

Chapter 2 Assessment of:

- 1) **Aquaculture and Fish Genetics Research Programme (AFGRP)**
- 2) **Fisheries Management Science Programme (FMSP)**
- 3) **Post-Harvest Fisheries Research Programme (PHFRP)**

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2.1 SUMMARY

Key Issue	Key Findings
Science Quality	
<i>(a) Quality of experimental design and analysis</i>	Excellent in many cases, less good in others, also witnessed by their degree of publishing in recognised refereed journals;
<i>(b) Contribution of projects sampled to new knowledge;</i>	Highly innovative in many cases, more a case of reapplying old knowledge in others;
<i>(c) Extent the projects use existing knowledge creatively in new contexts;</i>	Many instances of creative use, others appeared more repetitious;
<i>(d) Awareness of all current knowledge;</i>	Many cases of cutting-edge awareness, a few apparently unaware of key knowledge;
<i>(e) Innovativeness and scientific risk-taking with comment on projects that are innovative and projects that are not;</i>	The variations among projects in the three programmes are wide, so this issue has been addressed in the section within the report evaluating selected projects individually;
<i>(f) How risk was managed by programmes and project managers and the lessons from this should be included;</i>	The three programmes seemed to manage scientific risk appropriately and their approach should be continued.
<i>Address the issue of measuring science quality for applied projects with non-peer reviewed reports.</i>	The measurement of science quality for applied projects with non-peer reviewed reports may be addressed by studying these publications and applying the criteria that we are accustomed to when reviewing any scientific work - scientific standards should not be lowered for the sake of expediency. Applied science and popularised materials must be based upon solid underlying scientific knowledge.
Science Capacity Building	
<i>Science capacity building in the south for both individuals and institutions.</i>	DFID's earlier policies did not adequately allow for scientific capacity building for individuals or institutions in the South. None-the-less the Programmes did indirectly contribute to this important aspect in many cases, sometimes through parallel activities funded separately.
<i>Include development of long-term institutional relationships between UK institutions and Southern institutions;</i>	It would seem highly desirable and relevant to incorporate this aspect centrally into any future programmes towards achieving DFID's overall developmental goals and to contribute effectively towards the eradication of poverty through scientific research.

Key Issue	Key Findings
<p>Knowledge Dissemination</p> <p><i>Adoption, lessons etc. from different approaches to dissemination and uptake promotion.</i></p>	<p>The Programmes increasingly emphasised dissemination and uptake promotion as witnessed by the dramatic increase in quantity and enhanced quality of their non-peer-reviewed publications (see Annex 2).</p>
<p>Management Approach</p> <p><i>Identify the lesson learning on identification of demand, relevant project design, appropriate dissemination and uptake pathways etc.</i></p> <p><i>Identify the lesson learning from different approaches in selecting and designing projects to achieve the purpose.</i></p> <p><i>Identify how the programme has evolved and become more demand driven.</i></p>	<p>These important questions were not specified in the briefing or terms of reference to the specialists. The interactions with the Programme Mangers therefore did not focus on these issues. We hesitate to speculate on these, but merely point out that our impression has been that the three Programmes became increasingly demand-driven in a conscious and successful manner.</p>
<p>Conclusions and Lessons for the Future</p> <ul style="list-style-type: none"> • <i>Knowledge dissemination</i> 	<p><i>Knowledge dissemination:</i> prioritise peer-reviewed journals alongside other media for popularisation and wider impact;</p>
<ul style="list-style-type: none"> • <i>Capacity building</i> 	<p><i>Capacity building:</i> need for major re-focusing in order to strengthen this aspect within any future programme that is to have a developmental impact;</p>
<ul style="list-style-type: none"> • <i>Maintaining high science quality</i> 	<p><i>Maintaining high science quality:</i> periodic peer-review processes to ensure quality;</p>
<ul style="list-style-type: none"> • <i>Management</i> 	<p><i>Management:</i> essential to ensure high-level scientific competence in the selection of Programme Managers;</p>
<ul style="list-style-type: none"> • <i>Research themes for the future</i> <p><i>Recommendations on the future research themes should refer to DFID's comparative advantage (or otherwise) in the context of international support to natural resources research.</i></p>	<p><i>Research themes for the future:</i> selected relevant research foci from within the three existing Programmes deserve continued support (as detailed on page 21 of this report). Several British researchers and institutions in collaboration with research partners in developing countries do excel and are internationally recognised in various fields of aquaculture and fisheries research -- much of this success has been based upon long-term research cooperation. Incorporating interdisciplinary approaches can often enhance the developmental relevance of scientific research.</p>

2.2 ACHIEVEMENT OF PROGRAMME OUTPUTS (logframe in Annex 3)

Achievement of scientific outputs in log-frames

The latest versions of the logical frameworks at programme-level for all three Programmes appear to have been followed closely and implemented accordingly. They share similar “Super Goals”, “Goals” and “Purposes” but naturally differ more at the “Output” level. The AFGRP and FMSP log-frames for 2004-2006 appear to be scientifically challenging and developmentally relevant. The PHFRP log-frame appears to be relatively practical, rigorously logical, developmentally oriented and perhaps more realistically achievable.

Programmes' stated logframe outputs	Comments
<p>AFGRP:</p> <ol style="list-style-type: none"> 1. Enabling contexts for aquatic stock selection and production, livelihood impacts defined and indicators developed, in present and emerging inland and coastal aquatic systems 2. Practical strategy developed and applied for aquatic stock identification, selection and improvement in target enhancement and aquaculture systems 3. Improved culture and enhancement systems based on natural and human resource relationships, and their effective use of productive inputs (broodstock, seed, nutrients) in target regions 4. Livelihood risks/constraints of environmental, stock quality or aquatic health factors reduced in target systems through improved techniques and strategies for assessment, control and management 5. Improved global knowledge base on aquatic stocks and culture practice established and disseminated through project linkages, national and international networks, workshops and publication 6. Successful promotion and uptake of improved approaches, and impacts measured, through local institutional/uptake pathways 	<p>The documentation, publications and interviews indicate that the programme has made considerable progress towards achieving these six outputs.</p> <p>The level of achievement is generally high in Asia where AFGRP has been active for longer, but lower in Africa where the programme has recently focused more attention, and this is probably also due to the lack of aquaculture traditions among people, absence of strong institutions and the general circumstances of wider and more acute poverty in many African countries. Encouragement of South-South links between Asian and African institutions (relevant to output 5) would seem to have special potential for further development.</p> <p>It becomes clear again that both AFGRP and FMSP address "enhancement systems", and only close cooperation between the programmes has ensured avoidance of replication of research efforts.</p> <p>The AGFRP "Indicator of Achievement" for the "Purpose" only mentions South and Southeast Asia, not Africa, but this is probably an oversight left over from their earlier geographical focus.</p>
<p>FMSP:</p> <ol style="list-style-type: none"> 1. Existing FMSP research outputs relating to: the contribution of capture and enhancement fisheries to the livelihoods of the poor; fisheries management tools and strategies that could benefit the poor; and, the means to realise improved management, further developed, disseminated and promoted to relevant stakeholders at all levels. 	<p>These general outputs are desirable and reflect the quintessence of the Programme, but they difficult to assess as stated: their meaning and the degree of achievement are more easily understood by summarising the cumulative outputs of the Programme at the level of projects and activities (as we have attempted in this document).</p>
<p>PHFRP:</p> <ol style="list-style-type: none"> 1. Relevant new knowledge (strategies, management systems, methodologies and tools) developed, which will improve the post-harvest utilisation of fish and which are appropriate to poor producers, processors, traders and consumers. 2. New knowledge successfully disseminated and promoted to the point where it is taken-up and used by key intuitions and other stakeholders within targeted fisheries and wider geographical regions. 	<p>These clear outputs reflect the Programme's focus and activities. The development relevance is particularly evident in these formulations.</p> <p>However, the term "new knowledge", as they use it, is open to different interpretations from a scientific point of view.</p>

Respective log-frames at project-levels were examined while reviewing the individual projects, and they are commented upon under the sampling and methodology section.

The log-frames are probably useful in planning exercises and for DFID overviews, but they appear to be of very limited value for the purpose of evaluating the quality of scientific research achieved by the Programmes.

2.3 BACKGROUND

This desk review report is intended as input towards an Evaluation of DFID's Renewable Natural Resources Research Strategy (RNRRS), which comes under the Rural Livelihoods Research theme, for the period from 1995 until the present. The RNRRS has a bilateral component which is made up of ten programmes. The multilateral component is not included in the Evaluation.

A Core Team of four evaluators received the first version of the assessment along with seven other parallel assessments of the other programmes as contributions towards the overall evaluation of the RNRRS. The specialists initially submitted their eight reports by 22nd December 2004, but the Core Team was requested by DFID to instruct the specialists to re-organise their assessments into a uniform outline. The re-organised reports were submitted by 15th March and finally on 12 April 2005.

The ten RNRRS research programmes have the common goal of improving the livelihoods of poor people through sustainable enhancement of the production and productivity of renewable natural resources systems.

Under DFID's RNRRS for the period 1995 - 2005, the bilateral component is organised under ten programmes. These programmes are each managed by institutions contracted by DFID. Each programme has a Programme Advisory Committee (PAC) which provides independent advice in relevant natural and social sciences as well as development aspects.

Three of the ten programmes are related to various aspects of fish resources and products, these are:

- Aquaculture and Fish Genetics Research Programme (AFGRP) managed by Professor James Muir of the Institute of Aquaculture, University of Stirling. This programme was previously organised under two ("Aquaculture" and "Fish Genetics"), but these were combined into a single programme in 2001
- Fisheries Management Science Programme (FMSP) managed by Professor John Beddington of Marine Resources Assessment Group Ltd.
- Post-harvest Fisheries Research Programme (PHFRP) managed Mr John Sanchez of NR International Ltd.

Within a total RNRRS budget £ 230 million, the allocation of funding for each of these three programmes is smaller than the funding for any of the others:

Aquaculture and Fish Genetics Research Programme (AFGRP)	4.0 %
Fisheries Management Science Programme (FMSP)	2.0 %
Post-harvest Fisheries Research Programme (PHFRP)	1.5 %
The other seven programmes	92.5 %

Though relatively small in terms of allocations, these research programmes none-the-less address issues of crucial importance to poor people's livelihoods and towards poverty reduction in developing countries. Despite thematic proximity, the three programmes have distinctly different research agendas, priorities, approaches and management arrangements.

Aquaculture and Fish Genetics Research Programme (AFGRP)

The Purpose of this programme is "Productive benefits of aquatic resources for poor people generated and sustained through improved knowledge of aquatic stocks and their selection, enhancement and culture".

The Programme has three themes:

- **Seed Production.** The research topics include broodstock management, selective breeding and seed production. The theme also emphasises research on social and institutional dimensions, and is particularly focused on the integration of fish farming with rice cultivation in flood-plain areas of Asia. Integrated pest management and the harvesting of freshwater shrimps and snails are also considered important. The research's particular relevance to poor farmers is strongly emphasized.
- **Aquatic Animal Health.** Since the commencement of the Programme, research has been carried out on important fish and shrimp diseases, with impressive continuity in their research work on the epizootic ulcerative syndrome (EUS) which widely affects cultured fishes in Asia.
- **Systems.** Aquaculture is researched as a part of people's food production systems. Topics of investigation include the integration of aquaculture with irrigations systems and the importance to poorer people of self-recruiting species of fish, which are sometimes looked upon as "weed-fish". The links between fish, environment,

farmers and their families, traders and consumers are highlighted, and a systems perspective is used to link local livelihoods and production contexts with rural and urban markets, and with issues of global trade.

Gender is recognised as a crosscutting theme and the social roles of men and women are consciously included in aquaculture research.

The Programme is managed and coordinated by the Institute of Aquaculture, University of Stirling. The Fish Genetics component was formerly managed by the School of Biological Sciences, University of Wales Swansea, but these were combined into a single programme in 2001 under the management of Stirling. This amalgamation appears to have strengthened the focus on impact and relevance to poverty reduction as well as maximising the synergy between these two closely related topics.

The Institute of Aquaculture of the University of Stirling has a longstanding focus on aquaculture in developing countries and has trained a large number of aquaculture specialists at BSc, MSc and PhD levels all over the world: probably the foremost institution in the world in this respect. It has engaged in basic and applied research for many decades in collaboration with international research partners.

These are important strengths which are actively drawn upon for the DFID-funded AFGRP programme that mainly emphasizes applied research. The Programme has progressively placed greater emphasis on the development relevance and the impact of its research, but it has maintained a strong record of publishing in peer-reviewed journals. Interdisciplinary approaches are increasingly emphasized in many of the research projects. The Programme Manager has a detailed overview and insight into the programme's diverse research activities with an appreciation of their context within international research agendas and priorities, particularly through close collaboration with FAO and other international and regional research bodies.

The geographic focus is predominantly upon Asia, but there are an increasing number of projects in Africa. Aquaculture is most widely practiced in Asia (accounting for 95% of world production) and is important among small-scale producers as well as for industrial-type projects, but it also has huge potential in Africa in the long-term despite evident difficulties in introducing it initially.

The Programme has a well designed website (<http://www.dfid.stir.ac.uk/>) that is actively used. Amongst a range of promotional initiatives the Programme had a stand at the 2004 Asian Fisheries Forum which was well visited, and AFGRP researchers were prominent among speakers and their collaborators were among the prize-winners at the conference.

Fisheries Management Science Programme (FMSP)

The Purpose of this programme is "Benefits for poor people generated by application of new knowledge to fisheries management systems".

The Programme addresses both capture and enhancement fisheries. It intends to contribute toward benefits at the community level and evaluates options for community participation in management and reduction of resource use conflict. The Programme is organised into five themes with eleven clusters:

Product Theme

- i. Information to inform management-research and influence policy
- ii. Information systems to support the co-management of fisheries important to the poor
- iii. Fisheries assessment methods to inform management
- iv. Pro-poor capture fisheries management strategies
- v. Pro-poor enhancement fisheries management strategies.

Project Cluster

- a. Databases of information
- b. Livelihood appraisals
- c. Impacts of climate change
- d. Information requirements for fisheries management
- e. Stock assessment guidelines
- f. Bayesian stock assessment and management with limited data
- g. Generic management guidelines
- h. Control of foreign fisheries
- i. Floodplain fisheries management
- j. Enhancement of inland fisheries
- k. Enhancement of marine fisheries

The FMSP programme has projects that address both basic science (e.g. modelling of fish stocks) and applied (eg fisheries management solutions and optimisation strategies for fisheries enhancement through stocking) in recognition of the fact that many marine and freshwater fisheries resources are over-fished and badly managed throughout the world.

The Programme operates with three interrelated and overlapping phases:

- basic ecological research to assess the responses of ecosystems to different management systems;
- development of results into appropriate tools for fisheries management based on well founded scientific research; and
- assessment of the socio-economic implications of alternative management strategies that stem from questions of resource ownership and promotion of research outputs.

Since 1999/2000 the Programme has undertaken livelihoods appraisals and examined institutional arrangements suitable for management and uptake.

The Programme has largely aimed at research which addresses strategic and policy levels, and towards capacity building in order to contribute towards creating enabling environments that will finally benefit poor communities.

The geographic focus of FMSP during the last four years has been on:

- East Africa (Kenya and Tanzania) for marine fisheries research, with additional minor inputs into Indian Ocean small island developing states;
- South and South East Asia (Bangladesh, Cambodia, Lao PDR and Vietnam) for inland fisheries research;
- India (West Bengal, Orissa and Andhra Pradesh) for the promotion of existing FMSP outputs.

The Programme is managed and coordinated by Marine Resources Assessment Group Ltd. (MRAG), London. MRAG has a core staff of about 30 specialists and a large international network of associations and collaborations with academic institutions, private organisations and renowned scientific experts. In addition to DFID and FMSP, MRAG's services have been utilised by several international development agencies, government departments, private organisations and commercial companies.

Several of FMSP's scientists are recognised to be in the forefront of research in their fields of expertise, and much of their work may be characterised as cutting-edge science, both in natural sciences and within interdisciplinary fields. Their publications in peer-reviewed journals are of high calibre.

The management of the Programme appeared to work well as a scientific team, aware of one another's various capacities and capabilities. They engaged in fruitful discussions and were responsive and efficient towards diverse requests and queries during the review process.

An important component of FMSP's programme has been the production of software packages for fisheries stock assessment. The FMSP considered it desirable to include this in the assessment, but this field is outside the areas of competence of the reviewer, therefore we requested Dr Jeppe Kolding, Bergen, to specifically assess the software packages that FMSP has produced. Dr Kolding made a technical assessment of these which, in our view, raised some interesting questions and issues.

It should be pointed out that there is a potential for overlap between FMSP's focus on "enhancement fisheries" and AFGRP's "aquaculture". Close cooperation between the two programmes has ensured that this has not become a problem of what could become duplication of research effort. To the contrary, they even implemented project R7917 jointly.

The FMSP has a useful and accessible website (<http://www.fmsp.org.uk/>) with relatively up-to-date lists of their publications. FMSP scientists were also present at the 7th Asian Fisheries Forum and their presentations were considered innovative and high quality by Asian and international delegates.

Post-harvest Fisheries Research Programme (PHFRP)

The Programme has defined both a vision and a purpose. The vision is "to improve the livelihoods and food security of poor people within the post-harvest fisheries sector by: (i) working with the poor to identify constraints to better livelihoods and improved food security; (ii) commissioning high-quality research to develop methods and tools to overcome constraints; (iii) effectively promoting the results of research to the point where they are adopted for the benefit of the poor". The purpose is "to produce benefits for poor producers, processors, traders and consumers through the application of new knowledge to the improved utilisation of fish from fisheries in South Asia and East and West Africa".

PHFRP has defined three core research areas, these are:

- To develop improved methods to identify the source and magnitude of post-harvest losses and promote take-up and use by key institutions;
- To develop appropriate value-adding and loss reduction processes and technologies and promote use by key stakeholders;
- To generate new knowledge of the structure and operation of post-harvest credit and market systems and the impact on the poor of changes in the utilisation of fish and disseminate this knowledge to key policy makers and stakeholders;

The PHFRP focuses on the enabling environment in order to influence policies, institutions and processes affecting people in the post-harvest fisheries sector.

The Programme is managed and coordinated by NR International Ltd., Kent, which is owned by Imperial College London, the University of Edinburgh and the University of Greenwich. NR International Ltd. was formed in 1996 upon the dissolution and privatisation of the Government's scientific body for development, the then Natural Resources Institute. NR International Ltd. now manages five of the ten RNRRS programmes: CPHP, CPP, FRP and LPP in addition to PHFRP.

In PHFRP's earlier years research efforts were focused upon applied scientific and technical aspects of fish spoilage and insect infestations that cause significant losses in developing countries. A change in management thinking in 2000 resulted in the completion of earlier projects, a synthesis of results and a process of demand identification towards a new focus emphasizing outreach, dissemination and promotion. Emphasis was perceived as being shifted from a "supply-led" to a "demand-driven" approach. PHFRP management regards it to be difficult, and perhaps meaningless, to differentiate between "research" and "development". The Programme considers that "dissemination" may be too passive a concept and that "promotion" is a more effective approach.

PHFRP works closely with Integrated Marine Management Ltd. (IMM), Exeter who are involved in the implementation of several of the projects.

PHFRP has an informative website at <http://www.phfp.uk.com/> which is both user-friendly and interactive.

2.4 SAMPLING AND METHODOLOGY

Sampling procedure and the detailed project assessments

In view of the wide disciplinary range of research fields within these three programmes, the large number of diverse projects and the vast amount of documentation which was all to be assessed within a relatively short period of time, it was necessary to engage in active dialogue with the three Programme Managers and their key programme staff and to access documentation in both paper and electronic formats. The Programme Managers were all most helpful and efficient in providing the relevant documentation in addition to the documentation provided by DFID, the Core Team and the Performance Assessment Resource Centre (PARC).

Consultations were made through visits and face-to-face meetings with the Programme Managers as well as a few key staff members and researchers in addition to telephone discussions and over 200 e-mail exchanges. Time constraints dictated a major limitation in the degree of consultation possible, especially in the case of PHFRP as the Programme Manager was constrained by other commitments and travel.

We took advantage of the opportunity of meeting several members of the research teams of AFGRP and FMSP in Penang, Malaysia while attending the Asian Fisheries Forum. In addition this afforded us the opportunity of meeting with some partner scientists from Asian countries who were to attend the same conference. We also availed ourselves of the opportunity of exchanging views with relevant persons at the WorldFish Center in Penang concerning relevant research priorities and thinking. In one instance, we had telephone contact with a partner researcher in Africa and used the opportunity to briefly solicit her views on one of the research projects under review.

The paper documentation was substantial and the electronic documentation included some 376 documents occupying over 700 megabytes.

Since the number of research projects within the portfolios of the three programmes totals more than 90, it was necessary to select a few projects to be examined in some detail. This selection was carried out in consultation with the respective Programme Managers, with the addition of a small number of projects at the discretion of the reviewer. The reviewer requested the available detailed documentation for each of these projects and attempted to contact key researchers involved in their implementation where possible. Several peer-reviewed publications emanating from the programmes were sought through electronic library services for closer scrutiny.

The specialist does not consider himself “specialist” enough in some of the wide-ranging research topics spanned by the three programmes, and it would have been desirable to consult several independent specialists in these fields if time had permitted. In particular, it was hoped that we could contact specialists on fish genetics and aspects of post-harvest fisheries, but the persons approached were not available at short notice, however, we did engage Dr Jeppe Kolding, Bergen, to assist us in evaluating FMSP’s sophisticated software packages for mathematical modelling of fish stocks.

Consultations were made with each of the Programme Managers concerning the choice of projects to be examined in more detail. The Programme Managers each suggested selections and we have agreed to these, but we have none-the-less had to reduce the numbers slightly precisely because we are attempting to cover three programmes and the total suggested would have been unmanageable in the time available.

An attempt has been made to choose projects that come from the majority of the important themes, core research areas and clusters within each of the three programmes. Some individual projects have been chosen at the discretion of the evaluator to provide a slightly wider picture.

We sincerely regret the fact that there was insufficient time to adequately consult project research staff, and in some cases we have had to rely entirely upon written documentation. We also feel that it is difficult to judge the scientific merit of many of these projects without being able to see results in the field nor talk to recipient institutions or beneficiaries - but we are comforted by the fact that the Core Team will be able to achieve this in a few cases.

Particular attention has been paid to the quality and quantity of peer-reviewed publications emanating from the projects, but in some cases it is actually difficult to correlate particular publications with individual projects, especially when complex interdisciplinary issues are being addressed.

The following projects were selected for brief individual assessment:

AFGRP : R6979, R7064, R7100, R7284, R7590, R7917
FMSP : R7336, R8118, R5050, R7041, R7947, R7335
PHFRP : R7008, R7971, R7799, R8111

AFGRP - R6979 - Applied studies on epizootic ulcerative syndrome - the ecology, immunogenicity and treatment of *Aphanomyces invadans*

The project’s purpose was “to generate the information needed for the formulation of strategies to contain EUS; and to develop and introduce improved prophylactic and therapeutic treatments to provide fish farmers with a means of reducing losses due to EUS”. It was implemented jointly by researchers from Stirling in collaboration with Aquatic Animal Health Research Institute (AAHRI) in Thailand.

The intended beneficiaries were Asian freshwater fish farmers, and the target institutions included: AAHRI (Thailand), FRI, BAU, CARE-LIFE (Bangladesh), CIFA (FAO), BFAR (Philippines), FDD (Nepal), FRTI (Pakistan) and RIA-1 (Vietnam).

The project was implemented from July 1997 and completed in February 2001. It built upon earlier work in the Programme (R5430 on related viruses and especially R5997 on the same fugal pathogen).

The scientific standard of this research was world-class, scoring high on categories of “new knowledge” (further developed from previous programme work) and use of “existing knowledge”. A total of 10 peer-reviewed publications were reported in the final technical report (FTR) along with 13 other publications, 6 theses and numerous other forms of dissemination. The scientific relevance of this research was high since it addressed a pervasive problem in freshwater aquaculture affecting the livelihoods of large numbers of South and Southeast Asian fish farmers. It has led to higher awareness and emphasis on both preventative measures and effective curative remedies against EUS.

AFGRP - R7064 - Small-scale farmer managed aquaculture in engineered water systems: critical design and management approaches

The purpose of the project was “to identify the social and bio-economic constraints to the introduction of aquaculture into farmer-managed irrigation systems and to develop and promote effective approaches that enhance livelihoods of the poor”. It was led by David Little and Francis Murray of the University of Stirling and focused on Karnataka, India and Northwest Province, Sri Lanka; both dry areas with little previous tradition of aquaculture but community-managed water bodies used for irrigation. The project was originally intended also to be implemented in Pakistan, but contemporary political difficulties made this impossible.

The intended beneficiaries were rural fish farmers, consumers of fish and other users of scarce water resources. Target institutions included the University of Peradeniya, Wayamba Development Authority, National Aquaculture Development Authority, CARE, Action Contre la Faim in Sri Lanka and Samuha, CIFE Peninsular Aquaculture Division, Sewalanka Foundation and International Water Management Institute in India.

The project commenced in December 1997 and was completed in March 2002. It built upon earlier projects related to integrating aquaculture with agro-ecological systems and was focused towards addressing specifically poverty-related issues.

The FTR lists 5 peer-reviewed publications of good scientific quality. The project also produced numerous other forms of dissemination in the forms of reports, extension materials, workshop presentations, etc. It was innovative in linking irrigation systems with quite easily adoptable and managed aquaculture systems suitable for poorer farming communities, and it utilised participatory methodologies in a creative manner. This experience is likely to have relevance to other fairly dry regions in Asia and Africa in the future when shortages of fish supplies will be increasingly felt especially in such areas.

AFGRP - R7100 - Improved management of small scale tropical cage culture systems

The purpose was “to develop sustained small scale cage fish culture in inland (Bangladesh) and coastal (Vietnam) waters through the understanding of the social, institutional and resource environment of resource poor groups. Identifying appropriate technical opportunities and development approaches for these contexts”. It was led by Malcolm Beveridge and Paul Bulcock from Stirling and John Hambrey then at the Asian Institute of Technology (AIT), Thailand.

The intended beneficiaries were poorer groups among communities in the case study areas in Bangladesh and Vietnam. In Bangladesh, CARE was involved as a coordinating NGO with 45 different small NGOs or CBOs working at community levels, and in Vietnam both AIT and the University of Fisheries, Nha Trang were active partners.

The project was started in January 1998 and completed in September 2000. It was not a direct continuation of any earlier programme activity, but it built upon Beveridge’s highly recognised earlier and current scientific work on this topic (with high citation indices and including a book on the subject) and considerable experience with cage culture in various parts of the world.

The 2000-01 Annual Report indicated 10 peer-reviewed publications “in press”. The scientific quality of this work appears to have been of a high standard, and some of the publications included scientists from Vietnam and Bangladesh as co-authors. The work probably did not represent radically new findings, but were high quality use of existing knowledge in new contexts of significant relevance to development and sustainability issues. The study elucidates problems related to the sustainability of seed and feed supplies as well as questions relating to the pollution impacts of these cage systems in interesting ways.

AFGRP - R7284 - Performance (productivity) of fish in aquaculture and enhancement fisheries improved through selection, genetic manipulation, and improved broodstock maintenance.

The purpose was to produce “higher yielding genetically male tilapia (GMT) developed for improved livelihoods in small-scale aquaculture in Southern Africa”. It was led by the University of Stellenbosch, South Africa (Louw Hoffman) and the University of Wales Swansea (John Beardmore and Graham Mair).

The intended beneficiaries were small-scale farmers working within community based aquaculture projects based on irrigation dams. Target institutions included the University of the North and the Provincial Department of Agriculture, the Small Farmer Aquaculture Programme and unspecified NGOs.

The commencement of the project was in December 1998 and completion in June 2002. The project was not a direct continuation of any previous projects, but a logical extension of earlier AFGRP work with tilapia genetics in Southeast Asia.

This research project addresses the issue that *Oreochromis niloticus* is a preferred species for aquaculture, but is not endemic to South Africa whereas *O. mossambicus* is: this in turn means that it is desirable for reasons of biodiversity conservation to ensure that escapees of *O. niloticus* do not breed in the wild. Furthermore, exclusively male populations (GMT) grow faster as energy is not used on reproduction, but purely for growth, so that this technique developed for *O. niloticus* was applied to *O. mossambicus*. The project produced four peer-reviewed publications in 2003-04.

AFGRP - R7590 - Genetic management and improvement strategies for exotic carps in Asia

The purpose was “strategies for genetic management and improvement of cultured exotic carp species in low input aquaculture systems developed, verified and recommended for adoption in Bangladesh, India and Vietnam and potential impact of improved fish on livelihoods demonstrated”. More specifically, to develop breeding and selection of superior stocks of carps, on-station and on-farm trials of these stocks, development and application of a suite of polymorphic DNA markers to Chinese carps, development of appropriate broodstock management and dissemination strategies and formulation of recommendations to be presented and modified at workshops, and cryopreservation of sperm from base populations of all available stocks and transfer of frozen samples to appropriate locations. The lead institutions were the University of Wales, Swansea and the Institute of Aquaculture, University of Stirling. The project built upon progress made with R6059.

The intended beneficiaries were poor fish farmers in Bangladesh, India and Vietnam. Targeted institutions included Bangladesh Fisheries Research Institute (BFRI), Northwest Fisheries Extension Project, Parbatipur, Bangladesh (NFEP), University of Agricultural Sciences, Bangalore (UASB), Research Institute for Aquaculture No. 1, Vietnam (RIA-1).

The project was started in April 2000 and completed in September 2004. Thus there is no final technical report available, but a mid-term review evaluated the project positively, although noting the need to strengthen the social and institutional issues. RIA-1 scientists developed fish sperm cryopreservation protocols for common carp sperm and have applied these methods to creating a cryopreserved sperm gene bank for several stocks of the species in Vietnam. An interesting point to note is the fact that as a part of this project, Vietnamese scientists travelled to India to train scientists there in relevant techniques: a positive case of collaboration between scientists from developing countries. Links are also established with WorldFish Center and INGA. Two peer-reviewed publications are reported as “submitted” already.

AFGRP/FMSP (jointly) - R7917 - Self-recruiting species in aquaculture - their role in rural livelihoods

The purpose of the project was to characterise the role of self-recruiting species in different aquaculture systems, and to develop management approaches that enhance the production of and access to such resources by the poor. The participating researchers were Dave Little, Anton Immink (Stirling), Kai Lorenzen (Imperial College London), Amaratne Yakupitiyage, Harvey Demaine, Elsa Amilhat, Jack Morales (AIT), Janet Riley (IACR), Darrell Siebert (Natural History Museum, London), Faruk Ul Islam (Intermediate Technology Development Group, Bangladesh) and JS Gangwar (Gramin Vikhas Trust, India).

The intended beneficiaries were poor people in rural communities in Thailand, Cambodia, Vietnam, Bangladesh and India. Targeted institutions included Research Institute for Aquaculture No. 1, Vietnam, the Department of Fisheries, Cambodia and the Department of Fisheries, Thailand.

The project was started in November 2000 and completed in September 2004. The project findings were presented at the 7th Asian Fisheries Forum in Malaysia and were also featured at the AFGRP stand there, and in addition we were provided with a copy of a draft Final Technical Review.

Despite their apparent importance to rural livelihoods in South and Southeast Asia, researchers and officials addressing both aquaculture and fisheries have previously largely ignored self-recruiting species. “Self-recruiting species” are fish and other aquatic animals that can be harvested sustainably from farmer managed systems without regular stocking. The project has brought new knowledge about self-recruiting species as the Imperial College and Stirling based scientists have addressed theoretical issues of population dynamics for mixed stocked self-recruiting populations and reviewed fish domestication and interactions between cultured and wild fish while the scientists in Asia have conducted participatory rural appraisals and household monitoring surveys. The importance of these species to food supply in poorest households is a significant finding and will have considerable policy implications. Two peer-reviewed publications have been published and two are in press or submitted.

A positive feature of this research project is that it is jointly conducted by two programmes, AFGRP and FMSP.

FMSP - R7336 - Sustainable livelihoods from fluctuating fisheries resources in Malawi and Indonesia

The project purpose was to identify management regimes and development policies that are appropriate to the delivery of maximum benefits (income or food security) to subsistence and small-scale commercial fishers dependent on fish stocks that fluctuate extensively, so that livelihoods may be sustained and improved, and poverty in fishing communities reduced. The project team were E. Allison, F. Ellis, L. Mathieu (University of East Anglia), A. Musa (WBM Consulting, Indonesia) and P. Mvula (Chancellor College, Malawi).

The intended beneficiaries were resident and migrant fishers and fishing communities in Malawi and Indonesia. Target institutions included the Fisheries Departments of Malawi and Indonesia, community management organisations and NGOs, WorldFish Center's Africa programme, FAO's small-scale fisheries initiatives and Asian Development Bank.

The project was implemented from January 1999 until September 2001.

Seven peer-reviewed publications were reported for this project, but a follow-up question to the project leader on this divulged eleven peer-reviewed papers, three book chapters and four papers in published conference proceedings. It is difficult (and of questionable relevance) in such cases to equate particular papers with individual projects.

This research project's results challenged some prevailing theories and assumptions in fisheries management concerning the use of equilibrium MSY-based indicators and showed that these are problematic, and not just in the case of small pelagic fisheries. It sought to understand how fisherfolk responded to highly variable and unpredictable fish stocks. The findings produced a range of interesting typologies of fisheries, and it called into question prevailing wisdom that fisheries are open-access occupations of last resort, and the refuge for the "poorest of the poor". Conclusions were made concerning appropriate management institutions.

Dissemination was carried out through participation in conferences, organising workshops and publishing in various fora. Since project completion, the approaches developed and policy/management conclusions reached have been utilised by DFID in southern/eastern and West Africa.

FMSP - R8118 - Understanding livelihoods dependent on inland fisheries in Bangladesh and SE Asia

The project's purpose was to characterise the poor, identify their dependence upon aquatic resources, the nature and status of those resources, and their vulnerabilities in relation to loss or mismanagement. The project was implemented by a large team led by Mahfuz Ahmed, P. Sultana and P. Thompson of WorldFish Center and with other participants from Bangladesh Center for Advancement of Science, Imperial College, Britain, Durham University, Britain, MRAG, Britain, An Giang University, Vietnam, Can Tho University Vietnam, Department of Fisheries, Cambodia, and Living Aquatic Resources Research Centre, Lao PDR.

Intended beneficiaries were poor fishers and fishing communities in Bangladesh, Vietnam, Cambodia and Lao PDR. The target institutions were involved directly in the project.

The project was started in February 2002 and completed in January 2003.

The findings of this research showed the types of fishery in all four countries are broadly similar, being dominated by major rivers and their floodplains and/or deltas. It identified two common threats and trends were identified in the four countries: high fishing pressure and loss/degradation of wetlands and floodplain habitat to agriculture. These were, however, attributed to 1) flood control, drainage and irrigation structures; 2) modification of river-flows for hydroelectric power; and 3) effects of pollution and agro-chemicals.

The reports did not identify specific peer-reviewed publications emerging from this project; it appears to have been of a primarily enabling nature with strong policy implications for the countries involved. The involvement of the WorldFish Center will ensure wide dissemination of results and conclusions.

FMSP - R5050 - Computer aids in fish stock assessment - field development and FMSP - R7041 - Software for estimating potential yield under uncertainty

These two projects are considered jointly, and their assessment is based upon the evaluator's own judgement with assistance from Dr Jeppe Kolding who examined the software from a technical point of view, and with consideration taken of FMSP's responses to the latter's comments.

The projects' respective purposes were to develop, test and distribute user-friendly "Windows"-based versions of (i) revised CEDA and LFDA stock assessment software and (ii) software for estimating potential yields (taking account of uncertainty and inter-annual recruitment variability) towards diverse fisheries management objectives. The software was to be accessible for downloading over the internet, and comprehensive tutorials and manuals designed and mechanisms to enable feedback from users ensured.

The project teams were lead by Geoff Kirkwood, Imperial College/MRAG, with the collaboration of (i) T. Branch, S. Nicholson and S. Zara and (ii) K. Juntarashote (Thailand) and P. Medley (Turks and Caicos Islands).

The intended beneficiaries are poor fishing communities, as well as fisheries scientists and managers in developing countries.

The projects were implemented from (i) originally January 1992 to May 1995 (November 1998 to October 2001 for the Windows upgrade) and (ii) from January 1998 to March 2000.

There exist many diverging views about modelling of fish populations, stock assessments and yield estimations, but these two projects are based upon the work of renowned scientists and will undoubtedly be the basis for building competence among developing country fisheries science capacity towards improved management of increasingly overfished stocks that are essential for millions of livelihoods. They also contribute to ongoing debates about the strengths and weaknesses of various computer models. It is hoped that these tools may eventually be combined with new thinking focused on approaches towards ecosystem-based fisheries management in the future.

Following software development during these two projects, FMSP has undertaken training of trainers' courses for fisheries scientists from Kenya, Tanzania, Seychelles, Mauritius, Maldives, Laos, Cambodia, Vietnam, Bangladesh and India. An additional point is that this work will soon be published as an FAO Technical Paper in English, Spanish and Portuguese. 283 registrations have been made from 69 countries for downloading of the software from the FMSP website. Plans are underway to visit countries like India to work with scientists using the software and to try to influence policy.

FMSP - R7947 - Integrated fisheries management using Bayesian multi-criterion decision-making: participatory fisheries stock assessment (ParFish)

The project purpose was to develop improved strategies and plans for the management of capture fisheries important to poor people. The project was managed by P. Medley cooperating with the Institute of Marine Sciences and Fisheries Department in Zanzibar, and MRAG.

The intended beneficiaries were poor fishing communities in developing countries, and specifically in Tanzania.

The project was started in August 2001 and completed in October 2003.

This project built upon earlier FMSP work on fisheries stock assessment methods intended to inform management and it incorporated participatory methodologies, testing them in Tanzania (Zanzibar) and also in the Turks and Caicos Islands. This approach has proven especially valuable in data-poor artisanal fisheries in situation such as coastal Tanzania, which is typical for many developing countries. It has an empowering element for fishing communities in terms of knowledge and active interest in management of their own fish resources and presumably encourages fisheries officials to consider co-management options.

No peer-reviewed publications have been produced by this project yet. But the findings of this research project are being disseminated to various international and national organisations.

FMSP - R7335 - Adaptive learning approaches to fisheries enhancement

The purpose of the project was the development and promotion of adaptive learning approaches to fisheries enhancement. It recognised that the management of enhanced fisheries must be carefully tailored to local ecological and institutional conditions in order to provide maximum benefits in a sustainable manner. It was implemented by C. Garaway, R. Arthur (MRAG) and K. Lorenzen (Imperial College, London).

The intended beneficiaries were fishers and fishing communities and government agents, initially in Lao PDR. Target institutions included unspecified governmental and non-governmental organisations promoting or implementing fisheries enhancements.

The project was commenced in February 1999 and completed in June 2002.

The research was theoretically rigorous in terms of both the mathematical tools developed and the adaptive learning approaches to resource users; in this case enhancement fisheries in small freshwater bodies in Lao PDR. The focus on participation and learning rendered the project particularly successful in relation to its purpose and towards capacity building at local levels. The interdisciplinary approach was complex, but it seems to have functioned well. Eight peer-reviewed papers of high quality have already been produced, and more are expected following the completion of R. Arthur's PhD.

Wide efforts towards scientific dissemination have been made, and two of the researchers were observed to generate considerable interest about their work at the 7th Asian Fisheries Forum in Penang, Malaysia.

PHFRP - R7008 - Field and Desk Based Tools for Assessing Fish Losses: Adaptation and Validation in West Africa

The purpose of the research was to contribute towards the PHFRP output: "An appropriate and replicable methodology for identifying the magnitude and source of post-harvest losses developed and promoted." This was to be done by validating and further developing three post-harvest fish loss assessment tools developed by Project R5027 (in Tanzania). The tools were: field-based fish loss assessment methods designed to generate qualitative and quantitative data on losses; a predictive computer model to mimic intervention scenarios to reduce losses; and a database of fish loss data (FishLoss). The project was led by A. Ward of the then Natural Resources Institute at Chatham, Britain.

The intended beneficiary was defined as being the West African Association for the Development of Artisanal Fisheries (WADAF), the main collaborator for this research project.

The project was started in September 1997 and completed in October 2000

The project was of a strongly applied nature, aiming to further validate already researched assessment tools. The scientific strengths are not immediately obvious to an outsider to the field, whether the results were statistically representative did not seem to be considered, and one might even question whether this is the best approach to the problems in question: perhaps a more participatory initial approach with poor fish processors might have rendered more valid methods towards identifying problems and desired interventions. A manual for the computer model and database were produced, but no peer-reviewed publications were forthcoming.

PHFRP - R7971 - Field evaluation of a systems based approach to the reduction of blowfly infestation of traditionally processed fish in tropical developing countries

The project purpose was "to complete the development of a prototype blowfly control strategy that is appropriate for use by resource - poor fish processors in tropical countries, and produce related training / extension materials". The project team included J. Esser, V. Salagrama of MD Associates Ltd, Britain and A. Marriott of Mike Dillion Associates Ltd., Britain as well as eight other team members from Integrated Coastal Management, India and the Department of Fisheries in Andhra Pradesh, India.

The intended beneficiaries of this project were resource-poor fishing communities, fish processors and consumers of traditionally processed fish. Target institutions were the involved ICM and DoF in Andhra Pradesh.

The project was started in March 2001 and completed in 31 March 2003

This project was a continuation of aspects of several previous PHFRP projects addressing the same issue (R4911, R5795, R5802, R5921, R6700 and R6824). Such continuity strengthens confidence in the validity of the results, and while the application of these results in new contexts was probably justifiable and important for developmental considerations (and especially to provide a viable alternative to the current practice of using insecticides to control blowfly infestation of traditionally cured fish), it is somewhat unclear as to what scientifically new problems were being addressed. No peer-reviewed publications were reported from this project.

PHFRP - R7799 - Changing fish utilisation and its impact on poverty in India

The purpose of the project was "to develop strategies to increase the positive impact of improved post-harvest utilisation of fish on the lives of poor processors, traders and consumers". It was implemented by J. Campbell of IMM Ltd., Exeter, Britain.

The intended beneficiaries were poor fish processors (particularly women heads of households) and petty traders who rely on traditional practices and markets, particularly in coastal states Orissa, Andhra Pradesh, Tamil Nadu, Kerala and Karnataka. Target institutions included Integrated Coastal Management, India; the College of Fisheries, University of Agricultural Sciences, Mangalore, Karnataka; South Indian Federation of Fishermen Societies, Trivandrum, Kerala; and the Central Institute of Fisheries Education, Mumbai.

The project was commenced in August 2000 and completed in December 2003.

The research produced a macro-level tool called the Post-Harvest Overview Tool (PHOT) intended to assist government agencies. This tool was originally developed by IMM under the Bay of Bengal Programme. No peer-reviewed publications have emerged from this research and, despite its doubtlessly valuable practical applicability, it is difficult to assess what is scientifically new in this work.

PHFRP - R8111 - Poverty and Post-Harvest Fish Utilisation in Ghana

The purpose of the project is to develop “relevant new knowledge (strategies, management systems, methodologies and tools), which will improve the post-harvest utilisation of fish and which are appropriate to poor producers, processors, traders and consumers”. The project leader was A. Ward of IMM Ltd., Exeter, Britain.

The intended beneficiaries are poor producers, processors, traders and consumers in Ghana. Target institutions include the Department of Fisheries, various ministries, district assemblies, international NGOs in Ghana as well as the Institute of Statistical, Social and Economic Research, University of Cape Coast, and Department of Oceanography and Fisheries, University of Ghana.

The project was started in March 2002 and completed in March 2004.

Research was based upon the Post-Harvest Overview Tool (PHOT) that was developed in India and refined this through workshops, desk and field studies towards the Fisheries Post Harvest Overview Manual (FishPHOM). The Post-Harvest Livelihoods Analysis Tool (PHLAT) was developed to apply the sustainable livelihoods approach to the post-harvest fisheries sector. No peer-reviewed publications. It is again difficult to discern what is scientifically new in this work, although it surely has developmental value.

2.5 SCIENCE QUALITY

Contribution of projects sampled to new knowledge

It appeared clear to the reviewer from studying the projects above that all the six AFGRP projects resulted in significant contributions to new knowledge, and that R6979 and R7919 were outstanding in this respect. R6979 broke new scientific ground in the study of EUS and linked it closely to people’s livelihoods. R7919 produced novel theories about self-recruiting species that have been largely ignored and yet are of great importance to poorer fish farmers and local communities. R7917 is also novel in being a project that is implemented by two programmes (AFGRP and FMSP) jointly.

The six FMSP projects also evidently contributed significant new knowledge, and the reviewer considered R7336 and R7335 to be of especially notable value in this respect. R7336 cast doubt on conventional equilibrium-based MSY theories and also questioned the labelling of fisheries as a last resort occupation in open access situations for the poorest of the poor, and on the basis of these put forward novel ideas for fisheries management.

In the opinion of the reviewer, the four PHFRP projects did not contribute significantly towards scientifically new knowledge (but this does not preclude them from being valuable in other developmental respects).

Although it is difficult to compare different fields of research, it seems that FMSP has excelled in some aspects of basic research in addition to applied research and had greater emphasis on dissemination in the latter period. AFGRP has consistently emphasised applied research of high quality with a steady record of producing both peer-reviewed and more popularised publications. PHFRP has produced relatively few peer-reviewed publications in relation to AFGRP and FMSP, but it has produced much promotional materials, especially in the latter period. The reviewer concludes that PHFRP’s research has had a significantly smaller scientific production and impact, but with the opportunity to make field visits and meet with partner institutions and beneficiaries, the Core Team of the Evaluation will probably be in a better position to judge the relative developmental impact. See Annex 2 for numbers of publications, peer-reviewed and otherwise.

Extent the projects use existing knowledge creatively in new contexts

The AFGRP projects appeared even stronger in this respect as they effectively built upon the Programme’s earlier research efforts as well as incorporating lessons from other contemporary research. R7064 used knowledge about irrigation systems with pro-poor aquaculture systems, and R7100 utilised earlier work on the impacts of cage-aquaculture in new small-scale tropical circumstances.

FMSP projects were highly impressive in further developing earlier research results and ideas in newer projects and in learning from other ideas too. R5050 and R7041 built upon earlier mathematical modelling theories and applied them to field situations in more user-friendly fashions.

PHFRP projects contributed meaningfully in applying earlier projects' results in new geographical contexts. R7008 and R8111, for example, usefully applied methods and tools that were developed in earlier projects in Tanzania and India to West Africa.

Innovativeness and scientific risk-taking

The reviewer feels that it is difficult to distinguish between “innovativeness” and “newness and creativity” in research (Encyclopaedia Britannica's Thesaurus lists them as synonyms). Since we have already addressed aspects of newness and creativity in the two preceding sections, we shall avoid semantics and focus on the aspect of scientific risk-taking in this section.

AFGRP's projects did not appear to be particularly risky, but R7590 on carp genetics could be considered a quite difficult research problem that may not have rendered results (but did prove successful), and R7917 stretched across disciplines in a new way that might have failed (but actually turned out to be highly successful).

FMSP's R7336 was risky in straddling Malawi and Indonesia, but proved most rewarding. R7335 combined widely different disciplines encompassing both mathematical modelling and adaptive learning approaches, but resulted in eight high quality publications, contributed to a PhD thesis, and is likely to be emulated in research elsewhere.

The selected PHFRP projects displayed a low degree of scientific risk-taking.

Awareness of current knowledge

AFGRP scientists appeared to be abreast with cutting edge scientific thinking in aquaculture and fish genetics, in the forefront of the field in many respects, and with a high status in the international scientific community. The degree of conversancy with development research ideas appeared to good but slightly more variable, especially in earlier projects that were disciplinarily narrower.

FMSP researchers also appear to be fully conversant with their fields of fisheries specialisations, and avant-garde in scientific thinking in certain fields. Some scientists are particularly progressive in incorporating developmental and interdisciplinary dimensions in their research approaches.

PHFRP scientists appear to be well versed in their technical specialisations, but from their reports and publications the Programme did not appear to be aware of some of the key literature and ongoing discourses pertaining to relevant fields of development studies, theoretical aspects of poverty-related research, political economy, commodity chain analysis and globalisation of the marketing which are considered essential toward a deeper understanding of post-harvest fisheries issues in a development context.

2.6 SCIENCE CAPACITY BUILDING

Science capacity building in the South

Increasing attention has been paid to capacity building within partner institutions in developing countries during recent years, but there would appear to be considerable scope for further strengthening of these aspects. Such a shift would probably result in greater degrees of mutual exchange of scientific knowledge and experience, higher quality research and, above-all, greater development relevance in the fight against poverty.

The training of post-graduates from developing countries does not feature in any of the three programmes, but in many cases AFGRP and FMSP successfully used parallel funding mechanisms that achieved this in ways that complemented their research. Mechanisms to strengthen this dimension should be strongly encouraged in future programmes, especially within the institutional framework suggested in the preceding paragraph.

Development of long-term institutional relationships between British institutions and Southern institutions

Common to all three programmes is that they have shifted their emphasis from a strong base within British institutions towards closer partnership with institutions in developing countries. This collaboration is evidenced by increased numbers of joint publications with co-authors from partner institutions, but these aspects are still relatively weak by some international standards.

Future research collaboration within new and strengthened frameworks of institutional cooperation could be developed by competitive mechanisms through peer-reviewed application processes for collaborative research proposals forwarded jointly by British and developing country institutions, encouraging also British--South--South links, and possibly key researchers from other developed countries.

2.7 KNOWLEDGE DISSEMINATION

Rating of overall result knowledge dissemination from programmes

Both AFGRP and FMSP have consistently produced impressive numbers of peer-reviewed publications along with other more popularised publications, whereas PHFRP had a low production of peer-reviewed publications but did produce numerous other dissemination materials. Scientific citation indices also reflect this pattern clearly.

Observations and interviews conducted while attending the 7th Asian Fisheries Forum in Malaysia during December 2004 reinforced the impression that AFGRP and FMSP research is generally well renowned in the scientific community, whereas PHFRP research efforts apparently only reach a more limited audience. Some scientists at the WorldFish Center (formerly ICLARM) and the Asian Institute of Technology expressed familiarity with AGFRP and FMSP work but were not acquainted with PHFRP results. East African members of the Western Indian Ocean Marine Science Association responded similarly.

It was difficult to assess the knowledge dissemination to developing country policy audiences, outreach services and end-users in the time available for the specialist's assessment. It would seem from their own documentation that all three programmes consciously emphasise such outreach. The specialist estimates that AGFRP and FMSP probably reach a wider audience in these respects too, but that PHFRP is effective in reaching specifically targeted audiences in the countries and areas where they are working.

A limited number of telephone conversations with some individuals in FAO, Norwegian NORAD and Swedish Sida indicated that at least some members of the international donor community were familiar with some of the work of AFGRP and FMSP, but had not heard of that of PHFRP.

2.8 MANAGEMENT APPROACH

Some points of comparison and commonality between the programmes

All three programmes had good scientific reporting systems and convenient access to detailed research information, but PHFRP appeared to have the most systematic and coherent overviews of projects' status and progress, with time-lines and efficient access to any relevant documentation.

The Programmes appeared to be mostly strongly motivated in their work and responded enthusiastically to requests despite their other commitments and busy travel schedules, even replying immediately during evenings and weekends. An exception to a small extent was perhaps PHFRP who pointed out that only 55 of their workdays per year were covered by the Programme, resulting in occasional difficulty in relation to their other working obligations.

It appears that the three programmes have all been primarily geographically focused on Asia, but that they have initiated more projects in Africa during the latter period. The overview provided by PARC gives the following numbers of projects which are incomplete but do provide some basis for comparison:

	Africa	Asia	Lat Am
AFGRP	4	33	0
FMSP	7	21	0
PHFRP	3	8	0

In the latter period, the projects have been organised usefully in clusters to a greater degree, rather than their earlier tendency to exist more in isolation.

Many of the changes discussed above are a result of the programmes' own thinking, but they do also strongly reflect responses to changes in the former ODA's and evolving DFID's policies in these matters. It may have been quite difficult at times for the programmes to respond to a radically changing policy environment during the period in question.

2.9 CONCLUSIONS AND LESSONS FOR THE FUTURE

Research themes for the future

Recommendations for future emphasis in the research themes of the three programmes are first addressed briefly and separately:

(1) Aquaculture and Fish Genetics Research Programme - the three themes (Seed production; Aquatic animal health; Systems) have consistently produced scientifically significant and developmentally relevant results: seed production is often a bottle-neck to commencing production, health problems are of increasing importance and a holistic systems approach is essential to contribute in a development context. We recommend that emphasis on these central issues be continued in a future programme.

(2) Fisheries Management Science Programme - the five themes are Information to inform management-research and influence policy; Information systems to support the co-management of fisheries important to the poor; Fisheries assessment methods to inform management; Pro-poor capture fisheries management strategies; Pro-poor enhancement fisheries management strategies. Research should continue combine relevant basic and applied research towards improved management. These five themes address essential research issues and deserve continued support.

(3) Post-harvest Fisheries Research Programme - the three core research areas are “To develop improved methods to identify the source and magnitude of post-harvest losses and promote take-up and use by key institutions; To develop appropriate value-adding and loss reduction processes and technologies and promote use by key stakeholders; To generate new knowledge of the structure and operation of post-harvest credit and market systems and the impact on the poor of changes in the utilisation of fish and disseminate this knowledge to key policy makers and stakeholders”. These resulted in apparently useful development activities which have been implemented, but they have not contributed to significant research results, especially during the latter years of the programme. They are unlikely to prove fruitful in terms of future research if the present approach is maintained. It would be more appropriate to combine research aspects of post-harvest fisheries with an expanded fisheries management programme and to consider support to selected development activities under bilateral development cooperation channels.

General considerations that apply to all three programmes are that although they may be strong in their fields of specialisation, the three programmes’ managers and researchers seemed to have varying degrees of conversancy with development research literature and interdisciplinary considerations. It would be useful to pay added attention to cutting-edge research on natural resource management in developmental contexts by, for example, the Institute of Development Studies of the University of Sussex and the School of Development Studies at the University of East Anglia, which summarise some of the recent paradigm shifts in thinking in these fields.

Newer research ideas on questions of “non-equilibrium ecology” applied to fisheries and aquaculture, and challenges to conventional thinking in development contexts could be usefully explored and critiqued. The concept of “ecological and social resilience” in relation to natural resource management was launched by various researchers in different parts of the world, including groups at the Department of Systems Ecology of the University of Stockholm and the Beijer Institute. These ideas were familiar to some of the researchers and have been applied in a few FMSP and AFGRP projects, but could also perhaps be applied more widely. Considerations of political economy and newer ideas on “political ecology” that are relevant to scientific discourses on development issues were not featured strongly either.

Specifically in the fields of fisheries and aquaculture, the recent debates on the need to incorporate ecosystem approaches to management, attention to biodiversity issues and the inherent sustainability problems faced by increasing tendencies of “fishing down marine food webs” whilst “farming up” the same webs. There are obviously different scientific opinions on these questions, but in the context of development related research in an increasingly globalised arena, more focus on these with a rigorous scientific approach could be most useful (recent FMSP and AFGRP research efforts on effects of climate change and livelihoods are relevant in this context). Underlying land and sea tenure questions have been raised to some extent, but deserve increased attention.

Concluding remarks

The three programmes addressed research issues of crucial importance to the livelihoods of poor people in poor countries. Development research in these fields has produced relevant and scientifically sound results when conducted by competent scientists with outstanding academic records and incorporating interdisciplinary approaches, especially when researchers and institutions from both Britain and developing countries cooperated.

Any future research programmes would be most likely to be successful if they are designed to contribute meaningfully towards knowledge-based development cooperation for the eradication of poverty. They should attract and ensure sustained motivation among highly competent British researchers in cooperation with colleagues from developing countries. It would seem desirable to prioritise enhanced and regular dialogue between researchers and scientifically competent DFID personnel to generate a meeting of inspired scientific approaches with ensured relevance to development processes. Independent and critical research should be consciously encouraged. The recycling of old research ideas or use simplified utilitarian approaches to development research are unlikely to prove useful in addressing future challenges in aquaculture, fisheries and post-harvest issues in a rapidly changing and increasingly globalised world. Innovative approaches and apparently “risky” research that question established dogmas and paradigms should be accommodated alongside deliberate problem solving research.

Annex 1. Fisheries, List of Programmes' personnel consulted

The following people from the three programmes, or associated persons, were consulted in person, but they are in no way responsible for any errors that may be contained in this report, and any judgements or opinions expressed are purely my own.

AFGRP

Prof James Muir	(in Britain)
Dr David Little	(in Malaysia)
Mr Anton Immink	(in Malaysia)
Prof James Young	(in Malaysia)
Dr Kai Lorenzen	(in Malaysia)
Dr Krishen Rana	(in Malaysia)
Dr Francis Murray	(in Malaysia)
Prof Md Abdul Wahab	(in Malaysia)

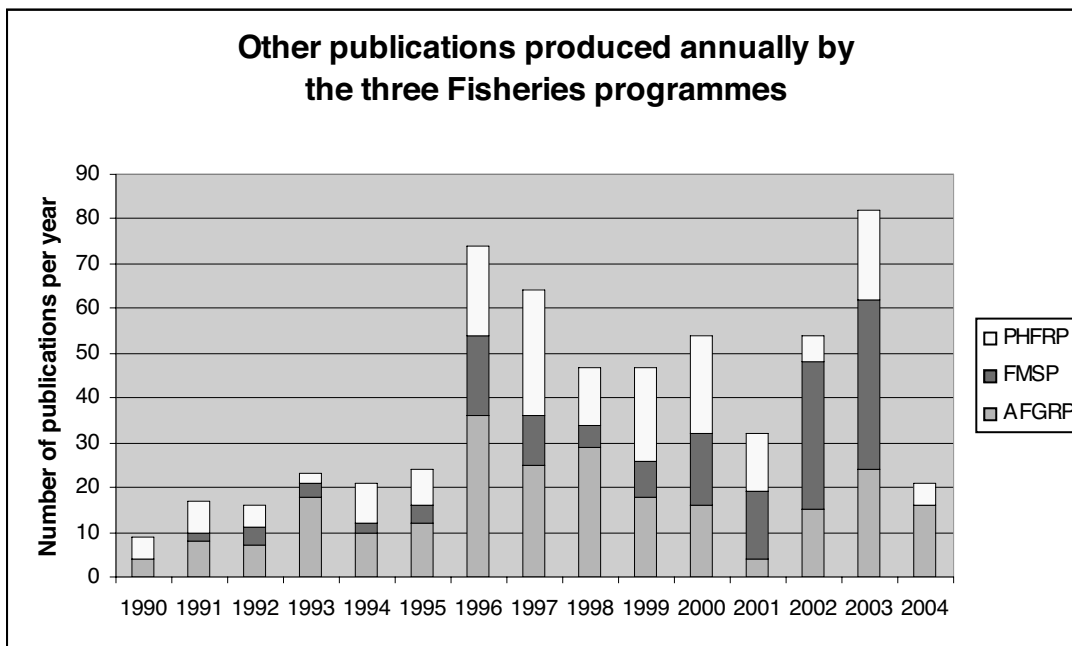
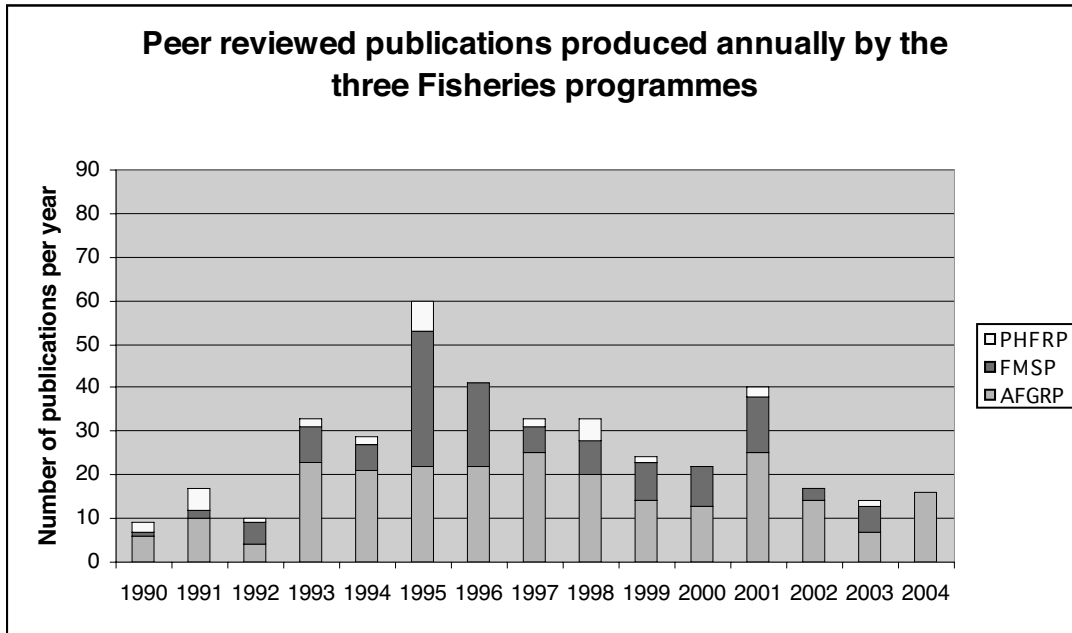
FMSP

Prof John Beddington	(in Britain)
Dr Chris Mees	(in Britain)
Dr Ian Payne	(in Britain)
Dr Robert Arthur	(in Britain)
Ms Catherine O'Neill	(in Britain)
Dr Geoff Kirkwood	(in Britain)
Ms Suzannah Walmsley	(in Britain)
Ms Charlotte Howard	(in Britain)
Dr Eddie Allison	(in Britain)
Dr Ashley Halls	(in Britain)
Dr Caroline Garaway	(in Britain and Malaysia)
Dr Meryl Williams	(in Malaysia)
Dr Mahfuz Ahmed	(in Malaysia)
Dr Kai Lorenzen	(in Malaysia)

PHFRP

Mr John Sanchez	(in Britain)
Ms Sarah Godfrey	(in Britain)

Annex 2. Annual publications from each of the three programmes



Note: numbers of publications for 2004 are incomplete as they are due to be reported in April 2005.

Annex 3. DFID AQUACULTURE AND FISH GENETICS RESEARCH PROGRAMME (AFGRP)

NARRATIVE SUMMARY	INDICATORS OF ACHIEVEMENT	MEANS OF VERIFICATION	RISKS AND ASSUMPTIONS
<p>GOAL Livelihoods of poor people improved through sustainably enhanced production and productivity of RNR.</p>	<p>Food security indicators, measures of changes in capabilities; assets and activities, access to services</p>	<p>National and local level monitoring of poverty and livelihoods (household survey, employment statistics) WHO reports. DFID evaluations.</p>	<p>Political stability maintained</p>
<p>PURPOSE Sustained benefits of aquatic resources for poor people generated through improved knowledge of aquatic stocks, their selection, enhancement, culture and consumption.</p>	<p>By 2006, knowledge gains allow 500,000 poor people in S & SE Asia to improve food supply and quality by 20% and income by 20%, based on yield increases related to better aquatic stocks, sustainable aquaculture and enhancement practices, and at least 100,000 people positively impacted by development activities incorporating programme outputs.</p>	<p>National, FAO sector surveys; environment report. Evaluation RNRs/AGRP. National reports to regional organisations. Reports of target institutions/ key locations. Household and community surveys/ monitoring against base-line data.</p>	<p>Poor people invest benefits to improve livelihoods.</p>
<p>OUTPUTS</p> <ol style="list-style-type: none"> 1 Enabling contexts for aquatic stock selection and production, livelihood impacts defined and indicators developed, in present and emerging inland and coastal aquatic systems 2 Practical strategy developed and applied for aquatic stock identification, selection and improvement in target enhancement and aquaculture systems 3 Improved culture and enhancement systems based on natural and human resource relationships, and their effective use of productive inputs (broodstock, seed, nutrients) in target regions 4 Livelihood risks/constraints of environmental, stock quality or aquatic health factors reduced in target systems through improved techniques and strategies for assessment, control and management 5 Improved global knowledge base on aquatic stocks and culture practice established and disseminated through project linkages, national and international networks, workshops and publication 6 Successful promotion and uptake of improved approaches, and impacts measured, through local institutional/uptake pathways 	<p>By: 2006 reports on all PLF Output 1 indicators available, interactions with key development agents and evidence of uptake in policy</p> <p>By: 2006 reports on all PLF Output 2 indicators available, evidence of use in practical context in at least 3 target countries</p> <p>By: 2006 reports on all PLF Output 3 indicators available, with evidence of target gains and their development impacts.</p> <p>By: 2006 reports on all PLF Output 4 indicators available, with evidence of application of approaches and their development impacts</p> <p>By: 2006 reports on all PLF Output 5 indicators available, with evidence of ongoing post-programme knowledge sharing and development</p> <p>By: 2006 reports on all PLF Output 6 indicators available, with evidence of further post-programme uptake and impact development</p>	<p>- reports, published documents, peer review publications,</p> <p>- reports, independent reviews of systems and practice, peer review publications; analysis of key stocks; policy and management documents</p> <p>- reports, independent technical and economic assessments; peer review publications; workshop content. application in analysis and techniques; impact measurement</p> <p>- reports, peer review publication; application in analysis and techniques, independent assessment uptake and use in laboratory and field practice; impact measurement</p> <p>- internet function; network information and reports, development project reports, reviews; network activity statements and programme details; workshop content and participation data; publication details, review content</p> <p>- reports, surveys of institutional activity; skill, attitude and knowledge assessments, impact indicators in target groups</p>	<p>- Natural resources of required quality remain available - climatic conditions remain favourable.</p> <p>- enabling environment (policies, institutions, markets, incentives) exists for widespread adoption of new technologies and strategies.</p> <p>- other sectoral factors remain stable - aquaculture offers potential for target groups and/or viable mechanisms for change</p> <p>- end-user linkages can be identified and maintained over the course of the programme</p> <p>- research activities enhance understanding sufficient to widen management options and improve risks/factor productivity.</p> <p>- uptake can be promoted in the target contexts</p> <p>- local institutions maintain co-operation, invest resources in uptake and application.</p>

DFID FISHERIES MANAGEMENT SCIENCE PROGRAMME LOGICAL FRAMEWORK August 2004-March 2005

NARRATIVE SUMMARY	INDICATORS OF ACHIEVEMENT	MEANS OF VERIFICATION	RISKS AND ASSUMPTIONS
<p>SUPER GOAL Poverty eliminated in poorer countries through sustainable development</p> <p>GOAL Livelihoods of poor people improved through sustainably enhanced production and productivity of land/water interface systems.</p> <p>PURPOSE Benefits for poor people generated by application of new knowledge to fisheries management systems.</p>	<p>Measures of empowerment</p> <p>- Food security indicators</p> <p>- Measures of change in capabilities, assets and activities</p>	<p>National and international poverty monitoring</p> <p>- National and local level monitoring of poverty and livelihoods (household surveys, employment statistics etc.)</p> <p>- WHO reports</p> <p>- DFID evaluations</p>	<p>Political stability maintained.</p> <p>Poor people invest benefits to improve livelihoods.</p>
<p>By 2005, evidence of application of FMSP research products, in S Asia (Bangladesh & West Bengal) and SE Asia (Cambodia, Laos and Vietnam) for inland fisheries, and East Africa (Kenya and Tanzania), Indian Ocean SIDS and S. Asia (Orissa and Andhra Pradesh) for marine fisheries by at least two of the following:</p> <ul style="list-style-type: none"> • Poor people • Institutions supplying services to the poor • Employers of the poor • Policymakers <p>- to benefit target communities by achieving, for at least one EFZ, coastal or inland capture fishery, and for two enhanced fisheries, one or more of the following:</p> <ul style="list-style-type: none"> - less variable capture fisheries production, and yield stabilised at sustainable level to support sustainable livelihoods - fisheries productivity increase/improvement for enhanced fisheries leading to increased livelihood benefits - improved fisheries employment (numbers, income, quality) - improved access by poor people to fisheries knowledge generated by the Programme. 	<p>National and local level surveys of production, employment, food markets, nutrition in fisheries sector, including:</p> <ul style="list-style-type: none"> - reports of target institutions - national production statistics - evaluation of fisheries management programme - research programme reports - Monitoring against baseline data 	<p>National and local level surveys of production, employment, food markets, nutrition in fisheries sector, including:</p> <ul style="list-style-type: none"> - reports of target institutions - national production statistics - evaluation of fisheries management programme - research programme reports - Monitoring against baseline data 	<p>Poor people invest benefits to improve livelihoods.</p>
<p>OUTPUTS Existing FMSP research outputs relating to: the contribution of capture and enhancement fisheries to the livelihoods of the poor; fisheries management tools and strategies that could benefit the poor; and, the means to realise improved management, further developed, disseminated and promoted to relevant stakeholders at all levels.</p>	<p>1. By 31 March 2006, at least three fisheries information products developed to inform management research and influence policy (in target countries, international knowledge systems and DFID)</p> <p>2. Project and programme level monitoring systems provide further benchmarking baseline data, record the take-up and adoption of FMSP products, and contribute to fisheries information products by 31 March 2006.</p> <p>3. Information systems to support the co-management of fisheries important to the poor field tested with target groups and institutions in at least three locations in two countries, adapted, and widely promoted (in target countries, international knowledge systems and DFID) by 31 March 2006.</p> <p>4. Fisheries assessment methods to inform sustainable management for improved livelihood benefits further developed with target institutions in at least two countries, widely promoted (nationally and internationally), by 31 March 2006.</p> <p>5. Pro-poor capture fisheries management strategies actively promoted into at least four target institutions (including the DFID bilateral country programmes) in two target countries and widely promoted (nationally and internationally) by 31 March 2006.</p> <p>6. Pro-poor enhancement fisheries management strategies actively promoted into at least four target institutions in two target countries and widely promoted (nationally and internationally) by 31 March 2006.</p>	<ul style="list-style-type: none"> • Project FTRs • Programme highlights • Publications and other communications materials • Teaching materials • Fisheries management tools • Quarterly and annual reports • FMSP project database • FMSP Website • Requests for manuals and guidelines received • Uptake of research products by target institutions monitored and reported in Annual Report • National statistics and publications • International networks, databases and publications 	<p>Policy makers remain receptive to information on fisheries management</p> <p>Government policies continue to support co-management</p> <p>Government policies continue to support pro-poor approaches</p> <p>Target beneficiaries remain receptive to management approaches proposed.</p> <p>Stock enhancement process cost effective and socially appropriate.</p>

Key: Programme Development activity: ; Project activity (uptake promotion / synthesis); ; See previously supplied material (e.g. FMSP annual report 2003/4) for details of projects in each cluster.

DFID POST HARVEST FISHERIES RESEARCH PROGRAMME LOGFRAME

NARRATIVE SUMMARY	INDICATORS OF ACHIEVEMENT	MEANS OF VERIFICATION	RISKS AND ASSUMPTIONS
<p>SUPER GOAL Poverty eliminated in poorer countries through sustainable development.</p>	<p>Increased empowerment of the poor.</p>		
<p>GOAL Livelihoods of poor people improved through sustainably enhanced production and productivity of RNR systems.</p>	<p>Food security indicators, measures of change in capabilities, assets, and activities, and access to services.</p>		<p>That improved livelihoods lead to reduced poverty. Political stability maintained</p>
<p>PURPOSE To produce benefits for poor producers, processors, traders and consumers through the application of new knowledge to the improved utilisation of fish from fisheries in South Asia and East and West Africa.</p>	<ul style="list-style-type: none"> • By 2005, <ul style="list-style-type: none"> • The level of post harvest losses identified and reduced by 50% in two target fisheries. • The net incomes of poor producers, processors and traders sustainably increased in two target fisheries. • Food security amongst poor consumers maintained or improved through the availability of affordable fish on local markets 	<ul style="list-style-type: none"> • Reports of target institutions. • National production statistics. • Participatory assessments. • Evaluation of fisheries post-harvest programme. • Research programme reports. • Monitoring against baseline data. 	<p>Poor people invest benefits to improve livelihoods.</p>
<p>OUTPUTS 1 Relevant new knowledge (strategies, management systems, methodologies and tools) developed, which will improve the post-harvest utilisation of fish and which are appropriate to poor producers, processors, traders and consumers.</p>	<ul style="list-style-type: none"> • By 2001 improved methods developed to identify the source and magnitude of post-harvest losses in capture fisheries. • By 2003 new knowledge generated of the structure and operation of post-harvest credit and market systems and the impact on the poor of changes in the utilisation of fish. • By the end of 2004, appropriate value-adding and loss reduction processes and technologies developed which are applicable to major poor stakeholder groups in target regions. 	<p>Annual reports FTRs reviews. Peer reviewed publications. External reviews. Reviews by primary stakeholders.</p>	<p>An appropriate enabling environment exists to allow the application and adoption of new strategies.</p>
<p>2. New knowledge successfully disseminated and promoted to the point where it is taken-up and used by key intuitions and other stakeholders within targeted fisheries and wider geographical regions.</p>	<ul style="list-style-type: none"> • By 2003 Improved methods for the identification of the source and magnitude of post-harvest losses taken-up and used by key institutions within target fisheries. • By 2005 key policy makers and stakeholders within target fisheries demonstrate an understanding of the structure and operation of the post-harvest credit and market systems and the impact on the poor of changing patterns of utilisation. • By mid 2005 appropriate value adding and loss reduction processes and technologies being used by key stakeholders within target fisheries. • By 2005 one pro-poor policy change has taken place within targeted fisheries. 	<p>Annual reports. FTRs reviews. Peer reviewed publications. External reviews. Reviews by primary stakeholders</p>	<p>Government, NGO agencies and the poor have the skills, attitude, knowledge and funds to apply the new strategies. An appropriate enabling environment exists to allow the application of new strategies.</p>