Managing fisheries when there's not much data

RIU

Validated RNRRS Output.

Tapping into fishers' knowledge opens the door to a wealth of data. This is invaluable in fisheries where there may be very little information or no records at all. As new fisheries are still being discovered in less-developed countries—and there's very little information about many existing fisheries—asking fishers to share their knowledge helps managers quickly weigh up the state of a fishery. In Namibia, Zanzibar, the Galapagos, Kenya, India, Gabon, Sri Lanka, Tanzania and the Seychelles fishers have shared important information with scientists, managers and stakeholders and helped develop plans for fisheries. Namibia, St Helena and Tonga have adopted precautionary management based on fishers' knowledge, and the US Virgin Islands, Puerto Rico, Trinidad and Tobago are planning to adopt this approach too.

Project Ref: **FMSP06:**
Topic: **7. Spreading the Word: Knowledge Management & Dissemination**
Lead Organisation: **MRAG Ltd, UK**
Source: **Fish Management Science Programme**

Document Contents:

Description

FMSP06

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

Geographical regions included:

Caribbean, Ecuador, Gabon, India, Kenya, Namibia, Oceania, Seychelles, Sri Lanka, Tanzania, Tonga, Turks & Caicos Islands,

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.

Full title: Managing fisheries with limited data: technical and participatory approaches

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.

R6437 – Management Strategies for New or Lightly Exploited Fisheries

Imperial College, London (Dr Murdoch McAllister and the late Dr Geoff Kirkwood)
Renewable Resources Assessment Group

Paul A. H. Medley, Dr. - Fisheries Scientist (Independent)
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Namibian Ministry of Fisheries and Marine Resources
P O Box 13355 Windhoek Namibia

Tongan Ministry for Fisheries
P.O. Box 871, Sopu, Nuku'alofa, Tonga

R7947 - Integrated fisheries management using Bayesian multi-criterion decision making

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R8397 – Uptake of Participatory Fisheries Stock Assessment (PFSA) Toolkit

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R8464 - Application and promotion of FMSP Participatory Fisheries Stock Assessment (ParFish)

As for R8397, and

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Government of Andhra Pradesh, India
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United Fishermen's Association (B.L.Narasimha Raju, General Secretary)
Boddu China Venkatayapalem-533461, East Godavari District (AP), India
Tel: +91 9390209023;

CORDIO East Africa (Dr David Obura)
8 Kibaki Flats, Kenyatta Beach, Bamburi Beach, P.O.BOX 10135 Mombasa, Kenya
Tel: +254-41-548 6473 Fax: +254-41-548 6473 Email: dobura@cordio.info

Wildlife Conservation Society (Dr Richard Parnell)
BP 7847, Libreville, Gabon
Tel: +241 53 99 95 Email: rparnell@wcs.org

UN Food and Agriculture Organization (Kevern Cochrane)
Viale delle Caracalla, 00100 Rome, Italy
Email: Kevern.Cochrane@fao.org

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.*

For many **developing country fisheries**, little data is available upon which **management decisions** can be based. For **sustainable management**, there is therefore a need for methods to inform decisions about what management measures and **targets** for effort levels and yields should be adopted. For both commercial and **small-scale fisheries**, appropriate **precautionary management** is required to prevent or address the over-exploitation of a potentially valuable, sustainable fishery, and that takes into account the social, biological and economic aspects of the fishery.

This cluster includes two main products, both of which are aimed at fisheries that have limited data available for conducting conventional stock assessments:

- Management strategies for new or lightly exploited fisheries in developing countries ('Precautionary management methods'); and,
- Participatory Fisheries Stock Assessment (ParFish).

Precautionary management methods:
Methods for stock assessment that can be used with new or lightly exploited fisheries for which minimal data are available were developed over the period 1996 – 1999. These methods are based on Bayesian rather than frequentist statistical approaches to stock assessment, where uncertainties are dealt with using decision analysis. This allows **management targets** to be set, even when little data are available, and for management to proceed on a precautionary basis. It also enables the possible effects of different management and monitoring strategies to be explored and evaluated.

ParFish:
ParFish is a new approach to **stock assessment** that was developed over the period 2000 – 2005. **Small-scale and multispecies fisheries** play a vital role in the **livelihoods** of millions of people, predominantly in developing countries. **Information** is key to sound management and policy making, but limited resources results in a lack of information concerning these **fisheries**. ParFish is a tool that enables **management recommendations** to be identified quickly, based on an initial stock assessment, even where no previous data exist. It addresses many of the problems associated with stock assessments for small-scale fisheries and supports **co-management**.

ParFish is based on conventional models, but does not require long time series of data, using instead Bayesian Statistics to incorporate **fishers' knowledge** on the resource, which is collected through structured **interviews**, and provides a starting point for the stock assessment. Where long-term **catch and effort data** exist, they can be incorporated with interview data and fishing experiment data

An initial assessment can be carried out quickly through the use of **rapid data collection techniques**, and the **participatory process** that surrounds the data collection and stock assessment supports co-management by bringing together fishers, scientists, managers and other stakeholders in a dialogue for learning, management planning and implementation that supports more effective resource

management.

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*		*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

The main commodities that these outputs are focussed are capture fishery resources. This includes coastal, inland and deep sea fish stocks, including fish, crustaceans and shell-fish.

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 fishing***	***Deep sea fishing***
						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.

Value could be added to these outputs by clustering them with other outputs that focus on governance issues in natural resource management. In particular, for 'management strategies for new or lightly exploited fisheries', relevant issues are precautionary management, good governance and tackling illegal, unreported and unregulated (IUU) fishing. For ParFish, issues surrounding decentralised management, participation and governance for natural resource management are highly relevant.

Management strategies for new or lightly exploited fisheries in developing countries could be clustered with the following FMSP outputs:

- Fisheries stock assessment and management – A collection of tools and guides for assessing fisheries and developing management plans;
- Control of Foreign Fishing to provide economic benefits to developing coastal states;
- Improving policy for fisheries management; maximising potential for economic growth and poverty reduction.

ParFish could be clustered with:

- FMSP cluster Fisheries stock assessment and management – A collection of tools and guides for assessing fisheries and developing management plans;
- FMSP cluster Improving policy for fisheries management; maximising potential for economic growth and poverty reduction;
- FMSP cluster Adaptive co-management: Supporting co-managed fisheries;
- FMSP cluster Participatory fisheries monitoring: transparency, sustainability and empowerment;
- NRSP Cluster Improving NRM through CBM – PAPD;
- NRSP Cluster Institutions for pro-poor livelihoods in ICZM;
- NRSP Cluster Public governance mechanisms for NRM;

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)**.*

Precautionary management methods:

The precautionary management methods were developed through a theoretical phase which developed the Bayesian statistical methods. These methods were tested and validated through two case studies: a newly discovered orange roughy fishery in Namibia and the Tongan seamount fishery for snappers and groupers. In the former, validation was carried out by scientists from Imperial College and counterparts in the Namibian Ministry of Fisheries and Marine Resources. Alternative fishery development strategies were evaluated and the results presented to the Namibian Deepwater Fisheries Working Group, forming the primary basis for formulation of scientific advice to the Ministry of Fisheries and Marine Resources. In the Tongan example, a detailed spatial model of the fish stocks, commercial and artisanal fleets and

fishing tactics was developed, and the expected outcomes of different management options were assessed. Validation was carried out using data from the Department of Fisheries and involved fisheries officers in workshops.

ParFish:

In Turks and Caicos, validation was carried out by comparing a stock assessment based on ParFish fisher interviews with one based on the excellent catch-effort data set available for this fishery. A retrospective analysis was carried out which simulated applying ParFish recommendations to the stock size in 1976 and predicted what the outcome on the fishery would have been. The conclusion was if the recommended quota (based only on fisher interviews) had been applied in 1976, then the overfishing of the conch stock that occurred in the 1980s would have been avoided. This would have avoided the drop in export earnings and the reduced income for the fishers. Validation was carried out by the MRAG team in partnership with the Department for the Environment and Coastal Resources, TCI.

The approach was also validated by implementing the process for coral reef fisheries in Zanzibar. Interviews and a fishing experiment were carried out and data were analysed using the software. These indicated that there was a chance the stock was overfished, although there was considerable uncertainty. Meetings and workshops were held with fishers and other stakeholders to discuss the results. The process was very successful in bringing together the different stakeholder groups, building up a dialogue and initiating discussion of precautionary management options. Testing was carried out with the Institute of Marine Science (intermediary and target organisation as well as end user), the Zanzibar Department of Fisheries (government department and end user), MRAG (private company), fishers (end users and beneficiaries) and other local researchers and fishery officers. The social group to which the product was applied was fisher communities, which may include poor people living in remote areas, moderate poor, assetless (or near assetless) households in rural areas.

Validation was carried out on a mud crab fishery in Andhra Pradesh, India, by the State Institute for Fisheries Technology (government department, target institution and end user), the State Department of Fisheries (government department, target institution and end user), MRAG, United Fishermens Association (grass-roots organisation) and the fishers (end users and beneficiaries). The value of the participatory approach was again demonstrated, but there was no comparable stock assessment with which results could be compared.

*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)**.*

Precautionary management methods:

In Namibia, the outputs were validated during 1997-1999 for the orange roughy fishery. The production system involved was deep sea fishing. No particular social group was targeted but the management

recommendations would be applicable to the (commercial) fishing vessels targeting the orange roughy fishery.

In Tonga, the outputs were validated during the period 1996 – 1999. The production system involved was deep sea fishing for a seamount fishery for primarily snappers and groupers. The validation was carried out mainly with the Tongan Department of Fisheries as the project was enabling, aiming to build capacity for better management in a fishery that involves both commercial and artisanal fishers.

The outputs were also used to inform fisheries negotiations for St Helena and associated dependencies during 1998-1999.

ParFish:
ParFish has been tested and validated in the following places:

Turks and Caicos: conch fishery on South Caicos, Turks and Caicos Islands in July, 2003.
Social group targeted: fishing community on South Caicos.
Production system: coastal artisanal fishing.

In Zanzibar, Tanzania (2003-2005),
Zanzibar: coastal reef fisheries (fringing and patch reefs) in Kizimkazi, south-west Unguja Island. 2003 – 2005.
Social group targeted: fishing communities (occupational group)
Production system: coastal artisanal fishing (coral reefs)

India: mud crab fishery in Coringa mangroves, East Godavari District, Andhra Pradesh. 2005.
Social group targeted: mud crab fishers (occupational group). Most are assetless or near assetless households in a rural area.
Production system: coastal artisanal fishing (mangroves).

Case studies have also been carried out in Kenya and Gabon (2005-2006).

Current Situation

C. Current situation

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

Precautionary management methods:
The methods were adopted and continue to inform management in the Namibian orange roughy fishery where they are used by the Ministry of Fisheries and Marine Resources. Involvement in the development and use of the assessment methods has developed capacity in Bayesian assessment

techniques amongst Namibian scientists, who are able to perform the stock assessments independently. Namibia currently has precautionary management for orange roughy.

In practice, the methods have had a major impact on the approaches adopted during a recently completed EC-funded project carried out jointly by MRAG and Italian and Icelandic research institutes (FAIR-CT95-0561 'Innovative integrated bioeconomic models for the management of multi-species multi-gear fisheries').

Academic papers published on the methods have been regularly cited, suggesting the outputs remain relevant to fisheries assessment and continue to be useful to those conducting assessments and managing fisheries.

ParFish:
ParFish is currently being used for participatory stock assessment to involve fishers and inform management by:
Fisheries research institutes (Institute of Marine Sciences, Zanzibar; Charles Darwin Research Station, Galapagos),
National departments of fisheries (Department of Fisheries, Kenya; West Bengal State Department of Fisheries, India),
NGOs (Wildlife Conservation Society (WCS) Gabon),
Universities (Mangalore Fisheries College, India; University of Kelaniya, Sri Lanka; University of Newcastle, UK - Seychelles)

ParFish has also been incorporated into training courses for stock assessment and to illustrate how various aspects of fisheries assessment can be applied and simplified to obtain management recommendations (Rhodes University, South Africa, Honours course in Fisheries Science, and Cantho University, Vietnam).

*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).***

Precautionary management methods:

These are currently being used in Namibia and have informed management in St Helena and Tonga.

ParFish:

ParFish is currently being used in a number of countries:

- Zanzibar and Mafia Island Marine Park, Tanzania (Institute for Marine Sciences, Tanzania) to carry out a stock assessment that involves fishers in a participatory manner and informs management;
- Marine Conservation and Investigation Area (BIOMAR), Galapagos (Charles Darwin Research Station), to complement scientific evaluations that have been carried out over the years, and to develop a fisheries management plan through a participatory process;

- Diani, Kenya (Department of Fisheries supported by CORDIO East Africa), to involve fishers in the management process and discussion of management options through a participatory stock assessment process;
- Gabon (Wildlife Conservation Society), with a group of net fishers to obtain information to support management;
- Mangalore, India, (Fisheries College), with coastal fishers;
- West Bengal, India (State Department of Fisheries);
- Sri Lanka (University of Kelaniya), for a reservoir fishery;
- Seychelles (PhD student) for research on the use of fishers' knowledge in management;
- Planned for use in a lobster stock assessment in US Virgin Islands, and a deep water snapper fishery in Puerto Rico;
- The Department of Fisheries in Trinidad and Tobago have made provision for implementing ParFish in their budget, and are waiting for the funds to come through.

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

Use of the precautionary management methods is currently localised, although there is potential for use to spread. Although many fisheries are over-exploited, lightly exploited fisheries do exist and new fisheries continue to be found, many in the waters of less-developed countries. Even heavily exploited fisheries often lack data for management and these methods can contribute to their management.

ParFish use is currently spread across three continents (Asia, Africa and Americas (Caribbean)), although in each place its use is localised, focussed on a specific artisanal fishery. Use has been established in these places over the course of the last two years, following on from testing and promotional work that was carried out during 2003 and 2004 (testing) and 2005 (testing and promotion). There has been widespread interest in the approach, with over 250 separate downloads of the software from the FMSP website alone, and a further 75 hard copies of the manuals and software being distributed. However, this has not yet translated into widespread use because many people have not had time in their existing workloads to follow it up. There is still considerable potential for usage of ParFish to spread, based on the interest that has been demonstrated by organisations such as the Marine Stewardship Council (in relation to certification of small-scale fisheries in developing countries), FAO (in relation to their strategy for improving the information on the status and trends of small-scale fisheries) and in-country target institutions such as the Tanzanian Fisheries Research Institute (TAFIRI) and the Faculty for Aquatic Science and Technology (FAST) in Tanzania. The general trend towards participatory and co-management of fisheries across the world also supports the argument that usage, uptake and adoption has great potential, as tools which support this process on a practical level will be required.

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).***

Precautionary management methods

Adoption of the precautionary management methods and stock assessment techniques was facilitated in Namibia by long-term investment by the Government in developing human resources capacity in the fisheries sector. Thus, relatively well-qualified and trained scientists were available to collaborate in implementing the methods, and subsequently adopted them independently. Because these methods are fairly complex, they require a level of understanding of stock assessment theory and approaches before they can be used by fisheries management and research institutes. In Tonga, initial capacity was much lower, making the uptake and adoption process more difficult. The key to successful uptake is long-term support and follow-up, to promote the methods and provide ongoing support for potential users.

ParFish

Development of a range of communication materials such as flyers, policy briefs and summary documents and their distribution through various channels (internet, email, hard copies, workshops and through personal contacts) has been successful in raising awareness of ParFish. Specific platforms that have been utilised for promotion include the WIOMSA newsletters; Fisheries Management Science Programme website; www.eldis.org; TECA website, DFID's Research for Development website and FAO's onefish and Participation websites.

Capacity building and sharing of experiences have been identified as essential for its uptake and adoption. A good example is the experience of IMS in Zanzibar. IMS was involved in developing the questionnaire and other data collection methodologies, they worked alongside the MRAG researchers, who were developing the approach, and facilitated workshops and coordinated all activities with the fishers. This long-term training and practical experience helped build IMS's capacity, confidence and understanding of the approach. Furthermore, a visit by Dr Jiddawi from IMS to a ParFish training workshop in India, where Indian fishery officers presented their experiences of applying ParFish, was also very important in building this capacity, putting Dr Jiddawi in contact with others that had used the approach. IMS has the ability to apply the technique without intervention from the original researchers; most others still require support for the software, which is technically the most difficult part.

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).***

Precautionary management methods:

Currently being promoted on the FMSP and TECA (Technologies for Agriculture) websites. Scientific papers that have been peer-reviewed and published continue to promote the methods and have been regularly cited in the academic literature. The methods will also be published as part of FAO Fisheries Technical Paper 487, 'Stock Assessment for Fishery Management: A Framework Guide to the use of the

FMSP Stock Assessment Tools'. This will be distributed in hard copy to over 3,000 individuals in Ministries and Departments of Fisheries, and will be available in PDF on the FAO website.

ParFish:

In the **Caribbean**, promotion is taking place through personal contacts and via regional fisheries meetings. In **Tanzania**, IMS have distributed flyers to colleagues in other departments and organisations. They respond to queries about ParFish and continue to promote it. In **India**, ParFish is being promoted through the organisations that are using and testing the approach. ParFish is also being promoted generally on a non-country-specific basis, through **word of mouth and personal contacts** and also through a number of **websites**:

TECA: Technologies for Agriculture – Proven technologies for smallholders – an FAO initiative that aims at improving access to information and knowledge about available proven technologies.
www.research4development.org – a website promoting DFID-funded research successes.
FMSP website www.fmsp.org.uk – which promotes the research products that were developed under the FMSP programme.
www.eldis.org – 'the gateway to development information' which promotes a range of manuals and toolkits.
www.onefish.org – a gateway to fisheries information. ParFish has had 817 hits since October 2004.
www.frameweb.org – knowledge sharing for the Natural Resource Community (funded by USAID).
http://www.infosysplus.org – The European Information System on Agricultural Research for Development).

ParFish is also included as a chapter in the FAO Fisheries Technical Paper No 487 and included in the FMSP co-management policy brief.

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)****.*

Precautionary management methods:
The main barrier preventing the adoption of this output is that, because the method is relatively complex, it requires well-trained people with a good understanding of stock assessment approaches. The lack of capacity in this area amongst fisheries department staff in many developing countries therefore makes its adoption difficult. Fisheries management arrangements also need to have clear objectives in place and a process that enables management measures to be revised in response to recommendations from the stock assessments and precautionary management put in place.

ParFish:
The main barriers preventing or slowing the adoption of ParFish are:

- Whilst awareness of ParFish has been raised in general, in some regions there is still a lack of awareness amongst possible target institutions;
- Lack of interest from policy makers in establishing effective management arrangements for small-

scale fisheries and investment for data collection for stock assessments of these fisheries;

- Reticence on the part of fishery officers or researchers to implement a new methodology which has a limited number of examples of where it has been implemented. Published examples are needed that demonstrate ParFish has been used and has worked in other situations;
- Lack of a 'critical mass' of users to share experiences of implementing ParFish and provide examples of its usefulness;
- Lack of capacity amongst target institutions in terms of financial resources and technical knowledge of stock assessment for analysing the data and interpreting the results.

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).***

In order to foster a better common understanding of the benefits of well managed fisheries and the costs of not managing them, this there is a need for raising both public and fisher awareness and to sensitise policy makers to the issues.

Precautionary management methods:
Capacity-building in stock assessment of fisheries department or research institute staff is important. The techniques are relatively complex and require a good understanding of the issues at hand to be able to carry out stock assessments. Training must be followed up with even low level but regular external support until stock assessment tools and management processes are embedded.

ParFish:
Fisheries and rural development policies need to be supportive of co-management and resource users' involvement in the management process and recognise the importance of small-scale fisheries. This is already happening to a some degree, but needs effective translation into practice.

Implementation of one or more case studies over a sufficient time-frame to follow the process through to implementing management measures would provide demonstration cases as evidence that the approach has been used and works in various situations. One should be for a fishery with good existing stock assessment data, so that ParFish can be compared with conventional stock assessment results. It is important that the robustness of ParFish is proven for wider adoption.

Develop Centres of Excellence (CoEs) to support its implementation: This process has begun with IMS in Zanzibar, which can serve as a resource centre for applying ParFish in Eastern Africa. CRFM and the Secretariat of the Pacific Community (SPC) could also be such Centres in the Caribbean and Pacific, respectively. Other institutions could be identified and trained to provide CoEs for Asia and West Africa.

Increase capacity of target end users (fisheries or NGO staff): There is already a high degree of interest in the approach, but potential users need a more detailed introduction to ParFish, to give them the confidence to put it into practice. This could be done: (i) through meetings at a regional level, bringing together people from different institutions and departments in a two-day seminar; (ii) through specific training workshops; or (iii) through case studies in collaboration with developing country

institutions, so they receive training 'on-the-job'.

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).***

It is important to improve understanding among decision-makers of the benefits of stock assessment for fisheries management. Both Precautionary management methods and, to a lesser extent, ParFish, are enabling technologies and require implementation by intermediary organisations to have an impact on poor people.

ParFish provides an opportunity to deal with conflicts and generate agreed actions which may not be obtained in other ways. By integrating the scientific part (stock assessment) of fisheries management into the co-management process, ParFish provides a better chance of long term sustainability which co-management alone cannot.

It is necessary to make stock assessment, the most difficult area of fisheries management for managers to understand, more accessible. ParFish goes some way towards this by addressing how the scientific concepts are communicated and understood among fishers, managers and scientists. This requires on-going development. Once there is a common understanding of such issues such as "overfishing" and "uncertainty", it is more likely that appropriate management actions will follow where there is co-operation within a community and a supportive external environment. Since ParFish generally needs the intervention of an intermediary organisation, such as the Department of Fisheries or an NGO, getting the outputs used by poor people usually requires these institutions to adopt the approach.

Uptake will improve if there are more obvious and direct benefit to fishers in developing access to markets and improved prices for fish products. Small-scale fisheries in developing countries often have difficulty getting certified due to the lack of stock assessment information. By integrating stock assessment with the co-management approach, ParFish can support fisheries' claims of sustainability and thereby potentially increase market access.

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.

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;

Walmsley, S.F., Medley, P.A.H. & Howard, C.A. (2005) Application and promotion of FMSP Participatory Fisheries Stock Assessment (ParFish). Final Technical Report. London, MRAG.

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*

Precautionary management methods:
In Namibia, application of these outputs and implementation of a precautionary approach to management of the orange roughy fishery is believed to have contributed to the development of a sustainable fishery that contributes to employment and revenue in Namibia. Although direct impacts on poor people are difficult to assess, fisheries is the second most important sector to the Namibian economy after mining, and a proportion of the revenues from fisheries are put into a social fund for education and health clinics across the country. The policy of 'Namibianisation' of the fisheries, where licences are given preferentially to newcomers to the fisheries, and to Namibian-owned companies, has increased national participation in the fisheries and contributed to poverty reduction. The development of on-shore processing provides about half of the 14,220 jobs in fisheries in the country.

In Tonga, direct impacts from the methods are not known, but the recommendations arising from the model included restriction of commercial fishing on the seamounts primarily exploited by the artisanal fleet, to reduce the probability of over-exploitation of the seamounts on which the artisanal fishers depend.

ParFish:
Positive impacts on livelihoods of fishers and fishing communities have been realised in Zanzibar, Tanzania, through participatory management of fishery resources:

- Human resources increased through knowledge about fish stock behaviour and fisheries management, and empowerment through their engagement in the management process;

- Social resources increased through mobilisation of fisher groups, helping their opinions to be taken into account;
- Potential for improved sustainability of natural resources through improved fishery management and thus maintenance of the livelihoods of people dependent on them;
- Potential for sustainability of financial resources through income from fishing in the future as a result of management maintaining fish stocks.

Also benefits have been realised by institutions involved IMS and Zanzibar Department of Fisheries, in particular relating to an increase in capacity, particularly in IMS.

One of the key positive impacts is the improved relationship and cooperation that the institutions now have with the fishers. It has opened up dialogue between them, there is more communication and the relationship between them has improved. This has knock-on effects to other lines of work with the fishers and discussions about management issues continue.

It is too early to detail any percentage increases in particular indicators, as changes in management need to be implemented, and then take time to have an impact on catch rates and incomes.

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.

The application of these technologies is expected to bring environmental benefits from sustainable exploitation of fishery resources, and avoid negative environmental impacts that arise from over-fishing: stock depletion, collapse and associated impacts on the wider ecosystem.

Sustainable exploitation of fishery resources means that the social and economic benefits derived from them, such as food security, employment and income, can be maintained for years to come.

In the case of ParFish, the fishing experiment that is conducted by fishers demonstrates that they can have an impact on the stock and have the capability to over-fish it. This can raise their awareness of the importance of management and controlling effort in order to sustain their catches in the long term.

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

100 words)

It is not anticipated that the application of these outputs would result in any negative environmental impacts. One part of the ParFish methodology includes a fishing experiment which involves fishing down a small area of the fishery over a period of a few days. However, guidance is provided to ensure that this is not irreversible and in tests, the area has been repopulated with fish through immigration in a matter of days. In fact, this exercise may serve to benefit the environment, as it raises fishers' awareness of the impacts they have on the environment.

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 cluster. Better management of fisheries is a key element of building adaptive capacity. ParFish, by establishing a management framework that involves resource users and is adaptive, can 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.