries.

Current Situation

C. Current situation

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

As indicated in question 10, training was provided to people from recognised training organisations, and to potential end users of the stock assessment tools and management guides that the training related to. For the former, the intention was to build training capacity and to get FMSP stock assessment and management tools incorporated into training curricula in order to generate greater capacity building over the longer term. This has indeed occurred, and training materials are currently being used by staff of universities, national training and research institutes in both formal (MSc and PhD) and informal (national ad hoc training programmes for end users) training programmes. For the 'user' group the intention was two-fold in that it was hoped that they would return home and provide training to other staff at their organisation, whilst at the same time providing exposure to the tools and training them in their use in order to encourage local adoption. For the 'user' group, use of the training outputs has been negligible, although the second objective of encouraging use of the tools has been more successful and is the subject of a separate proforma.

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).***

Training materials related to FMSP stock assessment tools are in use as follows:

East Africa: The University of Nairobi includes training in CEDA, LFDA, and Yield software within the fisheries modelling component of their MSc in Hydrobiology. The models have been included for the last three academic years. In 2004/5 there were 9 students on the course, in 2005/6 there were 3, and for 2006/7 12 students are signed up. Each year 1 or 2 Fisheries Department staff also attend the course. Also, a number of PhD students are using Yield for their studies. At undergraduate level, some of the parameters for stock assessment (e.g. growth parameters) are introduced, but not the models themselves. In Tanzania the Faculty of Aquatic Science and Technology, University of Dar Es Salaam have used the tools for teaching population dynamics in a Diploma in Fisheries for the past two years. There are 13 students this year and some from last year have gone on to work in government fisheries departments.

South East Asia: Cantho University in Vietnam has incorporated training in the FMSP stock assessment tools as a central part of a new course on fisheries management for students at the University and in Ho Chi Minh city. Over 500 students have been trained, some of whom are now at the Department of Fisheries. In Cambodia, the training materials have been translated into Khmer and used to train over 200 students over the past two years at the Prea Leap Agricultural School and within the BSc programme at the Royal University of Phnom Penh.

South Asia: In India the Central Institute of Fisheries Education and the Central Marine Fisheries Research Institute have developed training materials using these outputs. The first courses were based on the software tutorials and preceded the FMSP training of trainers courses. Subsequently more materials have been incorporated including those relating to the management guidelines. The most recent course was held in October 2006. Mangalore College of fisheries now includes the tools and management guidelines in its Fisheries Science Masters programme. The Department of Fisheries, West Bengal, India has included the software packages (CEDA, LFDA, Yield and ParFish) and the guide 'How to manage a fishery' within the syllabus of all internal

training programmes.

Caribbean: Powerpoint materials on the content and use of the FMSP stock assessment and managers guide were used at the second regional scientific meeting of the Caribbean Regional Fisheries Mechanism, held in March 2006. Copies of the guidelines were distributed at the meeting and at the annual CRFM manager's meeting (April 2006).

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

There has been uptake and use of the training materials in all of the locations targeted through the FMSP Programme except Bangladesh where use is constrained by capacity limitations, but demand and policy support for future use is high The scale of uptake is not great in terms of numbers of institutions, but those institutions that have adopted the Outputs are all significant training centres in their respective countries. Use was established immediately following the training of trainers courses run by FMSP in each case. As noted in Q 13, in India use of tutorial material relating to the stock assessment tools was taken up before FMSP had developed its own training of trainers programme. The use of the Outputs is still growing and there is a likelihood of use of the training outputs spreading as more organisations are able to use the tools (e.g. Moi University and Kenya Department of Fisheries would start training once data collection is in place). The use of the tools that the training relates to is also spreading (see Proforma 'Fisheries stock assessment and management – A collection of tools and guides for assessing fisheries developing management plans').

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).***

Regional training courses and workshops run through the Fisheries Management Science Programme have assisted with the promotion and adoption of these Outputs. Subsequent promotion by targeted training institutions has been less to do with further promotion of training materials than with promotion of stock assessment tools and management guidelines that the training relates to. The existence of already established training institutions with highly trained staff within a stable institutional environment, such as in India, has contributed significantly to the uptake of these Outputs. Substantial capacity and the necessary skill sets thus already existed to enable the rapid uptake of the training materials in some places. Feedback from this group indicated that the packaging of the tools and the training materials in a user friendly format was a significant contributory factor in their use.

In terms of capacity strengthening for existing trainers, this Output has contributed largely through the provision of materials to already high calibre staff, and by making them aware of the potential value and uses of FMSP stock assessment tools and management guidelines. In relation to the end users of the stock assessment tools and managers guides responsible for implementing fisheries management, uptake of training materials was not reported although uptake of the tools themselves occurred. The FMSP training courses built capacity amongst this group but provision of a training course alone was not adequate to build sustained capacity. This has been best achieved where there was continued exposure to the FMSP Outputs.

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).***

Questions 12 and 13 indicate where the current use of these training Outputs is occurring: India, Kenya, Tanzania, and Vietnam. In these locations, the relevant training institutions (Central Institute of Fisheries Education, Central Marine Fisheries Research Institute, University of Nairobi, Cantho University) are promoting FMSP fisheries stock assessment tools and management guidelines through annually conducted fisheries training programmes. Further promotion of training of trainers materials however potentially requires an internationally coordinated high level training programme (see Q 18).

The FMSP training Outputs are also promoted through the FMSP website (www.fmsp.org.uk Projects database, see project R8468, publications). Introductions and links to these materials have been provided on the FAO oneFish website (www.onefish.org/id/301916).

*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)**.*

Within the 'trainers' target group financial constraints were cited as a reason that training courses had not been developed by one institution, otherwise, as detailed elsewhere adoption was generally good although it has not subsequently spread.

Within the 'end user' target group a number of problems exist. Frequent movement of staff that had been trained through the FMSP capacity building programme has been significant in reducing adoption. Some of these staff were moved before they had the opportunity to pass on information, whilst others simply made colleagues aware of the training materials and tools without actively promoting them. The fact that this target group were not themselves trainers and lacked that skill set probably also explains the lack of further promotion, and suggests tailored courses are required for different categories of target audience. Furthermore, members of this group consistently indicated that subsequent follow-up training exercises and sensitisation of senior level policy makers was needed. This appears to be confirmed by the analysis relating to the fish stock assessment tools themselves, which indicated that uptake had been greatest where there was some form of continuous interaction with end users. Lack of infrastructure, particularly computing facilities can also be an obstacle for this target group.

In both the 'trainers' and 'end user' target groups, there is also commonly a lack of the basic scientific skills, particularly in quantitative data processing and analysis, that are required for effective use of any stock assessment tools. This was particularly clear at the Bangladesh 2005 training course, where few of the trainees even had experience in the use of spreadsheets for data manipulation.

User support and feedback for the stock assessment tools, since the end of the Programme, has only been possible on an ad hoc basis. Lack of external support has been cited as an impediment to further use, particularly

by individuals not involved in the initial training.

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).***

For the 'trainers' target group, additional financial resources will benefit some institutions and enable them to do more. To make uptake more widespread, an internationally coordinated capacity building programme, possibly coordinated through the RiUP would be valuable.

For the 'end user' target group, dedicated staff are required within a stable institutional environment. Capacity building must be delivered through a coordinated programme of activities, of which formal lecture room type training sessions are only a part. Continued support even at a low level has been shown to significantly increase the chances of uptake and successful adoption. Learning by doing and facilitated implementation with support through RiUP will be valuable. Mechanisms for users to share experiences and assist each other in using these outputs would also help promote uptake. A facility to provide remote user support will also help maintain uptake after the influence of the RiUP has gone. Thus encouraging a recognised international body such as FAO to adopt and support the software and tutorial and training materials is recommended. For example, these outputs could be incorporated into the FISAT suite of fisheries tools supported by FAO.

Tailored courses for different target audiences are also required. Those with a training mandate have different requirements from those who will be implementing the training that they receive. As noted above, for effective uptake in some places, the training should include a refresher course on basic fisheries science, and some development of IT skills, before starting on the FMSP tools. In others (e.g. Bangladesh) fundamental weaknesses within the national data collection and assessment systems must be addressed.

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 targeted at intermediary organisations – fisheries training institutions and those with a mandate for evaluating and managing fisheries. It is important that capacity is built amongst the latter 'end user' target group as it is through that group and participatory implementation of fisheries management that poor people will be reached. The recent decline in capacity related to fisheries resource assessments has been noted by FAO, who have also flagged a significant need for renewed efforts to develop internationally recognised capacity building programmes for fishery assessment and management. The need to find ways of maximising the capacity building of this target group has also been cited by a number of respondents during the evaluation exercise related to this proforma.

However, in order to make uptake and adoption of these outputs sustainable, it is necessary to build capacity amongst local training institutions. The increasing output of trained scientists through the various MSc and other courses in India, Kenya and Vietnam, and in future elsewhere too, will be taken up within the 'end user group'. In this way, future sustainable impacts upon the poor are more likely to be achieved.

Another way to increase the potential for reaching large numbers of poor people is through linkages with ongoing projects and programmes that may utilise the outputs, such as SWIOFP, the Sustainable Fisheries Livelihoods

Programme in West Africa, and through FAO or WorldFish Programmes in Africa and Asia.

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

Arthur, R., A. Halls and C. Mees, 2006, Impact of fisheries management science: Experience from DFID's Fisheries Management Science Programme. *Paper 235 IIFET Conference Proceedings*, IIFET, Portsmouth, July 2006. (Abstract appended)

The following paper is not an impact assessment per se, but outlines lessons learnt on delivering FMSP research that can lead to impact.

Mees, C. and R. Arthur, 2006, Fisheries Management Research And The MDGs: Past Experience And Future Vision *Paper 236 IIFET Conference Proceedings*, IIFET, Portsmouth, July 2006. (Abstract appended)

FMSP annual reports also provide some information on impacts, and since 2004 a specific impact assessment questionnaire was sent to project leaders in addition to other annual reporting requirements. Responses to those questionnaires have been incorporated into annual reports and into the above impact studies.

LTS International (2005) Evaluation of DFID renewable Natural Resources Research strategy, DFID London, See Annex 10 Chapter 2: http://www.dfid.gov.uk/research/renewable-natural-resources.asp

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*

This Output aims to create an enabling environment delivering livelihood benefits through the interventions of intermediary organisations and changes in policy and management of fisheries. Arthur et al (2006) indicate that for 'enabling' Outputs the measurement of direct poverty impacts will be complex and that it is necessary to look at the chain of events required to bring about change in people's livelihoods and at the impacts achieved at different stages in that chain. In particular this type of enabling Output seeks to build capacity of intermediary organisations to ultimately deliver benefits to the poor. As described elsewhere these Outputs have contributed significantly to capacity building in Africa and Asia and have been used by intermediary organisations to good effect (Q12-14).

Capacity development directly attributed to the training and validation process occurred for 17 people from East Africa, 20 from South East Asia, more than 28 in India and 13 from Bangladesh. This has resulted in use of the tools (Q13) in training programmes in Africa and Asia over the past three years to train over 700 people.

In Kenya at the University of Nairobi in 2004/5 there were 9 students on the course, in 2005/6 there were 3, and for 2006/7 12 students are signed up. Each year 1 or 2 Fisheries Department staff also attend the course. In Tanzania University of Dar Es Salaam trained 13 students this year and some from last year have gone on to work in government fisheries departments.

Cantho University in Vietnam has trained over 500 students with FMSP tools, some of whom are now at the Department of Fisheries. In Cambodia, the training materials have been translated into Khmer and used to train over 200 students over the past two years at the Prea Leap Agricultural School and within the BSc programme at the Royal University of Phnom Penh.

In India the Central Institute of Fisheries Education and the Central Marine Fisheries Research Institute, Mangalore College of Fisheries and the Department of Fisheries, West Bengal, India all provide training in the use of FMSP tools and Management Guidelines for training current and future fisheries staff.

At all these locations application of the knowledge gained by should ultimately lead to better resource management with positive livelihood impacts.

Halls and Arthur (2006) also indicated that FMSP has successfully transferred knowledge to target groups achieving adoption. They note the 'very significant impact' (of the FMSP) on the capacity of both institutions and

individual researchers to achieve or contribute to developmental impact' and it is especially here that these Outputs are important. This was cited not only by national fisheries organisations, but also by international bodies such as FAO and WorldFish Centre specifically for these Outputs.

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 fisheries following capacity building will result in sustainable fish production and increased biodiversity. There will be more and larger fish. It will prevent the negative environmental impacts associated with not adequately managing a fishery such as over-fishing, loss of biodiversity, extinctions and stock collapse, and loss of habitat. Wider beneficial environmental impacts related to preventing habitat destruction associated with inappropriate fishing methods will also occur. Depending on the management mechanisms adopted, habitat restoration may occur, or there may be river reserves (sanctuaries) or marine protected areas that can have both positive environmental impacts and fisheries benefits. Integrated management approaches can also bring wider environmental benefits such us mangrove forest restoration and management which may provide more nursery habitat for many reef associated species.

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

It is not anticipated that training courses related to better fisheries management would result in any negative environmental impacts.

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 undertaken 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, such as floodplains or 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.

Annex

ABSTRACTS

Arthur, R., A. Halls and C. Mees, 2006, Impact of fisheries management science: Experience from DFID's Fisheries Management Science Programme. *Paper 235 IIFET Conference Proceedings*, IIFET, Portsmouth, July 2006.

A central objective for UK Department for International Development (DFID) funded research on renewable natural resource systems has been that the research commissioned results in significant positive developmental impacts. This paper describes the outcomes of activities employed by the DFID funded Fisheries Management Science Programme to assess the developmental impact of fisheries management research achieved by projects commissioned under the Programme during the last 11 years. Fisheries pose a particular challenge for the attribution of impacts. A variety of approaches to impact assessment are required, as the systems are characteristically complex, dynamic and heterogeneous. Typically fishery systems operate across multiple scales, involving a wide range of stakeholders with different, and sometimes conflicting, objectives. Fisheries management, usually faced with multiple uncertainties about the system and its dynamics, has to occur at a scale that accounts for both the biophysical scale of the resource and the scale at which there exists the capacity and capability to manage. The paper will illustrate some of the impacts that have been achieved and highlight some of the lessons learned regarding uptake, adoption and impact assessment that should be of interest to researchers and those funding developmental research.

Mees, C. and R. Arthur, 2006, Fisheries Management Research And The MDGs: Past Experience And Future Vision Paper 236 IIFET Conference Proceedings, IIFET, Portsmouth, July 2006.

This paper examines the eleven year Department for International Development funded Fisheries Management Science Programme as a model to explore how fisheries management science can contribute to achieving the Millennium Development Goals. It describes how the Programme strategy was able to adapt to a changing policy environment and local needs and demands for research in order to achieve these goals. It describes a research portfolio that addresses a number of themes contributing to achieving ecologically and economically sustainable fisheries that can support and maintain fisheries associated livelihoods. These themes include policy information required to support fisheries; the information systems needed to involve fishers, particularly the poor, in the co-management of fishery resources; fisheries assessment methods and how these can be integrated within pro-poor capture fisheries management strategies; and, the role that enhancement fisheries can play in poverty alleviation. The paper concludes by highlighting what more needs to be done, building on the achievements of the FMSP, and outlining a vision for the future, getting research into use.
