

Lessening risks for fishers in climate-change hot spots

RIU

Validated RNRRS Output.

A new approach pinpoints places where climate change is likely to affect fisheries most. As well as fishers' lives, climate change will affect trade, economies and jobs. 'Vulnerability mapping', as it is called, alerts people to climate-change hot spots where action is urgently needed. Communities can use this approach to help prepare for climate change. Fishing groups in Malawi have now included migration and other ways to adapt to climate change in their plans. Benin, Malawi, South Africa, Cambodia, Indonesia, Malaysia, the Philippines, Brazil, Chile, Italy, Finland and the UK are also using vulnerability mapping. It has great potential for lessening the risks of climate change throughout Central and West Africa, tropical coastal areas in South America and South East Asia.

Project Ref: **FMSP03:**

Topic: **3. Improving Fishers Livelihoods: Better Fishing Management & Aquaculture**

Lead Organisation: **MRAG Ltd, UK**

Source: **Fish Management Science Programme**

Document Contents:

[Description](#), [Validation](#), [Current Situation](#), [Current Promotion](#), [Impacts On Poverty](#), [Environmental Impact](#),

Description

FMSP03

Research into Use

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

Geographical regions included:

[Africa](#), [Asia](#), [Malawi](#),
[South America](#),

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.

Vulnerability of fisheries and fisher communities to climate variation: adaptation and policy responses

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.

R4778J Vulnerability of fisher-folk living in poverty to climate change

R8475 Promoting new knowledge on climate change impacts on fisheries

R8475 Sustainable livelihoods from fluctuating fisheries

R no.	Institutional Partners	Current contact persons
R4778J	Overseas Development Group (ODG) University of East Anglia	Dr Edward Allison
	School of Development Studies University of East Anglia/Tyndall Centre for Climate Change	Dr Katrina Brown Dr Declan Conway
	School of Environmental Sciences/Tyndall Centre for Climate Change University of East Anglia	Dr Neil Adger
	Marine Resources Assessment Group Ltd	Dr Ashley Halls
	University of East Anglia School of Biological Sciences	Prof. John Reynolds
	Centre for Environment, Fisheries & Aquaculture Science	Dr Nick Dulvy

R8475	Centre for Environment, Fisheries & Aquaculture Science	Dr Nick Dulvy Dr Graham Pilling
	Marine Resources Assessment Group Ltd	Charlotte Howard
	School of Development Studies University of East Anglia	Dr Eddie Allison
	University of East Anglia School of Biological Sciences (Now of Simon Fraser University, British Columbia, Canada)	Prof. John Reynolds
	Aquae Sulis Ltd	Dr Ashley Halls
R7336	School of Development Studies University of East Anglia	Dr Edward Allison Laurence F. Mathieu Frank Ellis
	School of Environmental Sciences	Rob Tinch
	WBM Consulting, Indonesia	Agustina Musa
	Centre for Social Research, Malawi	Peter M Mvula

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.

This cluster of outputs includes research findings on livelihoods approaches; research findings on the impacts of climate variation on fisher communities; methods for assessing vulnerability to climate change; and policy messages for reducing poverty within fisheries strongly influenced by climate variability.

Research findings relate to livelihood approaches within fisheries management and to **climate change, poverty and fisheries**:

- **Livelihoods approach to fisheries**: Research findings based on work in Malawi and Indonesia (R8475) include the value of using a livelihoods approach to fisheries. Within this approach it is possible to understand the wider risks that fisher communities face which include **climate variability**, HIV/AIDS, illiteracy and dangerous forms of child labour
- **Vulnerability to climate change**: Research findings (summarised in Allison et al., 2005 ¹ from R4778J) revealed that the most vulnerable countries are concentrated in Africa (Central and West Africa) and areas in South East Asia where there is a high dependency on fisheries and a low capacity to cope.

The climate change research findings were based on a **vulnerability mapping methodology**, developed in 2004. Maps illustrating the global '**hot-spots**' vulnerable to the impacts of climate change on fisheries were produced. This provided a **global overview** of the vulnerability of countries to the impacts of climate change on the food security,

trade, GDP contribution and employment related to fisheries.

Policy messages were derived from research findings on climate change vulnerability and from work conducted on vulnerabilities associated with fluctuating fisheries:

- Climate impacts on fisheries have important social, nutritional and economic implications for some of the worlds' poorest countries and deserve specific attention;
- The most vulnerable countries are moderately or highly exposed to climate change, reliant on fisheries for export revenue, food security and employment and have a low capacity to respond to adverse or even positive impacts;
- Support in adapting to climate change in the fisheries sector should be focused on West Africa & Central Africa, coastal tropical regions of South America and some river-dependent fishery nations in South East Asia;
- Climate variation could be exacerbated by climate change and, in conjunction with over-exploitation, could also result in ecological regime shifts and adverse trends. Ecological resilience should be supported for buffer environments such as coral reefs, mangroves and wetlands;
- Institutions and management regimes need to support coastal and riparian community coping strategies and their vulnerability in general. This will likely include spatial and livelihood mobility.

These policy messages are synthesised in a **policy brief** (to be published by FAO's Sustainable Fisheries Livelihood Programme in 2006). The associated issues have been promoted through **flyers, posters, press releases** and **newsletter articles**.

¹ Allison, E H et al. (2005) Effects of climate change on the sustainability of capture and enhancement fisheries important to the poor. DFID Fisheries Management Science Programme Project R4778J, UK.

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 (Policy Advice)	

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 commodity which the output focuses is: **Fish**

This methodology (described above Q4) provides a global comparison of the vulnerability of different countries to impacts of climate change on their fisheries. This could be used to assess vulnerability of water resources, agriculture, forestry services, livestock and biodiversity. It would also be possible to compile this information across sectors and countries to compare dependence on climate sensitive sectors and resulting vulnerabilities.

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		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	Inland fisheries	Deep sea fisheries	Coastal artisanal fishing
		X				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.

As a first step these outputs on climate change, fisheries and poverty need to be incorporated within **fisheries management** approaches. Climate change underlines both the need for improved and adaptive management of fisheries. Related RNRRS outputs clusters include:

- Fisheries stock assessment and management;
- Adaptive co-management: supporting co-managed fisheries; and
- Tools for managing floodplain fisheries.

A closely related output led by the **Aquaculture and Fish Genetics Programme** provided a global overview to the vulnerability of countries to the impacts of climate change on aquaculture. The results from both analyses could be combined.

Beyond fisheries, climate change is a **cross-cutting** issue. There is a close link between climate-induced impacts on:

- Water resources management (Links with CGIAR Water and Food Global Challenge Programme);
- Community drinking water sources (R7888, R8088, R8116, R8381);
- Agricultural production where fishing communities combine fishing with agriculture and keeping livestock (Links with NEPAD and CGIAR centres)
 - Human health e.g. malaria, cholera and other climate driven infectious diseases) (Links with World Health Organisation)
- Infrastructure including fishing infrastructure: piers, processing factories, gear and community infrastructure: health centres, schools, market access

- Disaster risk reduction: (Links with ProVention Risk Reduction Network (<http://www.proventionconsortium.org/>))
- Coastal zone management: Links with (R8317, R7408, R7976)

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**).

Research findings and policy messages related to poverty, fisheries and climate change

Validation has been undertaken mainly by intermediary organisations (who were the targets of the outputs) rather than directly by beneficiaries. The methodology and research findings are targeted at other researchers. The policy messages are targeted at policy makers and national, regional and international fisheries management institutions to guide their decisions in supporting the fisheries sector to be more resilient to climate risks.

The main route for validation of the **methodology and research findings** has been through submission of a paper to a scientific journal. The methodology and research findings have also been informally validated through a range of processes including scenario testing, participatory workshops, presentations at scientific meetings and uptake through other research programmes. These are described below:

- **Scientific publication and peer review:** This is an important step in ensuring that the methods are robust. It also allows recommendations to be confidently adopted within policies or within fisheries management approaches. However, the process of submission has slowed down the dissemination of the key messages into the policy arena. Other means of technical validation have been through peer review of the Final Technical Report and through citation within the IPCC (Intergovernmental Panel on Climate Change) fourth assessment report.
- **Scenario testing:** After development of the methodology and initial results a range of scenarios were run (by project collaborators) to include different climate change models and different weightings to check the sensitivity of the results to different factors. The results were found to be robust, and that the same countries came out as the most vulnerable in almost every scenario.
- **Stakeholder feedback:** A participatory workshop was held with end users including representatives from the Department of International Development, Malawi Fisheries Department, Wetlands International, OECD, UNEP and

Action Aid. Feedback was given on the methodology and contributions on formulating the key policy messages.

- **Replication:** The method has been replicated and further developed within the Aquaculture and Fish Genetics Programme to provide a global overview to the vulnerability of countries to the impacts of climate change on aquaculture.

Policy messages on climate change, fisheries and poverty reduction have been validated by the FAO (the UN Food and Agriculture Organisation) through incorporation within a policy brief to be published as part of series on 'New Directions in Fisheries' (<http://www.sflp.org/briefs/eng/policybriefs.html>). This process involved considerable consultation throughout the FAO, involving member of the fisheries departments and the cross-departmental working group on climate change. The Organisation for Economic Cooperation and Development (OECD) has also incorporated recommendations into a paper directed at the Committee for Fisheries.

Research findings and policy messages related to the livelihoods approach

The research findings related to the livelihoods approach have been validated through a peer-reviewed publication:

- Allison, E.H., and F. Ellis (2001). The livelihoods approach and management of small-scale fisheries. *Marine Policy* 25 (5) 377-388.

Other examples of application and replication are provided in Section C: Current Use (*Questions 12-15*)

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**).*

Research findings and policy messages related to poverty, fisheries and climate change

The methodology and research findings were validated through peer review of all the final technical reports, and, for the recent vulnerability analysis, through citation within the IPCC report during the drafting process which runs up to 20th October 2006. A scientific paper, summarising the research findings and policy messages has been submitted to the Proceedings of the National Academy of Sciences. Informally, the methods and results have been presented to participatory workshops including one held with end-users at DFID London offices on 11th September 2005. This allowed opportunities for peer-feedback. Other scientific presentations include:

- NERC/ESRC in London, April 2005
- FAO Sustainable Fisheries Livelihood Programme (representing 25 West African countries) in Benin, September 2005
- 'Climate Change and Biodiversity in Africa' conference held at Pretoria, 17-19th October 2005
- Reef Conservation UK annual meeting in London on 5th December 2005

The Policy messages have been validated through a range of international intermediary organisations. FAO (including the fisheries departments and Inter-departmental climate change working group based in Rome) have shown uptake of the policy messages within a policy brief (to be published by an FAO Programme in 2006). The research findings and policy messages have also been used extensively within an OECD publication which assesses the impacts of climate

change on fisheries within both OECD and non-OECD countries. This was submitted to the 98th Session of the Committee for Fisheries during 16th-18th October.

Validation of the policy messages on approaching fisheries management from a livelihood perspective has been illustrated through uptake by a number of intermediary and end-user (target) institutions. One particular example is the validation through informing co-management approaches on Lake Chilwa and Lake Malawi in Malawi. These lessons emerged following case studies undertaken in Indonesia and Malawi (between 1999 and 2000), but have been further developed and built on in Malawi up to the present day.

Research findings and policy messages related to the livelihoods approach

The research findings related to the livelihoods approach have been validated through a peer-reviewed publication:

- Allison, E.H., and F. Ellis (2001). The livelihoods approach and management of small-scale fisheries. *Marine Policy* 25 (5) 377-388.

Current Situation

C. Current situation

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

The **climate change, poverty and fisheries** research findings and policy messages are also being used by a range of global and regional organisations:

- The draft IPPC (International Panel on Climate Change) Fourth Assessment Report (FAR) cites the research findings or methodology four times within the Chapter on Food, Fibres and Forestry ;
- The UNESCO/IOC GLOBEC (Global Ocean Ecosystem Dynamics) network is using the findings/messages in a concept proposal for a new research topic on 'Predicting impacts of climate on marine ecosystems and fisheries productivity' ;
- The FAO/DFID Sustainable Fisheries Livelihood Programme (SFLP) is currently using the research and policy messages within their policy brief on climate change and fisheries;
- The research findings influenced a scoping study undertaken by the DFID Research unit (during 2005) in designing a response to climate change adaptation. It put fisheries and climate change on the agenda and raised awareness of specific vulnerabilities of fisheries in West Africa;
- The research and policy messages have been used in a report to the OECD on 'The Potential Impact of Climate Change on Fisheries: Implications for OECD and Non-OECD Countries submitted for Discussion to the 98th Session of the Committee for Fisheries, 16-18 October 2006;
- The DFID Aquaculture and Fish Genetics Research Programme adopted the methodology for a Climate change vulnerability assessment for the aquaculture sector in developing countries (2004-2006).

The **livelihoods approach to fisheries** (influenced by research findings) is being used by a wide range of individuals

and institutions:

- Wide citation of research outputs (one paper cited over 50 times) by researchers and policy-influencing organisations;
- Research findings are informing fisheries development and management debates globally;
- In Malawi, co-management arrangements have been influenced to be more flexible to account for migration and coping strategies to climate variation;
- Influence on the development of livelihood approaches in fisheries, including within the 25-country DFID/FAO Sustainable Fisheries Livelihood Programme.

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**).

Global use of livelihoods approach in fisheries: Outputs from the earlier work on adaptive livelihoods and resilient institutions (R7336) are being used to inform fisheries development and management debates both globally and specifically in the following countries: Benin, Malawi, South Africa, Cambodia, Indonesia, Malaysia, Philippines, Brazil, Chile, Italy, Finland and UK (Source: Google Scholar search on citations of output Allison & Ellis, 2001))

These outputs are also in use as an educational resource, disseminated by 'livelihoods connect' website www.livelihoods.org ('key resource documents') and are on the reading lists of university courses in the USA, Canada and the UK – courses that train students originating from many countries.

Livelihood approaches in Malawi the outputs in this research cluster have been developed in connection with the Malawi Fisheries Department and the University of Malawi's Centre for Social Research, where they have:

- Increased awareness and development of networks of people working on fisheries livelihoods and climate variability, and on social and economic aspects of fisheries;
- Influenced co-management arrangements to be more flexible to account for migration and coping strategies;
- Informed representatives from the Malawian fisheries department invited to a workshop on the impacts of climate change on health. This brought attention to the concerns of fisheries communities including vulnerability to climate driven diseases such as cholera and malaria.

Global use of climate change research findings and policy messages: The outputs from the recent work on climate change adaptation research needs and global vulnerability mapping are being used mainly by intermediary agencies working a global level (see Q12). Links with Sustainable Fisheries Livelihood Programme (SFLP) mean that the outputs will reach fisheries sector agencies in 25 West and Central African countries (see www.sflp.org for list).

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

Global use: Both outputs related to the livelihoods approach in fisheries and policy messages on climate change, poverty and fisheries are being used on a global scale by intermediary and facilitating organisations.

Livelihoods approach: The outputs on adaptive livelihoods and resilient institutions (project R7336) have been widely

and quickly used to inform fisheries management decision-making in Europe, Latin America, Africa, and the Asia-Pacific region (evidence: tracking citations of key output documents in 'Google Scholar' and monitoring list of 25 'hottest'/most downloaded articles' on Elsevier website. Key outputs informed subsequent policy research on policy-livelihoods linkages in four East and Southern Africa countries (DFID-funded LADDER project) and informed lesson-learning in a major development in 25 West and Central African countries (DFID-funded Sustainable Fisheries Livelihoods Programme). Use of these outputs is still spreading.

Vulnerability of fisheries to climate change: The use of research findings and policy messages related to the more recent climate-vulnerability mapping research is less established owing to its more recent status and owing to the delays in publication of a peer-reviewed paper (see Q17). However, even prior to full publication and dissemination of more recent outputs, the key messages are being acted upon by those working in key policy advisory roles working within global institutions (see Q12). It is likely that the uptake of these messages will be rapid following the publication of the paper and related policy brief.

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). (329)**

A range of existing programmes, institutions and policy processes have assisted with the promotion of the outputs:

Global initiatives have been highly instrumental in mainstreaming the outputs. This has included integration into the Fourth Assessment of the Intergovernmental Plan on Climate Change (IPCC) and discussions by the UN Food and Agriculture Organisation (FAO) cross-departmental working group on climate change. The CGIAR WorldFish Centre has also set up a global challenge fund on Water and Food and is currently facilitating the promotion of these outputs within the proposed research agenda for inland fisheries.

Donor funded regional programmes: A FAO/DFID funded fisheries programme across 25 West African countries (Sustainable Fisheries Livelihoods Programme) has supported development of the outputs into policy messages and their promotion across governments in West Africa.

Internet research platforms: Web-based research platforms, such as ID21, Livelihoods Connect, and Eldis have been effective platforms for disseminating research findings and policy messages.

Thematic research networks: As an example, the inter-disciplinary 'virtual' Tyndall Centre for Climate Change Research provided considerable expertise to the research findings and, given its far reaching networks, has led to promotion through a range of institutions where experts are based.

Related DFID-funded research programmes: Related DFID-funded research has enabled ongoing development of research methodologies and policy messages. For example, work under this cluster has been developed through the DFID LADDER livelihood research studies, and through the DFID Aquaculture research programme which undertook a similar study to assess the vulnerability of countries to the impacts of climate change on their aquaculture operations. The NERC/ESRC programme is also using some of the research findings within an integrated multi-sectoral assessment of climate change impacts.

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**).

Promotion is currently taking place through the following channels:

The UN Food and Agriculture Organisation is a **global** organisation with links through to country and regional development programmes. It is promoting the livelihoods approach and climate change policy messages through its **West African** Sustainable Fisheries Livelihood Programme (SFLP).

The Intergovernmental Panel on Climate Change (IPCC) – Research findings have been cited a chapter within the Fourth Assessment due in March 2007. The scale of this report is **global** with a specific focus on **Africa**.

The WorldFish Center (CGIAR) is incorporating fisheries into the development of research programme on resilience and adaptation to change (The programme covers **Niger Basin (Mali, Niger, Nigeria), Lower Mekong Basin (Cambodia, Vietnam, Lao PDR)**).

Website portals such as ID21, Livelihoods Connect and the DFID Intranet and web-based news are promoting key messages **globally**.

The Tyndall Centre for Climate Change Research is promoting the methodology for assessing and mapping vulnerability to climate change, through its website and related work at a **global** scale.

The International Institute of Fisheries Economics and Trade (IFFET) is promoting the research findings through conference presentations and publications (**Global**)

UNESCO and GLOBEC (**Global** Ocean Ecosystem Dynamics network) are promoting research approaches on climate change adaptation for the fisheries sector in developing countries.

NERC/ESRC Earth Systems Science Programme are influencing co-ordinated cross-governmental action on climate change at a global level to use vulnerability mapping methodologies (**UK**).

The Organisation for Economic Cooperation and Development is promoting the research findings and policy messages **globally** within a publication entitled 'The Potential Impact of Climate Change on Fisheries.'

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**).

Barriers slowing or preventing adoption of research findings are:

- **Delays in scientific publication:** Submission to high profile journals ('Nature' and 'Science') was considered but submission is currently ongoing with *Proceedings of the National Academy of Sciences*. Most of the dissemination outputs (e.g. policy brief) are on hold due to press embargos.
- **Climate impacts longer-term; Poverty issues immediate:** while many poverty concerns such as hunger and disease outbreaks are immediate, climate change impacts on fisheries are longer-term or appear unlikely to have devastating impacts in the next 5 years¹ and are more likely in 20-25 years.
- **Lack of impact evidence:** while global impacts of climate change on fisheries are a concern, there is a lack of national level impact evidence which is of immediate concern to policy makers and indicates clear adaptation options.
- **Fisheries distant from mainstream development:** The disconnection of fisheries departments from other policy processes is evident in the lack of social and economic data on fishing communities, hindering the development of analyses of climate-change impacts.
- **Livelihoods approach scattered:** In Malawi, livelihoods research revealed important policy messages, yet capacity for this approach is still limited to a small number of people within the fisheries department².
- **Complexity of coordinating policy initiatives:** Integrating research findings into policy is a particular challenge for issues concerning climate variability which is likely to influence a range of sectors including fisheries, water resources, infrastructure and health³.

¹ Personal communications, Keith Brander, Editor of Chapter on Food, Forestry and Fibre within the IPCC report, 26th September 2006

² Personal communications, Peter Mvula, Center of Social and Economic Research, Malawi, September 2006

³ Personal communications, Friday Njaya, Regional Fisheries Coordinator, Malawi, 26th September 2006

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**).

Publication of scientific paper: The publication of the paper in a peer-reviewed journal will remove the major barrier to promotion of research findings and policy messages.

Relieving data constraints: To overcome information constraints, there is a need to include fisher communities in poverty monitoring and vulnerability mapping processes, so that appropriate information on the social and economic conditions is available for climate impact analysis on a national scale. Higher resolution climate change predictions are also needed at a national and 'water-body' (or eco-region) scale.

Providing clear evidence on a national scale: Basic research on climate change impacts on water resource, coastal and marine systems will improve the ability of national fishery departments and regional fishery agencies to deliver support for adaptation based on an understanding of the likely impacts of climate change on their local fisheries.

Developing international networks and platforms: The global scientific organisations (e.g. Institutes of Oceanography and Meteorology) and the relevant CGIAR centers (IMWI and WorldFish), as well as major research centres and funders (IDRC, NERC/ESRC, Tyndall Centre, Earth Centre, Colombia University etc) are important networks for integrating climate, poverty and fisheries concerns.

Capacity building and collaboration with southern institutions: building capacity for climate change impact and adaptation research, and collaboration with African and Asian institutions will be the most effective means of integrating specific policy messages into national development plans.

Linking fisheries with mainstream development: Continued efforts are needed to integrate fisheries into poverty reduction strategies and district development plans to ensure the prioritisation of vulnerable fisher communities in development, adaptation planning and disaster relief.

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).*

This cluster of outputs was designed to influence policy rather than provide technologies or services for direct use by the poor. The products of the research were intended to inform the design of fisheries and climate change adaptation policies so that such policies were based on a better understanding of the needs, strengths, livelihood strategies and vulnerability context of the poor.

The lessons learnt in getting policies taken up are:

- **Academic publication:** High quality academic research has credibility that policy makers appreciate and can use as evidence for arguing for a particular policy option. Peer review and publication in high-quality journals can assist adoption of research outputs in policy processes.
- **Further promotion:** Clearly, academic publications in themselves are not enough to guarantee uptake of policy messages. We found that using peer-to-peer networks, presenting the research at meetings (a large research team helped with coverage here) and publishing newsletter articles to be effective means of promotion.
- **Distillation into policy messages:** Developing the outputs as policy briefs that clearly specify the potential for poverty reduction and gave relevant examples are key to the process of influencing policy.
- **Relating to ongoing policy processes:** It proved important to relate the climate change issues to other ongoing policy processes in fisheries such as the current focus on IUU fishing, and international trade.
- **Integration into global initiatives:** Integrating the research findings into the Intergovernmental Panel on Climate Change (IPCC) will be one of the most effective means of increasing awareness and promoting uptake of the outputs.
- **Networks:** Pro-active use of networks is particularly important. Researchers often have access to influential individuals, and use of these interpersonal networks can be a major factor in policy message

adoption and subsequent dissemination.

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 no specific poverty impact studies undertaken and it is unlikely that the project has resulted in immediate poverty impacts on fisher communities. The project was designed to be strategic rather than technical, with the objectives to influence policy to achieve the following:

- **Climate change addressed in the fisheries sector:** through increased resilience of fisheries management to climatic variations and ensuring new measures (such as co-management, reduced illegal fishing, and increased trade exports) do not increase the vulnerability of poor fisher communities to climate change.
- **Fisheries sector addressed in climate change adaptation:** adaptation and disaster preparedness supported in fisher communities, which are often the first in line to suffer climate related risks.
- **Target response to the most vulnerable countries:** revealed as West Africa & Central Africa, coastal tropical regions of South America and some river-dependent fishery nations in South East Asia

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

Despite the lack of formal poverty impact studies, there are a number of indications that there has been some initial uptake of these policy messages:

- Integration of the research findings and methodology into the draft Fourth Assessment Report from the Intergovernmental Panel on Climate Change (IPCC)¹;
- Integration of the research findings and policy messages within an Organisation for Economic Cooperation and Development (OECD) publication assessing the impacts of climate change on fisheries submitted to the 98th Session of the Committee for Fisheries, 16th-18th October 2006.

- DFID reports that they are currently undertaking a pilot of the climate risk associated with DFID country programmes which will also assess gaps in knowledge. They are expecting climate change and fisheries to be a specific knowledge gap², possibly providing the opportunity to close the gap by reviewing national impact and adaptation options for fisheries.
- DFID research programme have also reported that the research findings put the issue of climate change, poverty and fisheries on the agenda. If there is sufficient evidence for the impact on fisheries it could be a focus for adaptation research in the future DFID research programme³.

¹ Personal communications, Keith Brander, Editor of Chapter on Food, Forestry and Fibre within the IPCC report, 26th September 2006

² Personal communications, Jessica Troni, Climate Change Adviser, DFID, 10th October 2006

³ Personal communications, Simon Anderson, Climate Change research programme coordinator, DFID, 2nd October 2006

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)*

There are likely to be indirect environmental benefits related to the uptake of the policy messages.

The policy recommendation to take a livelihoods approach to fisheries management helps managers and facilitators to understand the incentives behind resource-users' behaviours (e.g. over-exploitation of resources) and to design initiatives that solve the causal problems. For example, in Malawi an understanding of the overall vulnerability of fisher communities has led to initiatives to support alternative livelihood options and provide social infrastructure such as health services to reduce the overall vulnerabilities of these marginalised communities¹.

Policy recommendations to support the flexible coping strategies should lead to improved resource management which is more robust to climate variations. These flexible approaches could help prevent degradation of the environment by users that have no other options but to continue harvesting a dwindling resource.

Other policy recommendations relate to the need to protect certain habitats that support the resilience of fisher communities which are often in the front-line of extreme climate impacts, such as coastal communities' vulnerabilities to sea level rise and storms, and river-basin communities' exposure to flooding. Coastal habitats such as coral reefs and mangroves are particularly important climate buffers and would benefit from protection if these recommendations were implemented.

¹ Personal communications, Friday Njaya, Regional Fisheries Manager, Malawi, 26th September 2006

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.

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

There are no adverse environmental impacts attributable directly to the research. There are indirect possibilities that a policy message in support of mobility as an adaptive strategy could undermine efforts to develop locally managed fisheries, as integrating migrants into local management systems can be difficult. Strategies which promote mobility - without ensuring that there are effective management systems in place - risk contributing to over-harvesting due to opportunistic fishers following the fish stocks to where climate-drivers have led to greater abundance. This risk can be alleviated through effective management measures such as tradable and exchangeable licenses and providing alternative livelihood options.

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)

This is the precise aim of the research. The policy recommendations from this work call for:

- Appreciation of the climate change impacts on the poor in fishing communities:
- Support to adaptation and coping strategies of the poor in fisher communities and fisheries management that assists this rather than increasing vulnerability
- Targeted support to the most vulnerable countries in West Africa & Central Africa, coastal tropical regions of South America and some river-dependent fishery nations in South East Asia with low capacity to cope.
- Support generally to vulnerability reduction in fisher communities which will increase their capacity to cope and will reduce their poverty.

If these recommendations are taken up in policy and implemented at regional and national scales, the outcomes will be for an increase in the capacity of poor in coastal and wetland areas to cope with the effects of climate change, to reduce their vulnerability to disasters, and to increase the resilience of their social-ecological systems.
