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Report of the Third External Program and Management Review of the WorldFish Center

January 2007

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

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Report of the Third External Program and Management Review of the WorldFish Center

Panel: Benedict Satia (Chair)
N. Balasubramanian
Stephen Blaber
Bernard Chevassus-au-Louis
Exequiel Gonzalez

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THIS DOCUMENT CONTAINS:

- Extracts from the Summary Record of Proceedings of the Annual General Meeting 2006 (AGM06)
- Science Council Commentary
- Transmittal letter and WorldFish Response to the Report of the EPMR
- Transmittal letter and Report of the Third WorldFish EPMR

Consultative Group on International Agricultural Research (CGIAR)

CGIAR Annual General Meeting, 2006 (AGM06)

Agenda Item 6. Evaluation

(a) External Program and Management Review of WorldFish[1]

K.Sierra introduced the item and asked F.Reifschneider to explain the new format for discussing EPMRs at AGM. He explained that this year, instead of dedicating time to formal presentations on EMPRs that have been completed up to a year ago in some cases, and in agreement with the Science Council, no formal presentation would be made in order to have more time for discussion. Questions and concerns raised by Members would be addressed by the Panel Chair Benedict Satia (through video conference), the Science Council Chair, Center or CGIAR Secretariat representative. F. Reifschneider presented the ExCo 10 recommendations to the CGIAR regarding the WorldFish EPMR.

Discussion:

- The high attrition rate of staff was mentioned as a concern by one Member.
- Another Member requested clarification of the role of coastal and marine fisheries in the Center's research agenda.
- The Director General, Stephen Hall, attributed the high turnover of corporate services staff to the competitive environment of the private sector in Penang, Malaysia. The Panel Chair, B. Satia, agreed with the DG but added that there was also concern about the high attrition within the research ranks as well, which the Panel believed was attributed to the introduction of matrix management.
- With respect to the research agenda. S.Hall, explained that the Center's capacity in coastal and marine fisheries had declined over the years and needs to be built up while keeping a focus on small scale fisheries.

Decision:

- *The CGIAR endorsed WorldFish EPMR recommendations and commended the Center for being proactive on governance issues and board reforms*.

[1] Extract from the Summary Record of Proceedings of Annual General Meeting, 6-7 December 2006.

Science Council Commentary
on the Third External Program and Management Review of
the WorldFish Center

April 2006

The Report of the Third EPMR of WorldFish was discussed at the Fifth Meeting of the Science Council (SC5, April 10-12, 2006) in the presence of Panel Chair, Dr. Benedict Satia, the Director General of WorldFish, Dr. Stephen Hall (through video-conference) and the Center's Deputy Director General for Research, Patrick Dugan. The SC thanks Dr. Satia and his team for a thorough and comprehensive review of the Center. The SC endorses all 15 Panel recommendations and notes, for the most part, that the Center Board and Management have as well. The SC found many other valuable suggestions throughout the body of the text and encourages the Center to consider all of these seriously. WorldFish moved from its previous location in the Philippines to its current location in Penang, Malaysia in 2000. The Panel finds the Center still in a transitional phase, and accordingly makes a number of key recommendations aimed at completing this transition in the near future. Overall, the SC was pleased by the Panel's assurance that donors' funds had been well invested and that the future for the Center was bright, though challenging.

The Panel identified a number of major achievements of the Center since the last Review. These include the worldwide successful transfer of the GIFT, the strengthening and expansion of INGA, the development and application of methodologies and technologies for integrated aquaculture-agriculture (IAA) and rice field based aquaculture, the production of *Bayfish* and *TrawlBase* databases and the upgrading and maintenance of other key databases such as *Fishbase* and *Reefbase*, the production of global and regional models on fisheries and aquaculture supply and demand ("Fish to 2020" co-authored with IFPRI), and the development of methodologies and guidelines on fisheries co-management. The Panel also noted positively the new strategic alliance with IWMI to share Corporate Services. Major aspects of the Center's performance that attracted the Panel's concerns involved its priorities, its science quality, its regional reach, and its focus on SSA.

Priorities and Strategy

The Panel found that the Center had not yet clearly defined its research priorities *(Recommendation 3*) and that its strategy does not articulate the major specific objectives to be attained over a given time period. Given the vast area of research that conceivably falls under aquaculture and fisheries research and development, as defined in Chapter 1 of the report, the SC concurs with the Panel about the need for the Center to identify a smaller set of science based priorities on which it keeps a tight focus and for which the Center will be well recognized by its science peers. The Panel also found that science quality appeared mediocre when judged by publications in peer reviewed journals. The two issues, priority definition and science quality, are by no means unrelated. It is clear that WorldFish Management is

aware of and is addressing this issue with new research strategies being developed for the September 2006 Board meeting. While emphasizing he did not wish to in any way to pre-determine the strategies to be developed by the Center's Discipline Directors, the Director General identified a number of possible priority areas during his video-conference at the SC5 meeting. The SC reiterates that it is vital that WorldFish articulate soon its research niche capitalizing on its comparative advantage. Partnerships with ARIs, where World Fish is seen as the preferred research partner, will clearly be a key route to enhancing the outputs and impact of the Center, as will be filling key vacancies left by high performing scientists.

The SC is concerned that a third element -- the large numbers of regions in the region x discipline matrix may also be compromising scientific focus. WorldFish is, therefore, encouraged, like other Centers, to think carefully about the optimal number of regional offices and the core scientific staff needed in each in the context of focusing on a clear mandate for generating good quality science capable of generating mission-relevant IPGs. The SC highlights that the changing demography of the Center's staff has important implications for research management, in particular, stressing the need for mentoring of young scientists to help them achieve the appropriate balance of time between research and knowledge transfer.

The SC was expecting to see further elaboration in the Panel's Report about the future involvement of WorldFish in the conservation of genetic resources, in line with the new CGIAR Priority 1D. Discussion at SC5 did not determine whether a modest entry into fish genetic resources research was among the priority foci that WorldFish would embrace, but as the Center is being encouraged to focus on a fewer number of priority areas and this is currently not on their agenda, it may not get the attention the SC believes it warrants.

Science Quality and Relevance

The Panel stopped short of making a recommendation about the Center's shortfall in publication output as they were satisfied that Management had satisfactorily addressed this problem through the setting of Key Performance Goals and the annual appraisal system. Top quality papers are necessary to attract the top-flight collaborators from leading ARIs that are essential to achieving WorldFish's goals. In addition, and perhaps more critically important, setting individual performance targets should be complemented by a sharpening of the scientific focus. Potential journals for publication should also be discussed at the time of experimental design. The SC does, however, agree that WorldFish scientists also need to spend some time publishing research that can be applied by their primary NARS partners.

The Panel also urged WorldFish to continue to move away from pure development projects (*Recommendation 5*). The SC agrees with this recommendation and is reassured by the Center's response concerning the strong complementary linkages with NARS and NGOs. It is also pleased with WorldFish's use of the 'research-for-development value chain' to identify the place on the chain whereby research could achieve the greatest impact, but specifying where on the chain the Center should position itself for achieving its major objectives needs fuller articulation.

The SC notes the Panel drew extensively on the five CCERs conducted since the last review and therefore strongly supports the recommendation to institute rolling CCERs for each of the programs (*Recommendation 13*, bullet 5).

Focus on SSA

The Panel raised the concern (see *Recommendation 10*) about the lack of critical mass and activity in SSA (compounded by the large number of regional sites discussed above) and as a consequence the probable lack of impact in the future. This was an issue raised prominently by the 2nd EPMR team and the SC is also concerned, therefore, to note again that the 3rd EPMR Panel observed that 'the accomplishments … in no way correspond to the acclaimed importance that the Center attaches to SSA'. The SC understands that the demands for Africa are immense and that impact in Africa is difficult to achieve making the earlier observation on focus and fewer regional centers even more critical for the Center to address. The SC received assurances that the Center is indeed progressively increasing its resource commitment in the Region. The SC cautions that with a small unrestricted budget this alone cannot address the concern of overstretching with too few scientists in too many regions to conduct mission based IPG research that will make a difference in Africa. The Center is encouraged to address the issues raised earlier to maintain focus.

Governance and Management

Other issues raised by the Panel included the new matrix management system, restructuring of the Center Board and the inter-Center linkages. While understanding WorldFish's need for having separate disciplinary and regional foci, the SC nevertheless shares the Panel's concern about potentially high transaction costs and staff acceptability of the matrix (*Recommendation 1*). The SC was reassured by the monitoring process already in place at WorldFish. However, the SC notes that regional matrix system was common to several Centers reviewed in 2006 and in all the centers concerns were raised about the potential loss of focus on IPG research and on the loss in integration across disciplines (which is the main source of high quality, land mark journal publications) inherent in an over-extended regional matrix system. It is important that these potential high transactions costs do not overwhelm the task of integration at the discipline levels. For example, the Panel has highlighted the need of developing a strategic research agenda from the merger of genetic resources and NRM research and to guard against a mere co- habitation of these in the new management system. The SC would encourage the Center to critically examine the implementation of its own matrix structure earlier rather than later (*Recommendation 1*).

Board structure and the establishment of a Scientific Advisory Committee was an issue the Panel addressed at some length (*Recommendation 13*). The SC was pleased to note that WorldFish had already put the required changes in place.

The SC joins the Panel in commending the proactive actions taken by WorldFish and IWMI to share Corporate Services. SC also noted the ongoing discussions between the scientists and the Boards of the two Centers and encourages further interactions that enhance the effectiveness and efficiencies of the Centers.

The SC looks forward to seeing some first responses to the Panel's observations in the 2007-2009 MTP, particularly it relates to key scientific research focus, fewer regional nodes, and the Center's plans to enhance its presence and improve impact in SSA through appropriate interactions with other CGIAR Centers working in the region.

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

SCIENCE COUNCIL AND CGIAR SECRETARIAT

REPORT OF THE

THIRD EXTERNAL PROGRAM AND MANAGEMENT REVIEW

OF THE

WORLDFISH CENTER

Review Panel: Benedict Satia (Chair)
N. Balasubramanian
Stephen Blaber
Bernard Chevassus-au-Louis
Exequiel Gonzalez

Deepjee Singhal (Consultant)

SCIENCE COUNCIL SECRETARIAT

March 2006

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ACKNOWLEDGEMENTS

The 3rd WorldFish EPMR Panel wishes to expresses its sincere appreciation to the Board, Senior Management and all staff of WorldFish for their support and assistance during this review. The Panel is grateful to Trond Bjorndal, Chairman of the Board, and the other members of the Board of Trustees for their positive and constructive approach to this Review.

The Panel thanks especially Steve Hall- Director General, Patrick Dugan- Deputy Director General for Research, Jamie Oliver- Science Coordinator, Helen Leitch - Director of the Business Development Office, Tan Guat Chang – Chief financial Officer, Marie Chan –Finance Manager, Tan Khor Hoay – Head of Human Resources, Emily Khor – Board Secretarial, and other members of the management staff, all of whom cooperated fully with the Panel in the organization and implementation of this EPMR. They ensured that the Panel was provided with a good working environment, effective technical support, and friendly hospitality (including coping with a couple of vegetarians!).

The Panel was fortunate to visit several of WorldFish's country Programs in Malaysia, Malawi, Egypt and Cambodia—and wishes to express its gratitude for all the support, information and hospitality provided by WorldFish staff and its partners at those sites. Special thanks go to E. W. Ponzoni and A. Ponniah (Malaysia); Daniel Jamu and Simon Heck (Malawi); Blake Ratner, Yumiko Kura and Eric Baran (Cambodia) and Patrick Dugan (Egypt), for their help in organizing and hosting Panel visits to those countries.

There are a number of other WorldFish staff who either directly or indirectly helped the Panel by providing the necessary logistical, computing, photocopying, and other support, including nourishment! They are many, but we especially want to mention the assistance the Panel received from Helen Leich and her fantastic team. In particular, the Panel would like to specifically mention the superbly efficient support from Meena Arivananthan, who never seemed to be without a smile. The Panel also records with appreciation the valuable support received from Siew Hua Koh in terms of travel and related assistance for Panel visits to Penang.

The expresses its appreciation to all donor representatives, Directors General of CGIAR centers, WorldFish clients and stakeholders for accepting to interact with the Panel in-person, on telephone interviews and email correspondence.

It is the Panel's pleasure to also thank the SC Secretariat, in particular Tim Kelley, who served as secretary to the Panel, and the CGIAR Secretariat, particularly Manny Lantin who served as resource person to the Panel, for coordination and management of this review and for guidance throughout. The Panel also would like to thank Irmi Braun-Castaldi from the SC Secretariat for making travel arrangements for the Initial and Main Phases of the review and the Field Visits.

PREFACE

This is the report of the Third External Program and Management Review (EPMR) Panel appointed to evaluate the research program and management of the WorldFish Center. The composition of the Review Panel and short biodata of its members are given in Appendix I. The standard terms of reference for EPMRs and an additional set of issues specific to this particular Review are found in Appendix II. The itinerary of the Panel is provided at the end of Chapter I.

The EPMR Panel was guided by the general objectives of EPMRs: (a) providing the CGIAR members with an independent and rigorous assessment of the institutional health and contribution of the Center; and (b) providing the Center and its collaborators with assessment information that complements or validates their own evaluation effort.

The Panel made every attempt to conduct the review in an objective and transparent manner with a focus on the future as well as the past.

With respect to the review process, the Panel relied on a vast amount of information in identifying key issues and concerns, assessing Center performance and reaching its conclusions and making recommendations. These included:

- briefings given to the Panel Chair and members by the SC and its Secretariat;
- extensive documentation provided by WorldFish and the SC and the CGIAR Secretariats that was made available to the Panel in an EPMR Internet site and is listed in Appendix III;
- briefings during the Initial Visit to WorldFish HQs from: (a) the Director General (DG) and his senior management team, (b) Regional Portfolio Directors and other project leaders, (c) communications and other research support units, and (d) finance and administration team;
- Panel member field visits in Malaysia (October 2005), Malawi (October 2005), Egypt (January 2006) and Cambodia (January 2006) to review WorldFish research project activities in the field and meet with its clients and collaborators;
- review of BoT agendas, minutes and other documentation, observations of the BoT in action (at the September 2005 meeting) and interaction with BoT members individually;
- BoT member survey;
- consultant's report on finance by Deepjee Singhal;
- in-person or telephone interviews and email correspondence with a variety of WorldFish donors, clients and other stakeholders, including other CGIAR Center and Challenge Program leaders (see Appendix VIII);
- follow-up meetings and discussions with WorldFish Center staff members during and between the Initial and Main Phase visits;
- WorldFish staff survey conducted electronically by the Panel.

The Panel did not delve into every aspect of the Center's activities and into all possible issues, but chose to focus on what it believed were the most significant ones, given the time available. To the extent possible, the Panel relied on Center commissioned external review and donor commissioned reviews that had been completed prior to December 2005.

The Center was kept informed of the Panel's activities and progress during the review. The Panel Chair and WorldFish DG were in regular contact. During the Main Phase, Panel members worked individually and collectively to produce drafts of specific sections of the report. As they were completed, drafts were shared with the Center for comments and to check for factual accuracy prior to finalization. At the end of the Main Phase visit, the Panel Chair presented the main findings and recommendations of the Review to WorldFish staff. The Chairman of the Board of Trustees was also present.

SUMMARY AND RECOMMENDATIONS

This is the report of the Third External Program and Management Review of the WorldFish Center and covers the period 1999 to 2005. During this time, the Center has undergone major changes: It moved its global headquarters from the Philippines to Malaysia, it changed its public name from ICLARM to WorldFish, executive and Board leadership changed and the Center implemented two new strategies and re-structured its programs. Indeed, the Center is still in transition in many respects, a healthy sign in the Panel's view.

The Panel conducted the third EPMR in two parts. A retrospective part assessed the outputs and achievements of the Center, based on the old program structure, which was in place for the greater part of the review period. For the prospective part of its assessment, the Panel considered the current mission, strategy and organizational structure of the Center and its new programmatic thrusts to examine how well it is positioned to meets its goals and objectives. The Panel's assessment was facilitated by *inter alia*, documentation provided by the Center, briefings by the Center, SC and CGIAR Secretariats, views obtained in meetings and/or interviews with the Board members, previous board chairs, the previous Director-General of WorldFish, donors and a range of stake-holders, as well as visits to four countries.

Vision, Mission and Strategy

Against the backdrop of the many changes that occurred in the external and internal environment during the review period, WorldFish made significant efforts to update its Vision, Mission and Objectives and to propose to its partners, donors and other key stakeholders new perspectives on fisheries and aquaculture that address the challenges of sustainable development, consistent with CGIAR goals. The Center elaborated a Strategy update in 2005 to respond to the challenge of meeting the Millennium Development Goals (MDGs) with a fish focus. The direct interventions are with regard to the eradication of extreme poverty and hunger, to ensure environmental sustainability, the promotion of gender equity and the empowerment of women. However, flows of benefits would accrue to the other MDGs. The strategy update provides details of the processes and mechanisms the Center will pursue in order to generate various outputs that ultimately contribute to achieving the MDGs. However, no detailed programs or milestones for an assessment of performance in the medium term have yet been elaborated. The Panel believes that the Center needs to make key choices, limit itself to a few strategic areas of work, and be selective in its choice of partners. Institutional KPGs and related quantitative indicators mirrored in the CGIAR's Performance Monitoring System have been elaborated in the MTP 2006-2008.

WorldFish is in the process of implementing its new program structure based on a matrix structure of three global disciplines (Natural Resource Management, Aquaculture and Genetic Improvement and Policy, Economics and Social Sciences) and interacting with six to eight regional portfolios. Several organizational steps have been taken by the Center, including the definition of roles to provide clarity and alternative career streams for scientists based on their skills and interests, and modification of the process to avoid problems typically associated with the matrix structure. The Panel sees merit in adopting the matrix management approach and was informed that the structure has been working

well thus far. However, it wondered whether the Center was not underestimating the difficulties in implementing its matrix. Among the perceived or potential difficulties are the possible drift towards short term projects, tensions between Discipline and Portfolio Directors, increased transaction costs, the lack of a critical mass of scientists, the lack of well specified long term goals and, based on the latter, the need for the right balance between the disciplines. Some of these issues can only be addressed after the Center has more clearly articulated its chosen research domain, defined Center and program level research priorities and identified its positioning along the R-D value chain for each major objective specified.

Accomplishments and Impacts

Despite the potentially disruptive effects of the relocation of the headquarters, the research output has, in general, remained steady and staff have continued to produce a wide range of outputs, some of which have made significant contributions to science.

In the area of biodiversity and genetic resources, transfer of the GIFT methodology to other areas including Africa or other species (Asian carps) represented a key contribution of WorldFish to the definition of efficient genetic improvement strategies for tropical aquaculture. This was further enhanced by the strengthening, expansion and change of emphasis of INGA, making it more actively involved in the development of genetic improvement programs, and in particular in multiplication and dissemination of the improved stock.

WorldFish developed innovative restocking and alternative livelihood options for sea cucumber (beche de mer) fisheries and is now re-focusing the biological work using a more comprehensive approach in which culture and restocking are seen as one management tool among many in small-scale fisheries. The Center also produced *Bayfish*, a decision-making tool that utilizes data on species and habitat diversity in developing modelling approaches that link fish production and hydrological patterns in the Greater Mekong Region. In addition, the WorldFish partnered with NARs and ARIs to produce *Trawlbase* and has continued to upgrade and maintain *Reefbase* and *FishBase*, the world's premier source of information on all fish species.

Methodologies and technologies for promoting pond and rice field based aquaculture and the efficient use of wetlands have been elaborated and validated. Over 200,000 farm families have adopted the Integrated-Agriculture-Aquaculture (IAA) technology. WorldFish conducted two impact assessments that validate the relevance of their research (i) on the development and dissemination of GIFT fish in six countries, and (ii) on the development and dissemination of IAA technologies in Malawi. GIFT tilapia are now farmed in 13 countries where they contribute to increasing the supply of low cost, high quality protein for the poor. In terms of past and projected impacts, the internal rate of return (IRR) from GIFT research, dissemination and related activities over the period 1988 to 2010 has been estimated at 70%. In a similar manner, the adoption of IAA in Malawi has reduced childhood malnutrition by 15%, increased the number of fish farmers from 400 (1980) to 4000 and increased total annual fish production by more than 160 percent. Considering only *ex-post* effects, the estimated IRR from IAA research, dissemination and related activities already achieved is 15%.

Especially important has been the production of global and regional models on fisheries and aquaculture supply and demand, which have been widely commended for providing key information for policy design and implementation. Co-management research conducted in Asia, Southeast Asia and Sub-Saharan Africa has resulted in the creation of fisheries community organizations, the establishment or modification of fishing rights and the establishment of sanctuaries. It has also led to the production of guidelines for participatory approaches to management and development

Quality and Relevance of Science

The quality of science produced by the Center, as measured by outputs in international refereed journals, has declined since 1999. The annual mean number of scientific papers per scientist was less than one during the review period. This is below the internationally accepted norm.

However, the Key Performance Goal for all scientists in this respect has now been set at a minimum of two refereed papers per year, and the Panel was given evidence that this target will be met for 2006.

Notwithstanding the poor publication record, much of the research being carried out by the Center is highly relevant to its partners and clients. This is exemplified by the internally published reviews, booklets and pamphlets produced for specific audiences and conveying vital messages, which are widely used and applauded by a wide range of NARS and NGOs. Center staff received nine prestigious awards during the review period, further reinforcing evidence of the relevance of their research to stakeholders.

Partnerships and Linkages

One of the key factors in WorldFish successes during the period has been its strong working relationships with NARs and NGOs and the effective use of NARs networks of both within and between countries to address common issues and concerns. In addition, the scope and quantity of WorldFish involvement with other Centers is significant and the latter provided a favorable assessment of their collaboration with the Center. The Center has entered into a Strategic Alliance with IWMI to share Corporate Services. Both Centers have voluntarily engaged in this process that will likely result in improving complementarities between their programs. The entire process seems to be in line with the program and structural alignment, which the CGIAR is now exploring, particularly in SSA.

WorldFish is making substantial progress in the clarification of its relationship with FAO, which is a key partner for many activities. At the same time, the Center continues to establish strategic partnerships with ARIs in a few key areas, aimed at strengthening its scientific staff and improving its international image.

Governance

Overall, governance processes and institutions at WorldFish are adequate but need strengthening in several areas to reach required levels of excellence in terms of international best practices. There is scope for improving the competency profile of the Board in areas like financial and accounting appreciation. The Panel was informed that

action in this regard has already been taken. Board size and structures, however, appear geared for a much larger size of operation, and need correction in the near term.

The Panel perceives a need to strengthen external advice and counsel in matters of science to assist the Board and the executive, and a Science Advisory Committee for this purpose is considered useful. The Panel was informed that that a proposal to this effect is due for discussion at the Board meeting in March 2006.

The Annual Report of the Center, which is a valuable communication medium to all stakeholders is currently published late into the following year. The Panel believes that advancing the publication dates substantially, and including audited financial reports, would significantly enhance its value.

Management

WorldFish has managed the physical transition from the Philippines to Malaysia and established facilities in Penang extremely well. Its executive management structure has been reorganized into a matrix of Disciplines and Portfolios, with necessary support structures. Its ability to attract and retain staff of the right caliber, however, needs further strengthening, without which, it will be hard pressed to achieve its ambitious goals. In terms of its financial accounting management, there seem to be some areas that need strengthening. Internal controls assessment and risk management are beginning to be addressed and there is a need to further improve legal compliance and intellectual property safeguarding. SAP has been introduced and is expected to offer better service delivery in terms of information support and management.

An important issue relating to charging projects imputed rentals for space occupied at Headquarters (where the land is leased at a nominal rent from the Malaysian Government) needs a comprehensive review by the Board taking into account all relevant factors such as the Center's Constitution which mandates it as a not-for-profit organization, the Host Country and Land Lease agreements with the Malaysian Government, transparency and disclosure to donors, and so on.

Some IP, gender and diversity, and employee attrition issues have been discussed; the Center is fully cognizant of these matters.

Shared services as a cost-containment exercise under discussion with IWMI is a welcome initiative; thoughts of extending such service offerings to other CG Centers in future, as appears to be the intention, however, is an area where the Center needs to proceed with caution, having due regard for host country land lease agreements and other relevant aspects.

Business development in the last two years of the Review period has been impressive, with substantial funding growth. The Center should redouble its efforts in internal capacity building that will be required to handle the increased activity levels in the years ahead.

Conclusions

Despite the extensive changes that have taken place within the Center, WorldFish is under-going a gradual transition. The Panel has raised a number of issues from its evaluation of the Center's programs, governance, management and finance, and has made recommendations and suggestions for improvement. However, the overall assessment of WorldFish's performance over the period in review is positive. The Panel confirms that donors' funds had been well invested, and on this basis WorldFish should be a Center of choice for future investments by donors. The task ahead will be challenging for the Board, Management and staff of the WorldFish Center, but the Panel is convinced that it is moving in the right direction to achieve its goals.

Recommendations

Recommendation 1. As the matrix management structure is likely to exert a considerable influence on the performance of the Center's research programs, the Panel **recommends** that the Board commissions an external review of the new research structure by mid 2007 to specifically examine the effectiveness and impact of the matrix approach, the extent of transaction costs incurred and the acceptability by different levels of staff.

Recommendation 2. To broaden the staff resource base and maximize its efficiency, the Panel **recommends** that, within the framework of strategic alliances and the growth strategy of the Center, a pragmatic strategy is defined for leveraging additional resources through a range of joint ventures, including but not limited to co-financing of PhD grants, postdoctoral grants, associated scientists/laboratories in advanced research institutes and calls for joint research proposals.

Recommendation 3. While welcoming the potential creativity from and fruitful interactions between Disciplinary and Portfolio Directors, the Panel **recommends** that WorldFish identify and embrace a limited number of key scientific issues and research objectives that could be achieved within a reasonable period of time (4 to 6 years) and that could:

- stimulate WorldFish scientists of different disciplines and promote interdisciplinary research;
- be recognized by the scientific community as cutting-edge research and, as a result, stimulate collaboration with scientists from both developed and developing countries;
- demonstrate the comparative advantage of the Center and its leadership capacity in the field of aquaculture and fisheries for developing countries.

Recommendation 4. To better understand the way selective breeding changes biological growth parameters, the Panel **recommends** further studies on GIFT be undertaken by geneticists and nutritionists working together, using more controlled experimental conditions, and testing a large range of feeding levels.

Recommendation 5. In order to ensure that its development oriented partners are better equipped to scale out methodologies and technologies for enhancing outcomes and impacts, the Panel **recommends** that WorldFish:

- continue to make a conscious effort to move away from downstream development activities and explore opportunities for development-related activities to be executed by local or bilateral entities, where available, while the Center continues to monitor

and evaluate the activities/developments in order to analyze the impacts and also to identify constraints and bottlenecks which might require further research;
- undertake a scoping exercise to identify its partners' strengths and weaknesses in order to better target capacity building, especially of NGOs, to advance the development spectrum of its work; and,
- synthesize and package existing information, including frameworks, manuals, protocols and guidelines to ensure greater dissemination and use of its products.

Recommendation 6. While acknowledging the key role of FishBase within the newly defined NRM priorities and strategic directions, the Panel **recommends** that WorldFish clearly define its continuing involvement and role in the database, including specifying how the various demands on staff will be met.

Recommendation 7. n search of appropriate tools for decisions making, the Panel **recommends** the Center expand its modelling work on the supply and demand of fisheries and aquaculture and undertake additional ex-post impact assessment in aquaculture, paying particularly attention in both cases to technological environmental impacts and non-negligible dynamic (inter-temporal) effects of fisheries and aquaculture activities.

Recommendation 8. Considering the rapid development of aquaculture in developing countries and the increasing demand for dissemination of a few improved strains, from sometimes only non-local species, the Panel **recommends** that future efforts be made in defining on a pragmatic and objective basis, the acceptable dissemination area of an improved strain, and the realistic monitoring that should be implemented in relation to this dissemination.

Recommendation 9. In view of the critical role of the PESS discipline within the Center, the current breadth of its tasks as outlined in the 2006-08 MTP agenda and its current staff composition, the Panel **recommends** that the Center take action on the following:
- secure a Discipline Director as soon as possible;
- conduct a strategic process of research planning and prioritization that enables the discipline to more precisely identify its research domain and a selected set of issues to produce significant IPGs; and,
- develop and apply a balanced growth policy for qualified scientific staff according to research priorities.

Recommendation 10. Bearing in mind that many activities under fast track opportunities within the WorldFish – NEPAD initiative go beyond the realm of fisheries and/or aquaculture, the Panel **recommends** that WorldFish explore opportunities for collaboration with other CG Centers, in particular IITA, WARDA, IRRI, CIFOR, IWMI, IFPRI and ICRAF, possibly within the context of task forces, to identify gaps in the application of IAA technology and methodology or for activities related to fisheries governance.

Recommendation 11. Given the poor scientific publications record and its current limited scientific expertise and reputation, the panel **recommends** the Center give high priority to:

- recruitment of senior scientists with a proven track record or the involvement of such scientists in Center projects through various forms of partnership and adjunct arrangements, and
- recruitment of a cadre of younger, recent PhD graduates, particularly in view of present and past difficulties in attracting more senior scientists.

Recommendation 12. In view of the importance of partnerships as a vehicle for achieving the goals of the Center, the Panel **recommends** that WorldFish:
- elaborate a Partnership Strategy focusing on, among others, the modus operandi for establishing strategic partnerships and alliances that would add significant value to the current research activities undertaken by the Center;
- explicitly define the roles and responsibilities of the Center relative to its partners in all major projects;
- determine its positioning on the research-to-development continuum, within the framework of an impact pathway analysis, for all major projects; and
- elaborate a human capacity building policy for its staff and its partners taking into account, as appropriate, the suggestions that have been provided.

Recommendation 13. In order to bring about greater cohesion, process improvements, trustee participation and contribution, and board-costs containment, and to enhance the quality of independent science support, the Panel **recommends** that the Center's Board and Board Committees be restructured as follows:
- reduce the Board size to not more than nine Trustees, including the ex officio Director General, Host Country representatives and the FAO nominee;
- modify Board Committee Structure to retain the Audit Committee, the Nominating Committee, and the Executive Committee, and eliminate the Program Committee;
- include in the Center's Annual Reports a Report of the Trustees, discussed and approved by, and signed on behalf of, the Board, and Audited Financials, duly certified by the Director General and the Chief Financial Officer, along with the Independent Auditors' Report;
- constitute a Science Advisory Committee of about four members with suitable qualifications and experience/expertise, with a member of the Board as the Committee Chair. The Committee will report to the Board, and the Committee Chair (or any other member other than the Director General) should brief the Board at every meeting on its deliberations and advice; and,
- process expeditiously planning for CCERs on a five-year rolling time frame, to be updated each year, to obtain the best panelists with adequate advance notice, and spreading the workload evenly over the period. The CCER Panel Chairs should be requested to make the presentations to the Board on their Reports and Recommendations.

Recommendation 14. Given the importance of maintaining reserves at prudent and yet not unduly excessive levels, the Panel **recommends** that the Center continue to accord this matter very high priority and importance so that necessary and appropriate allocations are expeditiously approved and utilized.

Recommendation 15. Given the status of WorldFish as an international not-for-profit organization, having regard to the letter and spirit of the agreements with the Malaysian Government in respect of the leased land, and to ensure that as a CGIAR affiliate, the Center follows the best practices in accounting and reporting, the Panel **recommends** that

the Center should revisit and comprehensively review this recovery methodology in all its aspects, seek directions from the Audit Committee and Board urgently, and adopt an appropriate policy that would be consistent with the its Constitution mandating it as a not-for-profit organization, and in full compliance with the Host Country and Land Lease Agreements with the Malaysian Government, and transparent disclosure to, and concurrence of, the donors, if any such recoveries are proposed to be continued or commenced afresh.

1 WORLDFISH CENTER IN A CHANGING ENVIRONMENT

ICLARM, now WorldFish Center, started its operations in 1977 through the support of the Rockefeller Foundation. The Center was admitted into the CGIAR in 1992 following the expansion of the CGIAR to incorporate explicitly natural resources management concerns. As a condition to joining the System, ICLARM was asked to develop a Strategic Plan, which subsequently provided the basis for the development of its first medium-term plan covering the period 1994-98. The CGIAR specifically agreed to support research on inland and coastal area fisheries but not support research on deep sea capture fisheries or capital intensive aquaculture, as these sectors of the industry were dominated by large scale commercial operators.

The Second EPMR of the Center was conducted in 1999. Among other things the Panel noted the difficult circumstances under which ICLARM operated and recommended that "the ICLARM Board and Management place the highest priority to locating and transitioning to a permanent site that meets ICLARM's criteria". At its Fifteenth Meeting in February 1999, immediately following the EPMR Report, the ICLARM Board decided to locate the global headquarters in Penang. The move finally took place in February 2000.

During the past seven years (1999-2005) ICLARM/WorldFish Center has undergone a strategic transformation characterized by *inter alia*: the relocation of its headquarters from the Philippines to Malaysia, the change of its public name from ICLARM to WorldFish Center (WorldFish), the adoption of two strategic plans and an evolution in program structures and the recruitment of a new Director General as well as an extensive revision or introduction of supporting organizational arrangements. All these have taken place at a time of continued stagnation and even degradation of global capture fisheries, the tremendous growth of aquaculture industry and the intense globalization of fish products which have great relevance to developing countries livelihoods, and provide both challenges and opportunities for WorldFish. Changes have also occurred within the CGIAR and in the international development agenda as dictated by major international conferences.

This review assesses these changes and their effects, actual and potential, on the work of the Center. Accordingly, the Panel has attempted to provide a comprehensive and rigorous review of WorldFish's science, governance and management to ensure that WorldFish can continue to fulfill both its and the CGIAR's mission for fisheries and aquaculture. The retrospective part of the review assesses the outputs and impacts of the Center based principally on the old program structure since the new program had just been put in place.

1.1 Some Major Challenges and Opportunities in World Fisheries and Aquaculture

The WorldFish Center is committed to poverty reduction and food security with a fish focus with due concern to maintaining environmental sustainability. From a fisheries and aquaculture perspective, and in the context of contributing to the MDGs some of the major challenges and opportunities can be grouped under three principal headings: Fish and Food Security, Fish and Poverty and Fish and environmental sustainability.

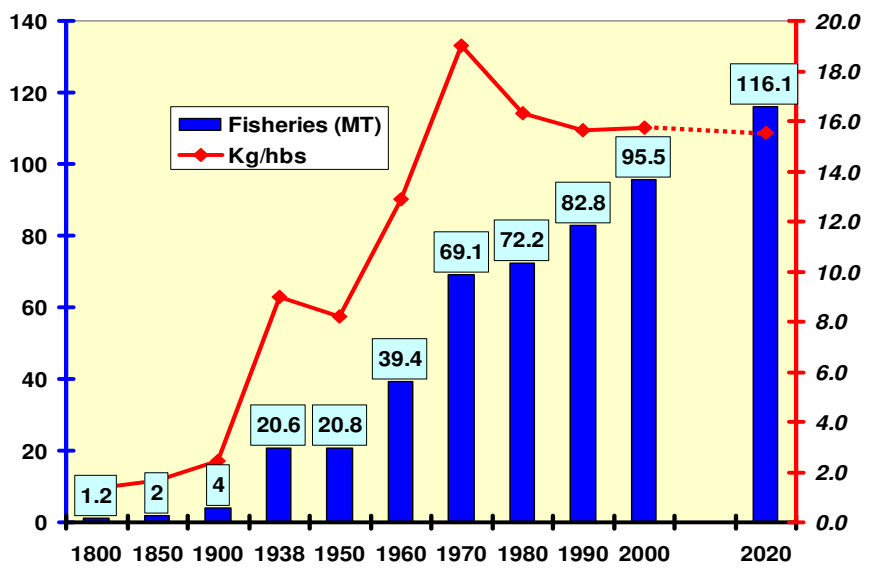
1.1.1 Fish and Food Security

Fish, as well as other aquatic plants and animals, are a crucial food source for millions of people through out the world. Poor people in developing countries are particularly dependent on fish for income and basic nutrition. In many Asian countries for example, the proportion of the food budget spent on fish is highest in low income groups. In low income food-deficit countries, fish provides 20 percent of animal protein in a typical diet versus 13 percent in industrialized countries. In several countries in Asia, the proportion is 30 percent and in some countries it is higher than 50%, e.g. Bangladesh (51%), Indonesia (58%) and Cambodia (75%). In the past 50 years the world's average per capita consumption of fish increased by more than 70 percent and demand is likely to increase further by nearly 21 percent worldwide by 2020 and by as much as 30% in developing countries, according to the "Fish to 2020" study.

Global fish production is no longer keeping pace with demand while capture fisheries are generally declining and have little scope for future growth since 75 percent of the wild caught fish come from stocks that are even now depleted, over-fished or fully exploited. The potential of capture fisheries appears limited with only a one percent annual increase expected to the year 2020 under the most plausible scenario (Fig. 1.1). Under an "ecological collapse" scenario, it could even decline by as much as 20 percent. Even under ideal conditions, long-term sustainable production from capture fisheries (including food fish and fish for meal) is estimated at about 100 million metric tones while the proportion of capture fisheries for fish meal is expected to increase by about 2% by 2020 (From 32 to 34%).

In 2002, worldwide production of fish, crustaceans and mollusks reached 132.2 million tones. More than 76 percent of the total amount was used for direct consumption. Inland capture fisheries accounted for 6.1 percent. While the majority of inland fisheries production countries have an Environmental Sustainability Index (ESI) that range from moderate to high, of concern are the countries, generally poor developing countries, for which the ESI ranges from moderately low to low and for which the trend in production is slowly or moderately decreasing.

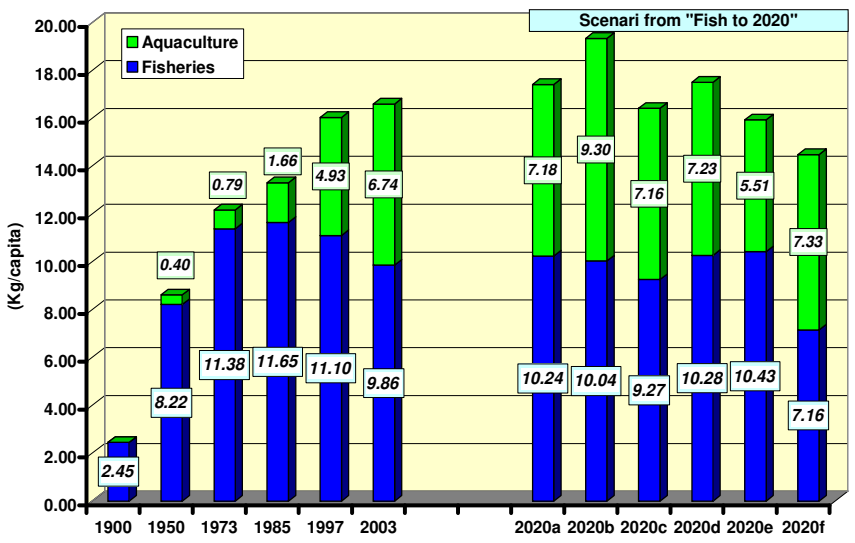
Figure 1.1 World Fisheries from 1800 to 2000, per capita consumption and 2020 perspective (source FAO and "Fish to 2020")



Aquaculture by contrast is providing a steadily increasing proportion of the total fish production – 30 percent in 1997 to a projected 41 percent in 2020 - and represents the main area of future growth (Fig.1.2). Developing countries contribute almost 90 percent of global aquaculture production, of which Asian countries produce 87 percent. It is estimated that a yearly increase of 2 percent would be sufficient to maintain the per capita consumption rate of aquatic products at global level. However, to raise per capita consumption in developing countries from 14 to 18.2 Kg/year, aquaculture production would need to expand by 4 percent per year. However pollution, mangrove destruction, fish disease and the use of wild-caught fish as feed for aquaculture species, mean that sustainable growth in this sector is far from simple. Currently, 34 percent of the capture fishery production is used for non-human consumption, i.e. fish meal. The figure is likely to increase unless alternate food sources are developed for livestock and aquaculture. Thus the future growth of aquaculture may have to depend on the development of alternate sources of fish feed, or the development of herbivorous fish for large-scale aquaculture.

Low value food fish (LVFF) will be a strategic issue for developing countries because it constitutes 47% of total fish production (capture + aquaculture). In developing countries about 95% of LVFF is used for human consumption and as animal and fish feed and represent 65% of total aquatic products consumption in these countries and would still be 60% in 2020. Presently, 61% of the global supply of LVFF comes from capture fisheries but more LVFF will be produced from aquaculture in the future, particularly from developing countries. The bulk of LVFF is produced in developing countries; however, the role of aquaculture in enhancing the value of low-value by-products into high value fish or crustaceans will remain very secondary in developing countries.

Fig.1.2 Contribution of fisheries (excluding fish meal) and aquaculture to World per Capita fish consumption (source: "Fish to 2020")



Whereas meat prices have fallen by half in real terms since the 1970s and are expected to continue to decline, fish prices are projected to rise over the coming two decades, including prices for low-value food fish that the poor consume. Much depends on the rate of aquaculture expansion, and on the state of ecosystems that underpin fish production. The risk is that, as production continues to fall short of demand, rising prices will reduce fish consumption by the very groups who need it most.

1.1.2 Fish and Poverty

Most poor people are concentrated in tropical developing countries, with high percentages of the poor in South Asia and sub Saharan Africa. Fisheries can contribute directly to achieving some specific MDGs and indirectly to all the goals. It is the strength of fisheries, and in particular small-scale fisheries, that it enables millions of poor fishers, processors and traders to diversify their livelihood strategy on the basis of income and commercial skills while at the same time supplying vast numbers of poor consumers with essential nutrition. Reducing poverty requires a focus on livelihoods, not just incomes, and recognizing the diversity of livelihood strategies employed by small-scale fishers, fish-farmers, and processors. In most regions fishers' livelihoods are under threat from: (i) over-fishing that reduces stocks, (ii) commercial exploitation that constraints access to fisheries by the poorest and (iii) pollution, habitat destruction and associated changes in land use that undermine ecosystem productivity. The failure to sustainably manage these common pool resources has three consequences: it reduces the food supply, it shrinks employment opportunities for fishers and processors (and farmers and others who supplement their incomes and diets through part-time fishing), and it creates conflicts that can unravel social progress in other domains, such as health and education.

The challenge of securing adequate supplies of fish for the world's poor is especially acute in those areas where hunger is most prevalent. Sub-Saharan Africa for example accounts for 198 million of the undernourished and represents 75 percent of all undernourished children in developing countries. The prevalence of hunger is particularly high among small farmers, herders, fishers and those who rely on the natural resource base. These communities account for about 20 percent of underweight children below five years of age.

Between 1970 and 1990 the number of fishers and fish farmers in the world doubled. Most of this occurred in Asian countries where four fifths of all fishers dwell. Globally, an estimated 200 million are now employed in fishing and fish processing and the vast majority of these are small-scale operators.

Fish are also an increasingly important export commodity in developing countries (Table 1.1). Roughly 35 percent of global fish output by value was traded across international borders in 2002, compared to less than 10 percent for meat. Fish products, especially from aquaculture, contribute significantly to gross domestic products (GDP) and foreign exchange earnings in low-income Asian countries.

The markets for high valued fish are often vulnerable to trade policies and import requirements of their customers from the developed world. In addition, they often rely on imported fish gears or feeds. The demand for fish is expected to double by 2020 in developing countries, providing fish producers access to larger local markets. Fish trade between developing countries is also growing in importance. By 2020, developing countries will both produce and consume nearly 80 percent of the world's fish. In many countries, small-scale fishers are both politically and economically marginalized which means that targeted policy measures are needed to ensure that growing trade opportunities will benefit the poor. Indeed, over the past two decades, the absolute increase in global fish trade had been substantial and the developing countries' relative contribution to this growth was much higher than those of developed countries. However, the export/production ratio is likely to decrease in the future for many countries except in Latin America (See Table 1.1).

Table 1.1 Export/production ratio for food fish in different regions

	1973			1997			2020 (Baseline scenario)		
Region	Prod. (MT)	Exp. (MT)	E/P %	Prod. (MT)	Exp. (MT)	E/P %	Prod. (MT)	Exp. (MT)	E/P %
China	4854	-108	-2.2	33339	181	+0.5	53074	543	+1.0
SE ASia	5360	-324	-6.0	12632	1131	+8.9	17521	482	+2.7
India	1851	-49	-2.6	4768	122	+2.5	7985	426	+5.3
Other Asia	1172	26	-2.2	2056	84	+4.1	2999	-157	-5.2
Latin America	2330	44	+1.9	6380	2435	+38.2	8807	3047	+34.6
WANA	674	35	+5.2	2248	50	+2.2	2776	-538	-19.4
SSA	2064	-604	-29.3	3738	-54	-1.4	6015	-492	-8.2
Developed World	26880	818	+3.0	25194	-4045	-16.0	27618	-2813	-10.2

1.1.3 Fish and Environmental Sustainability

Fishing is currently the largest extractive use of wildlife in the world. Because of this, the links between fisheries productivity and ecosystem health are even more direct than in other areas of food production. Several fundamental requirements for achieving the MDGs identified by the Millennium Project Task Force on Environmental Sustainability apply equally to the fisheries and aquaculture sectors. They include stakeholder recognition of the importance of environmental sustainability to poverty reduction, implementation of substantive environmental safeguards, incorporation of sustainability criteria into economic and trade policies, international agreements and enforcement that guarantee equitable resource allocation, and development planning based on realistic estimates of future population growth and distribution.

The poor are the most vulnerable to environmental change which could be due to urbanization, industrialization, tourism and growing coastal population. Achieving environmentally sustainable productivity gains in the face of natural and human induced climate change presents an additional challenge. Furthermore, the whole fisheries ecosystem may be at risk from some aspects of climate change. Coral reefs and mangroves are vulnerable to climate change via temperature mediated coral bleaching and sea-level rise respectively and there could be substantial losses in productivity from some areas over the next 20-50 years.

Raising productivity, particularly in aquaculture, also requires special precautions to manage against risks from the introduction of alien species into new habitats and escapes of alien stocks from controlled environments into natural ecosystems. The sensitivity of aquaculture to environmental changes has also become more apparent in recent years, as well as its capacity to cause environmental damage if not managed responsibly.

These challenges highlight the need of an integrated approach to water resources management in freshwater systems and the need to protect marine and coastal environments. Furthermore, some of the challenges in the fisheries sector are underpinned by inappropriate governance. In many areas, a governance revolution is needed to redress the root cause of the current crisis. Technical actions invariably fail unless policy changes remove constraints to progress and create capacity in order to expand the scale of successful hunger-reduction-actions.

To address these challenges eight broad areas of scientific emphasis have been identified by WorldFish. The Panel agrees on the importance of these areas and believes they merit special attention in the coming years. These areas of emphasis map to the technical arenas outlined in the WorldFish Strategy Update and link to achieving the MDGs. The broad areas are:

- Comparative analysis of alternative governance /institutional arrangements;
- Geospatial sciences and geo-informatics for fisheries and aquaculture research;
- Advances in fish nutrition to farm-based feeds for resource poor farmers;
- A systematic approach to genetic improvement programs for aquatic species;
- Developing Tools for Improved Management of Small-scale fisheries;
- Improving resilience of inland fisheries and freshwater aquaculture production;
- Fish Markets and Trade; and,
- Impact Assessment for Improved Delivery of research outputs and development outcomes.

Various components of these broad areas are addressed by the Center in the 2006 – 2008 MTP and are the subject of review in this report.

1.2 Changes within the CGIAR and External Environment

Major changes and reforms within the CGIAR since the last EPMR have had an impact on WorldFish. Since the last review, the CGIAR adopted a new vision and modified its overarching goal and mission statement[2]. It identified an integrated strategic approach for System activities based on seven "planks". In particular, the System re-affirmed even more strongly its 'people and poverty' focus giving greater priority to Sub Sahara Africa and South Asia; a regional approach to research planning and implementation was adopted; new types of partners and new forms of partnerships were advocated; and task forces were encouraged in addressing major, clearly identifiable problems. Finally, it was recommended that the role of the CGIAR as a catalyst, integrator and disseminator of knowledge should be strengthened.

Other key reforms in the CGIAR included (i) the establishment of a executive body for streamlining decision making (Executive Council), (ii) incorporating a programmatic approach to research planning and funding (the Challenge Programs or CPs), (iii) transforming the Technical Advisory Committee into a Science Council (SC), and (iv) establishing a virtual System Office comprised of various support units. These changes have, in one way or another, affected all 15 CGIAR Centers and some, like WorldFish, contributed in a major way to their development.

Arguably, one of the most significant activities in which the CGIAR has been engaged recently relates to the identification of System level priorities. The need for developing a small and well defined set of priorities had been growing for some time, with the main rationale being to avoid dispersion and atomization of research, to mobilize research capacity across system, to enhance coordination and cooperation, and to enhance accountability. After an intensive and highly interactive two-year exercise led by the SC

[2] CGIAR vision: A food secure world for all; CGIAR goal: To reduce poverty, hunger and malnutrition by sustainably increasing the productivity of resources in agriculture, forestry and fisheries; CGIAR mission: To achieve sustainable food security and reduce poverty in developing countries through scientific research and research-related activities in the fields of agriculture, forestry, fisheries, policy and environment.

that involved numerous stakeholder meetings and various deliberations and consultations with the donors and CGIAR Centers themselves, the SC presented, and the Group endorsed at AGM'05, a set of 20 System priorities, grouped into five broad areas[3]. It is significant to point out that there are at least 7 priorities where WorldFish is likely to have or could easily play a significant role in their implementation, by virtue of its current expertise or the problem area identified. These are:

- Conservation of aquatic animal genetic resources
- Genetic enhancement of selected high-value species
- Enhancing income through increased productivity of fisheries and aquaculture
- Sustaining and managing aquatic ecosystems for food and livelihoods
- Improving water productivity
- Sustainable agro-ecological intensification in low - & high-potential areas
- Rural institutions and their governance.

The new priorities will, ultimately, not only guide resource allocation but also help to define a framework for the selection of the mode of operation, including the CPs. The Group is now in the process of developing a plan for implementing the priorities over a 3-year period, with obvious implications for funding allocation decisions by donors.

MDGs

In September 2000 the member states of the United Nations unanimously adopted the Millennium Declaration - a common commitment to end global poverty and suffering. The MDGs are part of the road map for implementing this Millennium Declaration. The CGIAR, for its part, undertakes research that generates the science and technologies to underpin advances towards each of the MDGs, especially those related to rural poverty (Goal 1, Target 1); hunger (Goal 1, Target 2); health (Goals 4,5, and 6); and the environment (Goal 7). The CGIAR's new priorities draw explicit reference to the MDGs and WorldFish's own KPGs are annual targets that reflect the MDGs.

The Report of the UN Millennium Project "Investing in Development" released in January 2005, highlighted the importance of science and technology in achieving the MDGs. Indeed, the report recognizes the contribution of global public goods and the unique and continuing contribution of the CGIAR, and recommends a large increase in financial support to sustain and expand the research and impact of the System.

1.3 Center's Response to Recommendations of the Second EPMR

The Second EPMR in 1999 made six important recommendations and raised concerns on 10 major issues, the implementation of which has greatly shaped the Center over the past seven years. Several of these recommendations address topics that are still relevant to the Center today and the Panel has, in the pages of this report, deliberated further on them. Nevertheless, following standard practice, the current EPMR Panel has reviewed the

[3] The resulting five System Priority Areas for CGIAR research are:

1. Sustaining biodiversity for current and future generations;
2. Producing more and better food at lower cost through genetic improvements;
3. Reducing rural poverty through agricultural diversification and emerging opportunities for high-value commodities and products;
4. Poverty alleviation and sustainable management of water, land, and forest resources; and
5. Improving policies and facilitating institutional innovation to support sustainable reduction of poverty and hunger.

recommendations of the 2nd EPMR report, along with WorldFish's updated response to them and provided in Appendix III its assessment of the present situation.

1.4 Conduct of the Review

In early September 2005, the Panel Chair had a formal telephone briefing with the Chair of the SC. The Panel Chair and the Panel member responsible for Governance and Management attended the Twenty-eighth Board of Trustees Meeting in mid-September 2005 to observe the Board, interact with Board members concerning review expectations and to elicit views and perceptions from the Board about the major challenges and opportunities facing the center.

The entire Panel and the consultant on financial matters visited WorldFish headquarters in Penang, Malaysia from 24-29 October 2005 for the Initial Phase of the Review. The Panel received briefings from the Director-General and the Senior Management Team, Discipline and Portfolio Directors, other scientists and administrative staff and had an opportunity to visit the research station in nearby Jitra and meet counterparts there. The briefings during the Initial Visit provided the Panel with an overall view of the center's goals, priorities, strategies and a sense of the Center's own perceptions of its place in the international scene, the future challenges and mechanisms to address them. Panel members further held more in-depth discussions with some staff. The Initial Visit also permitted the Panel to make an assessment of the progress on the implementation of the recommendations of the Second EPMR, to identify key strategic issues and formulate hypothesis for key findings, to agree on the outline of Draft Report and plan a strategy for completing the Review.

Field trips were undertaken in October/November 2005 to Malaysia and Malawi and to Egypt and the Mekong Basin Region in January 2006. In each of the countries, panel members met with government, private sector and WorldFish partners (representatives of NARs, ARI, NGOs, etc).

The Panel conducted the review in an as objective and transparent manner as possible and through out the review the Panel Chair maintained close contacts with the DG of WorldFish.

Between the Initial Visit and the Main Phase, a host of individual interviews were conducted by the Panel with the previous Director General and the two immediate previous Board Chairs of WorldFish, the DGs of some CGIAR Centers, Donors, Peers, and Clients, including a full day of discussions with colleagues at FAO in Rome. The Panel also conducted a staff survey through anonymous submission of an electronic form, available to all staff both at headquarters and out-reached centers. In all, information was received from 118 WorldFish staff, 8 CGIAR Centers, 9 representatives of donors and over 60 representatives of partners, clients and peers.

The entire Panel less the Consultant on Finance visited WorldFish HQ again during the Main Phase of the review, from 30 January to 10 February 2006. During that time Panel member drafts were integrated into a complete Panel report. Final drafts of the Report were shared with the DG and relevant senior staff for comments and factual correction. On 10 February the Panel's report was presented to WorldFish staff and Management. The Board Chair was also present.

2 STRATEGY

Since 1999, the perception of the status and potential role of aquatic resources with regard to the world food challenge has changed dramatically and, at the same time, the constraints on these resources have become more evident. New conditions and visions have emerged and were presented in chapter 1, the more relevant being:

- The acknowledgment of the highly worrying situation of world's fisheries with a large number of stocks being overexploited and a low efficiency of moratorium policies to restore stocks. Correlatively, aquaculture will have to play a key role and should progress substantially just to maintain the per capita consumption rate of aquatic products worldwide. In this context, LVFF will be a strategic issue for developing countries and aquaculture in these countries will have to produce most of the expected increase of this production.
- Impacts of human activities on aquatic environments (e.g. pollution and the effects of dams, irrigation infrastructure and urban development among others) play a major and growing role in the reduction of aquatic resources and could overcome policies aimed at reducing fishing pressure. Demographic growth (mainly in coastal areas or those bordering inland water bodies) and climatic changes will further contribute to this already problematic situation. At the same time, there is an increasing awareness on the importance of ecological services provided by aquatic ecosystems (e.g. climate regulation, maintenance of water quality and biodiversity) and the detrimental effect of food production from increasingly intensive production systems may have on their capacity to provide global services (ecological and marketable). Aquaculture is not free of responsibilities in this respect and shrimp mariculture is well recognized as emblematic in this context.
- Finally, there is an increasing awareness about the shortcomings that aquaculture development based on a top-down dissemination strategy has on long-term efficiency goals. New bottom-up approaches based on socio-economic analysis of production systems to understand their constraints appears much more relevant even if sometimes less productive in the short term. In summary, there is shift is from "we will tell people how to grow this fish" to "how to make people interested in producing fish".

This chapter describes and analyses the strategies that ICLARM/WorldFish Center has developed from 1999 to 2005 to face these challenges. The strategies are analyzed and reviewed in terms of general principles, definition, implementation and mode of action. Analyses of the Center's approach, criteria and procedure for selection and mobilization of significant partners (i.e. "partnership strategy") is presented in chapter 5. The Center's organizational structure and operational setting (i.e. the "management strategy") are analyzed in chapter 6 and 7 of this report.

2.1 The 2000-2020 Strategic Plan

ICLARM reviewed through a participatory process with its partners its strategy and priorities in 1998/99 just before the 2nd EPMR. The Strategy was published as ICLARM Strategic Plan 2000-2020.

At the Center of this strategy is the decision to adopt a systems approach to formulate integrated models for management and governance of aquatic resources. The Center

identified and prioritized six "aquatic resource systems" (ARS) defined as the "zone of convergence of the resources, their aquatic environment and the human users" which are listed in order of importance (Table 2.1).

Table 2.1 Definition of the eight ARS and main regional implementation areas

ARS	Priority	WANA*	SSA*	SA*	ESEA*	Mekong	SIDS*
Ponds	Very high		X	X	X		
Coral reefs	Very high		X		X		X
Floodplains, Streams and Rivers	High			X		X	
Coastal waters (including estuaries and lagoon)	High		X		X	X	X
Small water bodies, reservoirs and lakes	Medium		X				
Soft bottom shelves	Medium	X	X	X	X		
Upwelling shelves	Low						
Open oceans	Low						

** WANA = West Asia and North Africa; SSA = Sub-Saharan Africa, SA = South Asia; ESEA = East and South-East Asia, SIDS = Small Island Developing States (mainly South Pacific)*

The Plan initially had nine programs although the 2nd EPMR Panel suggested that the Program structure be consolidated to:

- release senior scientists time from administration and management;
- improve external understanding of program structure and objectives;
- increase opportunities for interaction among projects and scientists;
- foster closer linkages between the Deputy Director General for Research and program leaders; and,
- reduce overhead and transaction costs.

Over the years the priority areas in the Strategic Plan were fine tuned and significant structural changes have been made to the programs in the context of the Center's Medium Term Plans (MTP). The Center consolidated its nine programs into four main programs and a fifth program that provided support to all the four main programs (Biodiversity & Genetic Resources; Freshwater Resources; Coastal & Marine Resources and Policy Research and Impact Assessment). The number of thrusts was also modified in each MTP to improve clarity in the explanation of the Center's research plan. The structural changes and modifications were always made against the backdrop of world events, particularly the outcomes of the World Summit on Sustainable Development, the Millennium Development Goals (MDGs) and the on-going trends of overexploitation, reduced production and increased demand for fish and other aquatic resources.

The Center also took concrete steps to maximize its impact by clustering its efforts in specific areas or 'geographies" including by starting a regional program in the Greater Mekong Region and expanding its work in Africa. Work in mainland Latin America was not a priority though, the Center was open to extending its generic technologies (e.g.

trawl data analysis, economic analysis and small-scale aquaculture approaches) to NARS of the region, when opportunities emerge.

In essence all the changes represented an evolution of the Center's research program rather than a significant departure in new directions.

2.2 Strategy Update 2005

In September 2005 the Board approved a Strategy Update for WorldFish. The Strategy represents WorldFish's approach to continue to respond to the challenge of meeting the MDGs with a fish focus in the light of the newly articulated priorities of the CGIAR. Impact research undertaken by WorldFish has demonstrated that investments in fisheries and aquaculture can play a vital role in helping to achieve both the CGIAR goals and the MDGs. The direct intervention or entry points in the framework of the Strategy are with regards to the eradication of extreme poverty and hunger, to ensure environmental sustainability and the promotion of gender equity and the empowerment of women.

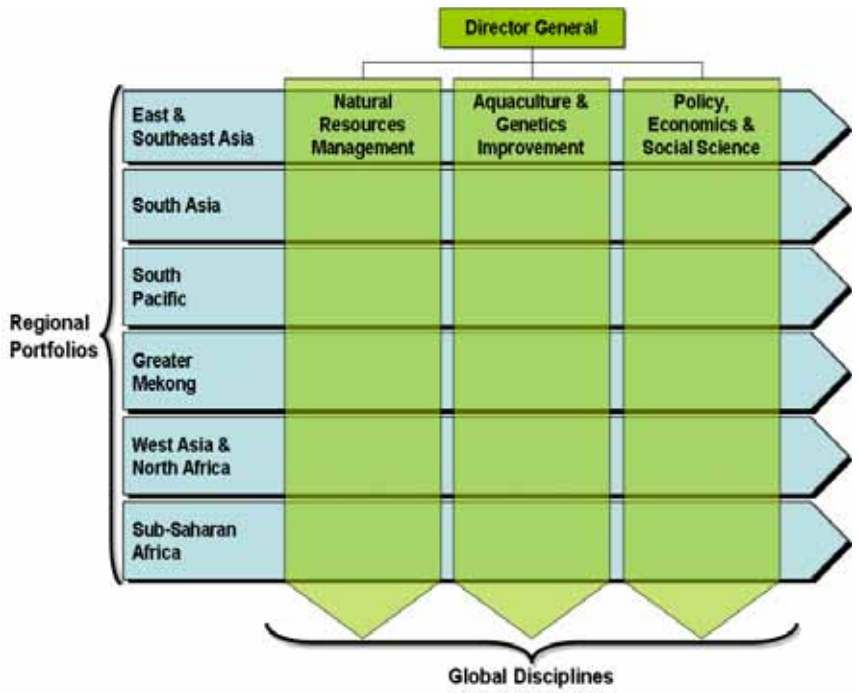
This strategy proposes to take into account some perceived weaknesses of the previous WorldFish setup, in particular:

- the "lack of clear accountability for competing geographic, global and program priorities";
- the existence of an "incoherent rationale for site/country selection – mixture of regional and country-specific mandates"; and,
- an "unclear accountability for front-end development of new projects and funding opportunities".

2.2.1 Matrix management

The matrix management is one of the important innovations in this strategy, the new Programmatic Structure consisting of a matrix of three disciplines interacting with six to eight regional portfolios (Figure 2.1).

Figure 2.1 WFC's Research Structure: the matrix (Source: WorldFish Center)



The three global disciplines are Natural Resource Management (NRM), Aquaculture and Genetic Improvement (AGI) and Policy, Economics and Social Science (PESS). The portfolios cover South and South East Asia, Greater Mekong, South Pacific, South Asia, Sub-Saharan Africa, North Africa and West Asia.

WorldFish has defined the segregation of the roles of discipline vs. portfolio Directors to provide clarity and alternate career streams for scientists based on their skills and interests:

- Discipline Directors are in charge of the leadership and development of a core science discipline and its application to achieve the Center's mission. They are responsible for: (i) the recruitment and development of staff in the discipline, (ii) the allocation of staff resources from disciplines to projects and (iii) the science strategy and high level science contributions of global significance. They are also accountable for the quality of research inputs and outputs, and for cross-disciplinary coordination. They report directly to WorldFish's Director General (DG).
- Portfolio Directors are responsible for the development and maintenance of research projects aligned with WorldFish mission and for developing high level relationships with investors and partners. They are also accountable for developing opportunities into funded projects and the performance of project portfolio. They report directly to the Center's Deputy Director General (DDG).

2.2.2 Differentiators and vehicles

Other characteristics in the strategy are its Elements (Arenas, Differentiators, Staging, Economic logic, and Vehicles), and the internalization of the WorldFish Campaigns to reside beneath the "Fish for All" banner. In addition, there are now milestones which would permit an assessment of performance in the short and medium term, i.e. Thematic goals and Key Performance Goals (KPGs).

Differentiators

For proper partnership identification, the Strategy Update identifies and analyses the characteristics that differentiate the Center from other organizations in research and development in fisheries and aquaculture at global, regional and national levels. The analysis is based on the comparison of a number of attributes such as: (i) the point of focus along the Research for Development Value Chain, (ii) modus operandi, (iii) geographic scope and, (iv) organizational status.

Vehicles

The strategic plan defines several *vehicles* required to achieve its overall goals, such as: (i) the establishment of effective partnerships and of key strategic alliances, (ii) the capacity to grow organically and (iii) the capacity to elevate the agenda and galvanize support, i.e. through its 'Campaigns'. Thus:

- A *strategic alliance* refers to a "long-term strategic (…) that is of considerable significance for achieving overall goals". Due to the intensive nature of this institutional relationship only a few number of organizations will be involved in such alliances.
- The Strategic Plan defines *organic growth* as an organizational expansion purely within the Center's current internal research structures and with their traditional investor base.

- In the context of CGIAR System campaigns, the strategy defines three key challenges as focal points for three *WorldFish Campaigns*. WorldFish perceives these Campaigns as a new approach for galvanizing support and action around a set of goals oriented to assist in the achievement of MDGs. In addition, campaigns are explicitly intended to be broader in scope and to provide a framework for action which can help to align interests, capabilities and efforts of a wide range of partners and collaborators to address the problem at hand.

Thematic goals
Three thematic goals have been identified from which the 2005 KPGs have been derived. These three thematic goals are partnership, excellence and growth. Partnership refers to the Center's conviction that development impacts can only be effectively achieved through high quality partnership. Excellence refers to the notion that excellence in both science and the modus operandi are essential to become an effective leader and catalyst for change. Growth is emphasized because with increasing investments in research, geographical spread, global scope and research breadth and depth, a greater impact on MDGs will be achieved.

2.2.3 Comparative Analysis of strategies and Panel assessment
In order to conduct a systematic analysis of potential changes in the strategies developed by the Center during the period 1999-2005 and their possible strengths and weaknesses, a comparative analysis is made in this section based on information reflected in Tables 2.2, 2.3 and 2.5. For this purpose, the ICLARM/WorldFish Center Strategic Plan 2000-2020 will be referred as "Strategic Plan" and the WorldFish Center Strategy Update 2005 will be referred as "Strategy Update".

Table 2.2 refers to the general principles of the Center and it includes its vision, mission, values and long-term goals. Table 2.3 shows the definition and implementation of the strategies and describes objectives, processes, positioning, program structure and priorities. Table 2.5 presents the mode of action and it includes partnership, organizational standards, resource mobilization and performance indicators.

Information used for this comparative analysis has been drawn from two relevant documents: the ICLARM/WorldFish Strategic Plan 2000-2020 (Strategic Plan) and the WorldFish Center Strategy Update 2005.

General Principles
General principles of the Center as expressed in their strategy documents are analyzed with respect to four elements, namely: vision, mission, values and long-term goals (Table 2.2).

With regard to the Center's Vision, it is possible to observe a shift from a problem and people oriented vision documented in Strategic Plan to an institutionally-oriented vision expressed in Strategy Update. In the Panel's view, the Center's institutional vision is useful for in-house motivation, however, inclusion of the more problem and people oriented perspective should be included for external motivation.

Table 2.2 General principles

ATTRIBUTES	STRATEGIC PLAN 2000-2020	STRATEGY UPDATE 2005
Vision	To improve the well-being and livelihood of present and future generations of poor people in developing countries	To be the science partner of choice for delivering fisheries and aquaculture solutions for developing countries
Mission	To undertake, facilitate and disseminate scientific research to improve the production, management and conservation of aquatic resources such as fish	To reduce poverty and hunger by improving fisheries and aquaculture
Values	Not articulated	• Integrity and trust • Fairness and equity • Excellence and innovation • Team work and sharing knowledge
Long-term Goals	• Poverty eradication • Healthier families • Reduced pressure on fragile ecosystems • People Centered sustainable development	**Millennium Development Goals (10 years)** • Direct intervention on: o Eradicate extreme poverty and hunger o Promote gender equity and empower women o Ensure environmental sustainability o Develop a global partnership for development • Known flow-on benefits o Universal primary education o Reduce child mortality o Improve maternal health o Combat HIV/AIDS and other diseases

The Center's Mission as stated by the Strategy Update shows a greater emphasis on impacts instead of outputs and outcomes as it was expressed in the Strategic Plan document. The Panel would like to see those three levels incorporated in the Center's mission.

The Strategy Update expresses Values that are in line with modern business management approach and the Strategic Plan does not explicitly show values as such.

The Panel concurs with the Center in the benefits of expressing their values and principles both for in-house and external motivational purposes.

Long-term goals formulated in the Strategic Plan are based on people's livelihood and aquatic resources systems approach. The Strategy Update reflects the new UN Millennium Development Goals. Nonetheless, long-term goals appear to be similar in both strategies.

Table 2.3 Definition and implementation of the strategy

ATTRIBUTES	STRATEGIC PLAN 2000-2020	STRATEGY UPDATE 2005
Objectives	• * raising and sustaining the productivity of fisheries and aquaculture • protecting the aquatic environment • saving aquatic biodiversity • improving policies for sustainable development of aquatic resources • strengthening the capacity of national programs to support sustainable development	Objectives of the three WorldFish campaigns • *Global Change and Fisheries:* understanding and exploiting the global vectors of change affecting fisheries and aquaculture so that they benefit the poor • *Sustainable Fisheries Livelihoods:* ensuring a sustainable and well managed supply of fish from coastal and inland fisheries • *Pro-poor Aquaculture:* increasing the sustainable production of fish through aquaculture as a source of protein and income to poor communities
Process and Positioning	• Wide consultation and participation by partners • SWOT analysis to determine strengths and weaknesses	• In house brain storming, taking advantage of prior consultation conducted at regional levels (SSA and ESEA) • Positioning on the research to development value chain • Differentiators, attributes vis-à-vis partners (point of focus along RD Value Chain, modus operandi, geographical scope and organizational status) • Unique combination of attributes to be the science partner of choice
Program Structure	Seven research approaches: • Ecosystem approach • Integrated aquaculture technology • Aquatic genetic research • Contributions to proper governance • Impact analysis • Monitoring of global issues (IPR, Climate change) • Multidisciplinarity	Prioritization inside the disciplinary perspectives: • Natural Resources Management (NRM) • Aquaculture and Genetic Improvement (AGI) • Policy, Economics and Social Science (PESS)
	Two thematic (BGRRP, PRIAP), two ecosystem (CMRRP, FRRP) and one cross cutting (PIT) programs. Balance: 25% on global research and 75% regional	Three disciplines (NRM, PESS, AGI) by 6 - 8 Regional Portfolios (Matrix Structures)
Regional Priorities	Strategic research prioritization based on • Aquatic Resources Systems • Regional distribution of efforts based on existing production systems, NARs capacities and imperatives for research	• Geographic prioritization based on five criteria (Human development need, Resource potential, potential for impact by WorldFish, Enabling environment, Past relationships and need) • Aquatic systems prioritization defined inside each geographic domain (criteria not explicit)

The Panel's view is that both the Strategic Plan and Strategy Update, although formulated in different terms, share the same general principles and are consistent with the CGIAR's mission and vision.

Definition and implementation of strategies

The definition and implementation of the strategies is analyzed on the basis of its objectives, processes, positioning and program structure and regional priorities (Table 2.3).

a) Objectives

The Strategic Plan document shows that the Center was defining a scientific paradigm based on a number of long-term goals, approaches and processes, among which it is possible to highlight:

i) People Centered sustainable development
ii) Ecosystems approach
iii) Strategic research prioritization based on regions and aquatic resources systems.

The Strategy Update makes new advances in the formulation a center's paradigm. Prioritization is based on regions and aquatic resources systems and it proposes to integrate those with a strategic analysis of relevant disciplines.

While acknowledging the progress made, the Panel believes that the above emphasizes the need for further efforts in the elaboration of a holistic and dynamic oriented approach (paradigm). This approach will enable the integration of disciplines required to support policy and decision making, aiming for the attainment of sustainable development of fisheries and aquaculture in developing countries. This should ultimately contribute to poverty alleviation.

As seen by the Panel, a *holistic approach* is one which views and analyses a system from three perspectives, namely: (i) clearly defining the system's boundary, (ii) identifying and characterizing the relevant components of the system, (iii) carefully considering the existing interactions between components and the ways in which they integrate and (iv) accounts for potential influence of external forces (variables) and externalities of the system.

A *dynamic approach* should be applied when modelling and measuring the state of the resource base and its environment over time, as well as when measuring the performance and impacts of human activities and management interventions. These are essential requirements for obtaining the best possible information on the trade-offs between alternative ways of attaining sustainable development.

According to Thomas Kuhn, a scientific paradigm refers to *the set of practices that define a scientific discipline during a particular period of time.* It includes what is to be observed and scrutinized, the kind of questions that are supposed to be asked and probed for answers in relation to this subject, how these questions are to be structured, and how the results of scientific investigations should be interpreted.

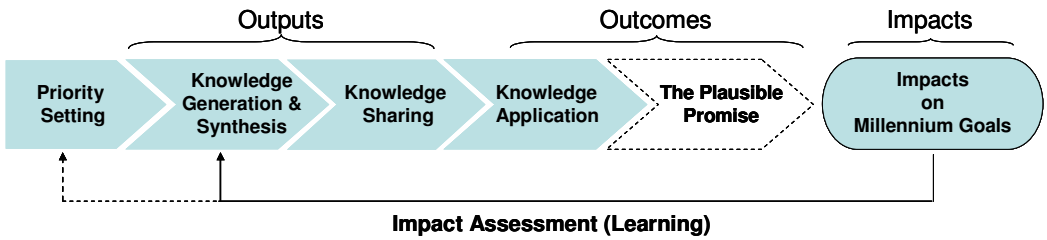
In this context, the Panel's view is that the Center's positioning in the research realm, both within the CGIAR system and within the global context of research on aquatic resource use and management, will benefit from further formulation and elaboration of the scientific paradigm and WorldFish articulation of its own research domain.

b) Process and Positioning

The Strategic Plan indicates that over its 22-year history the Center has developed strong partnerships with national systems (government and non-government organizations), ARIs, individual scientists, the private sector and farmers-fishers. The Center's niche in the research to development (R-D) continuum is placed with respect to its skills, its institutional attributes, its long-lasting partnership and its unique role in the CGIAR and various regional and international forums.

The Strategy Update indicates the broad areas of emphasis and investments in research on the basis of disciplinary perspectives,, the categories of outputs to produce, the key technologies and the geographic and aquatic segments to focus upon. This draws on the concept of the "Research for Development Value Chain" (Figure 2.2).

Figure 2.2 The Research for Development Value Chain (Source: WorldFish Center Strategy Update 2005)



Recognizing that there is a multiplicity of factors affecting the degree of impact to be achieved through research, many of which are beyond the control of the Center, the Strategy Update states that the decision to support the Center's work depends on acceptance of some risk by investors. This acceptance is based on the likelihood of seeing a return on investment. An investment decision, therefore, implies the acceptance of what the Center considers a "plausible promise" that impact will be achieved.
In the context of this value chain, WorldFish sees the primary thrust of its research being conducted within the Knowledge Generation & Synthesis and Knowledge Sharing components, thus placing their future work slightly left of the Center in the middle of the R-D continuum. With this perspective, greater emphasis will be given (i) to new synthesis and insights with global, regional and national analyses and synthesis and (ii) to research outputs with agenda setting and advice, knowledge products, tools and networks and capacity building.

Even though consultations with stakeholder had been conducted in the past, the Panel perceives, based on the information it received, that the in-house nature of the design process in the Strategy Update has not ensured sufficient involvement and ownership by partners. Accordingly, the Panel envisages great benefits from enhancing interaction with partners in strategy dialogue. The Panel sees that this will have a positive effect on external motivation with respect to the Center's role in the international arena.

In addition, the Panel's impression is that the Strategy Update focuses too narrowly on the middle of the R-D Value Chain, resulting in a risky position in the long-term with

respect to the future positioning of other relevant players in the R-D value chain. The Panel is convinced that improving the analysis and understanding of the multiple factors influencing the impacts of research on poverty alleviation (vis-à-vis the Center's own role in contributing to sustainable development of fisheries and aquaculture), will help to minimize this potential long-term risk (see Chapter 8). In this context, the Panel suggests that further application of the methodological framework developed for impact pathway analysis on research planning and prioritization—at both the Center and program levels—would be very helpful.

Finally, to ensure the production of the appropriate IPGs, the Center should, at the research planning and prioritization process, specify the expected outputs and validate the extent to which they constitute legitimate IPGs.

c) Program structure

The Strategic Plan represents an initial departure from a largely fisheries-oriented perspective towards one aimed at broadening the Center's work by integrating equity, sustainability and efficiency considerations. Thus, the Plan is not only oriented to reinforce the Center's commitment to conservation of aquatic resources but also to promote intergenerational equity of benefits and efficient resource use over time. Its program structure represents a compromise between a disciplinary and a system approach, with two programs that can be considered as "disciplinary" (PRIAP and BGRRP) and the other two having an ARS perspective (CMRRP, FRRP).

As shown in Table 2.3, the main changes observed in moving from the Strategic Plan to the Strategy Update relate to:

i) The definition of three "disciplines", as a result of the division of FRRP (freshwater program) in fisheries aspects going into NRM and aquaculture going into AGI. In addition CMRRP is also merged into NRM and PRIAP is renamed as PESS.
ii) The creation of regional portfolios with scientists appointed as portfolio directors.

From a conceptual perspective, the Strategy Update operationally expresses the three "Research Categories" identified under the methodological framework developed for the implementation of Impact Pathway Analysis for Research Planning in 2002-2003. In the Panel's perspective, the "Disciplines" are in fact clusters of scientific disciplines, each cluster having a specific contribution to impact pathway.

Within each "discipline", the strategy identifies areas of work that will be (i) increased, (ii) maintained/adapted and, (iii) what they will not conduct themselves but, should be conducted by their partners as a complementary work. The strategy stresses that the decision to discontinue direct involvement in some type of research does not necessarily imply that the Center considers them irrelevant to achieve the long term goals but, rather reflects the view that the Center's involvement may add little in that direction.

The Panel applauds the establishment of the three disciplines as a means for better generating knowledge, synergy, synthesis and for focusing on the science aspects of living aquatic resources. However, the disciplinary strategies and the fleshing out of the broad areas of emphasis are yet to be elaborated. The Panel cautions that the fusion of aquaculture and genetics and biodiversity, a strategic integration of ideas, knowledge and technologies to contribute to the further development of sustainable aquaculture,

should not become a simple co-habitation of two programs. At the same time the Panel sees in the creation of PESS a good opportunity to forge into maturity the impact culture that is beginning to emerge in the Center over the past few years.

From the disciplinary perspective, there is a need to further formulate the rationale by which scientists residing under the present program structure are identifying relevant research issues or aspects (originated from the identification of problems in the functioning of the fisheries and aquaculture system) that WorldFish will tackle, which will enable the generation of knowledge and information required to contribute to the attainment of sustainable development.

Another relevant aspect is whether the matrix approach is adequate, from a conceptual point of view, to integrate the search for knowledge and information between the three research categories with the needs at the regional and aquatic resources system level. It is the Panel's view that, if all required processes and conditions for an effective implementation of the methodological framework to assess the potential impacts of research are met and the planning, implementation-monitoring and retrospective evaluation stages are met, in theory the matrix system is appropriate.

The Panel perceives that the new program structure is aimed at addressing some earlier weaknesses in the Center research set up, such as increasing opportunities for interaction among projects and scientists, fostering closer linkages between the Director for Science Coordination and Discipline Directors. However, the Panel doubts that this program structure would release senior scientists time from administration and management, reduce overhead and transaction costs and decrease tensions potentially arising between Portfolio Directors (financial resources) and Discipline Directors (limited human resources).

Theoretically, the matrix approach represents an integration tool and provides a potentially fruitful dialectic tension between two visions – disciplines and portfolios. It also would provide for a better regional and global focus and allow the Center to draw on cross-disciplinary linkages effectively, while the differentiation of discipline and portfolio directors is an attempt to segregate and define research, project management, and fund-raising which are now expected of a core group of researchers. However, the Panel's opinion is that managing effective collaboration and taking decisions on resource allocations are hard to make while simultaneously focusing on cutting-edge research. Senior Management may well have to make some difficult and top level decisions in the area of resource allocation between disciplines and portfolios directors.

The Panel agrees with the decision by Management to first recruit Portfolio Directors and continue with the search for Discipline Directors. After the recent appointment of the Discipline Director (DD) for NRM, the Panel was informed of the arrival of a DD for AGI in April 2006. It is the Panel's opinion that discipline directors will first need time to fully understand the strategy that will provide them the flexibility to fine tune implementation, shape their staff, and adjust the pace of change to build good will and the personal sense of value that will influence success. The Panel has been informed of difficulties in the appointment of the Discipline Director for PESS and that the Center does not plan to fill this position until 2007. The Panel emphasizes the need of having this position filled as soon as possible.

The Panel cautions that for the matrix management to work effectively due concern should be given to increase the Center's critical mass and intensify staff training on the matrix to ensure all staff have an excellent understanding to operate within the new system for project and financial management.

As the matrix management structure is likely to exert a considerable influence on the performance of the Center's research programs, ***the Panel recommends that the Board commissions an external review of the new research structure by mid 2007 to specifically examine the effectiveness and impact of the matrix approach, the extent of transaction costs incurred and the acceptability by different levels of staff.***

d) Regional Priorities

The Strategy Update realizes the progressive emergence of the importance of regional priorities. The Strategic Plan does not present directly the regional strategies but acknowledge the importance of this issue through the concept of "Aquatic Resource System" and considered that, with regards to the very specific traits of each ARS, the challenge was not to disseminate a "generic output" in all ARS but to have a dedicated strategy for each of them. Even if not present at the strategic level, regional dimension existed at the operational level. The first explicit regional strategy was the "Strategy for Africa and West Asia" elaborated in 2001 and published in 2003.

The limits of considering ARSs as global and coherent entities have been progressively perceived. One of the main problems was that a given ARS can present very different opportunities and constraints and can deserve very different research approaches in the different regions. The regional approach used in the Strategy Update reflects this critical analysis. Within this new framework, regions become real strategic entities: "For each region, a plan is now being developed which addresses the needs of partners and beneficiaries and is responsive to the priorities of donors". In addition, "focal countries" are identified in each region on the basis of six selection criteria (potential for learning, human development need, resource potential, potential for impact, enabling environment, past relationships and need. The concept of ARS remains present but with various priority orders within each regional portfolio.

Even though the two approaches appear to be different from a conceptual point of view, the Panel notices that they lead to quite similar choices from a practical point of view.

The Panel considers that the appointment of regional portfolio leaders having the responsibility to analyze local situations, to define strategies and to seek partners has several obvious advantages. It will support the ambition of the Center to expand which cannot be realized without new partnerships in the different regions. It will provide discipline leaders with relevant information related to ecological, social and economic realities of each country. It should offer the opportunity to establish better co-ordinations with other CG Centers acting in the same regions and to contribute to the definition of global CG strategies for each region. The Panel, therefore, endorses this strategic choice, but at the same time wishes to raise two issues that will deserve attention in terms of management:

i) There is a potential risk of drift towards short term and location-specific projects, that are frequently more easy to "sell" and more likely to quickly produce visible impacts. To limit this risk, coordination with the DDs should be done "upstream"

to develop a common vision of the type of projects WorldFish should promote and implement.

ii) In view of its very limited staff strength, it was premature for the Center to appoint 7 portfolio directors, when a limited number could have performed this function and with time and experience additional appointments made. Although the Center intends to put greater emphasis on SSA, the Panel considers it excessive to appoint three out of five IRS ear-marked for the Region as portfolio directors (see Chapter 5).

e) Global priorities and recommendations

The Panel observed that neither the Strategic Plan nor the Strategy Update gives an indication of or provides the decision criteria for the optimal breakdown of WorldFish staff between the different regions or between the different disciplines. WorldFish only refers to the need "to have the required critical mass in all thee Disciplines" that will be "distributed effectively across the different geographic area".

Table 2.4 gives the present breakdown of professional staff as of December 2005 in comparison to the 1999 situation in order to visualize the" implicit strategy" of the Center. This table has been constructed according to the data made available by the Center and refers to the location of the office where the particular staff were based.
Several conclusions can be drawn from this table. First, Asia remains by far the dominant place for WorldFish staff and the investment in SSA is still very limited. The major change concerns WANA with the growth of the Abbassa station between 2000 and 2003. Second, some changes have occurred between disciplines, with a significant decrease of NRM and a slight increase of AGI. PESS remain stable but it should be noted that four of the six regional portfolio directors belong to this discipline. Finally, there is an increase in the number of people involved in general management, especially if DDs and PDs are included in the figure.

Table 2.4 Breakdown of WorldFish professional staff by disciplines and regional areas in 1999 and 2005 (December*) (Source WorldFish 3rd EPMR Doc, # 17c)**

Disciplines	**Gnl****		**AGI**		**NRM**		**PESS**		**TOTAL**	
Region	1999	2005	1999	2005	1999	2005	1999	2005	**1999**	**2005**
E & SE Asia			7	5	14	9	7	5	**28**	**19**
Mekong	-	-	-	-	-	1	-	1	**-**	**2**
S Asia	-	-	2	3	1	1	4	3	**7**	**7**
SSA	-	-	1	2	-	-	-	-	**1**	**2**
WANA			4	5	0	2	1	3	**5**	**10**
S Pacific & Caribbean	-	-	-	-	7	5	-	-	**7**	**5**
TOTAL Disciplines			**14**	**15**	**22**	**18**	**12**	**12**	**48**	**45**
Gnl Management*	6	11							**6**	**11**
TOTAL	**6**	**11**	**14**	**15**	**22**	**18**	**12**	**12**	**54**	**56**

* including Manila or Penang Headquarter and Abbassa

** General management (not including discipline and portfolio directors)

*** People left in 2005 are not considered

Regional strategies have not been elaborated for all regions. The Panel suggests that in developing these regional strategies, priorities are clearly articulated, indicating in which specific areas the Center will be investing more (or less) in the future, and the explicit criteria for those choices.

Finally, given the potential tensions between Directors than could result from a too general articulation of priorities and the recognized need to reinforce both Disciplines and Portfolios, the Panel urges the Center to more explicitly define in its strategy the medium term objectives it has for the breakdown of its scientific staff by disciplines and regions.

Modes of Action

Mode of action are analyzed with respect to four elements: partnership, organizational standards, resource mobilization and performance indicators (Table 2.5).

a) Partnerships

The need for a more selective partnership strategy, i.e. strategic alliances, is fully recognized in both documents but, it is still to be defined and implemented. This point is a key aspect of human resources mobilization, as discussed below. General aspects of partnership are discussed in Chapter 5

b) Organizational standards

The Strategy Update puts considerable emphases on internal institutional characteristics, i.e. excellence and growth, in addition to the quality of interfacing through networking and partnership. In the Panel's view these standards are in line with modern management principles and are further discussed in Chapter 7.

Table 2.5 Mode of Action

ATTRIBUTES	STRATEGIC PLAN 2000-2020	STRATEGY UPDATE 2005
Partnerships	• Partnership and strategic alliances • Capacity building within NARs	Partnerships and strategic alliances (vehicles 1 and 2)
Organizational standards	• Interaction CG centers • High quality of Center governance • Communication with Stakeholders	Thematic Goals (3-5 years) • High quality partnership • Excellence in science and operation • Growth based on profitability of investment, geographical spread and global scope, and MTP targets
Resources Mobilization	Development of internal capacity	Organic growth (vehicle 3)
	Donor resource mobilization	Economic Logic
	Fish for All Summit	WorldFish Campaigns
Activities	Annual revision of MTPs	Staging and Annual revision of MTPs
Performance Indicators	Provides expected outputs for each ARS and subsequently in MTPs	Annual Key Performance Goals (Designed to clarify expectations and drive behavior)

c) Resources mobilization

The Strategic Plan and the Strategy Update propose two different approaches for the same goal. The Strategic Plan aims at recruiting and retaining excellent scientists through a supportive environment while the Strategy Update is much more oriented to capture the attention of investors (donors) and proposes a proactive policy with devoted people (within the Business Development Office) and Campaigns for attracting new partners.

Attracting and retaining a large number of high quality scientists at the Center is obviously critical to WorldFish's success. However, the Panel envisages that the strategy of internal growth could meet several difficulties in the future for two main reasons.

First, the Center needs to clearly define its positioning in the R-D value chain based on a research domain that has not yet been clearly defined, as discussed earlier in this chapter. This definition, which will have practical implications at local and regional levels, will determine the research needs and therefore, the capacities and abilities required to meet the research challenges. Second, as signaled by the problems the Center has faced in recruiting scientists, e.g. DD for PESS and others, and by the rather high turnover rate of scientists experienced in the past, the number of qualified and highly experienced scientists willing to move from their place of origin appears to be decreasing over time. The Panel believes this situation is far from improving as an increasing number of ARIs, Universities and NARs are engaging more and more in bilateral research activities in fisheries and aquaculture. This is discussed further in Chapters 5 and 7.

In the Panel's view, the Center needs to design an innovative and aggressive strategy to overcome these difficulties. A possible alternative could be to develop a two-pronged strategy aiming at, on the one hand, forming a solid staff of young scientists at the doctoral and post-doctoral level and, on the other, generating strategic alliances with relevant ARIs and Universities, with highly experienced and well recognized scientists willing to take on part time or adjunct appointments. The Center's two senior research fellow positions is a good first step in this direction.

To broaden the staff resource base and maximize its efficiency, the Panel recommends that, within the framework of strategic alliances and the growth strategy of the Center, a pragmatic strategy is defined for leveraging additional resources through a range of joint ventures, including but not limited to co-financing of PhD grants, postdoctoral grants, associated scientists/laboratories in advanced research institutes and calls for joint research proposals.

Another positive outcome of the synergies likely to be generated by this strategy would be to enhance WorldFish's presence in the international scientific community. If the Center were able to properly conceive and implement an aggressive policy of partnerships and linkages this would facilitate the identification and production of relevant IPGs.

d) Activities and Performance Indicators

A more specific annual agenda is described under the MTP. The Panel commends the Center for the definition of institutional KPGs (see Chapters 4 and 6) and related

quantitative indicators, defined under the Strategy Update, which offers a more systematic way of monitoring target achievements in the short and medium run.

2.2.4 Conclusions

Mission and Vision

Notwithstanding the many changes the Center has had to face during the review period in terms both of internal management (relocation of its Headquarter, high turner of its scientific staff) and the external environment (as seen in chapter 1), the Panel considers that WorldFish has made significant efforts to update its vision, mission and objectives in order to propose to its staff, partners and donors perspectives in the area of fisheries and aquaculture that address the challenges of sustainable development, and are consistent with CGIAR Goals.

Strategy

WorldFish future directions and priorities will be based largely on the strategic analysis that Discipline and Portfolio Directors will elaborate.

While welcoming the potential creativity from and fruitful interactions between Disciplinary and Portfolio Directors, the Panel recommends that WorldFish identify and embrace a limited number of key scientific issues and research objectives that could be achieved within a reasonable period of time (4 to 6 years) and that could:

- ***stimulate WorldFish scientists of different disciplines and promote interdisciplinary research;***
- ***be recognized by the scientific community as cutting-edge research and, as a result, stimulate collaboration with scientists from both developed and developing countries;***
- ***demonstrate the comparative advantage of the Center and its leadership capacity in the field of aquaculture and fisheries for developing countries.***

Chapter 3 will propose some areas that could be explored for such an approach.

Positioning

The WorldFish strategy clearly aims at establishing the Center as the preferred link (a "partner of choice") in the "Research for Development Value Chain", with emphasis on knowledge synthesis and sharing. The Panel appreciates the intention of WorldFish to be in the future less involved in knowledge dissemination while remaining attentive to the needs of its partners. The Panel invites the Center to explore the limits and risks of the Research for Development Value Chain as the only paradigm for positioning itself, a topic further developed in Chapters 5 and 8.

Resource mobilization

WorldFish has defined a proactive strategy to mobilize its partners through dedicated people (portfolios), Campaigns, Strategic Alliances in order to increase its critical mass. The efficiency of this strategy can only be fully assessed ex-post, but the Panel considers it at this stage to be promising, while emphasizing the tension that the Center could have to manage between this policy and the new positioning it wants to adopt, i.e. the potential drift towards the application end of the R-D of the Value Chain.

Resource allocation

The Panel observes that WorldFish has previously had difficulties in implementing elements of its strategy that were presented as priorities. The slow growth in human investment in SSA, and the decrease in the scientific potential of the NRM discipline, despite the emphasis put on environmental challenges, are examples of these difficulties. The Panel invites the Center to analyze this problem carefully in order to link available resources to specified priorities more clearly.

3 RESEARCH ACCOMPLISHMENTS AND FUTURE DIRECTIONS

3.1 Background

The Second EPMR strongly supported the intentions of WorldFish to rationalize and consolidate its nine programs into a smaller, more coherent set of interacting programs. In February 2000, the nine ICLARM Programs were consolidated into five and this was reflected in MTP 2003-2005:

- Biodiversity and Genetic Resources Research Program
- Freshwater Resources Research Program
- Coastal and Marine Resources Program
- Policy Research and Impact Assessment Program
- Partnerships, Information and Training Program, which was established as a cross-cutting support to all research programs.

In 2004, the research structure was further reorganized as a matrix of disciplines and portfolios (see Chapter 2). This Chapter will address the accomplishments under the old program structure and highlights of the new research structure will be presented under "Future Directions".

3.2 Research Accomplishments

3.2.1 Biodiversity and Genetic Resources Research Program

Introduction

In 2002, the 'Biodiversity and Genetic Resources Program' (BGRP) and the 'Germplasm Enhancement and Breeding Program' (GEBP) merged to form the 'Biodiversity and Genetic Resources Research Program' (BGRRP) which focused on inland waters.

In 2004, three operating projects (OP) were in progress within this program: "Conservation of aquatic diversity" (OP1, mainly FISHBASE, discussed in section b), "Mitigation of adverse impact of introduced species on aquatic diversity" (OP2) and "Genetic enhancement and breeding" (OP3). Activities in other aspects of freshwater aquaculture are considered in section c. Coastal aquaculture, including genetic aspects (characterization and management of stocks) is examined in section b.

From 1999 to 2005 the number of scientific staff devoted to these activities (excluding FISHBASE) ranged between three and six, of which two were mainly in charge of networking and training. It should be noted, however, that a large turnover (about 50%) occurred during this period.

Goals

The program's main goals are the characterization of genetic resources of freshwater fish for aquaculture and the testing of efficiency of different genetic improvement methods such as selective breeding, crossbreeding, experimental cytogenetics and interspecific hybridization, in order to define effective and efficient strategies for improvement of different species in general or specific contexts. A connected goal is to develop risk assessment and management tools for the introduction of genetically improved strains or alien species in new ecosystems.

The improvement of the growth rate in pond aquaculture has been a major objective of the program but only investigations on survival, cold resistance and production of monosexe populations were performed. Tilapias, with a focus on Nile tilapia, and Asian cyprinids (about twenty species) were the main groups under investigation.

Activities

a) Tilapias

The "Genetic Improvement of Farmed Tilapia" (GIFT) Program was developed from 1988 to 1997 in The Philippines with the strong support of AKVAFORSK (a Norwegian ARI) and of two national research organizations., The GIFT program developed a strain with an increased growth rate that was subsequently transferred to different Asian countries (DEGITA program, 1994-1997). A gene bank of cryopreserved sperms representing the different populations initially collected (and several generations of selection) was created.

In 1998, continued selection in The Philippines was entrusted to the GIFT foundation, a private, non-profit organization. WorldFish activities were then reoriented towards the support of other national programs in Asia using the GIFT strain and continuing genetic improvement by various approaches (e.g. family selection, crossing with local strains, etc) and in transferring the 6th generation of the GIFT strain in Malaysia and to establish a control line and to examine the effect of different environments (ponds vs. cages) on the genetic progress. The latter is done in cooperation with the Malaysian Department of Fisheries.

Genetic improvement of Tilapias in Africa: Following the establishment of a WorldFish office and laboratory in Egypt, it was decided to develop genetic improvement programs in Africa based on the GIFT methodology but using local genetic resources. Three programs have been implemented: (i) in Egypt, efficiency of mass selection was investigated on two species (*Oreochromis niloticus* and *O. aureus*) and genetic parameters of growth and body shape were estimated; (ii) in Ghana, a synthetic strain regrouping four West Africa populations as a basis for selective breeding was established and the program is still in progress and, (iii) in Malawi, where Nile Tilapia is not indigenous, four populations of a local species (*O. shiranus*) were collected to create a synthetic strain that is under selection for growth rate.

Social and economic impact of GIFT in Asia: In collaboration with the PRIAP program (see section 3.2.4) data collected by the DEGITA program were analyzed in order to investigate in different farming conditions the magnitude of the genetic gain achieved and to assess the distribution of benefits between producers and consumers from the GIFT. In addition, adoption levels in several Asian countries and the returns to investment of GIFT technology there were estimated.

Alternative approaches for genetic improvement: A project for introducing and testing YY males for the production of monosexe populations and homozygous clones for the production of F1 hybrid lines was implemented.

b) Carps (Asian cyprinids)

Supported by ADB (Asian Development Bank), the "Genetic Improvement of Carp Species in Asia" project was conducted from 1997 to 2000. In cooperation with NARS in

different countries, the focus of the project was an inventory of species used for aquaculture and, from the available data, characterization of genetic resources and of the results of different genetic improvement experiments (interspecific hybridization, strain crossing, polyploidisation, selective breeding). A Phase II component of this program was initiated in 2004.

c) Training and capacity building

Established in 1993, The International Network for Genetics in Aquaculture (INGA) aims at providing a forum for exchange of information, methods, germplasm and also for training and capacity building. INGA has now 13 developing countries and 12 developed countries members. During the period, activities were mainly dedicated to the management of the carp program, to the organization of expert consultation on biosafety and environmental impacts of introduced strains or species and to organization of training programs.

Outputs

The major outputs from this program are:

- Estimation of genetic parameters and response to selection for growth of tilapias in different contexts (ponds, cages) and for different methods (mass selection, combined selection). Heritabilities are in the range of 20 to 30% with similar values under high and low input conditions. Mass selection results in a 3 to 8% per generation progress, about half of what was obtained by a more sophisticated method (combined selection) in the GIFT program.
- Preliminary analysis of cold resistance for Nile tilapia in North Africa. No difference was observed between the random line and the line selected for growth. Heritability estimates for cold tolerance are very low and this problem, which is mainly limited to WANA area, should be solved by environmental management.
- Characterization of genetic resources of the black-chinned tilapia, a potential species for brackish water aquaculture. Genetically differentiated populations exist along the West African Coast, from Gabon to Senegal, with the larger within population variability en Ivory Coast, the middle of the distribution area.
- Assessment of the potential and implementation of gynogenesis and polyploidy for Nile tilapia (YY males, F1 crossbred clones, triploids). F1 crossbred clones appears hard to routinely produce. YY males are still in the experimental stage.
- On farm estimation of the performance of the GIFT strain in comparison with local Asiatic strains (DEGITA project): weight at harvest is higher both in ponds (from +11.4% in China to + 77.4% in Bangladesh) and cages (+16.7% in China, +19% in Philippines) and survival similar or better.
- Inventory of data on genetic resources for different carp species used for aquaculture in Asia: characterization of strains by various approaches, potential of interspecific hybridization, polyploidisation and gynogenesis, efficiency of crossbreeding and selective breeding in two species (silver barb and Rohu carp).

In close cooperation with the PRIAP program, two significant outputs were produced:

- Demonstration that GIFT is a "scale-neutral" technology: relatively similar progresses can be achieved for different levels of inputs.
- Development of a model for assessing the socio-economic impact of culturing GIFT in several Asian countries.

In terms of publications, 119 documents (among 613) are referenced in the WorldFish publication data base under the "AQ" discipline from 1999 to October 2005. Only 25 of these documents are related to genetic resources and genetic improvement, the others dealing with other aspects of aquaculture (pond management, socio-economic studies, nutrition and feeding, and related topics). The same proportion can be observed for publications in peer reviewed journals (10 out of 37). Conversely, some papers referenced to the PESS discipline are related to the impact assessment of genetic technology and can be considered as outputs of this program.

Outcomes

The most significant outcomes from this program (and its precedents) are:

- The development and implementation of national genetic improvement programs using GIFT material in Asia (Bangladesh, Fiji, Thailand, Vietnam, Malaysia) and the implementation of the GIFT methodology in Africa for local genetic resources (Egypt, Ghana, Malawi). INGA has played a key role for the coordination of these activities.
- The implementation of the GIFT Foundation in Philippines to support the continuation of selective breeding and dissemination of GIFT in this country.
- A high adoption rate by farmers: 2001 estimates indicate that adoption rate of GIFT or GIFT derived strains in 2001 was high in several Asian countries: from 30% in Indonesia to 70% in Philippines.
- An efficient training activity: several training sessions were organized during the period on themes related to selective breeding and production of monosexe populations. Trainees from various Asian and African countries (about 20) attended these sessions (see Chapter 5). Original and high quality documents were produced by scientists. As a result, several qualified scientists are now in place in the main countries and are able to conceive and manage genetic improvement programs.

Impacts

Some of the major impacts from the work of this program include:

- GIFT impact assessment: In collaboration with PRIAP, the projected impact of GIFT based on five country-specific fish sector models (Bangladesh, China, Philippines, Thailand, Vietnam) has been estimated using observed parameters of the DEGITA experiment. The main results are: For an adoption rate of 30 to 40%, national production of tilapias should increase by about 13% on average with no negative impacts on the production of other species; market prices should decrease by about 9% and, consequently, per capita tilapia consumption should increase by 11% without adverse effects on the consumption of other species; profitability of fish farming for GIFT adopters will change according the share of tilapia in their production, e.g. from +6% in Bangladesh where tilapia relatively less important to 84% in Philippines where tilapia is the only freshwater farmed fish. On the other hand, due to the estimated price decline from increased production, non-adopters of GIFT will experience some reduced profitability.
- R&D economic efficiency: Using the GIFT impact assessment and the estimated total cost of the program (about US$ 370M), the annual rate of return from GIFT research and dissemination investment was estimated at 70%.
- Environmental impact: A very preliminary and indirect assessment of environmental impacts of introduced tilapias was done though an enquiry among farmers of five Asian countries. According their declarations, tilapia introduction doesn't seem to cause displacement of existing fish species in natural waters in most of the countries.

In Philippines, where a minority of farmers claimed that the landings of existing species reduced substantially, a complementary enquiry was performed by a multidisciplinary team and concluded that "the decline of native species … was probably the result of a number of factors, the least influential of these being the presence of exotic tilapia". The Panel will comment later on this conclusion.

Assessments

a) Suggestions and Recommendations of external reviews

The program was submitted to three main external reviews during the period under review: a CCER review (2004) and two evaluations by donors, the European Commission for the "Genetic enhancement and breeding program" (2004) and the Asian Development Bank for the DEGITA program (2005).

The CCER recommended extension of the activities to new regions and species (while ensuring the capabilities of NARS or participating institutions to be long term and liable partners) to: stop the F1 clone technology approach; invest more in appropriate breeding methodologies (implementation of control lines, BLUP analysis), develop a more active publication policy in refereed journals, continue the "genetic improvement program of carp species" in Asia; and stimulate joint approaches with social sciences.

The major points of the EC review related to the IPG status of GIFT (In the case of partnership with private operators, "uninterrupted attention should be given to access by poor fisherfolk to improved GIFT stocks"), to the problem of biodiversity impacts (The Center should watch over the respect by every operators of Nairobi declaration in the case of import in Africa of genetically improved or alien species) and to a proper analysis of African specificities before implementing genetic improvement programs.

ADB emphasized several major lessons of the DEGITA program, among them the critical importance of "long term and sustained investments", the need for an assessment of performances under various conditions before commercial production and the key role of partnership.

b) Panel's Assessment

The Panel acknowledges the importance and the quality of results that represent a major contribution to the definition and implementation of efficient and sustainable genetic improvement programs for aquaculture species in developing countries. It recognizes the value of having tested the GIFT strain in various contexts and of having taken into consideration social and economic impacts of the technology. The fruitful cooperation with social sciences should be considered as exemplary.

The investments made in organizing and/or supporting national activities though an efficient network for information exchanges, training and capacity building (INGA) is another very positive aspect of the program.

The Panel believes the potential for the future of two other products of the program is very high:

- the database on the ten generations of selective breeding, which is unique in the area of fish genetics (except Norwegian data bases on salmonids), yet to be fully exploited (in terms of papers published) and should be considered and organized as a "virtual"

open laboratory for fish geneticists. Integration in FishBase could be an option for that.

- the sperms cryobank, which preserves wild genetic resources from Africa and could be used in the future for various purposes (restocking, estimation of long term effects of selection, estimation of impacts of climate changes or other human activities…). This cryobank is now maintained by a national organization in Philippines (BFAR) and remains accessible to WorldFish scientists but WorldFish should ensure that its IPG status is secured by appropriate agreements.

Concerning carps aquaculture in Asia, the Panel emphasizes the quality and importance of activities coordinated by the Center for collecting useful data for the definition of genetic improvement programs on these species.

The Panel endorses the main conclusions and recommendations previously presented. In addition, with regards to the plausible large dissemination of GIFT methodology and/or products, the Panel considers that several points deserve special attention:

- **The weakness in publications in peer reviewed journals.** In the case of the GIFT program, only the results of the first phase (the comparison of strains and their crossbreds) have been published and no paper is available on the estimate of genetic progress during the first five generation. A significant effort must be made in this area and the Panel was informed that such an effort has actually started in 2005.
- **The still imprecise estimation of the genetic progress.** Due to the lack of a control line derived from the same gene pool, the magnitude of global genetic progress, often claimed to be 80%, remains imprecise. Progress Reports of the GIFT program give only comparisons between each generation and the former and/or comparisons with some Asian strains tested at the beginning of the program (Israel, Thailand). The DEGITA program estimated the superiority of GIFT strain over various local strains in farming conditions but these strains are supposed to have poor performances (that's why wild African populations where introduced at the beginning of the program). Therefore, the Panel strongly concurs with the creation of a control line for the continuation of selection in Malaysia even if some "relaxing effects" are likely to occur in this line that could lead to overestimate further genetic progress.
- **The dissemination of the "GIFT technology package".** This package is in fact regrouping several innovations: (i) the replacement of a local strain by a new synthetic gene pool resulting from the introduction, testing and crossbreeding of several wild or domestic populations; (ii) a proper management of this gene pool in order to avoid inbreeding and to allow progressive adaptation to local farming conditions through natural selection; (iii) a selective breeding methods that could be based only on individual performances or integrate family performances and (iv) sometimes, the technology for producing mono-sex populations. Considering that each of these tools has a specific interest and cost/benefit balance in the different aquaculture contexts and can be use independently, the Panel suggests that the WorldFish dissemination and capacity building policy should adopt a stepwise approach and more effectively distinguish between these tools.
- **The limited knowledge of the biological components of response to selection, especially changes in feeding behavior and food conversion efficiency** (higher spontaneous feeding rate and/or better food conversion efficiency). The assumption that GIFT allows more fish to be produced for the same amount of feed and/or fertilizers inputs, i.e. has a better growth and a better feed efficiency, is not obvious with regard to the scientific literature. Data on these points are only global estimates

in farming conditions without direct measurement of ingested food and using comparison with local Asian strains. Although they have concluded that a dramatic improvement in protein utilization in the GIFT strain has occurred, this result is difficult to impute only to selective breeding. This issue can be considered as a minor point for situations where tropic resources are in excess. It can become more serious in the case of intensive aquaculture or at the opposite end of the spectrum, i.e. in the case of very low input aquaculture systems or in polyculture systems.

To better understand the way selective breeding changes biological growth parameters, the Panel recommends further studies on GIFT be undertaken by geneticists and nutritionists working together, using more controlled experimental conditions, and testing a large range of feeding levels.

- **The assessment of the socioeconomic impact of GIFT.** The projected impact assessment presented to the Panel seems to be promising but is based on imprecise biological parameters (see former remark) and economic modelling. In order to reinforce these results, the Panel encourages WorldFish to undertake *ex-post* empirical studies in countries were large changes are believed to have resulted, e.g. the Philippines.
- **The assessment of environmental impacts.** The 2nd EPMR commended the Center for "undertaking environmental risk assessment associated with genetic improvement on fish". The EU review maid a similar remark. A very sensitive point is the impact of introduced tilapias, for which evidence of interactions with native species exists in the scientific literature. The preliminary results based on farmer's declarations can not be considered as a reliable and convincing argument for the lack of environmental impacts. The Panel acknowledges the methodological difficulties that exist to obtain accurate data in this area but encourages WorldFish to seriously consider this issue.

3.2.2 Freshwater Resources Research Program

Introduction

The Program has a long history within the Center. It is built from a series of activities aimed at increasing the productivity, sustainability and profitability of freshwater aquaculture, and improving management of lakes, reservoirs, small water bodies, rivers and flood plains. Since the last EPMR, 25 projects - with a total budget of approximately US$ 14.6M - have been executed, including: Integrated Agriculture - Aquaculture (IAA), Development of Sustainable Aquaculture (DSAP), Pond dynamics, and a number of Community-based projects on: Fish Culture in Flooded Rice Fields, fisheries management in flood plains and rivers, and Management of Aquatic Biodiversity and Fisheries.

An average of four Scientists per year has been involved in the program since 1999. Based on a review of human needs and the biophysical potential for positive gains from research, the focus during the current review period was on Africa, East and South-east Asia, in arid, semi-arid and humid environments.

Goals

The Program seeks to improve the livelihoods of fishers and fish-farmers of freshwater living aquatic resources. There are two main thrusts aimed at 1) increasing the

productivity and sustainability of freshwater aquaculture within the context of African and Asian farming systems; and 2) improving the knowledge base and management of freshwater living aquatic resources within the context of changing watersheds. The principal cultured species, including the GIFT tilapia, cyprinids and O. shiranus, are examined in section 3a.

Activities

The overall strategy for realizing the goal of sustainably improved management of freshwater resources is based on extensive analysis and pragmatic problem-solving. The projects are executed using networks and partners as tools for transferring technology and disseminating and exchanging information among farmers and small-scale fishers, collaborating scientists, individuals and government counterparts. The projects targeted the whole family and, using a participatory extension approach with a significant participation of women and girls, reinforced farmers, government officials and NGO partners with human capacity building.. During the present review period, the focus was on refining, validating, scaling-up and scaling-out the IAA and sustainable aquaculture technologies through research-extension-farmer partnerships, thus combining poverty with a fish focus. The methodologies and technologies for some aspects of the research for example for IAA and for sustainable aquaculture development had been developed even before the Second EPMR.

Outputs and Outcomes

Work on nutrient use efficiency based on station and on-farm experiments and modelling in Malawi demonstrated the usefulness of undertaking further work to improve the resilience to drought by planning and managing resource flows through IAA. Over the past seven years, the IAA technology has been adopted by over 200,000 new farm families. It is also expanding to Cameroon, Zambia and Mozambique. Commercial aquaculture opportunities have been created in Malawi and have potential to contribute to meeting the target production of 5,000 tons per year.

Methodologies and technologies for promoting pond and rice field based aquaculture and the efficient use of wetlands were elaborated and validated. As a follow up to these initiatives, emphasis was placed on techniques for scaling-up the initiatives through community-based partnerships and the gradual infusion of new business practices into rural areas. Raising fish in rice fields in Bangladesh increased the productivity and efficiency of farms and profitability was increased up some 20-85 per cent. The approach and technology has been successfully tested under an "adaptive learning" process in India on farmers managed trials. The Central Inland Fisheries Research Institute in Barrackpore provided technical assistance while WorldFish's role was that of enabling, coordinating and managing funds provided by DFID for this initiative.

The production of a decision-making tool (Bayfish) utilizing data on species and habitat diversity and the development of modelling approaches linking fish production and hydrological patterns in the Greater Mekong Region are important additional outputs of the project. Policy and decision-makers have become aware of the value of aquatic resources to food security, livelihoods, and national economic development in the Greater Mekong Region. An integrated planning process has been launched in southern Laos and Vietnam to measure trade-offs between mangroves and expanding shrimp aquaculture. Other relevant outputs of the Greater Mekong project have been: (i) training

of scientists, professional staff and students at IFReDI, the Mekong River Commission and IUCN in Bayesian modelling, fisheries biology, research methods, data analysis and report writing; and (ii) more than 20 publications in the form of technical reports, country and regional profiles, guidelines on stakeholder consultation, co-management and conflict management and BayFish Model use. Moreover, 32 peer reviewed publications of the Program's work, 29 non-refereed papers and five proceedings of international conferences and seminars have been published. Many of these outputs will lead to IPGs in the form of, among others, guidelines, decision-making tools and manuals (e.g. the policy brief on conflict management and policy guidelines for management of excess fishing capacity in small-scale fisheries).

The DSAP has spread new business, marketing and technological knowledge to the Bangladeshi population. Current emphasis/focus is on leveraging partnerships and skills to initiate market-driven aquaculture for the poor broadly. Scaling-up of the sustainable aquaculture technology has occurred and at least four community-based fisheries management projects funded by a variety of donors are being implemented independently by the government of Bangladesh. Community-based fisheries management approaches are also being implemented in Vietnam.

Thanks to innovative approaches developed under the community-based fisheries management projects, fishers in Bangladesh have gained access over the last four years to more than 115 water bodies covering close to 17,000 hectares thus increasing fish production and improving livelihoods for poor communities. In addition, 164 fish sanctuaries have been established in 81 water bodies covering 91 hectares.

Thirty-four training courses (19 national and 15 regional) involving a total of 502 trainees from 71 countries with a total of 3,484 trainee days were organized within the framework of the program (see Chapter 5).

Impacts

Impact assessments of the outputs of this Program both in Bangladesh and Malawi are reviewed in section 3d. In the areas of Malawi where IAA technology was adopted productivity of farm ponds improved substantially with the average yield more than doubling, from 1.34 to 2.73 t/ha. It has also been instrumental in increasing income (three to four times in some cases). Fish consumption in the project areas rose by about 160 percent and childhood malnutrition fell by 15 percent. The IAA technology has led to fish constituting an increased share of incomes in farming systems from some five percent before projects to more than 35 percent after. Geographical expansion of the IAA technology is creating conditions for spin-offs and contributes towards macroeconomic growth, job security, exports, and food security for the country's increasingly urban population. The IAA technology has been adopted as the official production technique by the Government of Malawi.

The integration and upgrading of hatchery, nursery, feeding, marketing and other components of the value chain resulting from the development of sustainable aquaculture in Bangladesh have contributed to raising production and total household income from fish culture (improved technologies) from 15 to 26 percent. The total number of households involved was 70,000. At the same time the proportion of total household income from fish increased from 5 percent before DSAP to 36 percent.

Panel's Assessment

The goals of this Program are fundamental to achieving the Mission and aims of both the Center and the CGIAR (CG). In addition, the projects carried out under this Program are in line with the CGIAR system's priorities, in particular: integrated land, water and forest management at the landscape level, sustaining and managing aquatic ecosystems for food and livelihoods and improving water productivity. They all seek pro-poor solutions.

The Panel noted that no specific CCERs had been undertaken on the FRRP. In its assessment of the Program, the Panel was able to draw on the Mid-Term Report of the DSAP, an assessment of progress under the DSAP by USAID and two CCERs on the Regional Strategies for Sub-Saharan Africa (SSA) and East and Southeast Asia (ESEA), which have a bearing on aspects of the program. All the reviews indicated that FRRP work was highly productive, the methodologies and technologies developed were sound and the results fulfilled the needs of WorldFish clients. The Panel concurs with the general findings of these reports. Two recommendations were of particular interest to the Panel: (1) that WorldFish should give special attention to improving the quality of institutional partnerships (CCER for ESEA); and (2) that WorldFish needs to ensure that it remains within its CG-defined remit, focusing on 1) generating new knowledge or ways to use old knowledge in new ways, 2) facilitating the dissemination, uptake and use of that knowledge, and 3) building capacity in research and facilitating knowledge uptake (CCER for SSA). The practical application of that knowledge for development purposes, and the associated skills, should be left to partners who have the comparative advantage in those areas. The Panel invites the Center to give due attention to these recommendations.

In the Panel's view, the initiatives under this Program represent state-of-the-art approaches in very innovative forms that are contributing substantially to achieving the WorldFish mission, goals and objectives. The significant outputs and impacts of the technologies are due to several factors including the whole family–participatory approach, linking with appropriate NGOs in implementing many projects within the Program, and, in particular, the involvement of women and girls. The latter were actively engaged in feed preparation, gear mending, collection of fish for consumption, and also had a greater role in decision-making. Forty percent of the participants in the IAA project in Malawi were women. In Bangladesh, 22 percent of the farmers who received grants from participating NGOs were women, while for receivers of grants from non-participating NGOs, the figure ranged from 6 to 16 percent.

The impressive outputs of the Program are due to successful partnerships with several NGOs in Bangladesh and World Vision in Malawi who are very good in mobilizing populations and possess strong rural extension qualities. In addition, in the case of DSAP in Bangladesh the NGOs were skilled in the management of credit among rural communities. Mindful of WorldFish's plan to scale-up the IAA methodology and technologies in SSA, the Panel encourages WorldFish to consider working in collaboration with the Consortium of World Vision national structures in Sub-Saharan Africa to attain its objective. The Panel was informed that a MoU governing Africa-wide collaboration with World Vision International will be signed during the week starting13 February, 2006. The overall output generated at a number of such sites is likely to be more robust for extrapolation. In addition, such cross country links between outputs would contribute to their transformation into IPGs.

Research on IAA and rice-fish culture are examples of projects where there could have been stronger interaction between WorldFish – a specialized and thematic Center- and other appropriate CG Centers such as IITA, IWMI and CIFOR. The Panel encourages WorldFish, if and when possible, to collaborate with other appropriate Centers of the CG under its "Fast Track Opportunities" in SSA in the framework of NEPAD, to scale-up successful IAA technologies from Malawi to other countries in Southern Africa. The Center may also wish to consider creating research programs in the commonly accepted priority areas which might add value to international efforts in improving livelihoods in poor farming and fishing communities.

The outcomes of the biodiversity and fisheries management research in the Greater Mekong Basin (judged as being of high quality by an EU commissioned report) are good and the global importance of the outputs is potentially high with wide applications in the watersheds and flood plains in ESEA, SSA as well as South America. Efficiency has been greatly enhanced by the degree of scientific collaboration and partnership pursued within the GMR and interaction with IWMI and scientists from outside the area for example, South Africa, Australia, UK, Sri Lanka, Brazil, and Finland. The Panel encourages WorldFish to explore the possibilities of interacting with scientists involved in similar activities in these regions and, as appropriate, consider the transfer of methodologies and technologies to other eco-regions taking into account their specific conditions. It was reported that habitat restoration activities and sanctuaries in Bangladesh have led to increases in biodiversity, in some areas by as much as 30 percent. The Panel considers this an important finding and invites the Center to endorse this information with more studies.

The Panel found ample evidence in the documentation provided and in the relevant publications, as well as during its interaction with WorldFish partners that WorldFish methodologies and technologies in IAA, flood plains and rice-fish culture as well as wetlands/river basin fisheries are generally of good quality and relevant for the recipient countries. The Center has received client recognition and support for its delivery of practical, validated technology (See Chapter 4) even at the village level.

The adoption of the whole family – participatory approach together with the limited number of staff allocated to the Program favored the involvement of a wide variety of partner-groups in project implementation and of the Center in the entire Research-to-Development Continuum. For example, training in natural spawning techniques could be given to a particular partner-group that could then scale-up the activity. The Panel, however, ascertained from documentation that such training is often given to a wide variety of partner-groups: government officials, NGOs and contact farmers and includes the provision of extension services. While these activities in some instances are justifiable in as much as they can and do contribute to outputs, the wide variety of partner-groups targeted and the degree and intensity of such activities tend to detract staff time from science and usually carry high transaction costs. The Center should explore ways to devolve such down stream activities to other development oriented partners.

The Panel's opinion is that over the past seven years the FRRP has produced relevant outputs with clear impacts. The Panel is however convinced that the outputs could be made more relevant and long term impacts on the development agenda substantially enhanced if the Center optimally positioned itself in the Research for Development Value chain, a phenomenon that the Center acknowledges in its new strategy. Fundamental to

achieving this, the Panel considers it essential that WorldFish should work to better understand the weaknesses and strengths of its partners.

The Panel noted that much of the work undertaken had not been packaged in forms appropriate for use by WorldFish partners to scale out methodologies and technologies. Without the adequate capture, interpretation and translation of this knowledge into specific and relevant forms of communication (such as publications in refereed journals, manuals and technical briefs for use by partners and NGOs), much of the value of the good aquatic science that is currently being produced at some sites will not benefit several poor riverine or coastal communities.

In order to ensure that its development oriented partners are better equipped to scale out methodologies and technologies for enhancing outcomes and impacts, the Panel recommends that WorldFish:

- ***continue to make a conscious effort to move away from downstream development activities and explore opportunities for development-related activities to be executed by local or bilateral entities, where available, while the Center continues to monitor and evaluate the activities/developments in order to analyze the impacts and also to identify constraints and bottlenecks which might require further research;***
- ***undertake a scoping exercise to identify its partners' strengths and weaknesses in order to better target capacity building, especially of NGOs, to advance the development spectrum of its work; and,***
- ***synthesize and package existing information, including frameworks, manuals, protocols and guidelines to ensure greater dissemination and use of its products.***

The spectacular achievements of the IAA and other technologies in Bangladesh where WorldFish has a history of over 30 years and in Malawi (close to 20 years), demonstrate that long term commitment is essential for success. The Panel suggests that WorldFish should continue to pay particular attention to the long term viability of its program in selecting strategic focal countries, particularly in SSA, in order to be able to maintain durable operational structures from which IPGs could be developed.

IAA and the rice-fish systems are more dynamic, durable and resilient sources of livelihoods than traditional farms. This is demonstrated by the fact that IAA farms are 18 percent more productive during drought than traditional forms of farming. This has great implications particularly in Southern Africa where with almost four farmers per hectare, even mild droughts can lead to food shortages. The IAA and rice-fish systems however have potential for conflicts with regard to water use and management. In this context, the Panel commends the Center for the excellent collaborative work with IWMI in the Mekong Region and invites further strengthening of such interaction to address issues related to water management.

Future Directions: In the new program structure the activities of FRRP would be realigned to either NRM or AGI. The future directions of the Center under this new framework are discussed in Chapter 3(II).

3.2.3 Coastal and Marine Resources Program

This program was reformulated in the 2003-2005 Mid Term Plan and in accordance with the priorities of the then Strategic Plan, focused on coral reefs and other near shore coastal habitats, by targeting populations of poor coastal communities in Southeast Asia

and Small Island Developing States, primarily in the Pacific. Very large numbers of people live in or near the coasts of these regions and are dependent on their highly productive ecosystems for food and livelihoods. Despite this however, near shore habitats such as coral reefs, mangroves and seagrass beds, together with large areas of the shallow continental shelf, are among the most threatened or degraded on the planet. An average of 12 scientists has been involved in the program since 1999. The project portfolio of CMRRP was subsumed into the larger Natural Resource Management (NRM) discipline area of the new management structure in 2005.

Goals and Activities

a) Goals

The Coastal and Marine Resources Research Program sought to equip developing countries with the means to increase the productivity of inshore fisheries resources on a sustainable basis. In particular, the program endeavored to assist managers: to rebuild stocks to more productive levels; to increase the productivity of fisheries resources and the opportunities for alternative livelihoods through the application of aquaculture; and to reverse the degradation of the habitats that support fisheries.

The program focuses on inshore fisheries, particularly those associated with coral reefs and shallow soft sediments in Asia, Southeast Asia and the Pacific. This focus was clearly relevant to the previous and current WorldFish mandates to reduce poverty and hunger by improving the livelihoods of fishers. The major problems faced are increasing human populations, decreasing fish stocks, degraded habitats, loss of livelihoods and the prospect of higher prices for fish. Hence the development needs relate to provision of more fish to meet increasing demand, improving the environment, more livelihood options, and information for decision making. Research activities of the program therefore had three major goals: 1) Restoration of Capture Fisheries; (2) Promoting Environmentally-Friendly Coastal Aquaculture; and (3) Reversing Degradation of Coastal Habitats. In addition, databases have been a central aspect of the Program's efforts.

b) Activities

i) Restoration of Capture Fisheries

From its inception as ICLARM, WorldFish became a world leader in tropical fish stock assessment. The use of statistical and modelling techniques (Elefan etc) established collaboration and capacity in this area in many developing countries. These successes were followed by the development of ecosystem modelling techniques (Ecopath etc), but loss of staff and other changes led to a decline in WorldFish involvement in this type of modelling. However, with particular reference to the massive declines in trawl fish catches in SE Asia, the need in terms of development assistance really switched to sustainable management and restoration. WorldFish responded with the development of TrawlBase in collaboration with UBC and eight SE Asian countries.

ii) Promoting Environmentally-Friendly Coastal Aquaculture

This program concentrated on inshore species with a high market value and low environmental impact that are amenable to small-scale culture in shallow coastal waters. The Coastal Aquaculture Center set up by WorldFish in the Solomon Islands developed the aquaculture of giant clams, pearl oysters and sea cucumbers prior to its

closure in 1998 due to civil unrest. Despite this setback in the Solomon Islands, the Center was re-established in New Caledonia in collaboration with IFREMER and successfully piloted sea cucumber and pearl culture, with significant potential for extension within and outside the region. In particular, the project for "Development of New Artisanal Fisheries Based on the Capture and Culture of Postlarval Coral Reef "Fish" not only has a simple design, but broad potential for uptake by coastal communities who could substantially increase their income from the sale of these fish.

iii) Reversing Degradation of Coastal Habitats

Two-thirds of all coral reef areas are found in developing countries and border much of the coastline of some of the poorest countries in the world. Almost 500 million people live within 100 km of a coral reef, but the number of people depending on coral reefs and their level of dependence are not well understood. Tens of millions rely on reefs to support part of their livelihood, providing food, income and basic subsistence needs. Despite numerous research and management projects on coral reefs, there has been little coordination and data sharing. This and the lack of data management capacity in developing countries led WorldFish to start ReefBase in 1993 in order to synthesize data on coral reefs in a standardized database in support of research and management.

iv) Databases

WorldFish is responsible for three major database initiatives: FishBase, ReefBase and TrawlBase. While the latter two are dealt with under research activities above, FishBase, as the world's premier source of information on all fish species, stands alone.

FishBase comprises the accumulation and structuring of knowledge on fish biology and ecology over the more than 15 years since its inception. It now contains over 28,000 species of fish known to science, has over 80,000 synonyms and 200,000 common names in over 250 languages. The names are the key to accessing knowledge accumulated over time and mobilizing scientific and non-scientific knowledge systems. Over 25,000 pictures illustrate these fish and information about them has been extracted from 20,000 references. The development of 'Key Facts' by species, first implemented on the web-version to great effect in late 1998, allows rapid estimation of key indicators of relevance for managers and conservationists. Estimates of these life-history indicators with 'best estimates with error margin' can now be produced rapidly on the basis of information already inside FishBase and re-estimated with the user's own data, as required. As an additional complement, an October 2000 update of IUCN's list of threatened fishes is incorporated. FAO nominal catches from 1950 to 1998 and the further improved presentation and analysis of tropic ecology information available to all interested users opens the doors for new types of global trend analysis.

The breadth and depth of information achieved so far, allows for new questions. This, in turn, allows shaping more analytical routines or other outputs with the potential for making the database more useful to scientific users. The constantly growing emphasis on graphical presentations of data, the relationships between different data sets, as well as the derivation of synthetic indicators like the ones mentioned above, make it increasingly interesting to a wider audience. It is hoped that the various tools will encourage local applications of global knowledge through interfacing with national data sets.

WorldFish no longer controls FishBase, but manages it as part of a consortium of museums, fisheries research institutes and international organizations with a fisheries mandate. The consortium has made an open-ended institutional commitment to further develop and consolidate FishBase and keep it in the public domain. The founding members of this open consortium are: Swedish Museum of Natural History (Stockholm), Royal Museum for Central Africa (Tervuren), Muséum National d'Histoire Naturelle (Paris), Institute of Marine Research (Kiel), Fisheries Center of the University of British Columbia (Vancouver), FAO (Rome) and WorldFish (Los Baños). The consortium members will thus ensure that the shared knowledge platform for the more than 500 individual and institutional collaborators and for the innumerable users around the world will continue to thrive.

Outputs and outcomes

WorldFish has developed innovative restocking and alternative livelihood options for sea cucumber (beche de mer) fisheries. It may be possible to use these options to help with the recovery or sustainable management of the fisheries in Vietnam, Philippines, Indonesia, PNG, Solomon Islands, New Caledonia and Kiribati. Transfer of pearl growing technology from Polynesia to Solomon Islands has created a potentially significant source of income for local people. However, WorldFish is re-focusing the biological work on the technical aspects of culture and restocking to a more comprehensive approach in which culture and restocking are seen as one management tool among many for small scale fisheries (SSF). The Panel sees this evolution as an important step in the application of some very important biological results to improved management and livelihoods in SSF (see Chapter 3 (2)ii) and endorses the approach. In the absence of this reorientation of focus, the biological work on culture and restocking could not achieve any management outcomes.

FiRST software and the regional database TrawlBase have, through workshops with eight different countries, been used to identify problems and the need for action in SE Asian fisheries where stocks have been reduced to more than 30% of levels prior to fishing. The results of the workshops have been published and made available to management agencies. This database system brings together very valuable data sets generated from national trawl surveys and again, uses excellent scientific principles to help standardize and analyze very important time-series data. The Panel notes that the outputs of TrawlBase currently provide the only scientific data of the type essential for planning sustainable trawl fisheries management. To date, only the Malaysian Government is implementing the recommendations of the TrawlBase workshop report in relation to establishment and maintenance of adequate catch databases, but there is scope for the transfer of the TrawlBase concept and technology to other areas of the world.

FishBase is the world's leading on-line information database on fish, and as such, hosts the databases of members from more than 100 countries and more than 1200 collaborators. Its use is extraordinary (23 million internet hits per month) and it is the first port of call for queries about any particular fish from fisheries managers and scientists throughout the world – both in developing and developed countries. FishBase is considered the best documented and most comprehensive of all biodiversity databases. It has become a tool that most fisheries staff cannot do without. Despite the richness of their aquatic resources, many African, Caribbean and Pacific (ACP) countries are among the least developed. Hence, the need for the creation of an enabling environment for ACP science and research was recognized during the dialogue on the Fisheries Research Initiative demanded by the ACP-EU Joint Assembly (a parliamentary body composed of

ACP representatives and members of the European Parliament). One of the resulting projects, entitled 'Strengthening fisheries and biodiversity management in ACP countries', uses FishBase and its analytical capabilities as its technical backbone.

ReefBase is rapidly becoming the FishBase equivalent for all those researching or managing coral reefs with 7.3 million 'hits', and 259,000 publication downloads by 770,000 users in 2003. It is being used by research institutions, governments and NGOs to improve coral reef management and hence benefit the poor who depend upon sustainable management of reef fisheries resources. The Panel notes that it is now widely recognized as the world's main information system on coral reefs. The new web-based ReefBase is dynamic, updatable, more user-friendly and client oriented, and able to house or access virtually unlimited amounts of information. The recently added GIS and mapping functions significantly increase its power and usefulness, e.g. to managers of marine protected areas, in helping to visualize threats or other factors which may influence the effectiveness of management, or coral reef hotspots where donors may wish to concentrate resources; and to NGOs who may wish to advocate on behalf of coral reefs, scientists and the interested public. Due to a change in strategy in 2000/2001, ReefBase now focuses less on raw data and more on information summaries. It was of great value recently in the compilation and mapping of data on the effects of the December 2004 Tsunami on coral reefs and fisheries of a number of nations, notably Indonesia, Maldives and Seychelles, thus allowing suitably targeted research and management responses by several countries including UK, Australia and USA.

With regard to scientific publications, unfortunately of the approximately 70 refereed publications produced by this program since 1999, only about 30 were in international journals with a measurable impact factor (see Chapter 4 for a more in-depth analysis). The remainder are in local or regional journals or conference proceedings of questionable quality. By any yardstick this performance is below the norm for a research institution, especially given its new vision statement "to be the science partner of choice for delivering fisheries and aquaculture solutions for developing countries". The Panel urges the Center to increase both the quality and quantity of its scientific publications.

Impacts

While direct impacts on poverty alleviation have not been realized or documented, the Panel is satisfied that there is ample evidence that this program has produced results that have had intermediate impacts. Of particular note are tools such as ReefBase and FishBase, which have been used in research projects that have produced results that have influenced fisheries management policy.

Panel's Assessment

a) FishBase

FishBase is the achievement for which WorldFish is best known and world famous, but it is also of primary importance for the planning and execution of WorldFish research as well as of other research institutions and organizations. However, as the recent (November 2005) EC "Review of the WorldFish Center Project 1, Conservation of Aquatic Biodiversity" report states: "The degree to which the needs of these diverse groups are met is perhaps the measure of the relevance and success of the 'project' ". There is a risk that FishBase is driven by the interests and expertise of the consortium, rather than by an assessment of real needs. In particular, there are important differences between the

consortium's focus on global biodiversity and WorldFish interest in regional research and management capacity for biodiversity conservation to alleviate poverty. Notwithstanding the above, there is no doubt that WorldFish obtains added value and derives great benefit from FishBase – not only was it 'fathered' by WorldFish, but the 'brand name' places a kudos on WorldFish that should not be underestimated in terms of influence.

While acknowledging the key role of FishBase within the newly defined NRM priorities and strategic directions, the Panel recommends that WorldFish clearly define its continuing involvement and role in the database, including specifying how the various demands on staff will be met.

The Panel also notes that FishBase offers a powerful tool for communicating and promoting new tools for small scale fisheries management.

External Reviews and Commentaries

a) CCER

This significant review, carried out in November 2003, was largely favorable, particularly with regard to relevance to WorldFish's mandate, its priorities, quality of research, scientific output, thrust directions, and identification of impact pathways. Nevertheless, it contained a list of 17 recommendations concerning aspects of the program in need of improvement. These recommendations were recognized by the Center and were used to assist with the organizational transformation that began after the appointment of the new DG. Restructuring according to the new discipline/portfolio matrix management has dealt with many of the structural issue recommendations such as impact pathway analysis, consolidating programs to maximize critical mass in key areas, strengthening cross-program linkages, streamlining project management, strengthening ties across WorldFish outreach sites, making use of adjunct scientists, and greater integration across projects within WorldFish. However, the Panel believes that the recommendations concerning maintaining high-end science reputation, the production of landmark papers and reviews and publishing in prestigious journals, require further attention if they are to be achieved (see also Chapter 4).

Recommendations from the CCER indicated that the Center should consider placing greater emphasis on landmark publications and reviews. In this context, the new review "Restocking and stock enhancement of marine invertebrate species", published in Advances in Marine Biology in December 2005, is particularly commendable. This publication in a prestigious book series, is highly relevant to the many restocking issues around the world, and will undoubtedly become a major reference of choice for managers and research scientists dealing with this topic.

3.2.4 Policy Research and Impact Assessment Program

Introduction

The Program was set up in 1996. Its original portfolio was developed from socio-economic and bio-economic studies associated with the Center's biotechnical research in support of fish farming and fisheries management in developing countries. Since 1999, PRIAP conducted its research and capacity building efforts under three main thematic areas: (i) Economic and social analysis and valuation of aquatic resources in developing countries, (ii) Aquatic resources planning and impact assessment, and (iii) Legal and

institutional analysis for fisheries management.. Since the last EPMR, the program has conducted projects in East and Southeast Asia, South Asia, the Pacific, Sub-Saharan Africa and the Caribbean. In 2005, as part of the Center's reformulation of its operational and research log-frame, the Program was renamed "Policy, Economics and Social Sciences, (PESS)".

Information available on scientist staff for PRIAP shows total of 12 scientists between 1999-2002. This situation improved between 2003 and 2005 when the total number of scientists resident in PRIAP reached a total of 18 of which eight were Ph.D. internationally recruited, four regionally recruited (2 Ph.D. and 2 MSc.) and five nationally recruited (1 Ph.D. and the rest MSc., MA, BSc. and BA.).

Goals

The main objective of the Program is to examine policies and options in fisheries, aquaculture and coastal and freshwater resources management to ensure the wider adoption and benefits of research by the poor in the developing world. WorldFish indicates that the Program embraces three broad goals: (i) to examine policy environments and policy options for adoption of approaches, technologies and policies to benefit the poor; (ii) to provide information and tools to fishers, researchers, extension workers and policy makers in making decisions on appropriate institutions for managing aquatic resources; and (iii) to assess the impact of aquatic research and development.

Activities

The Program has conducted its activities in four different modes: first, drawing information and knowledge from other Program research projects to document their economic and social impacts, such as with IAA in SSA and Asia; second, conducting field research in a participative manner, training and networking with national partners and communities to gain knowledge about factors and conditions determining resource users behavior and promote improvements in policy, institutional and management arrangements; third, drawing and synthesizing information and knowledge on model fisheries and aquaculture supply and demand to forecast its development alternatives at the global, regional and national levels; fourth, identifying and applying valuation tools and methods on coral reefs and wetlands to provide information and knowledge to support the design of policy setting management priorities for sustainable use.

A total of 38 projects were actively conducted by the Program during the period 1999-2005, including: research, capacity building, dissemination and/or networking. The Program shows a steady annual increase of 27% in the number of projects conducted, ranging from 6 projects in 1999 to a maximum of 22 in 2005.

Overall, these projects covered one or more of the following topics:

i) Determination of world supply and demand for capture fisheries and aquaculture and its analysis for forecasting and global, regional and national policy design
ii) Market analysis for fisheries and aquaculture products
iii) Economic valuation of aquatic environments and resources including Coral Reefs
iv) Socioeconomic and bio-economic analysis of coastal fish stocks
v) Project and research impact assessment

vi) Co-management approaches and gender participation in coastal and inland fisheries management
vii) Community assessment, management and monitoring of local aquatic resources
viii) Analysis of legal and institutional frameworks for coastal and inland fisheries management and development.

Outputs
In addition to publications and training, this Program generates three main types of outputs: (i) frameworks and guidelines, (ii) methods and (iii) models and analyses.

a) Frameworks, guidelines and methods

A framework was developed to encompass an impact pathway analysis for research planning and priority setting and was discussed during the 2002 and 2003 Science Weeks. The approach adopted is that of "ex-ante" impact assessment based on the three types of research that the Center delivers (i.e. research on technology, research on natural resources management and policy research). Impacts are classified as Economic or Environmental Benefits and quantitative indicators are identified. Two types of indicators are identified: those measurable in the field, such as changes in productivity, production costs and resources or environmental changes; and those measurable at the aggregated level such as changes in consumption levels, market prices, economic gains and changes in (users and managers) attitudes, knowledge and capacities.

A methodological framework and participatory action research methods for Co-Management in coastal and inland fisheries were developed in collaboration with the Institute for Fisheries Management (IFM), including community participation and gender involvement in the conservation and management of fisheries and aquatic resources. A policy brief on co-management was elaborated for dissemination among policy makers in developing countries.

A "Wetlands Perspective" was developed on rural development challenges in the Mekong Region (including Lao PDR, Cambodia, Vietnam and Thailand), giving special attention to the livelihoods of poor people and promoting awareness and long-term institutional changes. The research-dialogue process fostered the capacity for networking within and between governments.

A number of methodologies on economic valuation of coral reefs were identified and disseminated in collaboration with the International Coral Reef Action Network (ICRAN). These were based on research, reviews and discussions such as those included in the Proceedings of the "International Workshop on Economic Valuation and Policy Priorities for Sustainable Management of Coral Reef", identifying future economic and policy research directions relevant to the sustainable management of coral reefs.

b) Models and analyses

A global general equilibrium model on fish supply and demand, as part of the world markets for agricultural products, was developed in partnership with the International Food Policy Research Institute (IFPRI) and led to the publication of the book "Fish To 2020: supply and demand in changing global markets". The model allows for forecasts and analysis of trade of capture fisheries and aquaculture products at global and regional levels. It also allows for the examination of expected changes in capture fisheries and

aquaculture production and trade and their probable effects on regional settings, the environment and the poor, for policy and decision making purposes. In addition, a specific version of the general equilibrium model was prepared for Asia in association with national government institutions, universities and research centers from nine countries (Bangladesh, China, India, Indonesia, Malaysia, the Philippines, Sri Lanka, Thailand and Vietnam).

Econometric models, allowing for comparative static analyses (i.e. with and without project scenarios), were also constructed and applied for ex-post impact assessment of Integrated Agriculture Aquaculture (IAA) projects in Asia (e.g. Bangladesh and Philippines) and Sub-Saharan Africa (Malawi). These models do not include formal consideration of environmental impacts caused by technological externalities of IAA technologies and practices, or the aggregated effects of their adoption and development. Bio-economic models for analysis of fishing capacity in the Gulf of Thailand were also constructed and applied.

PRIAP also contributed to the design of a Bayesian model (BayFish) for the management of water flows to optimize aquatic resource production in the Mekong River Basin, developed under the BGRRP.

c) Publications and training

Between 1999 and 2005, the Program has produced 189 publications, including books, journal articles, technical reports and workshop proceedings. Twenty-six percent (49) were refereed journal papers and 27% were documents authored or co-authored by the Center. Refereed publications included a number of journals such as: Aquaculture Economics and Management; International Journal of Socio Economics; Marine Resource Economics; Coastal Management Journal; Environmental and Development Economics; and Agriculture, Ecosystems and Environment. The average publication rate in refereed journals for 2005 was one, considering a total of 12 publications and 12 Ph.D. According to the analysis provided in Chapter 4, the average publication rate was 0.56 per year for the period 1999-2004.

A total of 35 Training Programs have been conducted between 199 and 2005, with a total of 593 trainees from 16 countries. During the same period, 99 workshops were held to present, discuss and/or disseminate intermediate or final outputs listed above.

Outcomes

A summary of main outcomes of the Program for the period of interest is as follows:

i) Community-based organizations have been established and fisheries management principles have been practiced as result of the empowerment of co-management approaches applied at local level (e.g. Bangladesh and the Mekong River Basin). For example, 25,000 poor fisher families were organized in Bangladesh.

ii) Community-based management projects and approaches applied to inland water management in Bangladesh have contributed to the creation of 164 fish sanctuaries in 81 water bodies.

iii) Inter-ministerial dialogue on wetlands and fisheries policies in the Mekong River Basin evolved from community-based management (co-management) project and research, legal and institutional framework research and advisory reports.

iv) Improved linkages and networking on wetlands management between institutions, especially in the Mekong Region.
v) Establishment of access rights in open waters to poor fishers have resulted from co-management research, capacity building and networking.
vi) Four MSc. theses on economic valuation and policy development in Cambodian fisheries were completed by students from the Imperial College and the University of Portsmouth, UK.

Examples of outcomes of other type of research conducted under the Program, are: valuation of aquatic resources; fish supply and demand model and forecasting at the global level and in nine countries in Asia. *Ex-ante* and *ex-post* impact assessment of research are yet to be realized at regional and national levels. This realization process is dependent not only on the means for dissemination and transfer of the concepts, methods and tools generated but also on the need for training, symposium and workshop participants to get familiar with, and fully comprehend, the outputs made available to them.

Impacts

Examples of some local project site related impacts are the short to medium term improvements in income and food availability for local people directly related to a project site or its zone of influence, like those in Bangladesh and the Mekong region related to co-management and common use rights in fisheries. The establishment of fish sanctuaries in inland waters constitutes a local contribution to inland fish resources and environmental conservation (e.g. there was a 14% increase in fish diversity in project water bodies), but their long-term positive effects at national level are to yet be seen.

Panel's Assessment
Assessment of the Program's performance during the period of interest is based on the 2001 CCER of PRIAP, as well as on the Panel reviews of the results shown, including an analysis of research-to-impact pathways and international recognition awards, among other aspects.

The Panel considers that overall the Program's outputs and outcomes are a positive step toward the long-term goals of poverty alleviation and hunger reduction in developing countries by improving fisheries and aquaculture.

The Panel believes that the goals of this program are fundamental for the overall achievement of the Center's mission and long-term objectives of reducing poverty and hunger in developing countries by improving fisheries and aquaculture. To realize its full potential for impact, it is essential that the Program's efforts and activities are conducted in an integrated manner not only with counterparts within the Center but also with its partners at national, regional and international levels. From information gathered, the Panel is pleased to observe that the Program activities and scientists have been consistently working towards such a harmonious approach, as may be witnessed by the co-management work conducted in Bangladesh and the Mekong Region, as well as, in the ex-post impact analysis of the implementation of IAA by the BGRRP in SSA and Asia.

a) Research

The Program is conducting relevant research which has led to the generation of frameworks, guidelines, methods, models and analyses to generate knowledge and information necessary to priorities and conduct research supporting the design and implementation of development and management policy in fisheries and aquaculture in developing countries.

b) Frameworks and guidelines

The Panel commends the Center and the Program for establishing an Impact pathway analysis process that includes the three important stages of the impact assessment cycle (i.e. prospective evaluation, monitoring and evaluation, and retrospective evaluation).

The impact pathway analysis framework is based on a holistic approach to analyzing and gaining understanding of the fisheries and aquaculture sector. Three types of research have been rightly identified, as well as the type of indicators to be used and the levels at which their measurement needs to take place. The framework also recognizes and indicates the need for a two-way approach and emphasizes the important role of feedback. In addition to the measurement of economic and environmental impacts, the framework also includes analysis of impacts on regulations and institutional arrangements for fisheries and aquaculture development and management. Even though further explanation of the participatory process adopted is necessary, the framework does include mechanisms to incorporate feedback from relevant stakeholders. Further elaboration is, however, required on how ex-post impact assessment results feed into research planning

In the Panel's view, the framework is pointing towards an effective measurement of expected and required impacts from research conducted by the Center.

From conversations with the two DDs and the DG, the Panel was able to confirm its view that the developed framework for impact pathway assessment has not been systematically applied to the planning and prioritization of research in the Center. Nonetheless, this framework and lessons learned during its development stage have been partially applied by the Center scientists while planning or implementing individual projects or regional project portfolios (e.g. prioritization exercise for the Carp-1 Project and in the ESEA Regional portfolio).

The relevancy of participatory action research for Co-Management in coastal and inland fisheries, including the research dialogue process between governments, is shown by the documented outcomes regarding the establishment (Bangladesh) and the modification (Mekong region) of community use rights in fisheries. The appropriateness of policy briefs and guidelines on co-management have also been appreciated by government officials, as there has been immediate influence in fisheries regulations. Long-term impact, however, is yet to be seen, as stakeholders need to get familiar with, and fully comprehend, the outputs made available to them

The discussion and application of methods for valuation of coral reefs and wetlands reflects a good starting point for the generation of knowledge with respect to the importance of this type of complex ecosystems. Completion at the University of Portsmouth (UK) of four MSc theses on economic valuation of wetlands in Cambodian

fisheries (as part of the Center's partnership with the university, demonstrates a certain influence on knowledge generation. Results from valuation of aquatic resources in Cambodia have raised awareness among officials in multiple national and international agencies and NGOs in various countries in the Mekong region. The Panel commends this line of work and its influence on national and regional institutions in Asia. In the Panel's view interesting benefits and improvements could be obtained from a stronger interaction with the Bayesian type of modelling conducted in the Mekong region and the developments planned for it. Additional discussion on the role of valuation and its relative importance for policy design and decision making is worthwhile in order to identify its real contribution to the long-term goals.

c) Models and analyses

The Panel joins the international community in commending the Program and the Center on their involvement in the development of the first world (Fish to 2020) and national (Nine Asian Countries) general equilibrium fish supply and demand models. It recognizes the relevance of this type of modelling in the generation of required knowledge and information to support policy and decision making with respect to the development and management of fisheries and aquaculture and both global and national levels. It also commends the Program for recognizing the need to improve the accuracy of information required for this type of modelling thus allowing its application in nine Asian countries.

However, the Panel sees two areas where this line of work requires further development. First, the existing models are of static nature lacking proper consideration for non-negligible dynamic (inter-temporal) effects of fisheries and aquaculture development. Second, there is no evidence of proper consideration of environmental impacts arising from technological externalities of fisheries and aquaculture technologies and activities. Thus, consideration of dynamic modelling and inclusion of environmental impacts are relevant as estimation of, and forecast results obtained, with or without the inclusion of environmental costs and effects, not to mention the consideration of dynamic pathways, will most probably be significantly different.

Models for ex-post impact assessment and analysis used to document the impact of the Center's research on IAA in Asia and SSA are seen as having properly followed standard concepts and tools of economics and econometrics. However, similar improvements apply with respect to the need to include environmental impacts and dynamic modelling.

In search of appropriate tools for decisions making, ***the Panel recommends the Center expand its modelling work on the supply and demand of fisheries and aquaculture and undertake additional ex-post impact assessment in aquaculture, paying particularly attention in both cases to technological environmental impacts and non-negligible dynamic (inter-temporal) effects of fisheries and aquaculture activities.***

d) Scientific Staff

According to official Center data, in 2005, the Program ran a total of 22 projects with 18 professional scientists. Given the geographical span of projects conducted by the Program and the fact that its scientists also collaborate with several projects across disciplines and regions, Panel is concerned about the minimal amount of time that on average each of them dedicated to meet all project requirements. This is also sadly

reflected in the average ratio of publications, one of the lowest in the Center (0.56), for the PhD. Despite the increase in publications reflected in the 2005 data, only 1.09 articles were published in refereed journals. This situation is further characterized by the fact that during the review period the average annual number of total publications is only 27, and only 14 in 2005.

The situation of understaffing reported in the 2001 CCER of the Program showed improvement up until 2005. Nonetheless, the information available to the Panel suggests that the number of scientists has significantly decreased (February 2006). The Program is currently without a Discipline Director and the position is only expected to be filled by 2007. At the moment, the DG is acting as Discipline Director.

e) Training and Publications

Training, symposia, seminars, workshops and other dissemination means used by the Program have contributed to the process of knowledge and tool transfer (i.e. outcome generation). There are some indications that contributions have been made to achieve long-term impacts at the project-site or local level (i.e. income improvements and sanctuaries). Contribution to national, regional or global impacts has yet to be monitored.

f) Partnership

During the review period, PRIAP has been very involved in partnering with various national and regional government institutions, NGOs, universities in Bangladesh, India, the Mekong Region and Sub-Saharan Africa. The Program has also collaborated with intergovernmental bodies like the Mekong River Commission and other regional organizations like SEAFDEC. It continues to actively collaborate with the Collective Action and Property Rights (CAPRi), an inter-Center CGIAR System initiative.

g) Gender aspects

Community based and co-management projects in Bangladesh and the Mekong region have involved women in their work from the outset. Women have played a particular role in production and social-institutional arrangements for fisheries and aquaculture management. Positive effects on women empowerment and improvement of their social status in local fisheries management and aquaculture in inland waters of developing countries (e.g. Bangladesh) have been documented by the Center. Few examples of activities directly dealing with gender issues are: (i) a Project on Regional Capacity Building for Gender, Trade and Sustainable Livelihoods Analysis 2002-2003; (ii) Community Participation and Gender Involvement in the Conservation and Management of Fisheries and Aquatic Resources in the Mekong Delta of Vietnam; and, (iii) Global Symposium on Women in Fisheries, Sixth Asian Fisheries Forum, 29 November 2001, Kaohsiung, Taiwan, which led to publication of the article "From women in fisheries to gender and fisheries" (Williams et al.).

In the Panel's view the Program should look for ways and approaches to priorities and systematically cover gender issues across all relevant Center activities.

h) Center-wide issues from PRIAP perspective

The Panel is pleased with the successful definition of an adequate framework for Impact pathway analysis. .However, the Panel suggests that further efforts are required to document the impacts of past research projects, using a systematic formulation of the

research domain. The Panel believes that the Program should lead efforts within the Center to define the above mentioned research space and further suggests that a holistic and dynamic approach should be adopted to integrate disciplines, i.e. to move from multidisciplinary to interdisciplinary, in order to contribute to the attainment of sustainable development (see Chapter 2).

3.3 Future Directions

3.3.1 Aquaculture and Genetic Improvement Discipline

Under the new research structure of WFC, projects relevant to capture fisheries under FRRP will revert to the NRM discipline while projects related to aquaculture will join former BGRRP projects within the purview of the Aquaculture and Genetic Improvement Discipline (AGID).

AGID is yet to elaborate a disciplinary strategy and program. However, the science in both the IAA and the DSAP as well as in a range of regional projects in the 2006-2008 MTP indicate that as resource poor farmers intensify their aquaculture operations, feed costs become an increasingly major component of their operational costs.

BGRRP have also defined three main axes for future research:

- Refinements of methodologies: more precise evaluations of genetic values of individuals or families, new traits, introduction of molecular techniques. In this area an effort will be made to analyze the GIFT database and publish the main results.
- Genetic improvement of new species: in addition to carps and tilapias the program will investigate other species according their biological traits (ability to control reproduction, growth, survival, etc.) and their social and economic importance in partner countries. African catfish (*Clarias gariepinus*) and freshwater prawn (*Macrobrachium rosenbergii*) are among the candidates for this new investment.
- Regional expansion: the program will develop and strengthen relations with partner organizations in several Asian and African countries in order to establish sustainable genetic improvement programs in these countries.

These three main axes will be used to present the Panel's views on AGID's future strategy. More general comments follow.

The thematic axes

a) Advances in fish nutrition to farm-based feeds for resource poor farmers

As resource-poor farmers intensify their aquaculture operations, most of them still rely on farm-based feeds and the diversity of such feeds is, therefore, huge. The nutrient requirements of farmed fish, particularly under the extensive and semi-intensive farming systems adopted by poor farmers, are not well understood. Interactions between external inputs (pellets, organic manure) and internal pond food web can lead to low technical and economical efficiency of these inputs. As a result, research on farm-based feeds is different from the traditional dose-response approach used in fish nutritional research. This cutting edge nutritional research could be carried out (on request of WorldFish by partners from ARIs, while WorldFish focuses on integrating knowledge on nutrient utilization, production/food chain dynamics into an adaptive model capable of making meaningful predictions of the response to different feed and other inputs, under different production conditions and evolving practices of aquaculture intensification.

The Panel strongly supports such an investment as is identified among the eight priority areas where WorldFish wants "to make major contributions to the primary science literature" in the future. It emphasizes, however, the need to move from traditional empirical approaches, with mainly local relevance, to more analytical approaches leading to "International Public Knowledge" with a large spectrum of potential applications.

b) Refinements of methodologies

This area ("a systematic approach to genetic improvement programs for aquatic species") is also a high priority area. As government agencies and NGOs are now conducting genetic improvement programs, WorldFish proposes to place greater emphasis on refining the technology. The main goals would be:

- to generate knowledge to implement molecular tools (marker assisted selection, parentage assignation, etc.);
- to develop divergent lines for disease resistance; and
- to investigate the genetics of traits as fillet yield, flesh quality and variation of sex-ratio in response to temperature treatment.

The Panel fully agrees with the importance and relevance of this methodological investment for developing new and efficient methods for genetic improvement of aquatic species. The proper integration of molecular tools will be one of the key issues for the future.

The Panel advises the Center to pay attention to the context in which it uses the word "efficient". This word should not be limited to maximization of genetic progress per generation in the short term but should integrate cost/benefit analysis, practicability and sustainability in the various contexts of developing countries (including those without efficient NARS) and long term conservation of genetic variability of selected stocks.

In the same way, the Panel supports the investment in the analysis and publication of the GIFT program. The Panel suggests that the GIFT database should be considered as an international public good (IPG) and opened to cooperative investigations between WorldFish scientists and geneticists of various countries. Moreover, the Panel encourages further investigations on the biological characteristics of GIFT strain (metabolism, feeding behavior, nutritional efficiency for different nutrients, effect of stocking density, etc.) in comparison with a proper control group. The possibility of creating, using the cryobank, a proper control population representing the founder gene pool should be considered.

c) New species and regional expansion

The Panel suggests that at least in the short term and considering the available staff, the investment in new species should be cautious and supported by a strong partnership allowing WorldFish to act mainly as a methodological resource Center. In the same way, the Panel approves the commitment of the Center in different Asian and African countries but suggests a global strategy be defined in which each local program will systematically have a double dimension: a practical contribution to the local development of aquaculture and a cognitive contribution to genetic improvement strategies.

General comments

a) Integration into the "Aquaculture and genetic improvement" discipline

The integration of BGRPP in the new "Aquaculture and genetic improvement" discipline and the stimulation through the "Matrix" of interactions between discipline leaders and regional portfolio leaders is a highly strategic decision and raises several issues for the definition of policy in the area of genetic improvement.

Until now, aquaculture projects have been developed in a separate program and with a very systemic and integrative approach starting from farmers' practices and constraints for defining appropriate aquaculture activities. At the opposite end, the rationale for genetic improvement was based much more on the production of a "technological package" (improved strains and related aquaculture practices) that farmers were encouraged to adopt. While the Panel considers that the coming together of these two approaches under the same "discipline" has high potential, it believes the discipline leader will need to dedicate particular attention and consideration to the issue in order to avoid a simple "co-habitation**".** As one of the key areas for this integration is an efficient interface between genetics and nutrition, the Panel suggests stimulating ambitious and long term cooperation between those two areas. An issue requiring joint investigation is to aim at a more precise estimation and understanding of genotype x environment interactions that are crucial for the definition of dissemination policy of improved strains. Some results from the GIFT program seem to indicate low G x E interactions in different pond culture systems but recent results suggest that factors such as density of fish (comparison between cages and ponds) could create large interactions. In the same way, the dialogue with regional portfolio leaders will be crucial to adapt genetic improvement strategies to needs and constraints of local situations, especially in Africa.

The "Fish to 2020" report has clearly underlined the importance of aquaculture for fish production in the future. A high growth rate of aquaculture production of low value food fish in developing countries appears a key issue. Related to this is the need for a clearer vision of the types of aquaculture that can and will answer this challenge in order to develop a relevant definition of priorities for genetic improvement, i.e. which species? Mono or polyculture systems? Which intensification factors (labor, nutrients)? Which investors? In which countries? Will a simple dichotomy between "poor farmers" (the targets of WFC) and "industrial farmers" (not to be helped) remain relevant? Will the growth of production be mainly due to new farmers or to a "scaling-up" of existing farms?

Two points are especially sensitive for this scaling-up of fish farms: (i) some intermediate options in terms of intensification could be less profitable than extreme options (very extensive or very intensive) as is the case, for example, in Egypt. The question arises as to how farmers can be helped to pass though this "no profit land". (ii) scaling up can be achieved through various options: internal growth, acquisition of smaller and less efficient farms or development of producer co-operatives. Here the question is whether aquaculture policy should encourage one of these options and why.

The Panel suggests that to develop this perspective correctly, in-depth dialogues between social and biotechnical scientists are required, for which WorldFish appears to be the relevant convenor and facilitator. Such a project is not only of relevance and interest to WorldFish activities but for all genetic improvement programs in developing countries.

b) Biodiversity and genetic resources policy

In this area, EPMR2 recognized that ICLARM had played a leading role and should "continue to support the CDB and its associated organizations." From 1999 to 2005, various activities have been developed in this domain, primarily although not only within the BGRR program: management and improvement of data bases (FISHBASE); development of management models for freshwater systems aiming at a better conservation of species biodiversity; use of genetic markers for the characterization and management of wild or domestic populations (fish but also invertebrates for coastal aquaculture), development of tools to assess risks associated with introductions of alien species for aquaculture.

The range of activities has been very large both in terms of scientific disciplines (from genetics to socio-economy) and mode of intervention (laboratory studies, synthesis, problematic papers, declarations, development of national guidelines) and these activities are under review by the EC, one of the co-sponsors.

Characterization and preservation of genetic resources (in situ population genetic studies, creation and maintenance of new domestic gene pools, sperm cryopreservation) does not seem to be considered as a specific and relevant activity for the future. The Panel considers that the strategy of WorldFish in this area has to be defined. Such a strategy should concern both NRM and AGI disciplines but also PESS (economic and legal aspects) and include a broader spectrum of species and aquaculture systems that genetic improvement stricto sensu.

The connected issue of environmental impacts of improved strain and alien species, which was considered as a main issue by the EPMR2 Panel, has been the object of rather limited approaches (see Ia: enquiries among farmers in Philippines, Nairobi and Dhaka declarations).

Considering the rapid development of aquaculture in developing countries and the increasing demand for dissemination of a few improved strains, from sometimes only non-local species, ***the Panel recommends that future efforts be made in defining on a pragmatic and objective basis, the acceptable dissemination area of an improved strain, and the realistic monitoring that should be implemented in relation to this dissemination.***

3.3.2 Natural Resource Management Discipline

The creation of the Natural Resource Management Discipline provided an opportunity to reassess the strategic directions needed to maximize its contribution to the Center's Mission in order to make a significant impact on poverty reduction and increased food security through improved fisheries and aquaculture. The Discipline grew out of the Coastal and Freshwater Programs that had served the Center since 1998. These programs, and their predecessors, served the Center well and provided significant contributions. Nevertheless, changes in the external environment necessitated a change in approach.. The Center's overall response to this need to evolve and adapt is summarized in the *Strategic Update 2005*. This NRM strategy is embedded in the broader goals of the Center articulated in that document and in the Key Performance Goals. Overarching goals are provided by the MDGs and the goals of the CG system.

Recent reviews of the Coastal and Freshwater programs as well as the East and Southeast Asia Portfolio have highlighted areas for improvement in NRM research. While noting

significant output, the reviews suggested: (i) better integration with other Disciplines, (ii) greater synergy among projects in regions where the Center is active, (iii) building a critical mass of expertise in priority areas, and (iv) building more effective partnerships. The Discipline's own analysis led to similar conclusions, but also suggested the portfolio of projects is highly unbalanced. For example, 49% of the total project budget (including grant funding) is spent on FishBase and Reefbase, and very little is spent in Africa. Further, much of the research exists as small projects in different places. For example, there is no coastal or marine research done in the Mekong region, South Asia, or Africa, and there is no freshwater research done in South East Asia. This situation does not maximize leverage in attracting funding or generalizing research outputs.

Future directions

In response to the external and internal reviews and analyses, NRM has refocused its strategy on a smaller number of research topics, adapting others, and reducing or phasing out the current investments in molecular genetics and the technical aspects of reseeding marine fisheries that do not maximize contributions to the Center's Mission. This latter process began with the closure of the molecular genetics laboratory. Current projects and commitments will end in March 2006. Scaling back in some areas will allow the Discipline to focus on others. *Enhanced small-scale fisheries will be the unifying theme that will bind NRM research in 2006-2007.* All other areas of research will be judged by their capacity to contribute to enhanced SSF. Key areas for research identified for 2006-2007 include: geospatial sciences and geoinformatics, improving resilience of inland fisheries, and assessment and management of coastal fisheries in Aceh. The Panel endorses this approach. In order for the new Discipline-Portfolio matrix structure to deliver its full potential, the Panel suggests that NRM take advantage of the new structure to increase integration across Disciplines, as outlined in the Strategy Update – notably in relation to PESS; seek greater synergy across projects; and build critical mass of expertise in the priority area of small-scale fisheries management and socioeconomics.

One of the major tasks for the future is to continue to "develop tools for improved management of small-scale fisheries". The Panel believes that critical analysis of the broad approaches to this problem, and the technical tools available indicate that current and historical methods are not achieving the successes needed. Easy targets in this reappraisal are the single-species dynamic pool methods developed in the 1950's, which remain the backbone of fisheries assessments in much of the developing world, particularly in freshwater fisheries. The current swing to more people-focused socio-economic methods may be criticized for neglecting the ecological constraints that limit fisheries production. The Panel urges WorldFish to seek, with partners such as FAO, to be at the forefront for developing new methods that view management of small-scale fisheries as a socio-ecological problem where a technological solution may not be ideal. Such a change in emphasis could lead to much more effective SSF management. There may also be a need to build on exciting developments in the use of Bayesian belief theory (allows for dynamic integration of empirical knowledge into modelling) to integrate the many and varied variables relevant to developing and implementing management regimes. The Panel notes that the use of these tools in the Mekong shows great promise. Finally, there is a need to place small-scale fisheries management more effectively within the broader political, economic and biophysical environments. The Panel considers it crucial that this last challenge be overcome if small scale fisheries are to prosper in the long-term. Threats from outside the restrictive domain of fisheries management, for example, damming rivers, present the most insoluble threats.

In addition to the development of innovative management for small-scale fisheries there is a need for "comparative analysis of alternative governance and institutional arrangements". Through the strategic alliances developed with FAO and ARIs, the Panel considers that WorldFish should adopt an interdisciplinary approach to examine this question. A consensus has emerged among development institutions such as the World Bank and FAO as well as many regional and national fisheries bodies that improving outcomes for poor people who depend on fisheries for food and livelihood requires a major focus on governance and institutions. WorldFish should strengthen its capability to work with partners in assessing, synthesizing, and communicating lessons learnt in small-scale fisheries governance so that they can be adapted to the widest possible number of developing countries.

Few analytical tools, however, provide decision-makers with a means to appropriately assess institutional options for small-scale fisheries in their social, economic, and political context. The Panel believes that the institutional "fit" of various management systems and their resilience to change needs to be tracked, understood, and the lessons learned be subsequently used to strengthen capacity to design and adapt sustainable management systems, and to influence governance arrangements. However, in order to do so, there is an urgent need for a coherent framework that links the multiple dimensions and scales of aquatic resources governance, as well as tools that help stakeholders assess the fit between institutional options and local conditions. It will be important to test whether and how improved tools and approaches for assessing aquatic resources governance actually enable stakeholders to better manage aquatic resources at the various scales and consequently play a role in meeting development objectives.

The reorganization of the programs into the Natural Resource Management discipline allows for synergy across portfolios and hence expansion and transfer of technologies to new regions, but it has brought to light some major weaknesses. While the Panel observes that the portfolio of projects is highly unbalanced with a preponderance of projects on stock enhancement in the South Pacific, global databases, and ecosystem management in East and SE Asia, it also recognizes that there is a need for focus on particular areas or systems. In addition, the Panel notes that the Discipline is below critical mass of scientists. Apart from the Discipline Director and one Portfolio Director, NRM only has 7 PhD IRS scientists, 1 non-PhD position and 1 PhD RRS, plus NRS staff.

3.3.3 Policy, Economics and Social Sciences Discipline

In 2005, the Policy Research and Impact Assessment Program (PRIAP) was renamed "Policy, Economics and Social Sciences, (PESS)" and is considered now as one of the three "Disciplines" defined by the Center.

PESS intermediate goals are to contribute to ensuring that (i) aquatic resources are managed in a sustainable, participatory and equitable manner; (ii) aquatic resources are valued and their contribution reflected in national and international development planning; and (iii) impact of aquatic resources research and development are assessed and priorities are set accordingly.

a) The thematic areas

The following five areas represent a continuation of the work done under PRIAP, either led by the "Discipline" or conducted in collaboration with others. The Center considers that PESS should see these as its future directions:

- Policy and Macroeconomic Analysis,
- Trade and Market Analysis,
- Legal, Institutional and Governance,
- Natural Resources Valuation and,
- Impact Assessment

Evolutions may be identified under each of these five research areas. Under *Policy and Macroeconomic Analysis* the Program proposes moving from global analysis (e.g. Fish to 2020) to the generation of synthesis and global advocacy outputs, along with the elaboration of policy briefs for use by regional and national agencies. In addition, elaboration of decision support tools for policy making is proposed. The second change under this research area implies a change from regional models/analysis (Asia Fish) to generating outputs under Trade and Market Analysis research area.

Under *Trade and Market Analysis*, the Center proposes a shift from consumption and market chain type of analysis and from studying the economics of small-scale producers, to analysis on impact of globalization and trade policies on the poor. Also, a move towards research on Legal, institutional and governance aspects is proposed.

Under the *Legal, institutional and governance* research area, the Discipline wants to move from co-management, community based management and analysis of conflicts and surplus fishing capacity towards research aimed at enabling small-scale producers to move up along the scale of operation and specialized/intensity and benefit form commercial-scale development and, to the analysis of implications of decentralized governance on access to resources.

With respect to the *Natural Resource Valuation research*, the Discipline proposes the complement of wetlands and coral reefs valuation work with analysis and evaluation of interactions between humans and natural resources and biodiversity, including gender analysis. Future work in valuation of natural resources will be also related to impact assessment.

Work on *Impact Assessment* will go from the ex post analysis of the transfer of the GIFT technology and on the research on Integrated Agriculture-Aquaculture to further developments, including: analysis of impacts from natural resources management and knowledge-intensive technologies, the analysis and assessment of impacts on biophysical and socio-economic aspects and the need to further institutionalize impact assessment approaches and methods.

In addition, the Discipline is planning to integrate research efforts with AGI. The research to be conducted will involve Legal, Institutional and Governance aspects. On the other hand work with NRM Discipline will in addition to the above aspects lay emphasis on Natural Resources Valuation and Impact Assessment.

Additional skills required to implement this evolution are in: geomatics and geo-informatic tools, bio-economic modelling, trade and macroeconomic analyses, tools for the analysis of institutional and governance aspects, ecological / resource economics and, gender analysis.

As reported in the 2006-2008 MTP, the Discipline will develop research that aims at generating a number of outputs for regional projects. examples are: the Pacific Regional Project (feasibility study of pearl farming); the ESEA Regional Project (A partial equilibrium model of the live reef fish trade and, Improved strategies and institutional arrangements for resource access, quality management, supply networks, markets and trade); and the SA Regional Project (Policy Analysis brief in macro impacts of CBFM approaches, Scaling up of CBFM approaches in managing resources, alternative models for institutionalizing Community based Organizations for management of water bodies or fisheries, a framework for better integration CBOs, a comprehensive macro model for the fisheries sector, etc). Research will also be developed in the Greater Mekong Regional Project (Capacity development, policy briefs, technical reports on Tonle Sap fisheries and aquatic resources valuation, case studies on aquatic resources governance and local livelihoods, Policy priorities for supporting local livelihoods in inland and coastal systems, etc.). In the Sub-Saharan Regional Project (Assessment of the role of market constraints in determining viability of aquaculture in the forest margin zones, Assessment of the contribution of market constraints to aquaculture development, development of methodology for assessing the impact of market constraints on aquaculture development, etc).

b) Assessment

As reflected in the above summary of research activities, areas and outputs planned for the period 2006-2008, the PESS Discipline will be facing significant commitments. It is clear that continuation and evolution of efforts in the five main research areas - from the social, economic, legal and institutional perspectives - are relevant if a contribution is to be made to the attainment of the long term goal of poverty alleviation.

In the Panel's view, the proposed areas and efforts are relevant in relation to the Center's and CGIAR system long term goals. Particularly important are the proposed evolutions on fisheries and aquaculture supply and demand models and analysis to support national and regional planning and decision making for development and management purposes. Proposed improvements in impact assessment modelling and analysis are also very important to generate relevant information on economic, social and environmental impacts of technical innovations and on new policy and institutional arrangements. Understanding and design of participatory approaches to improve people's behavior and institutional and legal arrangements are also important to define sound alternatives to attain sustainable development of fisheries and aquaculture.

With respect to staff, in 2005 PESS Discipline had a total of 18 scientists, out of which a total of 13 are Ph.D. (72%). Thus, overall, there seems to be a good representation of qualified scientist in PESS. However, a more detailed analysis of the composition of scientists reveals that for the same year only six of them may be classified as Senior according to their degree and position in the Center. When analyzing areas of specialization, the 2005 composition for Ph.D. is of six scientists related to natural resource economics, agricultural economics or political economy. The remaining Ph.D.

are involved in social, anthropological, institutional or development sciences, among others. One of the scientists comes from a natural resources science.

In terms of the regional distribution of the Ph.D., six are located in Penang (HQ), three are located in Egypt, two in Bangladesh and one in Cambodia and the Philippines, respectively. It is also necessary to consider that four of the Senior Ph.D. are Regional Portfolio Directors, which have a significant portion of their time tied with management activities.

Available data (EPMR documents # 17c and # 32 and CV data on scientific staff) on composition of the scientific staff for the discipline allowed the Panel to estimate the figures for February 2006. These estimates indicate staffing has been reduced to a total of 12 scientists of which 10 have a Ph.D. and five are considered by the Panel to be senior. Of these senior scientists four remain as Portfolio Directors of the Center.

Not only have two Senior scientists left the Center but the Panel was informed that PESS is presently without a Director and that the Director General is acting as Discipline Director. The Panel was informed that the Center does not plan to fill this position until 2007.

Given the large number of commitments planned (MTP 2006-2008 October presentation on future directions and the Center's document on Future Investments in Science), the wide geographical span for the research activities, the pressing social and economic needs of the regions and country considered and, the relatively small number of scientists currently residing within this Discipline, it is the Panel's view that a significant prioritization work is required to determine the relative importance and time scheduling of each research activity.

The MTP 2006-2008 shows a varying degree of specificity in the definition of the partners considered to conduct the above mentioned research. In many cases, it refers in general to government institutions, local NGOs and universities. Collaboration with important international NGOs and intergovernmental bodies is specified in some cases, as it is for the Mekong Region, but no information on collaboration with relevant ARIS was found. It is the view of the Panel that in the planning and prioritization process of these and future research areas and activities, significant attention must be given to the definition of the modes and strategies for partnership in the research work of the Program.

In addition, the long term goals of poverty alleviation and hunger reduction, call not only for a significant research on technical innovations but also for research providing knowledge and information on the social, economic and cultural aspects of fisheries and aquaculture, on institutional and legal arrangements and on environmental variability and resilience. Thus, the role of the PESS Discipline is crucial not only for the outputs and outcomes it may generate, but also in the definition and implementation of approaches and tools for research planning and prioritization that will ensure the Center's production of IPGs. In this context, the Panel suggests that the Discipline should play a leading role not only in its own research area, but also for the documentation of impacts from Center-wide research activities and in providing guidance to, and support of, the Center's planning, monitoring and evaluation in the short and long term.

In view of the critical role of the PESS discipline within the Center, the current breadth of its tasks as outlined in the 2006-08 MTP agenda and its current staff composition, the Panel recommends that the Center take action on the following:

- ***secure a Discipline Director as soon as possible;***
- ***conduct a strategic process of research planning and prioritization that enables the discipline to more precisely identify its research domain and a selected set of issues to produce significant IPGs; and,***
- ***develop and apply a balanced growth policy for qualified scientific staff according to research priorities.***

3.4 Regional Portfolios

WorldFish has clustered its work into specific geographical areas where the Center seeks to maximize the impact through the combined effort of its scientists and partners. The Panel observed that the Center, through participatory/consultative processes, has elaborated regional strategies for SSA and WANA (2001), ESEA (2004) and has also produced a draft strategy for the Greater Mekong Region (GMR) in 2005. The ESEA and SSA/WANA strategies have been reviewed by CCER panels. A review of the activities of GMR is planned for 2006. In September 2004, in the context of the matrix management approach, Management appointed seven regional portfolio directors. This Chapter reviews the activities in the three regions for which regional strategies have been elaborated.

3.4.1 East and South-East Asia

The East and South East Asia Regional Program was established in September 2004 as part of the re-organization of the Center's operation under the matrix management approach. The region consists of a heterogeneous group of five countries –China, Indonesia, Malaysia, Philippines and Timor Leste - with respect to opportunities, aspirations for development and achievements with economies ranging from micro- to mega-scale. To ensure the needs of the different groups are met the Center conducted with stakeholders a detailed priority setting exercise using economic, environmental and biological criteria to determine the ranking of priority ecosystems. The results indicated more interest for activities in freshwaters and particularly aquaculture in ponds as a resource focus for research related to poverty reduction. Coastal capture fisheries is acknowledged as the principal ecosystem set because of its importance for supporting the livelihoods and food security of most poor in the region (See Fig.3.1).

The goals of the strategy include: food security and improved health, reducing poverty and improving livelihoods, sustaining aquatic ecosystems and improving knowledge and awareness of fish, poverty and environmental links. Thirteen key priority research areas that can be grouped into five subject areas (genetic improvement of tilapia and carps, coastal zone management and MPAs, coastal fisheries management, aquaculture excluding genetics and breeding, and social science) were identified and a MTP for 2006-2008 was elaborated. These areas represent priority areas of work for WorldFish and concerned Countries in a partnership mode.

Figure 3.1 Priority aquatic resources/ecosystems in ESEA

Resource Ecosystem	**RANKING**
Ponds	**HIGH**
Coastal waters (including estuaries and lagoons)	
Small water bodies, lakes and reservoir	
Floodplains, steams and rivers	
Coral reefs	
Continental Shelves/Open oceans	**LOW**

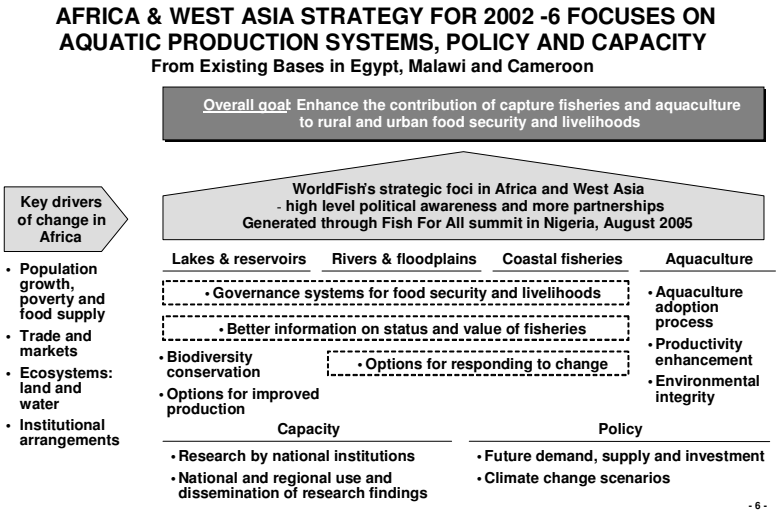
In the meantime, nine on-going projects are being implemented and the Center responded in a timely manner to the Indian Ocean Tsunami by collaborating with five other partners in the framework of the Consortium to Restore Shattered Livelihoods of Communities in Tsunami Affected Nations (CONSRN) to meet the immediate needs of affected communities (See Chapter 5).

The Panel considers the strategy to be appropriate, the quality of science for the on-going portfolio of projects to be good and from documentation made available to the Panel and its interaction with partners in three of the concerned Countries, is convinced that the outputs of the projects have contributed to the overall mission of the WorldFish Center. This observation underpins the conclusion reached by the CCER Panel. The Panel endorses the recommendations made by the CCER Panel to ensure that the suit of activities in support of the strategy is accomplished. The Panel, therefore, encourages the Center to pay particular attention to four recommendations that relate to i) the environmental impacts of aquaculture and environmental externalities; ii) the evaluation of MPAs; iii) production-marketing chain, ecological footprints and the extent to which MDGs are being met by research projects and, iv) interaction between food security and fish trade in developing countries. The Panel is pleased that the Center plans to take into account the recommendations of the CCER Panel, as appropriate, hold further consultations with stakeholders and eventually up-date the strategy.

3.4.2 Sub-Saharan Africa

The Center responded to one of the major recommendations by the Second EPMR that "ICLARM/WFC further develop its tactical plan for Africa and West Asia", by developing in 2001 an ambitious strategy. The strategy was prepared through an extensive consultation process involving regional and international partners, including FAO, and provided an important opportunity to engage a wider regional constituency in guiding the future development of the Center's work. The Panel confirms that the strategy is responsive to the development agenda of the region by focusing on small-scale fisheries and aquaculture, social/institutional/economic and policy parameters with a significant importance to developing and strengthening partnerships and capacity building. The main elements of this strategy are summarized in Figure 3.2.

Figure 3.2 WorldFish Strategy for Africa and West Asia



The Panel's view is that the goals of the strategy are relevant to the Mission of WorldFish and the CGIAR as well as the aspirations of fishing communities in the region. The Panel was informed that since 2002 the Strategy has provided the framework for specific efforts in capacity building and improvements in aquaculture and fish breeding. The Center's work has involved the participation of partners (government officials, NARs, NGOs and universities) with the capacity building component for NARs and government officials executed primarily, as appropriate, at the Abbassa facility in Egypt. The principal field activities have been concentrated in Malawi, with limited operations in Cameroon, Mozambique and Zambia.

The Panel endorses the conclusion of the CCER Panel that activities in Malawi have generated discernible impacts (see Chapter 3). The Panel also found ample evidence in documents, publications and through field visits that a) increased staff at the Abbassa facility has contributed to steady growth in research activities with spill-over effects in SSA, and b) work in Cameroon, Malawi, and Zambia generated a series of outputs in relation to IAA, fisheries co-management approaches, fisheries and watershed studies, genetic biodiversity of rainforest river and lake stocks of culturable fish species, and the identification of species of ornamental and economic value. In addition, WorldFish contributed to the elaboration of policy statements that have recently been adopted by SADC as regional planning documents. The Panel concurs with many of the recommendations made by the CCER Panel in connection with the strategy and on-going activities, and in particular "those related to partnerships, research remit and operational structure".

However it is the view of the Panel that the accomplishments so far, seen in the context of seven years, are small, highly localized and in no way correspond to the acclaimed importance the Center attaches to SSA. The Panel noted that of the five IRS ear-marked for SSA, three were appointed Portfolio Directors for SSA in September 2004 and two of the portfolio directors are still resident in Cairo. The Panel considers that WorldFish does not have the critical mass in the region to implement the ambitious strategy and fulfill the Center's goals. The Panel was informed that arrangements have been made to transfer the two Portfolio Directors to SSA and that two new staff members will be

appointed in April 2006 to fill a new office in Lusaka, Zambia and the other as an advisor to NEPAA, stationed in South Africa.

The Panel commends WorldFish for organizing, in collaboration with NEPAD, FAO and other partners, the NEPAD-Fish for All Summit in Nigeria in August 2005. The Summit produced a Declaration and an Action Plan. The latter catalogues activities that could be undertaken by WorldFish and other stakeholders to improve the livelihoods of fishing and farming communities through responsible fisheries and sustainable aquaculture development. The Panel ascertained from many WorldFish partners in the region and some donors that the summit was an important event in creating awareness and in stimulating the political will. However several partners also cautioned that without adequate follow-up, the summit would remain only an event.

The Panel reviewed two "Program Briefs" of collaboration between WorldFish and NEPAD which WorldFish had elaborated to advance the cause of the summit. The first program aims at enhancing the contribution of small-scale fisheries to Africa's economic development and the second one is on sustainable aquaculture development. The Panel acknowledges that key components of both programs are themes in which the Center is presently working on in some sites in SSA and the program documents foresee "Fast Track Opportunities" to scale-out the outputs to other key countries. Considering that over the past seven years the Center's contribution in SSA has been minimal (as explained previously), the Panel urges the Center to take advantage of this opportunity. The implementation of these programs affords to fine tune its modus operandi in the conduct of research, its delivery and dissemination mechanisms, so that the programs contribute to the attainment of MDGs through sustained development in aquaculture and improvements in small-scale capture fisheries.

Bearing in mind that many activities under fast track opportunities within the WorldFish – NEPAD initiative go beyond the realm of fisheries and/or aquaculture, ***the Panel recommends that WorldFish explore opportunities for collaboration with other CG Centers, in particular IITA, WARDA, IRRI, CIFOR, IWMI, IFPRI and ICRAF, possibly within the context of task forces, to identify gaps in the application of IAA technology and methodology or for activities related to fisheries governance.***

In addition, WorldFish should closely follow and advise on the Programmatic and Structural Alignment of the CG in SSA on the basis of its on-going collaboration with IWMI on similar matters, but also with a view to capitalizing on the synergies and enhance efficiency gains that could be obtained by associating with the two sub-regional entities of West and Central Africa (WCA) and East and Southern Africa (ESA).

See also Chapter 5 for recommendations on capacity building and effective positioning on the research-to-development continuum.

3.4.3 West Asia and North Africa (WANA)

The WANA regional program was created in 1997 with the establishment of ICLARM in Egypt. The activities at the out-reach site were reviewed by the Second EPMR. The Panel made two recommendations and several suggestions relevant to Abbassa, to which the Center has responded as detailed in Appendix 4. In 2001, a common Strategy was elaborated for WANA and SSA. The difference is in the details as elaborated through MTPs taking into account the specificities of WANA. The work in WANA has been

limited to Egypt with a focus on fish breeding, pond management, hatchery technology and disease monitoring producing national public goods. A study on fish supply and demand was undertaken in Jordan and the Abbassa facility has served as a hub for capacity building for partners and government officials from SSA and WANA. WorldFish, in collaboration with the Government of Egypt, has produced an extensive plan on "Strengthening Egyptian Fish Production: International Perspectives". The document presents a development framework for aquaculture development, outlines seven key approaches for meeting sectoral challenges and a timeline of interventions.

The Panel ascertained that the developments in the Abbassa facility have occurred in three phases:

- *Establishment Phase (1996-2000):* characterized by the rehabilitation and construction of ponds, the refurbishing of offices, laboratory and capacity building facilities, recruitment of staff, other administrative tasks, etc.
- *Building Phase (2001-2005):* the principal milestones include: emerging breeding programs on Nile Tilapia and Clarias gariepinus; solid research on pond production; some innovative technologies with regional applications; operation of demonstration farms; training of 130 regional trainees (65 SSA; 39 WANA); establishment of strategic partnerships with the University of Wageningen and other ARIs resulting in the training of 4 MScs; 3PhDs; while offering residence to 6 Post Docs. In addition, the WorldFish becomes a key player in aquaculture research and training in Egypt, interacts with the private sector and initial devolution of training to partners has started. The Panel was informed that the principal constraints or set backs included a slow development of the SSA program, limited partnership arrangements in SSA, uncertainty around the training program which is grant dependent, insufficient collaboration with ARIs, inadequate diversity of researchers at Abbassa and inadequate publication record. Despite these shortcomings, the Panel commends WorldFish for the achievements made at Abbassa over the past seven years.
- *Realizing Potential Phase (2006-2010):* It is envisaged during this phase to: consolidate and expand breeding programs through networks, sustained program of research on pond production generating regional tools on feeds and fish health; transfer technology with NEPAD providing the vehicle for transfer and further development of technologies; consolidate training programs as part of the tri-nodal regional training network (Abbassa-Malawi-Nigeria), targeted at key constraints; and lastly, establish strategic partnerships with five ARIs and put in place regional teams of trainers. The emphasis in the Realizing Phase corresponds in part with the WANA MTP 2006-2008. The projects ear-marked in the 2006-2008 MTP for this region are essentially location specific (Egypt) with almost exactly the same outputs as some projects e.g. nutrition and pond dynamics in SSA. The Panel considers that it would, therefore, be possible to produce, in some cases, IPGs in the form of comparative analysis across countries. The Panel commends the Center for establishing the strategic partnership with the University of Wageningen for the training of graduate, mainly PhD students. It is the students themselves who undertake field work at Abbassa, avail themselves of appropriate laboratory facilities in Wageningen while benefiting from the dual supervision of WorldFish staff and professors overseas. The Panel encourages the Center to foster similar collaboration with other ARIs, for provision of high-level expertise in genetics, fish health and fish nutrition as well as pond dynamics. The BoT has endorsed the consolidation of the Abbassa Center into a regional training hub, and it is planned to organize approximately four regional

courses a year for about 200 trainees from SSA and WANA during a two year period as well as strengthening of the staff at the Site.

The Panel endorses the medium-term plan for Abbassa and taking into account the fact that the Discipline Director for AGI will be stationed in Cairo, offers the following suggestion: WorldFish should review the SSA/WANA Strategy in the light of recent changes in the region, capitalize on the substantial regional momentum that has been created in support of aquaculture development as a result of the NEPAD Fish for All summit, and develop as a priority, a global WorldFish approach/strategy to aquaculture in the context of AGI discipline as part of Aquaculture Campaign under the banner of Fish for All.

3.4.4 Greater Mekong Region

The Greater Mekong Region was established in 2004. The regional program has three main thrusts: the development of trade offs, wild capture fisheries management and sustainable aquaculture. These thrusts are on-going and would continue through 2006-2008. In the implementation of these thrusts the Regional Portfolio, put in place in September 2004, has elaborated a draft regional strategy to guide research in response to development challenges.

The strategy focuses on creating a platform for the exchange of lessons and experiences with emphasis on the independence to address difficult issues, ensure sustained partnerships particularly with CSO but also governments. The strategy envisages imbedding in activities cross regional perspectives, synthesize and effectively communicate research results. Based on past experiences, the strategy provides for aligning campaigns with regional research policy dialogue, to engage in national debates and enhance institutional, as opposed to individual, capacity. Implementation of the strategy will be facilitated by building on existing strengths and strong partnerships and by adopting a step-wise approach, beginning in Cambodia and progressively expanding to the other countries. The step-wise approach does not imply a single country focus, but rather that emphasis will be placed initially in Cambodia with limited activities in the other countries. The Panel commends the Center for the "practice oriented strategy" that has been developed for the GMR.

The principal outputs and outcomes of the GMR Program were given in Chapter 3. The work undertaken in GMR is relevant to the Mission of the WFC. The quality of the science has been evaluated by an EU commissioned review to be good. The Panel endorses this conclusion and also underpins the fact that the Program collects hydrological, ecological, social and economic data that could be useful in a wide variety of ways. Efficiency has been greatly enhanced by the degree of scientific collaboration and partnership pursued within the GMR and interaction with IWMI and scientists from outside the area, for example: South Africa, Australia, UK, Sri Lanka, Brazil, and Finland. However, in the Panel's view, the Program needs additional social scientists to work at the interdisciplinary interface in the areas of local knowledge, development of consultation processes, governance of fisheries community organizations and the social and political context of policy decision making and thus add value to the science. It is suggested that social science expertise be sought.

Under the new matrix management system, these projects will align with the Natural Resources Management discipline. While a lot of data is being collected; there is a need

for more research to follow on from research data already compiled, particularly with regard to basin-wide management strategies and integration of local and regional activities. The Panel urges that the on-going work, particularly the collection of highly targeted primary data, as is the case in the portfolio, should be embraced and defined under the proposed new focus on small-scale fisheries development.

The Program has made a substantial contribution to capacity building particularly at the institutional level. As capacity increases in the region, it will be important for WorldFish to promote ecosystem-based fisheries management, possibly using the 'aquatic resources systems' approach. The GMR and the Mekong River (one of the world's great ecological systems) provide a great opportunity for such an integrated activity. It will require local, regional and national partnerships in which WorldFish may be well placed to help prioritize activities, promote collaboration and to play an important scientific coordination role. Such an approach will provide the opportunity to create alliances with other CGIAR centers, ARIs, NARs as well as relevant NGOs at regional and national levels.

4 QUALITY AND RELEVANCE OF SCIENCE

WorldFish is a research organization whose reputation depends upon the quality and relevance of its outputs. The processes and mechanisms to ensure that the scientific research executed is of high quality and that the outputs are relevant to the Center's mission are therefore vital. As staff are the single most important component in ensuring success in this respect, it is important that appropriate systems are in place to evaluate and monitor performance at all levels.

4.1 Quality of Inputs

4.1.1 Staff Quality

Currently WorldFish has 302 staff distributed across nine locations. There was a total of 45 professional scientific staff at the end of 2005 compared with 48 in 1999, not including 6 and 11 respectively who were involved in management (Table 2.4 Ch2). The reduction in the number of scientists has occurred despite an increase in projects from 39 in 1999 to 65 in 2005. Conceivably WorldFish is now in the situation of having to meet more project commitments with the same or fewer scientists. In addition, the new matrix structure places a high demand on professional staff and requires three Discipline Directors NRM, Aquaculture & PESS) and up to eight Portfolio Directors (geographic regions) all of whom will have limited time for running research projects. In the context of the matrix management structure which is in place and described in Chapter 2, with at least 11 senior scientists occupying management positions, the Center is clearly understaffed in project level scientists if the current commitments detailed in Chapter 3 are to be maintained or expanded.

During the review period there has been a high turnover of scientists. Between 1999 and 2005, 31 scientists left and 60% of the current scientists have joined WorldFish since 2001. However, a significant number of the scientists who left (or will soon be leaving), particularly those in Natural Resources Management were senior staff with an international reputation and a good publications record. Such staff are essential for WorldFish if it is to maintain its objective of being 'the science provider of choice'. In the view of the Panel they have been replaced by less experienced or younger scientists whose output has been much lower. With respect to getting a balance between younger and older staff, approximately 25% of the scientists received their PhD in the last five years and more than half in the last 15 years.

In terms of refereed papers produced per year between 2003 and 2005, the mean number per scientist was 0.9, but 9 scientists wrote none, 15 wrote less than one, 12 less than two, and four scientists produced between two and four. These figures compare less favorably with some other CGIAR centers, for which recent EPMRs have been conducted, e.g. IFPRI where the mean number of refereed publications is 1.4 and IRRI where it is about two (at IRRI 50% of staff produce more than two refereed papers per year), but are similar to others such as CIMMYT where the mean varies between 0.5 and 1.2. However, WorldFish are at the bottom of list for the CG Center s based on the 2004 performance monitoring system (averaging only 0.7 peer reviewed publications per scientist), and perhaps more importantly, are below the generally accepted international norm of two refereed papers per year (WorldFish's own KPG for staff is now set at two for 2006). The poor publication record is also reflected in the low total number of journals (A total of 32, but only 16 were international with an IF) for which WorldFish scientists are reviewers.

Based on staff CV data provided to the Panel, 33 of its staff (of 42 CVs made available) did not review a single refereed journal during the period 2003 to 2005.

Center scientists supervised 117 post-graduates between 2003 and 2005, but the load was very unevenly spread with seven staff responsible for 84 students. Twenty one staff did not supervise any students. There is a similar uneven distribution of representation on external committees, with only five staff accounting for membership of 33 of the total of 62 committees on which WorldFish is represented, with 25 staff on no committees.

Given the poor scientific publications record and its current limited scientific expertise and reputation, the Panel recommends the Center give high priority to:

- ***recruitment of senior scientists with a proven track record or the involvement of such scientists in Center projects through various forms of partnership and adjunct arrangements, and***
- ***recruitment of a cadre of younger, recent PhD graduates, particularly in view of present and past difficulties in attracting more senior scientists.***

Although performance with regard to scientific publications has been below expectations, during the period under review WorldFish staff received a number of awards, which recognize both the quality and relevance of its work. At total of nine awards were received in the reporting period although there were none in 1999 or 2000. Of particular note were (a) Dr. Modadugu V. Gupta formerly Deputy Director General for International Cooperation was awarded the 2005 World Food Prize, the premier recognition for those fighting against hunger. Dr Gupta was recognized for his work to enhance the nutrition of an estimated one million people, mostly very poor women, through the expansion of low-cost and environmentally friendly aquaculture in Asia, Southeast Asia and Africa.; (b) the Community-Based Fisheries Management project, executed in collaboration with several national partner organizations in Bangladesh was awarded Outstanding Partnership by the Consultative Group on International Agricultural Research. In addition, the Board Chair and the current and previous Directors General received prestigious Australian awards for their contributions to fisheries science.

4.1.2 Information Services for Scientists

Library Services

Access to scientific literature, in which libraries play a central role, is of primary importance for research scientists, without which, project design, implementation and reporting are severely hampered. Material taken from a review report, "….from collections to connections…." prepared by Dr Johannes Keizer from FAO-GIL (Library and Documentation Systems Division) following a study tour of WorldFish, IWMI and CIFOR in March 2005 is included in Appendix 2 and details the usage of the library. WorldFish plans to use the recommendations arising from this report to reorient and upgrade its library to play a more central, and eventually leading role in managing knowledge. This includes integration of the library with other information and communication services such as print and online publishing. Key points relate to the continued importance of access to peer reviewed journals, and changing from paper to electronic subscriptions. The overall message from of this report was that the library should become the focal point of knowledge management exchange and dissemination in the Center. The Panel endorses this suggestion and notes the importance given by WorldFish to subscriptions which was about three times that of CIFOR and six times that

of IWMI. Furthermore the Panel strongly encourages the Center to maintain and continue to improve its library services, particularly with regard to documenting and making available the extensive 'grey literature' on fisheries.

4.1.3 Infrastructure

Although WorldFish has first class facilities at its headquarters in Penang, it also has a set of high quality facilities for freshwater tropical species at the experimental stations at Abbassa (Egypt) and Zomba (Malawi) and has access to the facilities at Jitra (Malaysia). These stations have skilled and motivated technical staff and represent a large diversity of ecological situations. In addition, field laboratory facilities are available in Abbassa and Jitra. The experimental stations confer a major strength for WorldFish and the Panel encourages WorldFish to devote efforts to maintaining and strengthening these facilities.

4.1.4 Databases

The Panel noted that WorldFish staff has access to most major databases necessary for their work. Access to the biological and technical databases provided by the Center and CGIAR System is excellent, and availability of access to such information is not seen as a constraint to research.

4.2 Project Planning, Management and Review Processes

WorldFish has in place comprehensive processes for planning projects that involves both external and internal consultations including assessments of the relevance of the science, and once projects are established a monitoring and reporting system that may include several types of reviews.

4.2.1 External Consultations

In order to help ensure that research and the knowledge generated are relevant to and can help key stakeholders address the major fisheries and aquaculture development challenges they face, the Center has engaged in local regional and national consultations with a view to setting priorities and designing research projects.

For example in Malawi and Bangladesh where WorldFish has a substantial and long-standing presence and more recently in Cambodia, national priorities are identified through ongoing engagement and structured consultation with partners. In some cases, such as Bangladesh and the Philippines, they have worked through specific technical or policy workshops, e.g. the national policy workshop in Bangladesh (2005); the national workshop on fish, food security and nutrition in Malawi (2004). A number of regional consultations have been held. For example in developing the first regional strategy for Africa and West Asia (2002-2006) WorldFish sought views of national, regional and international stakeholders on key issues in the region and the role of the Center. Building on this a consultative workshop was held in April 2001 bring together over 30 participants from the region. More recently as WorldFish has sought to extend further its Africa program and build stronger partnerships with NEPAD and regional economic communities, several continental workshops and sub-regional workshops have been held under the auspices of these regional bodies. In the Panel's opinion these regional consultations have merit, but notes that such consultations have been de-emphasized in the last two years.

4.2.2 Internal consultations

In 2000 and 2001, the Center carried out in-house reviews that discussed research and set priorities for research projects. These were replaced from 2002 to 2004 by a 'Science Week'. The 'Science Weeks' were very successful and attended by all available headquarters staff, representatives from regional sites and invited NARS scientists. The event contained a mix of scientific reporting on projects, information sharing presentations, workshops to discuss priorities and focus, and finally summaries of new ideas for scientific excellence and project development in the context of manpower and financial constraints and relevance to the Center's partners, goals and mission. Research-to-impact pathways were discussed at the 2003 Science Week and were published in NAGA (Volume 27-3). The Panel's view is that this paper in NAGA represents 'guidelines' for partners. The Panel commends WorldFish for developing this approach, but would like to see more evidence of its use by the Center and its partners.

The Panel noted the success of the 'Science Week', but is not convinced that the Center has put in place a coherent mechanism for priority setting in the last two years, as highlighted in Chapter 2.

The Panel also noted that the Center is taking steps to appropriately position itself on the R-D continuum, with a view to minimizing its involvement in development type activities. This would permit the Center to concentrate on science and only facilitate the implementation of its science outcomes where it is indispensable (See Chapter 5).

Although these principles have now been clearly articulated, and the implementation plan for the WorldFish revised strategy reflects this (See Chapter 2), it is recognized that this ideal balance may not always have been achieved in the past. The emphasis may, by necessity, shift downstream beyond the idealized norm in some situations where there is insufficient local capacity and there is a risk that the achievement of impacts will be compromised without greater engagement by WorldFish at this end of the value chain.

With regard to scientific discussion and the exchange of ideas, the Panel noted that the Center schedules seminars by visiting scientists whenever possible. However, the Panel urges the Center to give thought to organizing a system of regular in-house seminars (open to all, including non-WorldFish scientists from other institutions) to encourage exchange of ideas and promote science excellence.

4.2.3 Proposal Development

Project ideas are normally developed with input from the Portfolio Director, Discipline Director and relevant scientists. The Business Development office provides advice on prospective donors. All project proposals go through a formal clearance process before they are submitted to donors.

4.2.4 Performance Monitoring

Performance indicators were only adopted in 2004 in response to a CGIAR performance monitoring system and appear for the first time in the 2005-2007 MTP. The Center designed performance indicators to parallel the CGIAR requirement for Future Harvest Centers. In 2004, the WorldFish Board approved a proposal to develop a Center -wide database on indicators for WorldFish to allow internal monitoring and evaluation in anticipation of further requests by the CGIAR donors and in preparation for the next scheduled WorldFish External Program and Management Review. The major categories

of indicators developed were: Financial Health; Outputs; Institutional Health/Governance; Partnerships; and Impacts. In particular, the indicators related to specific outcomes and impacts will ensure, from an ex post perspective, that the Center's outputs are contributing to addressing its mission. The establishment of thematic and annual KPGs for all staff was only introduced in 2005 (2006-2008 MTP). The Panel notes with satisfaction the increasing emphasis by management on monitoring and evaluating staff performance and goals.

Staff performance

Monitoring and evaluation of WorldFish science is carried out at a number of levels. At the lowest level, individual project managers are responsible for supervising the progress of each research project, and reporting to their supervisors. The CGIAR project manager database is now being used to record all relevant status and progress information for each project, including reports, agreements, and milestones. Portfolio Directors are responsible for ensuring that all projects in their portfolio are on track, and meeting all obligations to donors and achieving all internal deadlines and milestones for outputs. Discipline Directors are responsible for ensuring the quality of all scientific outputs of a project. They must clear all reports and scientific publications. They are also responsible for reviewing the performance of staff at 6 monthly intervals. At a higher level the Director for Science Coordination is responsible for ensuring that all research projects are being effectively managed and that all outputs and deliverables are on time. Each individual staff member is evaluated annually using standard performance assessment criteria.

Center Performance

Key Performance Goals and Key Performance Indicators

Internally the Center sets annual key performance goals which include several that are related directly to science outputs and quality. There are specific indicators and targets for each of these Goals, and these are monitored on a quarterly basis by the Director of Science Coordination. The Board of Trustees approves the proposed targets for each year and reviews performance against these targets at the end of the year. A dedicated internal website keeps track of progress towards achievement of the annual KPG targets. The Panel endorses the approaches that have been put in place and notes that they were implemented in 2005 and that new goals are in place for 2006.

As part of the CGIAR process of measuring performance through system-wide Key Performance Indicators, the Center, through the office of the Director of Science Coordination, monitors and reports on the various indicators set by the Science Council each year. This includes monitoring of impacts and outputs achieved against the Centers Medium Term Plan.

The Panel notes that the system of KPGs is a good mechanism and seems to be working effectively.

a) Center Commissioned External Reviews

As part of the ongoing monitoring and evaluation of its work, The WorldFish Center commissions independent reviews of its activities for programs and regions. Since the 2nd EPMR in 1999, 5 CCERs have been carried out for the following 3 programs – Policy Research and Impact Assessment(2002); Coastal Resources Management Research (2003)

and Genetic Resources (2004); and 2 regions – Sub-Saharan Africa and, East and South East Asia. A CCER of WorldFish's work in the Greater Mekong region is planned for early 2006. The Panel notes the value of these reviews for the EPMR, but also notes that their quality and level of detail are inconsistent (See Chapter 6).

b) Investor Commissioned Reviews

In addition to the External Program and Management Review a number of reviews have been commissioned by investors of projects they have funded. Recent reviews which have been made available to the EPMR Panel include:

- European Commission (2004) review of genetics and breeding work supported through specified funding
- US Agency for International Development (2004) review of Development of Sustainable Aquaculture Practices in Bangladesh
- European Commission (2005) review of conservation-related work supported through specified funding
- UK Department for International Development (2005) review of Community-based Fisheries Management in Bangladesh

The Panel notes the value to the EPMR of these reviews, which were comparable to, and supplemented, those of the CCERs.

4.3 Outputs

4.3.1 Scientific Publications

Overall productivity

According its data base, WorldFish has produced 613 documents from 1999 to 2005. This represents a mean production of 89 documents per full year (1999 – 2004, 2005 still incomplete), a figure quite similar to the 1994 – 1997 period (109, see EPMR 2).

The number of scientists in 2005 was lower than in1999, but there is a slightly higher number of PhDs. (see Table 4.1). The mean annual number of documents per PhD. scientist was 2.6 and this could be considered satisfactory using the global norm (3), if they were refereed papers. Unfortunately, mean number of refereed papers per scientist was only 1 or less.

Table 4.1 - Scientific Staff of the WorldFish

June 2005 per category (Source: doc.32)				
Category	**PhD**	**MSc**	**BSc**	**Total**
IRS	27	3	0	30
NRS & RRS	11	10	5	26
Total	38	13	5	56
January 1999 per category (Source: EPMR2)				
IRS	23	2	0	25
NRS & RRS	12	34	9	55
Total	35	36	9	80

The breakdown of this production by categories has been made with the frame used by EPMR 2 (Table 4.2) (In this analysis, we take the number of PhD scientists as the reference for an estimate of scientific productivity and not the total number of scientific staff): 31.8% of the documents were externally refereed; WorldFish published quite half of the non-refereed documents. Communications in seminars, symposia, workshops… represented about 30% of this production, i.e. about one communication per year and PhD scientist. The comparison with the 1994-1997 period (Table 4.3) indicates a stable proportion of refereed documents, but a decrease of internal publication activity for non-refereed documents. Thereby, the annual number of refereed documents per PhD. scientist remains rather low (0.78 per year from 1999 to 2004) and has decreased in comparison with the 1994 – 1997 period (1.0). The above mean differs slightly from that of 0.9 given in section 4.2 (inputs) because the latter is calculated from staff CVs for the past three years.

Table 4.2 - Breakdown of publications 1999 – 2005 (up to 25/10/05)

SUPPORT	TYPE	2005	2004	2003	2002	2001	2000	1999	TOTAL
External refereed	*Papers in journal*	15	21	23	23	8	35	28	153
	Communications	0	4	0	3	0	4	10	21
	Books or B. Chapters	2	1	5	7	3	0	3	21
	TOTAL REFEREED	**17**	**26**	**28**	**33**	**11**	**39**	**41**	**195**
WorldFish Publications	*Articles*	0	15	10	4	7	13	12	61
	Communications	2	11	12	9	4	4	15	57
	Manual	0	2	0	0	0	1	0	3
	Others	2	13	14	7	10	11	11	68
	TOTAL WorldFish	**4**	**41**	**36**	**20**	**21**	**29**	**38**	**189**
External non-refereed	*Papers in journal*	0	7	10	4	16	3	4	44
	Communications	1	10	19	36	20	16	4	106
	Books or B. Chapters	3	6	18	8	6	6	7	54
	Report	0	2	2	4	5	5	7	25
	TOTAL EXT. NR	**4**	**25**	**49**	**52**	**47**	**30**	**22**	**229**
TOTAL		**25**	**92**	**113**	**105**	**79**	**98**	**101**	**613**

Table 4.3 - Comparison with the 1994-1997 period (source: EPMR2)

SUPPORT	TYPE	1994-1997	%	N/y x Ph.D*	1999-2004	%	N/y x Ph.D*
External refereed	*Papers in journal*	62	14.2	0.44	138	23.5	0.61
	Communications	40	9.1	0.29	21	3.6	0.09
	Books or B. Chapters	38	8.7	0.27	19	3.2	0.08
TOTAL REFEREED		**140**	**32.0**	**1.00**	**178**	**30.3**	**0.78**
WorldFish Publications	*Articles*	108	24.7	0.77	**61**	10.4	0.27
	Communications	85	19.4	0.61	55	9.4	0.24
	Manual	7	1.6	0.05	3	0.5	0.01
	Others	37	8.4	0.26	66	11.2	0.29
TOTAL WorldFish		**237**	**54.1**	**1.69**	**185**	**31.5**	**0.81**
External Non-refeered Total		**61**	**13.9**	**0.44**	**225**	**38.3**	**0.99**
TOTAL		**438**	**100.0**	**3.13**	**588**	**100.0**	**2.58**

* number per full year and per Ph.D scientist

In order to make a more precise diagnosis of this production, the Panel carried out a specific analysis on the articles in "refereed journals" (according the database) and this is shown in Appendix 5.

4.3.2 Review Papers/Books

'Fish for All' was an important WorldFish initiative, one contribution to which was the joint initiative between WorldFish and the International Food Policy Research Institute, to produce the book *'Fish to 2020: Supply and demand in changing global markets'*. The collaboration started with a consultative conference between WorldFish and IFPRI in 1997 to define the key policy research issues confronting fisheries in developing countries, and to recommend a common agenda for policy research. One of the outcomes was the expressed need for a book to bring together all the complex tradeoffs within the fisheries sector, interactions outside the sector, and the impact of fisheries on food issues. The book has been widely lauded and projects the likely changes in the fisheries sector over the next two decades. A key finding was that developing countries will consume and produce a much greater share of the world's fish in the future.

The new review *"Restocking and stock enhancement of marine invertebrate species"* was published in *Advances in Marine Biology* in December 2005 is particularly commendable. This publication in a prestigious book series, is highly relevant to the many restocking issues around the world, and will undoubtedly become the first reference of choice for managers and research scientists dealing with this topic.

4.3.3 Conclusions Regarding Publications

As a conclusion, the Panel commends the WorldFish for producing a large number of documents for a wide variety of purposes. The number of communications in meetings, seminars, symposia has been satisfactory. The effort to disseminate results in technical brochures, books and reports has been high and is in accordance with the mission of the Center. The Panel has carried out an exhaustive review of WorldFish publications based on refereed journals, 'impact factors' and 'citation indices'. Unfortunately, the number of refereed papers in scientific journals remains too low (195 over 6 years) and the efforts in this area appear too dispersed, with no clear publication policy and no significant focus on a few journals with significant impact factors. The number of citations of the papers published in referenced impact factor journals (mean of 6) appears satisfactory, indicating a good audience in the scientific community for this small part of WorldFish production.

Hence although WorldFish has published 195 refereed papers since 1999, only 57 of these have been in international journals with a measurable impact factor, and of these most were published before 2002 (Annual mean of only 1 paper per scientist). Despite the often high standard of the science, there appears to be an unfortunate tendency to publish in local, regional and/or low profile journals with consequently low citations. This is inappropriate in relation to other research providers, and may compromise the vision statement "to be the science partner of choice for delivering fisheries and aquaculture solutions for developing countries". The Panel considered making a recommendation for seriously addressing the shortfall in output of scientific publications, but found evidence and received assurances that the problems are being addressed. The Panel commends the Center for its recent efforts to tackle this problem by setting the KPG for all scientific staff from 2006 onwards at a minimum of two refereed publications per year, and furthermore notes that new data indicate that based on accepted and in press papers, the NRM and AGI disciplines at least, will meet this target for 2006.

To ensure that the encouraging picture alluded to above is maintained the Panel advises the Center to implement a more formal internal system of reviewing and editing scientific papers before they are submitted. This could take the form firstly, of having two internal referees (outside the Center if no suitable scientist available within), and secondly, because for many Center scientists English is not their first language, copy and scientific editing. The latter is vital if Center scientists are to submit papers to high quality international journals.

4.3.4 Major Conferences, Internal Reviews, Expert Meetings

WorldFish staff attended 40 meetings between 2000 and 2003. Almost all were workshops and 28 were in-house. The distribution by area reflects the program/regional balance of projects. Of the 24 Major Planning Conferences and Expert Meetings attended by staff from 2000 to 2005 (EPMR Document #19), 16 were planning workshops and only 8 could be considered major international scientific conferences. Attendance at only 8 international scientific conferences over a five year period is very low for a research institute. The Panel urges the Center to be more outward looking in this respect. The attendance by WorldFish scientists at relevant scientific conferences and symposia is a core part of being a primary science institution and provider. It is also very important for staff development.

4.3.5 Databases

FishBase, ReefBase and TrawlBase (including FiRST) – see Chapter 3 for details. Not only are these databases the achievements for which WorldFish is best known and world famous, but they are also of primary importance for the planning and execution of WorldFish research as well as of other research institutions and organizations. FishBase has recently been comprehensively reviewed by the European Commission (2005), and the Panel has made a number of recommendations that are discussed in Chapter 3.

4.3.6 Relevance of outputs

During the period of review WorldFish conducted two ex post impact assessments that validate the relevance of their research:
1) on the development and dissemination of GIFT fish in six countries. This showed that the IRR from GIFT research, dissemination and related activities was 70.2% from 1988 to 2010. The GIFT technology has been highly successful and GIFT tilapia are now farmed in 13 countries where they contribute to increasing the supply of low cost, high quality protein for the poor.

2) on the development and dissemination of integrated agriculture-aquaculture technologies in Malawi. The estimated IRR from IAA research, dissemination and related activities was 15%. The adoption of IAA in Malawi has reduced childhood malnutrition by 15%, increased the number of fish farmers from 400 (1980) to 4000, and increased total annual fish production more than ten fold.

4.4 Overall Quality of Science

The Panel has attempted to critically assess the quality and relevance of the science carried out by the Center with respect to the three major components of (a) quality and quantity of inputs, (b) planning and review processes, and (c) quality and quantity of outputs. The Panel concludes that the quality and relevance of the science undertaken by the Center indicates that the Center has the appropriate infrastructure, and has put in

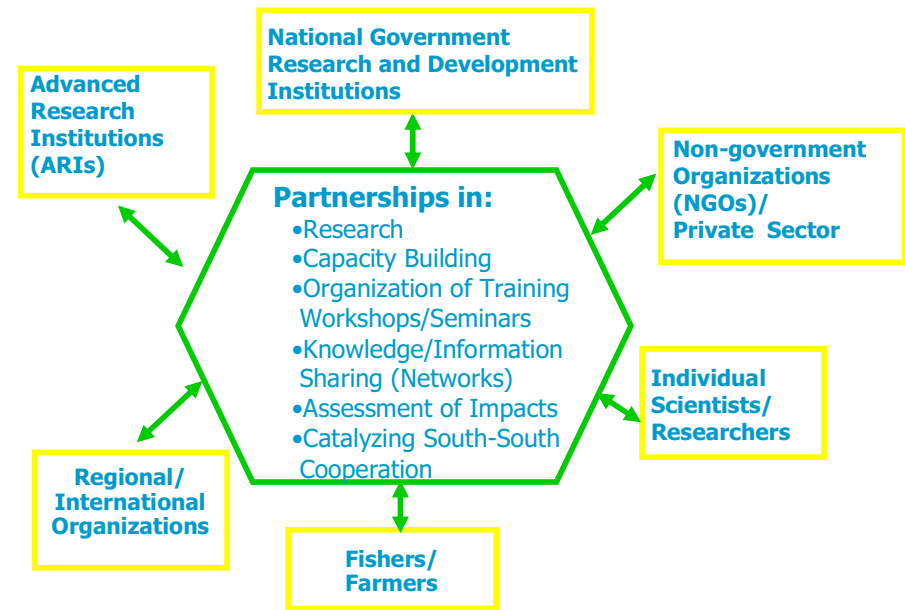
place adequate processes to improve on the present poor publication record. The Panel considers however, that greater efforts should be devoted to strengthening the quality and quantity of staff, and should elaborate mechanisms to ensure the relevance of its work, including a more explicit priority setting process.

5 PARTNERSHIPS AND LINKAGES

The WorldFish Center Policy on Partnerships, approved by the BoT in 1997, defines partnership as "any formally recognized collaborative, mutually beneficial and research-related activities (training, workshops, advisory services, publications, etc), between WorldFish and NARs, government and NGOs, research centers, individual scientists, the private sector, and farmers/fishers when they are experimenters in the generation and evolution of production/management technologies". Over the years, the Center has refined this definition to include strategic partnerships and strategic alliances which are long-term relationships to offer a broader set of skills or services to deliver impacts on poverty, hunger, either directly or through the improved efficiency and effectiveness of such cooperation. Figure 5.1 is a schematic representation of WorldFish partnerships in research and related activities with an indication of the broad areas of collaboration.

Figure 5.1

WorldFish Partnerships in Research and Related Activities

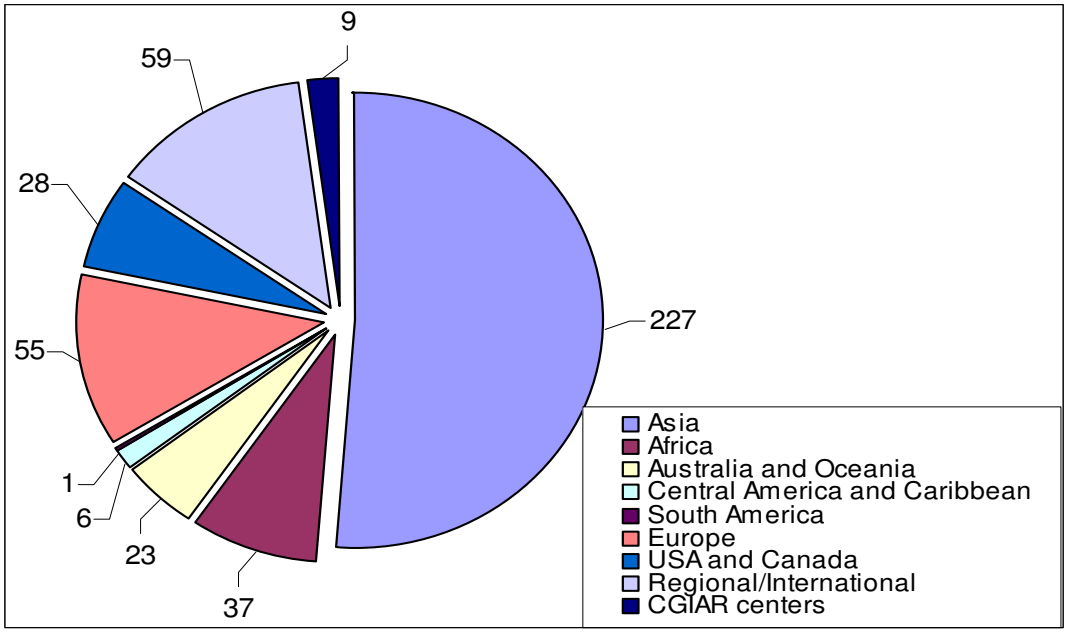


Source: WorldFish 2006

5.1 Types of and Geographical Spread of WorldFish Partners

On the basis of this broad definition, the Center historically works with several partners in both developing and developed countries (Fig. 5.2). In 1999, there were 92 partners, the number rose to 180 in 2000 and to 445 in 2005. The majority of WorldFish partners are from developing countries (69 percent), with Asia representing the region with the most partnerships (51 percent). The highest number of partners (55) is in Bangladesh, the country where the Center has two major community-based projects involving extensive work with local community organizations. The large number of partners in developing countries may be due to the fact that there are very few strong NARs in most developing countries but it could also be a reflection of the wide scope of activities covered in partnership arrangements. Formal partnerships, where the Center has entered into a signed agreement with another institution, amounted to 193 as of 31 December 2005.

Figure 5.2: Partners in 2005, by Region (source: WorldFish 2006)



5.2 Partnerships

5.2.1 Nature of Partnerships

The Panel found evidence in the documentation provided, from relevant publications and from its interaction with some WorldFish partners that in the past, they (the partners) had participated in the elaboration of the Center's strategic plans, in the identification and implementation of projects, and that the Center assisted partner countries to identify research priorities and develop national research plans. Many partners were unaware that the strategy of the Center had recently been up-dated. Many partners stated that conducting applied research, development of tools, models and methodologies, training and participation in conferences, workshops and seminars organized by the Center are priority areas of collaboration. Several partners felt the greatest impact of WorldFish work was in improving policies, increasing productivity, generation and dissemination of knowledge through publications and the strengthening of national systems. These revelations were underpinned by the results of surveys commissioned by the Center in 2004 in ESEA and SSA to better understand the perception of its partners about the Center.

The Panel noted that generally, but in particular NARs and NGOs, had a favorable opinion of the Center. The basis for WorldFish attractiveness for both NARs and NGOs was said to be its independent international nature, with freely available public goods and its quarterly publication, NAGA. Many partners regretted that NAGA was now available in print form only to institutions and not to individuals. The Center confirmed that for cost reasons, it had become necessary to charge individuals wishing to have hard copies. The Panel endorses this decision by the Center. It is also important to note that NAGA is a resource valued by many partners, but it is not the basis for partnerships generally. In terms of future broad areas of focus, NGOs laid emphasis on capacity building, government agencies on the development of policy frameworks and research institutions and universities on training and applied research. Some NGOs expressed the view that they did not receive adequate recognition for their contribution to the success

of the Center. The Panel considers these observations very telling and invites the Center to take them into account in planning its research and capacity building programs.

5.2.2 Relevance of Partnership Arrangements

The Panel observed that WorldFish programs complement those of other organizations, including bilateral programs and that WorldFish uses expertise from NGOs, national research institutions and universities in its own programs. The Panel, therefore, attempted to understand the relevance of WorldFish partnership arrangements with regards to some of the key partner-categories. In undertaking this assessment, the Panel relied on interaction with Center staff and a large number of partners as well as on documentation provided to the Panel. The Panel found examples of MoU and LoA where there was not sufficiently explicit delineation of the roles of WorldFish and its partners in the activities in which they are collaborating and considers this to be an oversight. The relevance of the relationship between the Center and its partner-categories is developed in the following sections.

General perspective

From a broad perspective, the Panel's view is that in some instances, such as in the GMR and to some extent in Bangladesh, the tenets of WorldFish-Partners relationships are strategic in as much as they support the basic science programs the partners had engaged in with WorldFish through its planning process and were not opportunistic responses to available funding. Such partnerships deliberately cut across work in several research thrusts or even programs and should be encouraged. However, in some cases, for example some projects in Bangladesh and in the South Pacific, partnerships seem to be developed on an ad hoc basis, are more the result of funding availability, or are driven by the desire to fill critical development needs when alternate suppliers were unlikely to engage. The Panel advises that in such circumstances, the Center should advocate that partners with a comparative advantage in development type activities take the lead, or in the extreme case the Center's involvement should be very minimal.

NARs and NGOs

The NARs and NGOs constitute the largest partnership-categories of WorldFish and of the partner-categories that have signed MoU/LoA, NARs constitute 74 percent. However, NGOs, particularly in Asia, make up over 60 percent of WorldFish partners. These two groups have also contributed substantially to the success of the Center. The Center has evolved a mechanism by which it is able to work together with a number of NARs to address specific issues. A good example is the International Network for Genetics in Aquaculture (INGA), which provides a forum for the exchange of information, methods, germplasm, and also for training and capacity building for its 13 developing countries and 12 developed country members. Another example is the collective work by WorldFish and nine Asian countries resulting in the production of a specified version of the general equilibrium model of fish supply and demand for analysis at the national level (see Chapter 3). These are good examples of partnership working mechanisms that should be strengthened. The outputs generated from such a network of several partners can be synthesized to produce IPGs. However, it is also important to stress that the desire to produce IPGs should be part of the overall planning process and not an "add on" phenomenon.

While NARs work mainly with the Center upstream, most of the work in transforming outputs into outcomes and impacts has been realized with NGOs. Several of the NGOs have specialized qualities that enable them to serve as appropriate linkages with WorldFish in its efforts to deliver impacts on human development. The Center was awarded the 2003 CGIAR Science Award for Outstanding Partnership for the Community-Based Fisheries Management – CBFM Project (see Chapter 4).

ARIs and Universities in developed countries.
Eighty-nine of the 445 WorldFish partners are from developed countries (55 in Europe, 28 in North America and 23 in Australia). By number and the assumed quality of their work this partner-group is potentially important in terms of the mutual benefits that could be derived from such linkages. The Panel commends WorldFish for establishing strategic partnerships with some of these ARIs as is evident in the wetlands research in the Greater Mekong Region, in the FishBase Consortium, on-going discussions on risk assessment of introduced species, and in the development of approaches for an integrated assessment of small-scale fisheries. In these and other areas such as genetics, nutrition and pond dynamics where partnerships with ARIs already exist, the Center should build on this base to further expand and strengthen partnerships with ARIs while also developing collaboration in new areas such as fish health. In doing so the Panel encourages the Center to carefully identify appropriate ARIs and establish a limited number of strategic, long term partnerships to address cutting-edge research, to enhance the quality of its staff and to add value to the Center's research agenda.

Private sector
While recognizing the potential benefits that linkages with the private sector could bring into a research organization, the only experience WorldFish has had so far, as a member of the GIFT Foundation, was not a harmonious one. This is not to say that linkages with the private sector are bad but rather that adequate care should be taken in establishing such arrangements (see Chapter 6). The Panel noted that the Board had recommended the Director-General to take appropriate steps to cease WorldFish membership of the GIFT Foundation, in a manner that seeks to maintain good relations with its partners and meet any outstanding obligations WorldFish had to the Foundation and its staff. The Panel further noted the commitment of Center Management to ensure judicious and balanced relationships with the private sector.

FAO
The Panel gathered from its interaction with several WorldFish stakeholders of that by the nature and scope of its work, FAO is often seen as both a collaborator and as a competitor to WorldFish. The underlying rationale for this is that FAO, as an inter-governmental body, deals mostly with global fishery policy, legislative and institutional frameworks, the elaboration of norms and standards through the Committee on Fisheries, and the generation of information to promote the transition to responsible fisheries. In addition, FAO traditionally undertakes a substantial amount of research related activities through the Advisory Committee on Fisheries Research and through projects executed by the organization. FAO also performs development activities through projects. Hence FAO would tend to be virtually everywhere along the Research for Development Value Chain (see Fig. 2.2 on page 30).

WorldFish on the other hand, has a number of attributes, the combination of which distinguishes it in the international fisheries arena. Some of these are its international stature as a CG Center, its independence, its impressive track record in the production of valuable databases and in the production of the GIFT, proven ability to form NARs networks both within and between countries to address common issues, as well as its ability to link with NGOs to transform outputs to outcomes and generate impacts.

With regards its positioning on the research-to-development continuum, WorldFish as a research center would be expected to be more on the left and less on the right of the chain. The Panel noted that WorldFish in its strategy up-date has made the decision to position itself in the middle of the output component of the research for development value chain. The Center will give high emphasis to knowledge generation and synthesis through knowledge sharing, medium emphasis to priority setting and low emphasis to knowledge application. The Panel considers priority setting, with the active participation of partners, to be very important. The Panel considers that by adopting this position, WorldFish may be leaving some of its agenda setting to others.

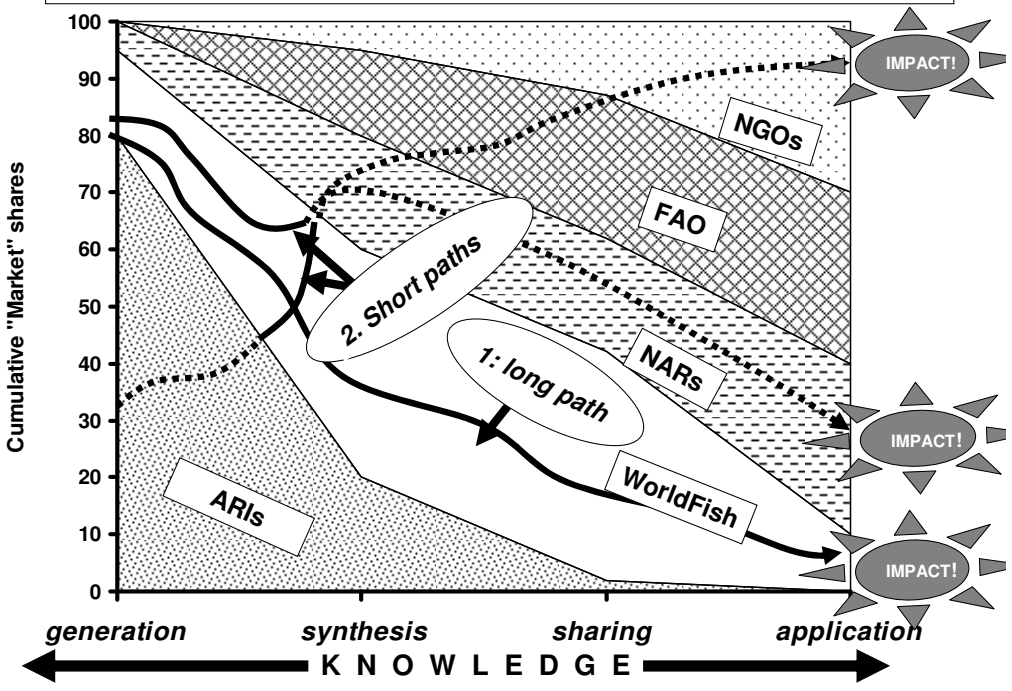
Concerning the specific matter of positioning on the research-to-development continuum, the Panel was informed that WorldFish and the FAO Fisheries Department are considering the issue of the strategic connection between upstream work in which WorldFish should have the lead and the downstream work in which FAO should have the lead, in other words - the Research-to-Development Continuum. Both partners, using the classical Research for Development Value Chain conceived by WorldFish in the Center Strategy update, agree that it only when all the links in the chain are satisfied will donor investments deliver impacts on human development.

The Panel commends the Center for proactively engaging with FAO because the outcome of the discussions are likely to clearly define the Center's position in the Research-to-Development Continuum, ensure a more efficient use of resources and the development of more appropriate partnerships to optimize WorldFish's contribution to the development agenda. However the Panel's view is that FAO's positioning or that of other partner-categories on the chain should not be assumed to be a precise entry point. On the contrary, rather than a chain, and the Center agrees to this interpretation, there are several possible trajectories that could be followed within what the Panel sees to be "Impact Pathways in Research to Development Space", to attain the end results, as depicted in fig. 5.4.

Furthermore, it should be noted that the various partners, including WorldFish, could enter and exit from this space at any moment, and even several times, depending on their role, specific strengths, etc. The Panel encourages WorldFish to determine for the most appropriate trajectory it might wish to follow with its different partner-categories, and key partners including FAO, in its major projects.

The Panel noted with satisfaction that FAO and WorldFish are testing grounds on joint projects in Africa and the Mekong River Basin and, at global level, are collaborating with at least three major academic partners in the development of a new approach to the assessment of small-scale fisheries contributing to poverty alleviation and food security.

Figure 5.3 Impact pathways in a R to D space (source EPMR Panel)



Comments: This figure is a very schematic representation of the relative importance (« Market » share on the Y axis, cumulative scale) of the different players of the « knowledge system" all along the research for development value chain (X axis). WorldFish is represented according to the position it proposes to adopt (see chapter 2).

A "path" is a sequence of actions going from knowledge generation to "plausible impacts". It can be entirely realized by WorldFish when it extends its activities all along the pathway ("long path") or be performed by several partners, WorldFish being only one of them ("short paths").
Definition of the type of paths WorldFish will implement is strongly influenced by its strategy, which in turn should be based on a comprehensive understanding of client needs and alternative suppliers of research along the pathways. Strategy should define trade-offs between its general comparative advantage and its specific competitive advantage for a given issue.

The Panel further noted that in the wake of the Indian Ocean Tsunami, WorldFish and FAO, in collaboration with five other organizations, constituted the Consortium to Restore Shattered Livelihoods of Communities in Tsunami Affected Nations (CONSRN). WorldFish, in the framework of CONSRN, has produced two policy Briefs on the Indian Ocean Tsunami: "Rebuilding boats may not equal rebuilding livelihoods", and "Rehabilitating Livelihoods in Tsunami-Affected Coastal Communities in Asia". The Panel commends WorldFish for its timely response to the tsunami disaster and encourages the Center to continue to work with other appropriate partners and CGIAR Centers to minimize the risks faced by the poorest communities and distressed households, laying greater emphasis on its intervention in assisting governments elaborate enabling policy frameworks.

5.2.3 Networking and Consortium

The Panel noted that WorldFish has recently taken steps to strengthen its partner interactions, in two restricted but important areas. First, by enhancing such interaction substantially through the establishment of the FishBase Consortium and the strengthening, expansion and change of emphasis of INGA making it more actively involved in the development of genetic improvement programs and in particular in multiplication and dissemination of the improved stock (see chapter 3). The FishBase Consortium, which includes WorldFish, FAO and a number of leading advanced institutions, is a good example of effective partnerships for knowledge generation, synthesis and sharing. The Panel is, however, concerned that the roles of the different partners in this Consortium have not been explicitly clarified.

5.2.4 Strategic Alliances

WorldFish has recognized strategic alliances with relevant organizations in India and China as being important. The Panel approves this strategy and, considering the high level of development of aquaculture and related research in these countries, suggests that these alliances should be dedicated to producing upstream knowledge of mutual interest. The Panel emphasizes the need to produce IPGs through these strategic alliances.

5.2.5 WorldFish Expansion in SSA

WorldFish is expanding in SSA, an area with pressing unmet needs and weak NARs, and other similar partners be it government officials or NGOs. The Panel considers that important investments envisaged for the region are justified. However, it is essential that from the outset the roles of the Center and its partners are clarified and that strategies and priorities are negotiated. The Panel also considers that the NEPAD "Fish for All" Summit for Africa, organized at Abuja, Nigeria in August 2005 has the potential for developing and expanding the nature of the Center's partnerships, currently dominated by NARs and government officials as opposed to NGOs. The Panel confirmed the significant contributions made by NGOs as evidenced in Malawi with World Vision to the work of the Center. The Panel has, therefore, provided guidance on how the Center should capitalize on the outcome of this summit in Chapter 3.

The Panel believes that the Center's activities have contributed to better informed scientists and managers. It has also contributed to human resources development in developing countries through partnerships and networking. The Panel is, however, concerned with the lack of clarity vis-à-vis relevance for such a large number of partners and the roles of WorldFish and its partners in some projects including the FishBase Consortium.

In view of the importance of partnerships as a vehicle for achieving the goals of the Center, the Panel recommends that WorldFish:

- ***elaborate a Partnership Strategy focusing on, among others, the modus operandi for establishing strategic partnerships and alliances that would add significant value to the current research activities undertaken by the Center;***
- ***explicitly define the roles and responsibilities of the Center relative to its partners in all major projects;***
- ***determine its positioning on the research-to-development continuum, within the framework of an impact pathway analysis, for all major projects; and***
- ***elaborate a human capacity building policy for its staff and its partners taking into account, as appropriate, the suggestions that have been provided.***

In addition, bearing in mind the significant contribution of NGOs to the work of the Center, as evidenced in Bangladesh and Malawi (see Chapter 3), the Panel suggests that the Center give due consideration to establishing linkages, networks or consortia particularly with NGOs, where appropriate, for promoting the application of research results, tools, information, etc beyond the range of publications it is providing.

5.3 Host Country Relationship

WorldFish has established good working relationship not only in Malaysia its global headquarters but also in other regional nodes where it operates, particularly at the government level. The Panel observed the nature of such collaboration in Malaysia, Egypt, Malawi and Cambodia. In all these countries, WorldFish has established linkages with government ministries, NARs, universities and other public institutions. Host country ties were also enhanced through participation in bilateral projects and joint R & D project planning and implementation. In addition, in all the countries WorldFish has helped establish highly cost-effective access to excellent facilities for research including for fish selective breeding work and in at least two countries (Egypt and Malawi) contributed in elaborating Program Briefs to increase the contribution of the sector in improving livelihoods. The Panel considers these developments vital for effective research but also in the delivery of WorldFish outputs. However, in Malaysia and Egypt some partners/researchers expressed dissatisfaction with WorldFish. The Panel was unable to determine the extent, magnitude and validity of such displeasure but the information was communicated to the Center Management.

5.4 Training and capacity building

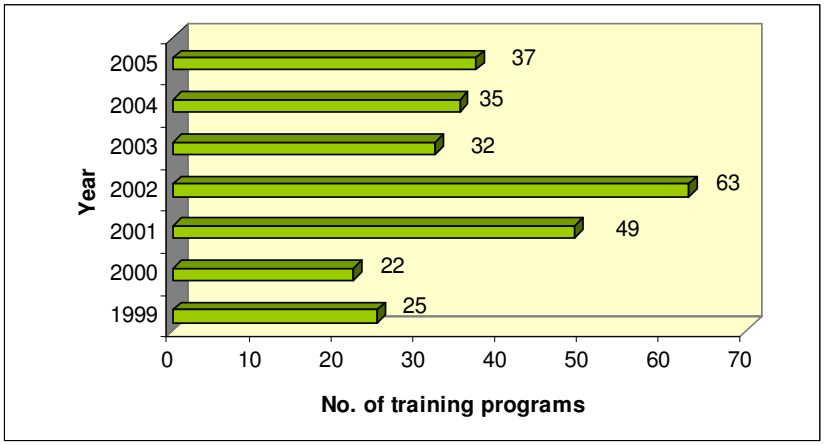
A major focus of the Center's work is to develop research and management capacity in fisheries and aquaculture. The Center conducted a number of training courses and organized workshops, seminars etc. (See fig. 5.4 and 5.5) on a wide variety of themes specific to the needs of its partners and relevant to its own mission. A total of 263 training programs were organized between 1999 and 2005. 14,177 partners/participants were trained during the review period of which 6,259 were farmers/fishers (44%), 32% were NGOs, 18% were NARs and the rest were from ARIs. The break down of the training by research program was: PRIAP (43%), BRRP (27%), CMRRP (16%) and FRRP (14%).

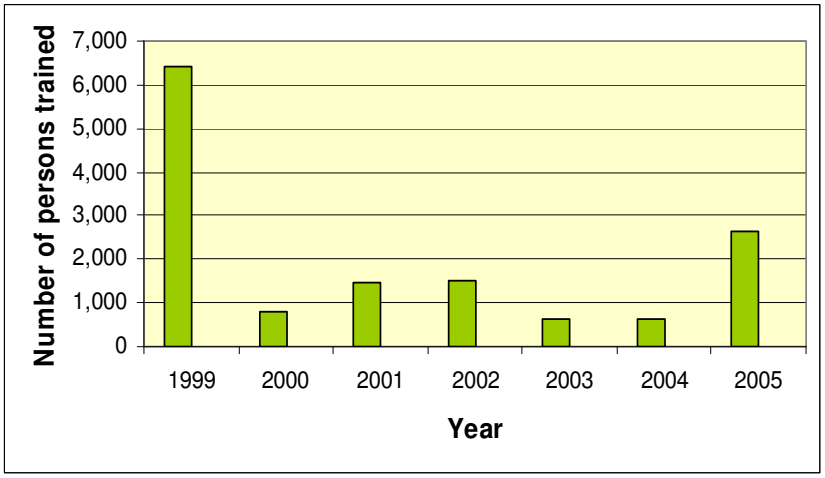
The Panel gathered from interviews with some WorldFish partners that some of the most important and durable results in capacity building come not from explicit programs of training and advice, but rather from informal relationships between WorldFish staff and institutions they work with in developing countries. In the Panel's opinion, this is an example of major contributions that Centers, such as WorldFish, make to human and institutional building but that are difficult to document. The Panel also noted that WorldFish facilities have been used by graduate students while staff has supervised the work of graduate students (see Chapter 4).

In the new strategic plan of the Center, the training functions are to be integrated into discipline strategies. Mindful of the resources that go into planning for training activities, and the apparent workload of discipline directors, the Panel considers that some of the pressing delivery functions would be facilitated by the joint corporate services (WorldFish-IWMI) which is soon to be operational. The Panel endorses the concept in the Strategy update to enlarge investment in the research base through, among others, the

establishment of a WorldFish Post-doctoral program and support to the WorldFish Campaign development process; as well as the development of the Abbassa facility as an African Center for Aquaculture Research and Capacity Building.

Figures 5.4 and 5.5 Number of training programs conducted and number of participants by year (source: WorldFish 2006)





The Panel considers that staff would need training to optimize the matrix management approach, and at least on analytical skills associated with impact pathways. It suggests that WorldFish undertake a critical analysis of the high priority needs/challenges for each of its partner-categories particularly NARs and NGOs so that it can better target capacity building for these partners. The Panel noted that significant increase in funds is proposed in the 2006-2008 MTP, and is likely to be the case in coming years, for the strengthening of NARs.

The Panel also suggests that the Center stimulate joint research proposals from alternate national research funds from leading institutions to conduct research on cutting-edge topics, which would draw a large critical mass of visiting scientists and post-graduate students to fisheries and aquaculture research located at the global discipline level. The Panel noted that adequate statistics on the training and capacity building activities were not maintained and that systematic evaluation of the programs or follow-up on trainees was not undertaken. The Center is invited to take corrective action.

5.5 WorldFish interaction with other CGIAR Centers

WorldFish has progressively established a niche for itself within the CGIAR system and is an active and potentially important player on the basis of its interaction with other Future Harvest Centers, its involvement in the Water and Food Challenge Program, its participation in the System-wide Initiative on Water Management, and comprehensive assessment of water in agriculture, as well as in the System-wide program on Collective Action and Property Rights (CAPRi). The Panel suggests that WorldFish continue to keep a watching brief. The Center has also housed a number of CG services including the CGIAR Chief Information Officer whose location was decided by competitive bids among Centers. The officer expressed full satisfaction with the quality of the facilities and the collegial working relationship. WorldFish is leading the development of collective action by a number of CGIAR Centers (ICRAF, IFPRI, CIFOR, IPGRI) and other partners aimed at: developing a cross-sectoral framework for livelihoods rehabilitation; implementing local rehabilitation options; and strengthening policy capacity in the Indian Ocean Tsunami affected countries. WorldFish is participating in a collective action initiative led by IWMI to undertake biophysical impact assessment of tsunami-affected areas.

In order to assess the qualitative dimension of the interactions between WorldFish and the other Centers, the Panel solicited the views of the DGs of seven Centers (IWMI, IFPRI, IITA, IWMI, IRRI, CIFOR and IPGRI) through interviews either in person or by telephone on WorldFish work with their centers. The responses were generally supportive; many felt that if WorldFish were not in the CGIAR family, there would be strong arguments for its creation. The view was also expressed that WorldFish has integrated very well, intelligently and effectively because as a small center, intensive involvement in too many System-wide activities could be detrimental to the overall growth and efficiency of the Center. The views expressed are expanded below.

5.5.1 WorldFish – IWMI Relationship

IWMI is an active partner in WorldFish activities in the Greater Mekong Region and both are members of System-wide Initiative on Water Management and the Comprehensive Assessment of Water in Agriculture, under the overall management of IWMI. The two Centers together with IRRI, CIAT and IFPRI are also partners in the Water and Food Challenge Program. The Boards of WorldFish and IWMI plan to hold their March 2006 Meetings in Penang, Malaysia and the September 2006 Meetings in Colombo, Sri Lanka. The Panel was informed that the discussions at the meetings will also focus on functional alignment at the programmatic level. The Center has entered into a Strategic Alliance with IWMI to share Corporate Services as the Centers explore quick wins related to financial services and IT/knowledge management and develop long-term vision corporate service integration. The Panel commends WorldFish and IWMI for their proactive action and voluntary engagement in this process and hopes that it will result in improving synergy between the programs of the two Centers. The entire process seems to be in line with the program and structural alignment, which the CGIAR is advocating of Centers.

5.5.2 WorldFish – IRRI Relationship

The International Rice Research Institute houses the FishBase Consortium and other WorldFish projects in the Philippines. The two Centers also collaborate in a rice – fish culture technology project which is presently very small but interaction in this area is

likely to increase over the next five years as IRRI's Rice Diversification Program intensifies.

5.5.3 WorldFish – IFPRI Relationship

Among the most influential publications produced by the WorldFish and its partners in recent times was the report "Fish to 2020: Supply and Demand in Global Markets", which integrates fish into the International Food Policy Research Institute's global food model (IMPACT). A collaborative effort with IFPRI, the report is a culmination of several years of work. Fish to 2020 draws upon global economic models and highlights WorldFish core competence in the fisheries sector and fisheries policy and IFPRI competence in modeling and policy. The Panel did not find evidence that WorldFish has a program in place to capture and crystallize the main results of the study. The Panel has recommended (Chapter 3) that WorldFish strengthen its PESS Discipline. This in the opinion of the Panel will permit the Center to better address, in collaboration with IFPRI, follow-up issues in the report.

5.5.4 WorldFish – IPGRI Relationship

WorldFish has been involved in the Inter-Center Working Group on Genetic Resources. The recommendations of the SC-commissioned Joint Study on Animal and Plant Genetic Resources (March 2005), call for stronger engagement of the CGIAR in fish genetics and for strengthened collaboration between WorldFish and IPGRI. This will permit inter-governmental bodies to have up-dated scientific information, if and when so desired in the context of adopting protocols. Both centers could further interact in the area of invasive species. While IPGRI has not got expertise in fisheries, WorldFish would benefit greatly from IPGRI's experience in plants.

5.5.5 WorldFish – CIFOR Relationship

Both Centers were involved in the Challenge Program proposal on coastal zones as well as the proposal to the ADB focusing on reconstruction after the Tsunami. However there is potential for programmatic interaction in the area of conceptual frameworks/research methodology particularly as related to institutional issues associated with common property resources.

5.5.6 WorldFish – IITA Relationship

IITA, as an eco-regional Center for Tropical Africa is a natural link through which a specialized Center such as WorldFish can intervene in rural communities. Both Centers' interaction in Cameroon on market access research in rural areas resulted in the production of a market-driven rural development model. IITA in 2006 will be working on a Pan-African Post Harvest program with the African Union. IITA expects WorldFish to play an active role.

5.6 Involvement of WorldFish in Challenge Programs (CPs)

The Center is coordinating Theme 3 "Aquaculture, Ecosystems and Fishes" within the Challenge Program on Water and Food as well as: "Improving fisheries management in tropical reservoirs" and "Community-based fish culture in irrigation systems and seasonal floodplains", while being directly involved in two other projects. The first of these is "Managing water and land resources for sustainable livelihoods at the interface between fresh and saline water environments", led by IRRI, and the second, "Enhancing diverse wetland benefits in the upper Nile and Volta basins through integrated

catchments management" is shepherded by IRRI. Activities undertaken in six of WorldFish's projects in Asia and Africa respond to the goals of the Challenge Program.

5.7 System-wide Initiative on Water Management

This program is under the overall management of IWMI. WorldFish is responsible for the project, "Increasing water productivity by managing the land-water interface: effective water control for solving conflicts among agriculture-fisheries-aquaculture in coastal zones". In the framework of the project "Improved Livelihoods through Appropriate Inland Aquaculture Technologies and Fisheries Management", WorldFish has conducted work on a variety of subjects including fish-in-watersheds, fish-in-floodplains, fish-in-river deltas, and on different aspects of aquaculture in Bangladesh, Cameroon, Egypt, Greater Mekong Region, Malawi and Mozambique in the contexts relevant to the CP.

5.8 System-wide Program on Collective Action on Property Rights (CAPRi)

WorldFish is fairly active in CAPRi. Using its own resources, it has executed over ten activities in the context of the program. In 1999 the Center hosted a workshop on "Devolution of Fishing Rights in Fisheries Co-management".

The Panel's assessment is that while it is too early to judge the utility and impact of the CPs in relation to WorldFish, it is clear that the Centers, by acting collectively, have attracted stronger support from a range of partners, than they could have individually. The CP has put water and indirectly fisheries and aquaculture at a higher level in some Centers. It has also influenced the way WorldFish and other Centers work with partners. The activities in the projects conducted by WorldFish are contributing to enhance research and development efforts in water management and would lead to the development of some IPGs, when scaled-out in terms of methodologies and approaches. The Panel encourages WorldFish to continue to participate actively in CP and suggests that WorldFish should synthesize available information and the results of its work and identify gaps to better target the end-users of the component parts.

5.9 Collaboration within the Intersection between Fisheries and Other Sectors

In many of the areas where WorldFish operates, the farmer/fisher communities are dependent not only on fish but a variety of other resources: water, forests, and land, for their livelihoods. The activities of the communities not only go beyond the realms of fisheries and aquaculture but the people most often have to develop livelihood-coping mechanisms. Furthermore, many of the countries where the Center is active have established or emerging HIV/AIDS epidemics, or their population may be exposed to natural disasters. While WorldFish does not have competence in crop or livestock farming, in forestry, irrigation or public health, the Center by engaging other competent partners of the CG or CSO could make a difference. WorldFish involvement in providing assistance to communities affected by the Indian Ocean Tsunami (See above and Chapter 3), in the framework of CONSRN, is a good example. In Malawi, WorldFish has partnered with World Vision (Malawi) to assist HIV/AIDS affected households to develop the potential of aquaculture as a farming technology that does not require sustained arduous labor and can provide income and nutrition to help people cope with and mitigate the social and economic effects of the spread of HIV/AIDS. There are therefore instances when WorldFish could play an important role in the intersection

between fisheries and aquaculture domain and other sectors. The Panel considers that WorldFish involvement in such situations is not only desirable but necessary. The Panel cautions however that the Center needs to create the appropriate balance so as not to be detracted from its primary mission and also must engage other competent partners in all such initiatives.

5.10 Conclusion

The Panel believes that effective partnerships are essential for WorldFish to fulfill its Mission. It also considers that from a practical point of view the Research for Development paradigm provides a prospective vision of trajectories for WorldFish and its partners to position themselves in the research-to-development continuum. The Panel is of the opinion that in real life, situations are not that linear and therefore in Chapter 8 under *The Way Forward*, provides elements to enrich this paradigm to ensure that WorldFish positions itself appropriately in the international fisheries and aquaculture landscape.

6 GOVERNANCE

The Panel had the opportunity to observe board and committee processes in operation during their sessions in September 2005; in addition, it had the benefit of perusing on a selective basis board and committee agenda material and minutes during the review period. The Panel conducted a brief Trustee Perceptions Survey on certain board issues, and also referred to the results of another survey carried out in 2005 by an external consultant previously engaged by the Center on their own initiative.

WorldFish was established in Manila in March 1977, as the International Center for Living Aquatic Resources Management (ICLARM); in May 1992, it became one of the research centers supported under the auspices of the Consultative Group on International Agricultural Research (CGIAR); and, upon shifting of the headquarters from the Philippines to Malaysia in 2000, it is currently sited in Penang. A Head Quarters Agreement with the Malaysian Government in January 2000 recognizes the Center as an International Organization entitled to a measure of immunity and privileges applicable to such institutions.

The Center's activities are spread out in West and North Africa, Sub-Saharan Africa, South Asia, East and South East Asia, and the Pacific. Its overall employee head count at the end of December 2004 was 284, which included 36 research staff and 128 research support staff. At an overall funding of US$ 14.3M in 2004, WorldFish is the second smallest among the 15 Centers in the CGIAR System.

6.1 Board & Committee Structure and Processes

WorldFish is governed by a Board of Trustees, currently numbering twelve, including the Director General, and a 13th non-voting member representing the Director General of the United Nations Food and Agricultural Organization. Two of the Trustees are nominees respectively of the Governments of Malaysia and Egypt.

The Center has, on its own, commissioned an exercise to ascertain Board competencies in 2004-05. The Panel would like to compliment WorldFish for this proactive initiative.

6.1.1 Board Size, Profile & Trustee Tenure

Appendix 6-1 sets out the particulars of the Center's Board of Trustees as of December 2005. The total strength of thirteen trustees as of December 2005, comparable with other CG Centers whose Trustee numbers range from a high of 19 to a low of 11. In relation, however, to the size of WorldFish funding, the present size is too large. Board costs at WorldFish over the review period have been around the US$ 215,000 mark in 1999 moving up to some US$ 285,000 in 2004; the estimated number for 2005 is US$ 360,000 and the 2006 budgeted figure is US$ 320,000, or about 1.9% of the Center's funding estimate of some US$ 18.1M in that year. 2004 and 2005 numbers include sizeable expenditure on development of performance management systems, governance improvements, etc commissioned for Board purposes, proposed higher frequency of meetings in 2006, larger number of field visits by Trustees to outreach locations, and so on, but even allowing for these, Board costs appear to be geared for a much larger scale of operations than is presently envisaged for the Center in the near future. (Board costs in many CG Centers have been rising in recent years. Total Board costs of all the Centers in

2001 were US$ 3.34M and rose to US$ 3.90M in 2004, an increase of some 18% in five years. During the same period, WorldFish Board costs rose some 100%, from US$ 168.000 in 2001 to US$ 339.000 in 2004. Source: CG Secretariat, February 2006).

The current Board is quite well diversified in terms of geographical and gender distribution, but not so in terms of complementary skill sets required for an institution such as the WorldFish. Seven trustees are from Part 1 (developed) countries and six from Part 2 (developing) countries. In terms of gender balance, with 42% of Trustees being women, compared to the overall CG Centers average of 28%, WorldFish is far ahead in the System; three out the five women on the Board (excluding the Director General for comparison purposes) are from Part 2 (developing) countries; this compares favorably with the CGIAR System average of 16% women on the Board from Part 2 countries.

In terms of skill sets, based on Panel perceptions during the Board and Committee meetings in September 2005, the Board needs to be strengthened in financial, risk appreciation, and basic management and legal appreciation skills. This need has also been brought out in a Board competencies survey carried out in 2005 by an external consultant employed by the Center.

In terms of scholarship, appropriately, the Board is very strongly endowed. Out of the 13 Trustees, 12 are PhDs, virtually all of them in disciplines bearing upon fisheries, agricultural economics, and social sciences. All the Trustees have proven track records in their fields of specialization.

Each Trustee is elected for a three-year term, which can be renewed for a further three-year term, but no longer. This process, not applicable to the *ex officio* directors, is intended to assist ongoing renewal and regeneration of expertise at the Board level. Although the second term for elected Trustees is discretionary at the option of the Board, (except in one solitary instance of a Trustee exiting a year ahead of her second term completion), such extensions have been granted to all the Trustees.

A review of the effectiveness of the Board renewal & regeneration process reveals that the Center has not been particularly successful on this count. Out of the nine members of the Board qualifying for this review (excluding the Director General, the FAO representative and the two Government nominees), as of December 2005, six Trustees (or two thirds) have been on the Board for periods in excess of four years. In an ideal situation, the Board should have no more than a third of its number in each tenure bucket of 1-2, 3-4 and 5-6 years at any time. To reach this ideal balance of tenure-mix by say December 2007, the Board may have to retire two existing Trustees in 2006, and retire three and recruit one new Trustee in 2007 as indicated in Appendix 6-2. The Board will still have to manage the recommended skill-sets profile in the interim, and it is possible that during the transition, numbers may actually exceed the recommended size, albeit for short periods.

The Board carries out a self-evaluation of its performance each year. From 1999 to 2001, this exercise was done in September each year and discussed within the Board in its next meeting. In 2002, the Nominating Committee recommended an open ended discussion on self evaluation forms and this was done in September 2002. In 2003, the Board reverted to written evaluation which was also followed in 2004, when Board competencies were first introduced in the questionnaire. In 2005, the Board went through

a facilitated session of evaluation with Ernst and Young, and later it was decided to pursue this with specific Key Performance Indicators; in September 2005, the Board agreed that it should develop a Board Competency Profile and work on this with an external consultant has commenced. The Board also decided to evaluate the Chair after a year in office, which will be March 2006. These are valuable efforts and are to be commended.

6.1.2 Board Committees

Currently the Center has Audit, Nominating, Program, and Executive Committees. Membership details are available in Appendix 6-1. Each Committee has a Charter of its role and responsibilities that closely follows the guidance provided by the CGIAR System. Each Committee has a Chair appointed by the Board; the Board Chair sits, *ex-officio*, on several of the Committees.

The Audit Committee

An improved version of the Terms of Reference of the Audit Committee was approved by the BoT, at its meeting in September 2005, but its implementation will have to await a larger exercise of amending the Center's constitution. The general dearth of financial literacy and probing expertise on the Audit Committee is reflected in the relatively limited discussions on financial and accounting information submitted to the Committee. An improved financial reporting system has now been put in place that should qualitatively enhance the value of inputs received by the Committee, but its benefits will have to await strengthening of committee competencies as noted earlier.

Financial information to the Audit Committee and the Board need to be strengthened by inclusion of cash flows during the reporting period, and treasury management in terms of surplus cash investments. A short presentation of financials, perhaps by the CFO, would also help the Trustees in better appreciating the financials. The Panel notes with satisfaction the improvements in financial reporting to the Audit Committee and the Board in the latter half of 2005, and encourages management to further build on this in future.

Audit Committee processes allow for executive sessions with internal and external auditors, without executive management being present. The Center is to be commended for instituting this discipline that, internationally, is among the key best practices in this field. The quality of discussion and the value-add of these sessions however leave scope for significant improvement. This could be achieved by the Audit Committee Chair and members seeking out, through probing questions, the auditors' impressions on issues like not only the acceptability but also the appropriateness of accounting and reporting policies adopted by the Center, internal control weaknesses if any, and so on. It is also a valuable input to the Committee to seek assurance from the external auditors on their "independence" status at least once each year. For example, it was observed that the external auditors, at management request, conduct and issue audit certificates on project expenditures to some donors, and that the aggregate remuneration they received for such "independent" audits exceeded their remuneration for auditing the Center's own accounts annually. In our confidential discussions, the external auditors, Ernst and Young in Penang, did accept this could be deemed as a factor eroding their independence (though they affirmed it did not in fact) and offered to relinquish such work if the Center could find another firm to do such audits. It would be a good practice

for the Committee to elicit such information during their executive sessions, and consciously decide whether any likely erosion of audit independence was involved.

One of the cardinal inputs to external auditors in determining their plan of work and deciding upon the adequacy of internal controls in the organization is the internal audit's adequacy of coverage and its periodical reports. The external auditors of the Center reported to us they did not have access to the internal audit reports until after the financials were signed off, since apparently they await "approval" by the Audit Committee, which usually coincides with the tabling of audited annual or half yearly accounts for Board approval. Clearly, this needs the Committee's immediate attention and decision to release internal audit reports to external auditors as they are issued or at least make them available to the external auditors during their audit. The Panel suggests that the Internal Audit Reports be made available to the independent external auditors as and when they are issued.

The Committee meets with internal and external auditors in executive sessions separately. It would be better if both the auditors are present during the sessions since they complement each other's work and would benefit from each other's confidential views expressed to the Committee. Similarly, it would a good practice to have both the auditors present when each of them is making their presentations to the Committee, again for their mutual benefit and ultimately for the good of the Center. The Panel suggests that the internal and external auditors be invited to be present together at Audit Committee meetings when their agenda items and presentations come up for discussion.

It was observed that the Director General was not invited to the Audit Committee meetings, with management being represented only by some functional managers. (The Panel was informed that normally the CFO and the Corporate Services Director would attend, but in September 2005, the incumbents were not in place). This practice denies the Committee the opportunity to hear the Chief Executive of the Center on matters coming up for discussion and needs correction. It is of course open to the Committee to excuse the Director General, as indeed any other management representative, during executive sessions with auditors or even otherwise when it deems appropriate. The Panel suggests that the Director General be invited as a matter of course to meetings of the Audit committee to facilitate its deliberations, except when the committee meets in executive session without any of the executive management being present.

The Program Committee

In the context of the Center's mission and key activities, the Program Committee's primacy is unquestioned. Among CG Centers, membership of this Committee is reportedly the largest. At WorldFish, the present Program Committee comprises six trustees (seven from 2006), but all the other members of the Board also sit through the proceedings as observers. If full Board membership presence and participation are considered beneficial and appropriate, there is little advantage of retaining the Committee structure for this part of Board activities, except for the possible benefit of a different Trustee acting as the Committee Chair, and the Deputy Director General fulfilling the role of the Committee Secretary. It may be more functional to reserve half-a-day or even a full-day slot in the Board agenda for Programs discussion in open session with appropriate executive staff presence.

The Nominating Committee
A major responsibility of the Nominating Committee is to evaluate Board balance and identify gaps in skill-sets that need addressing. While the Committee has been active during the review period in identifying suitable persons for possible Board membership, the Panel could not find any record of a formal balance study having been undertaken.

In the Nominating Committee meeting held in September 2005, it was observed that the Committee Chair was proposed and approved for recommendation to the Board, as Committee Chair for a second term. Continuance of sitting Chairs and members of Committees are more appropriately dealt with by the full Board (with the concerned persons being excused during such consideration), rather than being recommended by the Committees themselves, to obviate any potential conflicts of interest.

The Executive Committee
The Center has an Executive Committee (in 2006, it will have six members) that met twice in 2005 (including once by tele-conference), alongside other Board and Committee meetings. This Committee's main utility is that it can act as empowered by the Board, on behalf of the Board as the need arises between full meetings of the Board. It can also deal with sensitive issues that are better handled within a smaller group than is possible at the full Board, and even more importantly, it should act as a finance committee of the Board.

6.1.3 Processes
In 2005, Board and Committee meetings have been held twice in the year. Given the activities of the Center and the need for adequate Board guidance and monitoring, there is a case for increasing the frequency of the meetings, not necessarily uniformly, but on a need-to-meet basis. The present practice of combining all the meetings together, while certainly cost-beneficial, does impose a strain on the Trustees and may also adversely impact their contribution. A major constraint to need-based scheduling of Committee meetings at different times, is the concurrent membership of some of the Trustees on the Board and several Committees. Equally, containing Board costs which, as noted earlier, are already on the higher side, would also be a consideration.

One way of addressing this issue would be to schedule at least some of the meetings on an audio-video-conferencing mode. Trustees who do not have access to such facilities may prefer to attend the meetings at the nearest location where such facilities are available. This will enable the Trustee to save on travel time and related processes, minimize cost of meetings at increased frequency, while at the same time offering the benefits of additional meetings.

The Center's Annual Reports seem to be published substantially behind time. The 2003 Report was issued late in the second half of 2004, and the 2004 Report was not published until after November 2005. The financial summaries provided in the Report do not have the audit signatures or certifications; in fact the name of the Center's Independent Auditors does not even appear anywhere in the Report. External audit certification is a valuable instrument of reassurance to present and prospective donors, host country governments, present and prospective employees, and other stakeholders. In the interests of transparency of accounting and reporting, the Center's audited accounts and audit reports should be included in the Annual Reports. It is also necessary that the financials are approved by the Board of Trustees, and the financials are certified by the Director General and the Chief Financial Officer (by whatever name called) of the Center.

The Panel suggests that the Annual Reports of the Center be published by April 30 of the following year, and the CEO/CFO certify that the financials have been prepared in accordance with generally accepted accounting practices and guidance provided by the CGIAR System, and that internal controls relating to accounting and reporting have been reviewed and found adequate to provide reasonable assurance of reliability of the reported financials.

All the Trustees have a fiduciary responsibility to the stakeholders of the Center, including the CGIAR members and the donor community, besides the host country governments and other stakeholders. It is a good governance norm that those with such fiduciary responsibilities render an account of the activities of the organization under their charge, and account for the financial inflows and outflows during the year. The Center should issue a Trustees Report, duly approved by the Board, in each of its Annual Reports. The present practice of overviews and statements from the Board Chair and the Director General may at best complement, but not substitute, such a formal Report by the Trustees.

It was observed that some Trustees did not actively participate in the proceedings of the Board and Committee meetings. The Chair has a special responsibility to draw out the members who may not be forthcoming for any reason, language not being the least of them, so that the Board can have the benefit of the views and contribution of all its members.

6.1.4 External Reviews

Besides the Second EPMR of the Center in 1999, there were five Center Commissioned External Reviews during the current Review period; three of them were in 2004 and 2005). Although CCERs nearer the time of an EPMR are preferred, the general impression gathered during the discussions at the Program Committee meeting in September 2005 was that the 2004 and 2005 Reviews were not very helpful or particularly value-adding to the Center. It would be useful for the Board to devote more time and attention while constituting the Review Panels and specifying their Terms of Reference, ensure adequate senior management attention and assistance to the Panels during their work, such that their inputs and recommendations are useful to the Center in improving its performance. It is also important that the Panel Chair (instead of the Director responsible for the area of work being reviewed) makes the presentations of the Reports to the Board, so that their recommendations could be better appreciated in the background in which they had been made. The contents of the CCERs are being evaluated and commented upon elsewhere in chapters 3 and 4 of this Report.

It will be appropriate, as the Center is planning to do at its September 2006 meeting to schedule CCERs on a Rolling Plan over a five year time-frame l. This may facilitate the process of obtaining the best possible panelists, given sufficient advance notice, assisting in preparation by appropriate staff, and also spreading the workload reasonably evenly over the years. This would also facilitate compliance with the April 2005 CG Guidelines for EPMRs, incorporating a call for submission by the Centers, of proposed CCER plans to the CG Secretariat and the SC three years in prior to the scheduled EPMR dates.

In addition to these, there were four Investor Commissioned Reviews during this period for Board review in depth and necessary action.

6.2 Science Advisory Committee

The discussion in Chapter 3 and 4 of the Report on the quality and content of research at the Center suggests the imperatives of appropriate and independent advice and counsel on these matters. As has been pointed out earlier, the Board guidance and monitoring on these issues are circumscribed by time availability and meeting frequencies, compounded by its commitment to other governance responsibilities. The Panel believes that the Center would benefit from a specialist body with appropriate science expertise and wider exposure, in its march towards achieving the ambitious goals it has set for itself.

Accordingly the Panel believes that the Center should constitute a Science Advisory Committee, reporting to the Board, but closely interacting with the executive science management in devising, critiquing, and evaluating the Center's science policies and strategies. The Board would thus have the benefit of the counsel of an independent expert science body to facilitate its own decision making process, and the executive will have the counsel of an independent external expert group of specialists, unfettered by Board responsibilities. This Committee will not replace the EPMRs and CCERs.

6.3 Board and the Executive

The lines separating board role and executive responsibility are often quite thin; the best governed organizations are those that have found the golden mean between policy interventions and performance oversight on the one hand, and on the other, interference in, and micro-management of, day to day operations.

6.3.1 Executive Management

The executive management of the Center is headed by the Director General, supported by a Senior Management Group that as of January 2006, included besides himself, the Deputy Director General, the Director of Science Coordination, an elected Discipline Director, and an elected Portfolio Director. The objectives of the SMG have been set out as follows:

1. To serve as the principal body within WorldFish for making strategic management decisions that will affect the long-term success of the organization;
2. To contribute to the effective leadership and management of WorldFish and ensure alignment of decisions with World Fish's mission, vision and values;
3. Through sound decision making to create and embed a sense of organizational direction, commitment and challenge;
4. To utilize analysis, knowledge, experience and sound judgement to make ethical and values-driven decisions that impact WorldFish staff, partners and others, and communicate these decisions to employees;
5. To ensure WorldFish operates effectively in an environment of change & ambiguity for the achievement of strategic objectives;
6. To ensure appropriate levels of management support and cross-unit coordination to bring institutional advantages to decentralized activities; and,
7. To link dispersed management knowledge, skills and best practices across the organization.

SMG meetings are to be held each month and will be restricted to one or two strategic issues upon which background papers will be tabled; the SMG also proposes to have a tentative schedule of key issues for discussion during the year.

A second level decision-support team such as the SMG has been in place at WorldFish virtually throughout the Review period, though designated differently, like the Executive Management Team or Senior Management Team. While supporting such an institutional set up, the Panel notes perhaps an unintended fallout is reflected in the Group's present composition that is entirely homogenous with respect to gender and ethnicity, and without representation to key functions such as finance and human resources. The Panel is informed that the Director General has had a number of consultations with the Head of CG's Gender and Diversity Unit concerning strategies for increasing diversity in senior management and research positions, and this is planned for discussions as a special strategic topic at the next Board meeting in March 2006. The problem is seen as reflecting a deeper and longer term issue of inadequate diversity in senior positions in the organization as a whole. The Panel notes the proactive initiatives towards finding a solution to this issue and suggests that efforts be continued to seek an enduring solution with guidance from the Board.

6.3.2 Organization Structure

During the major part of the Review Period that is until late 2004 the organizational structure of the Center was as set out in Appendix 6.3-a.

The research organization was restructured in 2004 (Appendix 6.3-b) to bring about a matrix format that fostered cross-disciplinary work, and:

1. Offered clear, focused accountabilities of Portfolios (geographic priorities) and disciplines (global and programmatic priorities),
2. Enabled Portfolios to pursue coherent growth strategies within their geographical scope,
3. Charged Portfolios with the responsibility for pursuing opportunities and developing new projects, in collaboration with Business Development,
4. Enabled Disciplines to oversee staff and competency development, based on Portfolio needs,
5. Led to appropriate delegation to Discipline and Portfolio directors, and
6. The matrix management structure that WorldFish has adopted, while reportedly successful in many commercially driven organizations, has potentially its complexities in implementation especially in case of knowledge-worker-centric[4] institutions such as WorldFish. The Panel is assured that the model has been well accepted and being implemented, and is informed that in case of any unresolved issues, they would be mediated in joint consultation between the relevant parties and the Deputy Director General to whom the Portfolio Directors report, and the Director

[4] It was the late Professor Peter Drucker who coined the expression knowledge worker, to mean employees in organizations whose primary inputs were of a cerebral and intellectual nature. He posited in his Post Capitalist Society (1991, Harper Business Publishers), that "knowledge is the only meaningful resource today", and that "knowledge is now also being applied systematically and purposefully to define what new knowledge is needed, whether it is feasible, and what has to be done to make knowledge effective." In this sense, the concept is eminently appropriate to scientific research institutions such as WorldFish

General to whom the Discipline Directors report. The Panel notes this arrangement and encourages the Center to actively follow the process so that conflicts if any are resolved equitably as they arise, not leaving the success of the system to the vagaries of personal relationships and equations among Discipline Directors and Portfolio Directors.

6.3.3 The Director General and the Board

There are three dimensions to evaluating the interface between the Board and the Director General: one, the process of identifying and recruiting the DG; two, the process of enabling the DG to perform his role as the executive head of the Center while concurrently countervailing potential concentration or abuse of such executive authority; and three, the process of evaluating the DG's performance against established and mutually agreed measures.

The period under review had two Directors General in office, the previous DG till early 2004, and the incumbent DG since then. Board minutes (Item 19.2) of the Trustees meeting on 25-26 February, 2004, records the selection of the new DG on the basis of a report by a Search Committee tabled for discussion at that meeting. This Committee of Trustees was assisted by an outside specialist hired for the purpose.

As for providing an enabling environment in which the DG could perform his role satisfactorily, the situation appears to have been, and continues to be satisfactory. The working relationship between the Board Chair and the DG, as evidenced by our observations during this review, seemed appropriate; it was also apparent that there was a measure of commonality of purpose in advancing governance and performance of the Center, with both the Board Chair and the DG being in the relatively earlier part of their tenure. There was a visible emphasis on organizational transformation with structures being modified (for example, the changeover to the matrix form of organization), information reporting regimes being improved (for example, an updated information reporting system), organizational culture and morale being revisited (for example, the One-Staff approach to staff integration, bringing nationally and internationally recruited employees on to a uniform platform), better data processing and access (for example, through introduction of SAP-ERP facilities despite their relatively high cost), and so on. That the DG is able to communicate purposefully and convincingly with the Trustees is also a factor that strengthens the feel-good environment in which the DG is not only encouraged but is also able to discharge his responsibilities at the required level of excellence. The flip side of such a situation is the potential for rigorous centralization of power and authority in a single individual; this is generally sought to be contained by developing a strong and competent second line of management that could counsel, and if required countervail the potential for power abuse. In the Senior Management Group, the Center has in place a structure to achieve this objective, and its independence of thought and expression need to be bolstered by the Board through visible evidence of recognition of their importance in the organizational structure. Participation of second and third level functionaries in Board deliberations when meeting in open sessions is a step in the right direction and needs to be persisted with.

The third element of the Board-Executive relationship concerns the performance evaluation of the DG. In WorldFish, this assessment process is handled by the Board Chair aided by consultations with other Trustees and staff of the Center. The Board also has the benefit of a 360 degrees evaluation, a self-performance report by the Director

General, and achievement of Key Performance Goals. The Board discusses the DG's performance in executive session; after this, the Chair has a one-to-one session with the DG communicating the results of the evaluation exercise. As the incumbent Chair and the DG are relatively new to their positions, a formal performance appraisal of the current DG is expected to be undertaken only in 2006. Five criteria for measuring the DG's 2005 performance, have, however, been agreed as follows: Organizational Performance, Organizational Performance Management System, Financial and Other Management Reporting, Management Performance, and Individual Performance. Assessment with respect to organizational performance, is based on achievement against targets for the WorldFish Key Performance Goals, consisting of a comprehensive set of quantitative targets that the organization is dedicated to achieving in a given year. The DG's contract of appointment however lists a larger number of 18 measurement criteria, but in practice, most of these might be covered under sub-sets of the five named measures. The Panel suggests that the Board consider if it would not be more appropriate for this evaluation process including discussions with the DG to be conducted by a Board Committee constituted for this purpose (comprising of the Chair and possibly two other senior Trustees including the Vice Chair), with undoubtedly the Board Chair providing the leadership. In making this suggestion, the Panel is alive to the fact that the Chief Executive is responsible to the Board of Trustees as a whole, and that the suggested process would help to further restate and reiterate this key concept underlying this relationship.

The Panel has also had the opportunity of reviewing the DG's performance appraisal processes and documentation in the earlier years of the Review period, and subject to the suggestion in 4.9.4 above, found them satisfactory.

6.4 Panel Survey of Trustee Views

In order to gauge the perceptions and views of individual Trustees on the WorldFish Board, the Panel addressed a Survey Questionnaire and sought their responses. The Panel record their grateful appreciation to the Trustees for their time and effort in providing these responses, which were all received in complete anonymity. Responses were received from twelve of the thirteen Trustees and are summarized in Appendix 6-4.

In several respects, the responses support the conclusions independently reached by the Panel. Principally, the results indicate strong agreement that:

- The Board size should be reduced to a number in the range of 6 to 10, instead of the present 13,
- Board skill-sets need improvement in the fields of financial appreciation, strategy validation, and Center's funding issues,
- Africa representation needs strengthening and South America needs to be represented,
- More Trustees should be women to further strengthen gender balance on the Board,
- More meetings of the Board and its Committees are required, and Committee meetings need not necessarily be held alongside Board meetings,
- Some Board and Committee meetings may be held through audio-video conferencing, and some of the meetings should be held at outreach locations,
- The Program Committee should be scrapped, with its functions being assumed by the full Board, and

- Participation and contribution of several Trustees at Board and Committee meetings require improvement.

6.5 Overall Strengths and Weaknesses

Overall, governance processes and institutions at WorldFish, while adequate in many respects, need strengthening in several areas to reach required levels of excellence in terms of international best practices. The Center should continue to foster and build upon existing strengths and seek to bridge existing gaps in this field. The Center's Board has trustees with considerable expertise in their fields of specialization and their commitment to the well being and enriching growth of the Center in the years ahead is abundantly in evidence. Many of the incumbent Trustees have contributed significantly in programmatic initiatives and enhancing the global visibility of WorldFish in countries where it mattered.

In the incumbent Board Chair, the Center has a person with leadership qualities and purposeful task orientation, both of which are critical to successful Board functioning and contribution. During the earlier period of our Review, the Center had strong Board chairs, who along with the then Board of Trustees steered the Center clear of serious problems and perhaps laid the foundations for some of the processes and institution-building initiatives.

The previous DG, has contributed significantly to key organization-building efforts, successfully managing the head quarters move from the Philippines to Malaysia and stabilizing the startup operations in Penang, besides of course being the Center's well-received ambassador within the CGIAR System. The Center's current Chief Executive brings to his job a business-oriented science-management perspective, is accessible to his staff, has strong motivational and persuasive skills, and has a vision and the professional drive to take the Center forward.

The picture, however, is not without its share of deficiencies. Board decision making in several key areas has been relatively slow: for example, implementation of some of the 2nd EPMR recommendations such as removing the ten-year ceiling on IRS took some four years. Despite recent decisions to draw down the reserves, the Center is still grappling with large reserves that actually need to be spent on its Programs (Chapter 7). Its research and publications output, partly affected by the headquarters shifting, is not in keeping with the expectations of a Center of excellence like WorldFish (See Chapter 4). Staff attrition is quite high, even as fresh recruitments are lagging behind (Chapter 7). The cost of governance is escalating to some 1.9% of estimated funding projected for 2006. Internal control and risk management, essential components of good governance, are just beginning to be tackled. Legal compliance and monitoring, important elements in Center reputation and protection of Trustees and executive management, are to be strengthened (Chapter 7).

The Board and Executive Management have their tasks cut out to raise governance levels to new heights so that the Mission of the Center could be achieved, and achieved speedily. The Panel's suggestions and recommendations are aimed at helping the Center towards accomplishing this challenging task.

In order to bring about greater cohesion, process improvements, trustee participation and contribution, and board-costs containment, and to enhance the quality of independent science support, ***the Panel recommends that the Center's Board and Board Committees be restructured as follows (Appendix 6 - 5):***

Reduce the Board size to not more than nine Trustees, including the ex officio Director General, Host Country representatives and the FAO nominee.

Guidance:

- Ensure at all times that at least two amongst its number have accounting, financial, legal or strategic expertise that will be of value to the Board and the Center in the discharge of its fiduciary duties to its stakeholders.
- Quorum requirements for all Committee meetings shall be reckoned on the basis of participation personally or through audio-video conferencing.
- No Trustee including the Board Chair shall serve concurrently as a member of more than two Committees of the Board.
- The Board and its Committees should meet as often as considered necessary, and preferably at least four times during a year;
- Some of the meetings should be held at outreach locations and as appropriate the meetings may be held through audio-video conferencing;
- The Board or the Audit Committee agenda should be enhanced to include legal compliance and risk management oversight.

Modify Board Committee Structure to retain the Audit Committee, the Nominating Committee, and the Executive Committee, and eliminate the Program Committee.

Guidance:

Audit Committee of three or four of the Trustees including the *ex officio* voting members of the Board but excluding the Director General, with the Committee Chair being a person with adequate expertise in accounting and financial appreciation, The quorum for this Committee meetings shall be not less than two members, one whom at least shall have such expertise in accounting and financial appreciation.

Nominations Committee of three or four of the Trustees including the *ex officio* voting members of the Board but excluding the Director General, with the Committee Chair being a person with at least two years of experience as a Board member in WorldFish, and with a provision that the quorum for this committee meetings shall be not less than two members, one of whom at least shall have a minimum experience of two years of Board membership.

Executive Committee of four voting Trustees, of whom at least two with a minimum of two years experience as a WorldFish Trustee, at least one with expertise in accounting or financial matters; the Director General shall be a member *ex officio*, and the Board Chair will be the *ex officio* Chair of the Committee; the quorum for this Committee meetings shall be not less than two, one of whom shall always be the Director General.

Include in the Center's Annual Reports a Report of the Trustees, discussed and approved by, and signed on behalf of, the Board, and Audited Financials, duly certified by the

Director General and the Chief Financial Officer, along with the Independent Auditors' Report.

Guidance

The Annual Report should indicate the names of the Center's Independent Auditors. The financials should be certified by the Auditors, and the Audit Report on the financials (not any management letters) should be published as part of the Annual Report.

Constitute a Science Advisory Committee of about four members with suitable qualifications and experience/expertise, with a member of the Board as the Committee Chair. The Committee will report to the Board, and the Committee Chair (or any other member other than the Director General should brief the Board at every meeting on its deliberations and advice.

Guidance:

The Committee should be empowered to co-opt specialists as required, should advise, counsel and mentor executive management of the Center. Members of the Science Advisory Committee except its Chair, shall not be members of the Board of Trustees, they may act as advisors collectively or individually. The primary purpose of the Science Advisory Committee will be to provide independent expert advice and counsel to the Board and executive management on all science related issues

Process expeditiously planning for CCERs on a five-year rolling time frame, to be updated each year, to obtain the best panelists with adequate advance notice, and spreading the workload evenly over the period. The CCER Panel Chairs should be requested to make the presentations to the Board on their Reports and Recommendations.

7 MANAGEMENT

7.1 An Organization in Transition

The Review period witnessed significant change initiatives: relocation of the Center Head Quarters to Penang, its Brand makeover as World Fish Center reflecting its growing role in fisheries research, and structural reconfiguration of management to optimize use of its research resources. The period saw changes at the Board Chair and Director General levels, besides the scheduled turnover of about a third of its executive management team. That the Center, in the event, adequately coped with such a daunting clutch of changes in a relatively short period (1999-2005), albeit with some slowing down of research output during this phase, is a tribute to the change management planning and execution capabilities displayed by its Board and the top management team led by the Director General.

7.1.1 Relocation of Headquarters

Recommendation 5 of the 2nd EPMR Report delivered in February 1999, exhorted the Center's Board and Management to "place the highest priority to locating and transitioning to a permanent site that meets ICLARM's (as the Center was then called) criteria." This was also in line with the Center's own efforts since the early 1990's to find an acceptable and affordable home-base for its headquarters, In February 1999, the Board decided to pursue the Malaysian Government's offer to locate its global headquarters in Penang. The Center moved to its temporary offices in the Equatorial Hotel Complex in Penang, with some 30 internationally and regionally recruited staff from Makati in the Philippines relocating, supplemented by a further 20 locally recruited staff. The rebuilding and refurbishing activities at the new 5.5 hectares site in Batu Maung on the south-east coast of Penang, commenced in early 2001 and the facilities were inaugurated on 17 August 2001 by the Deputy Prime Minister of Malaysia. Of particular importance and professional satisfaction was the harmonious exit from the Philippines, with both the government and remaining-staff relations being handled with great finesse and equity, involving meticulous and detailed planning and execution of by the Board and the Management. The Center has a country-specific program for the Philippines, which is also the seat of the FishBase Consortium.

As an inevitable fallout of such major relocations, there has been a slowdown in the Center's research program development: senior management time was tied up with the transition process, deadlines were missed, reporting to donors was delayed, under-spending was high, refereed publications dropped, funding pipelines suffered, and so on. On the positive side, *post*-relocation, the Center was strongly placed for future growth: its potential to attract talent increased, its suitability for partnership with other research institutions improved, and its credentials as an international research Center with world class facilities were established. Relationships with the Malaysian Fisheries Department at Jitra, 140 kilometres from Penang, were initiated, access to a large and high-quality work force was possible. Overall, despite the unavoidable pains of relocation, the move seems to have opened up major strategic locational advantages to the Center.

7.1.2 Brand Makeover

Another major transition during the Review period was the change in the name of the Center and the choice of a new logo. The Center's earlier name, International Center for

Living Aquatic Resources Management, while most adequately reflecting the vision and mission of the Center, was in practice too long and was inevitably shortened to ICLARM. The relocation to Penang offered an opportunity to initiate a name-change exercise that was aimed at aligning the Center's name with its growing profile as a leading international center for fisheries research. The change was carried out in two stages: first, in 2000, to "ICLARM – The World Fish Center" to provide some continuity and connectivity to the earlier name, and then in 2002 to "WorldFish Center" that reflected the Center's global aspirations.

The new name communicated strong positioning with the Logo supporting the message using the same elements, i.e. people, fish, and the global shape. This change however, did not affect the legal name of the Center, which remained the same as earlier; the new name was only to be the Brand by which the Center was identified for academic, research, and day to day communication purposes.

This name change, though, had implications for governance, management and science at the Center, leading to a series of strategic transformations at the Center that are detailed in this Review. As part of its efforts to crystallize and firmly establish fish-related matters on world economic and environmental agendas, the Center launched the "Fish for All" initiative as a credible, global, science and policy dialogue to introduce some urgency through participation of policy-makers, opinion leaders and researchers at various community levels. WorldFish campaigns are now increasingly internalized to reside beneath the "Fish for All" banner in its Strategic Plan initiatives. Overall, the Brand changeover appears to have been managed well, the Center receiving the CGIAR Science Award for Outstanding Communication in 2003 for the "Fish for All" initiative.

7.2 Panel Staff Survey-2006

The success of a largely knowledge-worker-centric organization such as WorldFish, depends upon what its most valuable asset, the human resources pool, thinks of the Center as a place of work and social interaction. The Panel conducted an electronic survey of employee opinions on some key issues. Even though more complex questionnaire structures would have provided finer nuances of employee perceptions, the Panel chose simplicity as its driver, and is satisfied that the responses provide an acceptable basis for its purposes.

In all, 118 employees (out of the total 307, or 38%) responded to the survey, the somewhat low response rate was possibly due to lack of computer literacy and access in case of a large part of the workforce especially in outreach locations. Key participant demographics are provided in Appendix 7-1-A: of particular interest is the fact that 47% (38%) were women, 65% (86%) were Nationally Recruited Staff, 23% (10%) were Internationally Recruited Staff, 59% (29%) were from Head Quarters, and 26% (14%) were PhDs. Percentages in parentheses represent the respective proportion of the categories in the total staff strength of the Center.

Following are some of the key response insights:

A significant majority of respondents agree or strongly agree that they understand how the goals of their program, function or unit fit into the long term plans of the Center, (89%), feel decision-making is open and interactive and that they can freely express their

opinion on work-related issues (78%), the work environment is warm, friendly and collaborative (81%), with the physical environment being excellent (79%), they have enough time, opportunity and encouragement to pursue their research and professional interests (59%), and that they are satisfied with the balance between their private life and professional work (71%).

On the other hand, some of the perceptions with regard to personnel administration may be a cause for concern. For example, 28% of the respondents disagree that superior performance is generally recognized or rewarded, some 19% disagree there is no workplace discrimination or harassment, sexual or otherwise, 22% disagree that the performance evaluation system is transparent and fair, 28% disagree that personnel policies are clear, unambiguous and equitable, and 32% disagree that personnel policies are fairly and equitably administered.

While overall 80% of the respondents agree or strongly agree that they would continue working for the Center, given reasonable opportunities for personal growth, advancement and job satisfaction, it is disturbing that some 35% (36% NRS, 15% IRS) believe they should be looking for a change because growth prospects are perceived to be poor; 22% overall (15% each of IRS and NRS, 38% of RRS) believe better opportunities are available elsewhere Some of the other indicators also allude to a measure of restlessness within the Center, with 36% (48% of IRS, 51% of NRS) of the respondents preferring a change in location or function, 25% (24% of IRS,16% of NRS) preferring a different superior, and a substantial 45% (33% of NRS, 28% of IRS and RRS) preferring another program or project, all subject to suitable opportunities arising. The Center may wish to identify potential causes and to institute appropriate correctives.

Equally important are some of the indicators thrown up by research-related staff. While 71% (64% IRS, 75% NRS, 62% RRS) of the respondents agree or strongly agree that the research activities at the Center are of a very high quality, 78% (78% IRS, 74% NRS, 92% RRS) believe research quality leaves scope for considerable improvement. One possible interpretation is that while the fields of research activity engaged in by the Center are of a high quality, the research output quality leaves much to be desired (as concluded by the Panel also in Chapter 4).

Responses indicate that work-related tensions exist between the science staff and the staff functions like human resources, finance, and the IT. Similar tensions had also been highlighted at the time of change-over of Directors General in 2004. A certain level of healthy tension between the regulators and the regulated may not be altogether avoided and may even be welcome under certain circumstances, if only in the interests of ensuring appropriate internal controls and procedural discipline, but it does appear from the Panel survey that current tension levels may be due to the staff functions not reaching out to, or effectively communicating with, the program staff and others entrusted with the care and disposition of the Center's financial and other resources. There appears to be a strong case for reiteration and appreciation of respective roles and responsibilities.

It is useful for staff in functions such as finance and human resources to travel to outreach locations at reasonable intervals, as they have been doing, to establish personal rapport and to understand each others' problems as much as a measure of management control through visibility in the field. Such visits also provide an invaluable opportunity

to the concerned managers to get a first hand appreciation of the dynamics of field operations away from the center, and offer multiple advantages of not only understanding the ground level realities but also ensuring appropriate measures that, while facilitating operations, also protect the assets and interests of the Center. The Panel suggests that the Center continue the current practice of such staff traveling to outreach locations at appropriate frequencies.

The latest Staff Opinion Survey conducted by the Center in 2003 listed nine least favorable items emerging from those survey responses. The Panel reviewed these items in the light of responses to its survey in 2006, and observed that some of them, listed below, continue to be perceived as areas of concern:

Employee compensation and benefits: Nationally recruited staff pay is seen as significantly and unreasonably disadvantageous compared to internationally recruited staff compensation; in certain functions, benchmarking Center pay with comparable government jobs has been faulted for not reckoning other benefits available to latter.

Overall, 50% (22% of IRS, 44% of NRS, and 50% RRS) of the current respondents were satisfied with their remuneration (2003:21%).

In respect of job-benefits, 60% overall current respondents were satisfied (2003: 27%).18% of IRS, 39% of NRS, and 23% of RRS).

Transparency and equity is recognizing and rewarding superior performance: Overall, 51% of the respondents agreed that superior performance was recognized in the Center (2003: 35%). 30% each of IRS and NRS, however, disagreed.

However, several respondents expressed a view that the recognition and rewarding processes left scope for improvement in terms of perceived transparency and equity. The Center may wish to further explore these concerns and institute appropriate corrective measures that would restore employee confidence in the fairness of these processes.

On the positive side, with regard to Outreach Locations – Head Quarters Interface: Overall, 64% (2003: 25%) of the respondents expressing a view from outreach locations agreed that people at head quarters took into account their locational issues and requirements when decisions were made; this matches well with the 62% of the respondents from head quarters agreeing that people at outreach locations appreciated the overall context in which decisions were made at head quarters.

7.3 Stakeholders Survey –2005-06

As part of the Review Process, the Panel had the benefit of interaction with several stakeholders of WorldFish comprising donors, partners, and other CGIAR Centers collaborating with WorldFish. Key points and issues that emerged from these discussions have already been dealt with in Chapter 5.

7.4 Human Resources

7.4.1 The Most Valuable Assets

Without a doubt, human resources are the most precious assets of any knowledge-worker-centric research organization such as WorldFish. How well the Center's personnel policies and programs are devised and administered, and how well the organizational culture is developed to be conducive to alignment of employees' interests and aspirations with the Center's goals and mission, will be key to its timely and successful achievement of its objectives.

And yet, this has been an area of concern to the Center. The 1999 EPMR referred to a transformation process in progress (not considered achieved) that was addressing, among other issues, the problems of *a fragmented senior management and uneven performance and contribution of both national and international staff*. Several initiatives were launched, especially after the relocation to Penang, in updating certain policies and procedures (Appendix 7.1).

By 2000, salary structures for most of the regional offices were in place, as were the first set of policies and procedures for the new Head Quarters. A Center-wide Staff Attitude Survey was commissioned in 2001 (with 157 or 92% of the relevant population participating), the findings of which were not entirely flattering to the Center: Communications processes were a source of moderate to serious dissatisfaction with some 45% of the respondents, 70% felt management effectiveness was moderately to significantly poor, 70% dissatisfied with career development practices, and 56% of the staff were neutral in their response to their working relationships with their supervisors. Somewhat incongruently, 58% were satisfied with the Leadership, and 70% were satisfied with Teamwork at the Center.

Another Staff Opinion Survey in 2003 (with 182 or roughly 60% of the employee population) brought out the following least favorable responses, figures in parentheses reflect % of favorable responses): sufficient staff strength (36%), rewarding superior performance (35%), satisfactory communication of procedures and policies (34%), authority to fix work related problems without supervisory approval (33%), happiness with steps to improve communications since previous survey (31%), satisfactory input support from other units/divisions (30%), and good staff benefits (27%). 25% of the respondents said Head Quarters staff did not take their location into account when decisions were made, and 79% said, they were, overall, dissatisfied with their pay The last finding needs to be seen in the context of the composition of the respondents, some 84% of whom were nationally recruited staff, with a vast majority from Malaysia, Philippines and Bangladesh.

The results of the Panel Staff Survey in 2005-06 have been commented upon earlier in Section 2 of this Chapter. A key message emerging from the comments of respondents is that the HR function needs to be seen more widely by employees as a facilitating and equitable function professionally developing their capabilities and careers, and by management as strategically building internal capacity and enabling effective marshalling the Center's human resources,. The function should establish relationships at the grass root operations levels by continuous interactions and field visits, and earn the confidence of people that in HR they have an empathizing associate.

Major steps for improving people management are reported to be in hand; some of these have also been initiated (Appendix 7.1). Job evaluations are fully implemented across the Center, with the help of external consultants, salary structures have been reviewed and updated, Center-wide training needs are being consolidated and appropriate budgetary allocations obtained, a OneStaff concept is being adopted minimizing category-based distinctions among employees, which has emerged as a major irritant in the Center's human resources administration. The Panel appreciates the recognition of these imperatives and suggests that the Center pursue implementation of these initiatives on a priority basis, and ensure clear communications and administration of such policies with equity and transparency.

7.4.2 Staff Development

It is important that leadership skills are developed at various levels in the organization. Appropriate training programs need to be designed and delivered on a continuing basis, to enhance leadership qualities in the organization as a whole.

From 1999 to 2004 staff development appears to have been on an *ad hoc* train-as-you-go basis. There is little evidence of any systematic assessment of training needs based on job requirements and employee performance feedback. In 2005, an explicit budget was set up for training and development of staff members. Training needs analysis were conducted based on the performance appraisal feedback and training plans were developed. Human Resources function coordinated center-wide training programs during 2005, listed in Appendix 7.2.

Impressive as this training performance is (some 212 staff, some 69% of the total, were covered), leadership development courses covered only 16 employees. Excellent technologists, scientists, and other technocrats at operating levels could often find their supervisory, communications, and inter-personal relationship management skills, need strengthening so as to enable them to lead their teams successfully. The Panel suggests that the Center ascertain such leadership skill requirements and arrange for appropriate leadership training initiatives.

Based on our Staff Survey responses, there may be a case for articulating the processes involved in identifying employee training needs, selection of training programs, and nomination of staff to such programs. Such training and development inputs may be necessary not only for research personnel but also those in staff functions, as a measure of updating and upgrading their professional skills, to better serve the interests of the Center.

7.4.3 Enlarging the Scientists Pool

The Center has an uphill task in terms of recruiting, replenishing and strengthening its science pool (Chapter 4, for related discussion). While there have been some heartening instances recently of acceptances, the general trend still appears challenging. The situation seems to be further exacerbated by the dearth of appropriate talent in the required disciplines internationally. Some initiatives to attract such talent have been initiated by the Center, with the terms and conditions having been posted on the FishNet in 2003-04.

Another possible option to meet this situation could be to tie up with renowned educational and research universities and institutions, in doctoral and post-doctoral

programs in aquatic resources and their management, such that scholars are able to contribute to the Center's work while at the same time pursuing their research degrees and distinctions. This may supplement current efforts to get visiting scholars and scientists to work at the Center concurrently with their ongoing affiliations. The Panel suggests that Center consider developing such schemes as a measure of not only encouraging quality research in fields of its interest but also, in the process, mitigating its own problems of finding appropriate scientific resources for its work.

7.4.4 Performance & Potential Appraisals

WorldFish has had a reasonably satisfactory process of Performance appraisal management. This is now being strengthened, to take into account the requirements of the matrix management structure currently in place. Finalization of the design elements will be undertaken, with the help of an on-line survey of staff members, discussions with a special task force and extensive debate among senior leaders. It is expected to be rolled out in 2006.

The objectives of the Performance Management System (PMS) at WorldFish are to:

- Assess past performance
- Assess competencies
- Link rewards to performance
- Assist in annual Planning of objectives/targets
- Identify training needs, and,
- Facilitate continuous performance improvement

While the importance of potential assessment is recognized, it will not, quite correctly, be part of the Performance Management System. It will be a separate, stand alone system for consistent high performers and a part of a separate Succession Planning System. Potential ratings would be confidential and would be used in considering employees for higher responsibilities.

Considering its importance in the staff planning, retention, rewarding and replacement cycle, the Panel suggests that high priority be given to the finalization, implementation, and clear employee communication, of the revised performance management system and the potential appraisal initiative.

7.4.5 Succession Planning and Management

Senior Management Turnover

The Review period also saw several departures from executive management at the levels of Director General, Associate Directors General and Directors. Succession to the position of Director General was managed by the Board and it is creditworthy that the incoming DG was in place even while the outgoing DG was preparing for her departure. Finding suitable successors especially at senior levels, such as for example, the Director of Corporate Services, that took close to ten months, or the Chief Financial Officer which position was vacant for some 8 months, both in 2005, has not been easy. While during the interregnum, next-line staff appear to have responsibly coped with the situation, there is little doubt that strategic counsel and contribution expected from senior functionaries was unavailable to Center management during such periods.

Succession planning and smooth transition at senior levels are key to the stability and ongoing success of an organization. Unscheduled separations are indeed a problem, but

will have to be addressed, partly by in-house development of appropriate second line of officers and perhaps, where possible and appropriate, by outsourcing the roles to external consultants until suitable successors are in place.

7.4.6 Staff Demographics & Gender Diversity

As of January 31, 2006, there were 307 employees on the rolls with WorldFish (Appendix 7.3), of which female staff accounted for 109 or some 36%. This compares quite favorably with the CGIAR average of only 27% women as of April 2003. Among the 42 PhDs, women accounted for just 5 or 12% of the total; this is significantly lower women representation when compared to the CGIAR average of 20% women in the category of Scientist Staff. Internationally Recruited female PhDs at the Center account for 14 % of the total numbers in the category (29). Regionally Recruited female Staff (RRS) account for 58% (CGIAR average 32%) of the total RRS (12 staff members) and Nationally Recruited female Staff (NRS) account for39% (CGIAR average 28%) of the total NRS (253 staff members). In either case the WorldFish gender balance is superior.

Employee Attrition

Staff Turnover at WorldFish (Appendix 7.4) over the Review period (19.7%) was found to be high; though this seemed to have improved in 2002 (9.7%), an upward movement since then (2005: 19.7%) is a cause for concern (Appendix 7-6). Some functions appeared vulnerable to very high turnover rates: Information Technology (31%), Finance (32%), and Human Resources (20%) saw significant turnover rates on average over the Review period. It should be remembered, though, that the Review period witnessed a relocation of Headquarters, that led to separation of 67 NRS out of a total of 107 in that category, adversely impacting averages. On a relatively more stable-state basis, from 2001 to 2005 (October), the overall average is still 17%, and some functions like IT (27%), Finance (30%) and Information, Communication and Publications (22%) continue to be sources of concern. These attrition rates overall seem to be excessive in a CGIAR context, where overall departures during a study period of 20 months to April 2003 was reported at 10%, being considered an *acceptable* rate. The Panel was informed that containment and management of attrition levels in the Center would be a key HR priority in 2006. While appreciating the unique employment situation in Malaysia (where close to 30% of WorldFish employees are located) with its low unemployment levels and consequent higher mobility of employees, the Panel suggests that this issue is addressed on a priority basis and appropriate remedial measures introduced to contain staff attrition.

It is essential for an organization to know the profile of the people who depart, why they leave, and where they go; without such information, no worthwhile human resource strategies could ever be successful. While the cost of staff turnover may not be entirely eliminated, and perhaps it may even be desirable that a small percentage of employees do leave for mutual benefit, lack of information analysis on departures is a data gap that needs to be plugged immediately. It is understood that exit questionnaires are collected and in some cases interviews are also held, but this is limited to Headquarters only. The Panel suggests that the Center immediately strengthen the information system to collect reliable and validated data on all departures through an exit interview mechanism with senior line and human resources managers being present at the time, preferably without the immediate supervisor in attendance.

Staffing Plan and Recruitment

With the development of the 2006 budget, Discipline Directors and Division Heads have been requested to identify the existing skills set of staff and also the planned skills set required for the next 2-3 years. The surplus or shortage of skills derived through this analysis, together with estimated attrition could then be used to develop a staffing plan and recruitment strategy. The plan is expected to be developed by early 2006.

Two of the metrics the Center gauges its recruiting-effectiveness are "time to fill" and "cost per hire". The Center's experience in terms of recruitment-to-reporting time is said to be some 10 to 12 weeks (four for advertisement and response, two for candidate short-listing, one or two for phone interviews and two to four for personal interviews) for filling international positions (There have been significant deviations from this average time frame. See concluding paragraph in this section below). A further two to three months may be required before the selected candidate joins in. The cycle time is shorter, about four weeks, plus joining time for local recruitments.

Time and cost per hire metrics currently used by the Center do not, however, measure effectiveness in terms of effectiveness of hires. The Center plans to design effective metrics for this purpose by mid 2006. The Panel suggests that such quality measures also incorporate retention inputs that would indicate the effectiveness of the hiring program, as indicated by the time duration each recruit stays with the Center before any separation. Shorter timeframes between recruitment and separation may indicate any scope for improving recruiting practices, and more importantly, for reviewing candidate specifications for jobs. For example, in the Panel Staff Survey, overall 17% (11% IRS, 22% NRS) of respondents felt their work profile was not in line with what they were told at the time of recruitment or promotion. Even though the numbers may not be large, such perceptions may create unnecessary discontent, and in some cases may also lead to separation. Considering the future work plans of the Center and the need to be fully staffed in terms of skill requirements at all times, the Panel suggests that the staffing plan for 2006 be implemented on a priority basis through the appropriate skill-set inventorying and gap analysis, and building in estimated attritions and hiring effectiveness criteria.

There were 11 vacancies (Appendix 7.5) remaining to be filled as of January 31, 2006. Of these, six were PhD positions, including the Discipline Director for PESS and a Scientist for Fisheries Resources Management, both of which are pending from Mid-2005. The Panel was informed that the position of PESS Discipline Director was being re-advertised. The Panel suggests that the Center explore some innovative measures such as for example, head hunting by professional placement firms, or focused announcements in appropriate universities, and so on, would help in quicker recruitments.

Employee Engagement

The Center had set up a Staff Advisory Committee, especially after the feedback from the Staff Survey conducted in 2001, as a forum to interact with employees periodically; this has been inactive since 2004. In part, the communications need is met by the regular weekly/ monthly newsletters and updates the Director General addresses to all staff, but this does not permit two-way communications between employees and the center management. The Panel is informed that the Staff Advisory Committee is due to be reactivated soon, and suggests that this be done as soon as possible.

7.5 Finance, Accounts, & Audit

7.5.1 HQ and Regional Offices Accounting System

Headquarters accounts were maintained using Platinum software, a package with limited capabilities, until August 2005 when the systems migrated to SAP. All regional accounts have been maintained using MS Excel or equivalents, except for Egypt which migrated to SAP in October 2005. The function has been reporting to a senior executive at the level of Associate Director General; in October 2005, a Chief Financial Officer has joined as head of the function.

Financial Operations

Appendix 7.6 sets out a Statement of Activities from 1999 to 2005; Appendix 7.7 presents a Statement of Financial Position from December 1999 to December 2005; Appendix 7.8 sets out financial indicators; and Appendix 7.9 sets out the position of cash and cash equivalents from December 2000 to December 2005, held Headquarters and other locations.

Reserves: A Problem of Plenty

The Center reported operating deficits in 1999 and 2001. Since then it steadily built up its reserves to US$ 10.6M as of, 2004; this trend has since been reversed, leaving the Center with reserves of US$ 8.7M at 31 December, 2005. Working Capital Indicator (a measure of number of days cover for cash expenses) which was 72 days in 1999 steeply increased to a high of 272 days as of December 2004, but came down to 200 days as of December 2005. Although the buildup of reserves, especially through operating and cost efficiencies, may be suggestive of good financial stability, such accretions as a result of under-spending on research or allied activities, as has generally been the case here, would not be appropriate.

This level of reserves also compares unfavorably with the CG norms that suggest a range of 75 to 90 days of working capital cover. The Center Board is alive to this situation, and is actively looking at appropriate investment proposals that would bring down the excess reserves to a more acceptable 100 days range, while meaningfully achieving the Center's approved goals. The Center has already moved in this direction: besides the drawing down of US$ 1.9 M in 2005, its 2006 Budget, approved by its Executive Committee on December 7, 2005 in a tele-conferenced meeting, approved by the board out of session (by email) and, and awaiting Board ratification in March 2006, visualizes a further drawing down US$ 1.2M from reserves to meet projected expenditure, with a 2006 year-end projection of US$ 7.6M, equivalent to 143 days of working capital cover. If achieved, this would be a commendable effort.

Given the importance of maintaining reserves at prudent and yet not unduly excessive levels, ***the Panel recommends that the Center continue to accord this matter very high priority and importance so that necessary and appropriate allocations are expeditiously approved and utilized.***

Imputed Rental Charge to Projects

The CGIAR System encourages its Centers to recover their indirect costs fully by charge to the projects wherever identifiable. The Center's Board at its meeting on 4th March 2002, approved (Agenda Item 37.3) a management proposal "to develop a full costs recovery

system and implement the strategic steps for recovering indirect costs," as detailed in the proposal, which *inter alia* also included an assertion that such practices should comply with Generally Accepted Accounting Principles and International Accounting Standards.

Following this approval, the Center adopted full cost recovery method for recovering costs from donors, from 2002 onwards. In computing such indirect "costs", the Center included imputed (notional) rentals for Headquarters facilities at Penang market rates, even though the land which on which the facilities stand were leased to the Center by the Malaysian Government at a nominal annual rental of RM 1000, and the buildings and facilities were put up using grant funds in the unrestricted core funding category. During the years 2002, 2003 and 2004 a total of US$ 1,426,591.73 has been charged as imputed rent to various projects under this full cost recovery system. Out of this US$ 57,754.38 has been charged to projects in the restricted category which led to increase in profits of US$ 42,281 in 2003 and US$ 15,473 in 2004. Similarly US$ 945,282 was charged in 2003 to Core unrestricted projects and US$ 423,555 in 2004. These did not impact profits but led to increases on both the income side and expenditure side by US$ 1,368,837 (reflected higher utilization of donor receipts and higher expenditure on projects by the Center).

In following this practice, which, the Panel is informed, was at all times in complete good faith and believing it to be appropriate and legitimate, the Center appears to have been guided by a desire to "provide for substantial regular maintenance investments," to keep the infrastructure at international standards; this was sought to be done by, charging rental to all programs and units based on their space utilization. The Board was indeed briefed on the implications of the full cost recovery scheme, but whether it was informed of management's proposal to compute notional rents for this purpose at market rates in unclear, since the agenda notes do not make any specific reference to such intent, nor did the Panel's telephone discussions in February 2006, with the then Board Chair clarify the position. The following comment in the proposal placed for Board consideration however is worthy of note: "This [the full cost recovery system] is a departure from present CGIAR practices and should be similar to practices used in the for-profit sector but without the mark up for profit." How such a notional rental charge at market rates would be consistent with no mark up for profits is a question that does not seem to have been raised or addressed!

Independent auditors have also drawn attention in their Management Letters to these recoveries; minutes of the Audit Committee and Board meetings, where these letters had been tabled for consideration along with the financials, do not record any detailed discussion on the subject.

The Panel has been informed that "the intention of this procedure was to use rental as a general charge to defray a variety of indirect costs. The rental charge did indeed exceed the costs of the (nominal) rent charged by the Malaysian Government and the basic (pro-rated) facility maintenance costs, but even with this additional income the full costs of the project were never met." The Panel is further informed that the charge has been made only where the donors have consented to such a charge.

The Panel finds no justification for a charge which admittedly was in excess of actual rental and maintenance costs, pro-rated. If other overheads remained unrecovered, it would be logical for the Center to have identified them and charge the projects

specifically, rather than bundling them with a rental recovery. It is not also clear if the donors had been informed of this bundling of other indirect costs in the rental charge, when obtaining their consent.

The Panel is informed that this practice of recovering imputed rents has been discontinued from 2005, in respect of core fund projects but continues in case of grant projects; the fact of such discontinuance in case of core fund projects, though, does not appear to have been reported to, or approved by the Audit Committee or the Board.

Given the status of WorldFish as an international not-for-profit organization, having regard to the letter and spirit of the agreements with the Malaysian Government in respect of the leased land, and to ensure that as a CGIAR affiliate, the Center follows the best practices in accounting and reporting, ***the Panel recommends that the Center should revisit and comprehensively review this recovery methodology in all its aspects, seek directions from the Audit Committee and Board urgently, and adopt an appropriate policy that would be consistent with the its Constitution mandating it as not-for-profit organization, and in full compliance with the Host Country and Land Lease Agreements with the Malaysian Government, and transparent disclosure to, and concurrence of, the donors, if any such recoveries are to be continued or commenced afresh.***

Purchase Order Accruals

The Center has been accruing costs at year-ends in respect of services not yet received, in line with general guidelines relating to recognition of These are against restricted funds where the expenses would not be recovered from the projects if not spent or provided for in the same year. Accruals of this nature were US$ 62,471 in 2001, 44,567 in 2002, 205,413 in 2003, 135,133 in 2004, and 679,022 in 2005. No specific concurrence from the respective donors appear to have been received for such accruals..

According to CGIAR guidance on accounting policies, expenses are to be recognized when a decrease in future economic benefit related to a decrease in an asset or an increase in liability has arisen that can be measured reliably. Under International Accounting Standard 37, accrual represents liability to pay for goods or services that have been received or supplied but have not been paid, invoiced or formally agreed with the supplier. Independent Auditors have highlighted these departures from sound accounting and reporting requirements in their Management Letters, with neither the Management nor the Audit Committee / Board acting upon such comments.

The Panel understands that this practice of accruals has been discontinued effective 2005, and any amounts remaining to be spent as of December 2005 are planned to be reversed. There also appears to be a view that project expiry dates do not cover any *post* project publishing or other similar consequential expenditure, and as such it may not be incorrect to make such provisions for a limited period after project closures. Without the concurrence of donors, such a view taken unilaterally would be unjustified, since in principle, it would be violative of accepted accounting practice. The independent auditors may take an appropriate view at the time of certifying the 2005 financials later in February, 2006.

Investment Policies and Cash Management
The current investment policy approved by the Board in September, 2004, allows the Center to invest funds in different risk-averse, interest-bearing financial instruments such as Fixed Deposits, Bonds, Warrants, and so on. Investments may also be made in the currencies of receipt and expenditure, to minimize transaction losses. The Center is to be complimented for instituting robust investment currency management policies since 2004.

Surplus cash management initiatives at the Center, however, require strengthening. Substantial cash balances are retained in non-or-low-interest-bearing bank accounts, instead of being swept into term deposit accounts earning reasonable interest. For example, as of 31 December 2005, cash and equivalents held at Head Quarters and other locations amounted to US$ 12.5M, of which US$ 4.0 M was held as cash in bank accounts.

The Center needs to further refine its system of cash forecasting which is an essential part of a good treasury management regime. Rolling short-term forecasts would help the CFO to ascertain the immediate cash needs of the Center and place surpluses in interest-bearing term deposits with varying maturities. The Panel suggests that the Center introduce such a cash forecasting and management mechanisms to better utilize surplus funds.

Fixed Assets Management
No evidence was available to suggest any physical verification of assets at different locations; lack of such a basic control mechanism may lead to leakages and potential loss of property.

The Panel suggests that the Center institute a program of physical verification by the Center officials, at least once a year, and certified by the Officer-in-charge of each location. The Audit Committee may seek from the management a confirmation of such a Program being implemented and periodically note the results of such verification and any consequential write-off actions.

7.5.2 Budgeting & Management Information Reporting

The Annual Budgeting Process
Currently, the Center's budgeting process begins sometime in September, with budget owners being asked to submit budget requests in a prescribed format; the aggregated responses are analyzed by discipline, activity type and so on, all of which help to match projected activity levels and expenditure with expected core funding, as well as to assess the budgeted fit with the Center's strategic objectives. A key element of the process is the allocation of all staff time (measured as Full Time Equivalents) to one or more projects. An important feature of this time allocation process is that scientific paper writing is also specifically assigned to a Paper Writing Project for each discipline which would help in tracking optimal utilization of available time and following up on publications.

To a large extent, the Center appears to follow the principle of "planner being the doer" so that there is budget ownership established on the part of executing science personnel. The process usually culminates in a draft budget which is then ready for Board consideration and approval.

Ideally, the budget should be ready and approved before the beginning of the budget year. Meeting schedules as at present do not admit of this discipline. For example, the 2006 budget will be tabled for Board consideration only in March 2006, nearly a quarter into the budget year. The Executive Committee, through a tele-conference in December 2005, discussed and approved the draft 2006 budget for Board approval in March following. The Panel is informed that the Trustees (meeting out of session) approved the budget by email communications, and this approval will come up for Board ratification in March 2006. The Panel suggests that the Center give consideration to advancing the budgeting time schedule on the one hand, and deferring the Board meeting on the other such that the full Board could have an opportunity to interactively discuss and approve the Budget at a meeting before commencement of the budget year. This suggestion may be easier to implement if the Board meets more often as suggested by the Panel.

Management Information

Information and communication have been identified as one of the five essential components of the COSO Internal Control Framework, which is widely recognized as an essential management tool. Management information, to be of practical value, should be timely and relevant; voluminous collection and presentation of data is no substitute for duly processed information tailor-made to suit the need so of the managers.

The Panel was informed that a comprehensive financial information reporting regime has now been finalized and will be in place effective 2006. Apart from monthly and quarterly updates on the financial position, this package is also intended to provide management accounting information to project managers and other activity heads; with the introduction of SAP, it is planned to provide on-line reporting on a continuous basis, and will become comprehensive when all outreach locations also begin keying in their transaction data on a continuous basis. These are significant improvements which should help better control over operational management at the Center.

While undoubtedly a wide variety of data and information are available at the Center, the Panel's observation during this review was that the storage was generally dispersed making access and retrieval difficult and time consuming; there are of course important exceptions, but in most cases, managers were hard put to provide information, and often depended upon their own personal knowledge and record keeping. As the Center grows in size and complexity, this backup mechanism is unlikely to withstand future demands. The Panel recognizes that changes in personnel and organizational structures can exacerbate these issues, as seems to be the case following the relocation from the Philippines, in several instances.

Introduction of SAP provides a valuable opportunity to streamline the information collection, processing, and delivery mechanisms; the Panel notes that this task is already in hand, The Panel suggests that the Center gives due consideration in this process of gearing up management information systems, not only to converting existing processing routines as they are but also to reassessing and integrating data capture and information access in a cost-and-effort efficient manner.

7.5.3 Internal Control & Risk Management

Internal Control

No formal internal control reviews appear to have been carried out at the Center during the Review period, except perhaps to the extent the Center's independent external and internal auditors may have attempted for their purposes. It is important that executive management assures itself through an internal self assessment that adequate control mechanisms are in place, and are being complied with. Given the nature of accounting processes and reporting practices at the Center, both to the Board and to executive management for operational purposes, the Panel considered it necessary to attempt a limited assessment of the adequacy of the Center's internal control systems consistent with its size and operations; this was done by a Control Self Assessment exercise carried out by the Heads of the Finance and Human Resources functions at Head Quarters. The Self Assessment Questionnaires were derived from the COSO Internal Control Framework, and were simplified to meet our limited needs. As a test exercise, such assessment questionnaires were administered in respect of randomly selected processes relating to accounts payable, managing human resources programs, planning and acquiring personnel, payroll, and employee training and development. The Panel would like to record its appreciation of the support provided by these two functions in carrying out this exercise.

On a preliminary scrutiny of these responses, control initiatives in the selected processes seemed to be adequate. Assessments, though, have been made only in respect of processes at the Head Quarters, even though they were intended to cover the Center as a whole, including outreach locations. It should also be mentioned, that in some cases, on further inquiry, assessment responses were modified by the assessors; the robustness of the responses therefore needs to be revalidated by the respondents themselves and preferably by an independent agency such as the internal audit function to ensure that the responses were indeed appropriate.

All this, of course, does not imply that there have been no improvements at all in this area. On the contrary, many of the initiatives put in place (or planned) in recent months and years would in fact help to correct control deficiencies in the organization. Control assessment exercises such as these, are intended to help management and the Board to identify high-risk control weakness potential and institute remedial initiatives in time, and to that extent should be viewed as an aid to management.

The Panel suggests that formal internal control assessments be undertaken by management, covering all aspects of the Center's activities, and validated by the Internal Audit function; that the exercise be updated every second year, or more frequently if felt necessary; and, the Audit Committee and the Board keep this as a routine agenda item for consideration and necessary direction, at their meetings.

Risk Management

No systematic demonstrable risk management mechanism seems to have been in place until in March 2005, at the initiative of internal audit, the Board approved a Risk Management Framework for WorldFish. An update of the summary of Center-wide High Level Analysis, first completed using this Framework was presented to the Board

in September 2005, focusing on trends in the risk likelihood ratings which reflect developments since February 2005. The update is based on discussions of the Director of Internal Audit with WorldFish managers, and has been reviewed by the management team. WorldFish Risk Management and Internal Control Policy clearly lays down that a risk coordinator selected from within the Center's staff (or a Risk Management Coordination Committee) provide a focal point for integrating the results of risk management activities throughout the Center and supports management and the board in the preparation of Center-wide assessments and reporting. The Panel supports this suggestion.

The Panel suggests that in line with policy approved by Board in 2005, the Center designate a senior staff member for integrating the results of risk management activities throughout the Center and to support Management and the Board in the preparation of Center-wide assessments and reporting. Risk management is clearly a management responsibility with Board oversight; Internal Audit should only be required to periodically evaluate the effectiveness of the risk system and report to the Audit Committee and the Board.

The Panel further suggests that this work be continued further in initiating a risk management approach enterprise wide including various outreach locations prioritizing perceived high- risk geographies.

7.5.4 Independent External & Internal Audits

Center operations are subjected to external and internal audits mainly at the Head Quarters. A few audits have also been carried out at regional sites in other countries.

External Audit

Independent Auditors' Management letters were made available to the Panel only in respect of 2002 to 2004. 2005 audit was being completed at the time of our review and hence no such management letters were issued, but during a telephone discussion in February 2006, the auditors did not highlight any major areas of concern, especially since the practice of imputed rental recoveries and purchase order accruals (referred to earlier) had been discontinued.

At the Panel's request, the Center arranged for the Panel an executive session with Ernst & Young, with a Partner and Senior Manager participating. The Panel was informed that KPMG in Penang, the auditors in 2001, did not respond to a request for a similar executive session with the Panel.

At the executive session, the Independent Auditors highlighted the fact that their observations in Management letters had not been duly heeded, they had little or no access to the Center's internal audit reports before finalizing their financial audit and certification; they were generally concerned at the turnover of staff in the finance and accounting function as well as the lack of coordination between them and the internal audit function.

These and other related issues have been dealt with, and suggestions for improvement made, in Chapter 6 on Governance.

Internal Audit

The Center's internal audit requirements are met by the CG Internal Audit Unit of which the Center is a founding member.

Internal Auditors completed 28 audits at HQ and at the regional and outreach sites from 2000 to mid 2005. (There was no internal audit carried out in 1999). In August 2005, Internal Audit conducted a review of the implementation status of recommendations from 2000 to mid-2005; details are provided in Appendix 7.10.

In all, 354 audit recommendations had been made in the internal audit reports during this period, of which 94, or some 25% were either not implemented or implementation was under way. Of these, 85 recommendations related to reports in the years up to December 2004; this is a significant number and the Panel suggests that the Center review these recommendations and report to the Audit Committee on their implementation.

While overall the quality of internal auditing was good, the five-year coverage frequency of major areas may be too long. The Panel suggests that a risk-based internal audit plan be drawn up for approval of the Audit Committee, with all major locations and processes being covered at least once in two to three years based on their risk ranking.

Implementing accepted audit recommendations is a management responsibility. While the internal auditors themselves may review implementation of recommendations during subsequent audit assignments, it is for the Center management to follow up on accepted recommendations and ensure their implementation. The Panel suggests that the Center nominate a senior executive, for example the CFO, as the focal point for tracking implementation of internal audit recommendations and reporting to the Audit Committee.

7.5.5 Compliance, IP and IT

Legal Status & Local Compliance, Intellectual Property

a) Legal Status & Local Compliance

WorldFish as an international organization, has its own Constitution (amended as of 1999) and functions on the basis of host country agreements with the governments of the countries it operates in. Currently, it has such agreements in Malaysia, the Philippines, and Egypt; documentation in respect of other countries and projects are reported to be in various stages of negotiation and execution.

Even though WorldFish is an international organization and has a measure of immunity in its host countries for its staff and its operations, there would still be certain laws and regulations (such as those relating to staff employment, contract services, employee taxation, employee retrial benefits, and so on) that apply to the Center, non-compliance with them leading to penal consequences. At present, the Center does not have a regular compliance certification process in place The Panel suggests that the Center develop reliable checklists of compliance requirements, in consultation with local legal counsel in each country and ask its Officers in Charge at each location to certify periodically appropriate compliance, for regular tabling at Board meetings.

Apart from one litigation in the Philippines concerning the rented premises of the Center prior to relocation (value at risk = Php 400,000), the Panel is informed there were no other litigations pending against the Center in any of its outreach locations or at Head Quarters in Malaysia.

b) Intellectual Property

As a research organization, the Center is constantly adding to its store of intellectual property. As an international organization affiliated to the CGIAR System, virtually all its intellectual property is for public good, and in this background, it is possible that management of intellectual property is not assigned the same importance in such Institutions as would be the case elsewhere. It is important that the Center's intellectual property is well secured and protected, if not for commercial exploitation, then at least for ensuring that its application is under its control and discretionary jurisdiction. Such an approach would help the Center to channel exploitation of its intellectual property to the public causes that it is obligated to serve.

There is some evidence to indicate that IP matters may not have been handled with the diligence that is required, and as a consequence, the Center's rights may have been eroded to the detriment of its capability to serve the public causes it is obligated to. The Center has always had an IP Policy governing its rights and their application, but it is doubtful if while negotiating donor or partnership agreements, these aspects receive the kind of legal scrutiny that they deserve.

In one instance, concerning Center's membership of the GIFT Foundation, issues of IPR have surfaced, a reference to which was made in Chapter 5. Briefly, an agreement entered into between GIFT Foundation International and a private Norwegian commercial firm, "ushered in the involvement of a foreign private firm for tilapia genetic improvement and dissemination in the Philippines," conferred "exclusive rights to the products emanating from the contract, with GFI being responsible for carrying out research for GenoMar, thereby denying GFI any commercial rights to disseminate the GIFT strain." The Panel is informed that this arrangement did not impinge on WorldFish's rights to continue selective breeding with its own set of generation 9 progeny that were its share of the final product of the GIFT project. The Panel is further informed that this position is supported by opinions of independent lawyers and the CG Head of CAS-IP. The Center is now in the process of ceasing membership of the GFI, and assessing and settling any obligations it may have to discharge.

The Panel understands that the Center is now updating its IPR policies and guidelines with the assistance of legal counsel from the CGIAR System. The Panel suggests that this exercise be pursued with utmost urgency and processes put in place to ensure the Center's intellectual property rights are fully protected in its arrangements with donors and partners.

Information Technology & SAP

There is a strong case to integrate IT resources of the Center in a manner that it serves not just as a processing support but also more as a strategic distinguisher in promoting and enhancing the Center's Science and business agenda.

IT services and development are distributed across WorldFish HQ and Regional Offices. There is no single cohesive direction or planning. Projects hire and manage their own programs. The regional offices IT strategies has not been tightly integrated and communicated to Head Quarters. Regional Offices, reportedly, lack standardization of IT infrastructure, direction and connectivity.

On Information Management, the Center can do with more standardization of storing, cataloging and protecting science and corporate information. Electronic information is stored in a distributed manner across many repositories.

An internal papers (2005) that the Panel was provided with, observed that IT was not very pervasive in the science areas of WorldFish and so far, there has been lack of efforts to explore the possibilities of using IT for advancement and improvement of science and research. The Panel is informed that this subject is now being addressed by a special team constituted for the purpose, and hopes this would help to bring about access and efficiency improvements in this important field.

a) SAP ERP Project

A major decision to go in for ERP was taken in September 2004. Following a due tendering/ selection process, SAP was chosen as the preferred ERP. It has been introduced in Head Quarters and Egypt, with other locations to follow. The Center uses the Financial Accounting, Project System, Material Management, SAP Business Workflow, Management Accounting, Travel Management, and the Business Intelligence Tool modules. The Human Resources module is scheduled for implementation later. The Center has acquired 70 licenses with a further ten being planned in 2006.

The total cost of implementation is US$ 672,000. The recurring cost is estimated to be US$ 22,000 per annum plus cost of two personnel who are dedicated to this project. It may be noted that in this selection and acquisition process, the Center did not avail of any advice or assistance from the CGIAR System's Information Technology Coordination Unit, which arguably could have contributed to more optimal choices as well as possibly lower costs.

In the context of WorldFish's present and near-term size, this is clearly an expensive, though useful, acquisition. The Panel suggests that the Center, as a cost-containment exercise, actively pursue and bring to closure ongoing discussions with IWMI for service sharing arrangements, having due regard to the requirements imposed by the Host Country and Land Lease Agreements with the Malaysian Government.

7.5.6 Shared Corporate Services

The Board at its September 2005 meeting, discussed the concept of sharing corporate services IWMI, partly, though not primarily, as a cost containment exercise, and possibly also as a precursor to closer alignment in other science related fields. A Joint Corporate Services Director on the rolls of IWMI is now in place, located in Colombo, who will head this venture with roughly equal time commitment to either Center. As it stands, at least initially the identity of the units in each Center is expected to be maintained, with the focus being on enhancing service delivery quality and coverage to various locations and activities.

There does seem to be a distinct possibility of potential escalation of such sharing of common services to other Centers in the CGIAR System. There were references to likely merger of shared services functions of participating entities, thereby making this joint service center a consortium of multiple centers, or just outsourcing some of their service needs.

While welcoming such innovative service-enhancement and cost-containment initiatives, the Panel is conscious of management time and attention such ventures involve and hope that this could be accommodated without any adverse impact on its main focus on research. There may also be host-country-prescribed conditions that may militate against facilities being used for purposes other than those for which concessions have been granted by them. The Panel suggests that the Center pursue these initiatives with due attention to these concerns.

7.6 Business Development

7.6.1 Business Development & Resource Mobilization

The Business Development Office supports the growth of the Center and was created in November 2003, in line with a suggestion by the 2nd EPMR, to strengthen this function and help improve focus on identifying and obtaining resources for the Center's work. The move has been worthwhile, with significant improvements in the number and value of proposals, and even more importantly, in the conversion or success rates that have gone up from about 30% in 2003 to over 50% in 2004 and 65% in 2005. The budgeted core and grant revenues in 2006, at US$ 18.1M are significantly higher, and would call for strong and sustained effort. The processes in place and the track record on scaling up in the last two years or so, augur well for achieving increasingly higher targets in the years ahead.

The BDO also played an influential and leadership role in enhancing relationships with some other centers in the CGIAR System and the CGIAR Secretariat in terms of collaboration in marketing and communications; this augurs well for collaborative program funding possibilities. The Panel suggests that these efforts be continued and strengthened to optimize funding potential.

7.6.2 Information & Communications

The focus of this function, which has experienced considerable staff attrition throughout the Review period, is to maximize the Center's impact in developing countries and stimulating demand for its research products through effective communication and dissemination to stakeholders.

The function has also played an important role in the Center's brand makeover during this period; in addition, it has played a key promotional role in the Fish for All initiative in Penang in 2002.

There may be cost and other synergistic benefits in centralizing all publications within a single function, and the Communications Unit may be ideally suited because of its linkages and competencies, rather than spreading the resources too thin around in various departments. The Panel suggests that the Center explore possibilities of centralizing its publications effort to achieve better operational and cost efficiencies.

8 CONCLUSIONS

The ICLARM/WorldFish research programs and structure have undergone several strategic transformations since 1999 in response to challenges and opportunities in the fisheries sector, as identified by several international conferences and changes within the CGIAR, and have led to changes in program focus and structure. One of the most significant changes occurred in 2004 when the Center adopted the matrix management approach of three global disciplines interacting with 6-8 regional portfolios. This was followed by the adoption of a Strategy Update in 2005. The Center has moved quickly to implement the matrix management system over the last year. WorldFish has also modified its staff profile by a redefinition of tasks and a realignment of staff competencies with its Strategy Update and program. While the retrospective aspect of this review has been based on the old program structure, the Panel has extensively commented on the matrix management approach and new strategy and also alluded to the perceived advantages and constraints.

The Strategy Update commits WorldFish to a more impact-oriented and decentralized program based on multidisciplinary research, with a strong emphasis on partnerships and achieving the MDGs from a fisheries and aquaculture perspective, with a focus on poor communities. However, WorldFish is still a Center in transition and management need to develop detailed operational plans to match the goals of the Strategy Update and ensure the matrix approach functions effectively. Financial resources do not seem to have been a critical factor for the Center during the period in review, although they could become a major factor as the Center works to implement its yet-to-be-developed essential programs emanating from the Strategy Update.

Despite the changes that have taken place at the Center over the past seven years, from the relocation of its headquarters, to changes in strategy and programs, the research output has, in general, remained steady, although there appears to be an unfortunate tendency to publish in local, regional and lower profile journals. This is inadequate in relation to other research providers, and may compromise the vision statement "to be the science partner of choice for delivering fisheries and aquaculture solutions for developing countries." Having said this, it is noteworthy that many of the in-house publications of WorldFish seem to be exactly what are required by NARS, NGOs and other partners.

After a rigorous review of the WorldFish research portfolio, the Panel concludes that WorldFish has made some significant contributions to science, and with its partners has generated output and services of high relevance to developing countries, with documented impacts in at least two cases. However, the panel notes that much of the production was from scientists who have left or will be leaving the Center in the next year, and that more recent accomplishments would have been even more significant had WorldFish the appropriate critical mass of scientists.

Although some partners expressed satisfaction about the extent and quality of their partnerships with WorldFish, the Panel' s opinion is that WorldFish should more explicitly define its role and that of its partners on the Research-to-Development Continuum to optimize its contribution to the development agenda. The Center has actively participated in the Water and Food Challenge Program and the System-wide

Initiative on Water Management, and other work with a number of CGIAR Centers. In addition, the Center has played an important advocacy function through its "Fish for All Campaigns" and has created awareness of the vital importance of the fisheries and aquaculture sector in the context of poverty alleviation, and has stimulated political will in both Asia and SSA.

In terms of governance, the Center is positioned well in that many of their institutions and practices are already sound; what is required now is a giant leap as it were, so that the Center excels by international best practices; much of the Panel's recommendations in this regard are indeed geared towards this end. There are external governance dimensions such as performance, disclosure and accountability that would eventually lead to enhancement of corporate reputation. On internal governance dimensions, greater attention to Board processes and participation, independent science advice, and supervision and surveillance over executive management and its performance within a value-based framework are some of the key parameters that would enhance corporate credibility and trust, major ingredients in stakeholder recognition.

Internal management in WorldFish is also set for a step change, looking to the various plans that the Center has embarked upon. An improved financial reporting system is about to take off in 2006; several HR initiatives are in the pipeline, including the One Staff policy that hopefully will minimize perceived disparities in compensation packages of IRS and other staff; risk management in a formal sense is beginning to be applied to the activities of the Center; organizational structures have been refurbished to optimize use of available resources, but the biggest challenge lies in recruiting and retaining an adequate and appropriate pool of scientists and containing employee attrition. Closer interactions with host country governments, the investor community and other partners are seen as keys to growth and success in the years ahead. WorldFish has taken concrete steps to align its vision and mission to those of the CG, and its operations are much in line with the integrated strategic approach adopted by the CGIAR system. In addition, it is planning to play a significant role in the implementation of at least six or seven system priorities. Its interactions with other centers are impressive.

8.1 The Way Ahead

The challenges in world fisheries and aquaculture are enormous, but so are the opportunities to measurably influence trends in global food security and poverty reduction through fish-based research-development solutions. These challenges have influenced thinking within WorldFish and should continue to impact on its work in the coming decade, as already envisaged in the Strategy Update and program structure. The Center has made the strategic decision on what WorldFish will not do. This includes not focusing for the present on either the Caribbean or South America, and, closing its genetic analysis laboratory -- out-sourcing the work as appropriate. Furthermore, WorldFish will not work directly on disease diagnosis, post-harvest technologies, and breeding and culture research, though genetic improvement will be an area of major investment under the Aquaculture and Genetic Improvement Discipline.

The scope of world fisheries and aquaculture research potentially open to the Center is however, still vast. The Center needs to make key choices and limit itself to a few strategic areas and work with carefully chosen partners, and make future investments in science by addressing some of the key themes that have been highlighted in this review,

e.g. poverty in rural communities, environmental degradation, trade, and governance. On a regional basis, the Center should elaborate strategies to take into account the specificities of the different regions, and ensure matching resources to implement the activities. In this regard, special emphasis should be placed on SSA, a region with pressing and unmet needs. However, the Strategy Update does not include direct involvement in Latin America and the Caribbean at least until 2009, at which time the policy will be reviewed. It may however, be short sighted not to at least establish links immediately with relevant research institutes in relation to promoting outputs from WorldFish and developing collaboration – many important North America and European research institutes have solid research bases in Central and South America.

As the unique center that deals with fisheries and aquaculture within the CGIAR system, WorldFish faces a number of difficulties particularly in convincing some that it is producing international public goods. This is due in part to the nature of natural resources management. For example, learning how to develop community-based approaches to management, however, requires actually doing it on the ground in a particular country and accommodating the country specific issues that arise. A particular challenge for WorldFish, and for any Center that has a focus on natural resource management, is that these investments have a degree of geographic specificity and hence the difficulty of producing IPGs is relatively high. WorldFish needs to identify approaches that will enhance efficiency gains and also transform what would otherwise be national public goods into IPGs. To ensure the production of the appropriate IPGs, the Center should at the research planning and prioritization process, specify the expected outputs and validate that they constitute IPGs.

Human capacity building should be seen as an integral component of the long term success of the Center. WorldFish should work to enhance the competencies of its staff and partners through a number of innovative mechanisms, including mentoring and twinning with universities with renowned competencies in key strategic areas of interest to the Center and its clients.

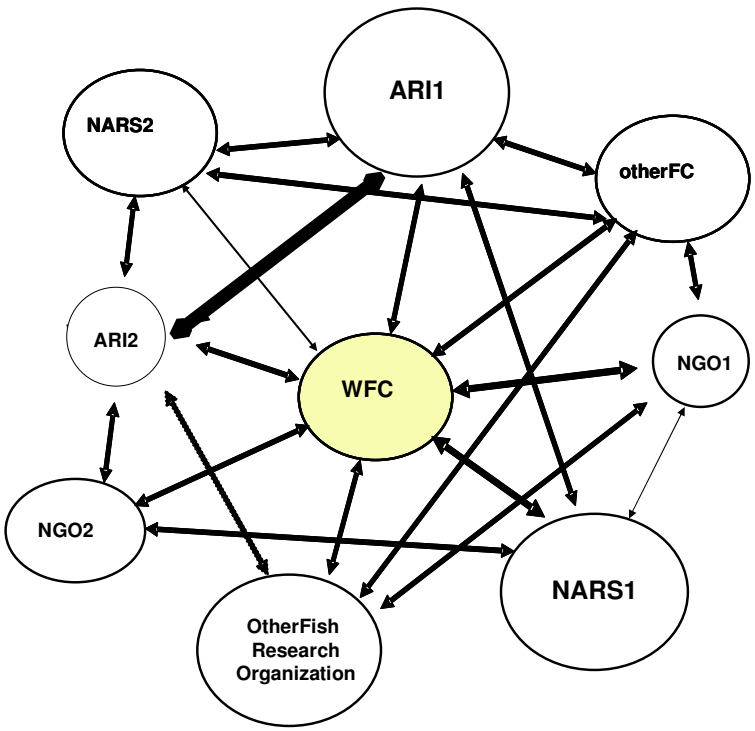
The matrix management approach needs a solid critical mass within WorldFish. To achieve this, WorldFish will need to strengthen efforts in resource mobilization and ensure that research outputs result in discernible impacts. This in part would require a re-thinking of how to position the Center in the international fisheries and aquaculture research landscape. From a conceptual point of view the R-D Value Chain paradigm is linear and polarized (from research to application). Seen from the perspective of this paradigm the conditions to be "the partner of choice" for other organizations are to have fast and efficient access to upstream outputs and to propose adapted inputs to downstream partners. The first refers for the most part to ARIs.

It appears plausible and can already be observed that research investment with a focus on developing countries will increase greatly in the future in the field of agriculture and food research, including NRM, which is one of the bed-rocks of WorldFish. Furthermore, it is foreseen that there could be reduction in specialist type training and that emphasis will be placed on "cross-cutting" disciplines including biotechnologies, computer sciences, system analysis, and human sciences. In addition, the research capacities in emerging countries will propose high quality outputs with sometimes very competitive costs compared to northern ARIs. The result of this larger effort of research could not only be an increase, but above all a diversification of research outputs, with the

development of more sophisticated products (synthesis, global analysis, impact assessments, policy advices) produced by ARIs together with the more classical products (publications) that could respond directly to the demand of developing countries and extension services.

The second point refers to the approaches and mechanisms developing countries will use to attract appropriate research. Even if the local research capacities of many countries will remain rather limited, their ability to identify appropriate partners and to implement and manage direct links with ARIs will in the opinion of the Panel, greatly increase. As a result of these two trends, the concept of interface in the "R for D chain", considered as a structural and vital position, could become obsolete. A more holistic paradigm with ARIs, WorldFish and similar organizations, NGOs and NARSs, as nodes of a network with all possible bilateral relationships and flow of information, could be more relevant.

Fig. 8.1 The Knowledge System Paradigm (Source: 3rd EPMR Panel, 2006).



This paradigm of a "knowledge system" calls for an extensive examination of several points: What could/should be the role of WorldFish in the management of this "reverse chain" (i.e. the flow of information resulting from knowledge dissemination back to e.g. relevant ARIs)? And what could/should be the mode of investment of WorldFish in the partnership with ARIs and development organizations. To be a "partner of choice" (and even to remain a partner), WorldFish should have very efficient roots in some selected ARIs in order to be really a co-producer of basic knowledge of interest and to be so at the first place to use them. This can only be obtained by long term and stable investments (creation of joint or associated laboratories, co-financing of PhD theses, exchange of scientist etc.). The same is worthwhile for development organizations in that WorldFish should continue to collaborate and interact with them in some extension activities and in

building confidence relationships with some NARSs. The cultivation of this "double rooting" imply a move towards a more selective partnership policy and the adoption of a "nervous system" paradigm in which WorldFish is similar to a bundle of neurones connecting very precisely and rapidly, key science players and users through efficient synapses. The Panel observed that WorldFish has progressively established a niche for itself within the CGIAR System; it has also embraced the opportunities and challenges emerging within the System and displayed leadership potential in a number of areas. This together with a stronger platform for partnerships, growth and organizational development which is evident within the Center should facilitate its positioning in this "knowledge system".

The Panel believes that WorldFish has comparative advantages through a combination of attributes to respond appropriately to the challenges at local, basin and coastal zone, national and international levels, taking into account the suggestions made in this review. The primary risk that the Center must guard against is burn out and loss of staff in key positions due to inadequate handling of multiple science and management pressures; while its greatest threat may be an inability to demonstrate impacts on poverty at a scale that attract attention and continued funding.

WorldFish is still under-going a transition. The Panel has raised a number of issues from its evaluation of the Center's Programs, governance, management and finance, and has made recommendations and suggestions for improvement. However, the overall assessment of WorldFish's performance over the period in review is very positive. The Panel confirms that donors' funds have been well invested, and on that basis WorldFish should be a Center of choice for future investments by donors. Looking ahead, the Panel acknowledges that the task will be challenging for the Board, Management and staff of the WorldFish Center, but the Panel is convinced that it is achievable.

APPENDIX 1

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Position: Previous: 1996-2004: Chief, International Institutions and Liaison Service, Fisheries Department, FAO, Rome, Italy;

Expertise: Integrated fisheries development

Education: Ph.D. in Fisheries, College of Fisheries, University of Washington, Seattle (1973); M.Sc. in Fisheries Science, College of Fisheries, University of Washington, Seattle (1972); B.Sc. in Fisheries Science, College of Fisheries, University of Washington, Seattle (1971); Diploma in Agriculture (Equivalent to B.Sc. in Agriculture), School of Agriculture, University of Ibadan, Nigeria (1966).

Experience: 1992-96: Program Coordinator, Integrated Development of Artisanal Fisheries in West Africa (IDAF), Cotonou, Benin, West Africa; 1979-92: Deputy Director of Fisheries, Ministry of Livestock, Fisheries and Animal Industries, Yaounde, Cameroon; 1975-79: Chief of Service, Fisheries and Aquaculture, Ministry of Agriculture, Yaounde, Cameroon; 1973-75: Post Doctoral Teaching and Research Associate, College of Fisheries, University of Washington, Seattle; 1970-73: Research and Teaching Assistant, College of Fisheries, University of Washington; 1967-69: Principal, Farm Settlement Institute and Responsible for Fisheries in West Cameroon, Obang, Cameroon; 1961-62: Agricultural Assistant, Agricultural Research Institute, Barombi Kang, Cameroon. Dr. Satia was Secretary to the Committee on Fisheries (COFI) and to the Advisory Committee on Fisheries Research (ACFR) during1996-2004. He was a Member of the Board of Trustees of ICLARM, now World Fish Center (WFC) for the period 1992-97 and Chairman of the Program Committee of ICLARM during the period 1993-97. Dr. Satia was appointed Chairman-designate of the ICLARM Board in 1996 but resigned to take up the position of Chief (see above) at FAO. He was Chairman of the Fishery Committee for Eastern Central Atlantic (CECAF), Accra, Ghana during 1989-92. From 1981 to 1988, Dr. Satia was Member and Vice-Chairman of the FAO Advisory Committee on Marine Resources Research (ACMRR), Rome, Italy. He has carried out various consultancies for USAID, UNDP, FAO, IDRC, ICLARM, and many other organizations and has been rapporteur for several international meetings on capture fisheries and aquaculture. Dr. Satia has written numerous publications on integrated fisheries development, small-scale fisheries, fisheries and poverty alleviation.

Name: **CHEVASSUS**, Bernard (France)
Position: President of the National Natural History Museum in Paris
Expertise: Fish domestication and fish genetic improving methodology
Education: "Ecole Normale Supérieure" in Paris, University teaching degree obtained, PhD in sciences at Paris-XI University
Experience: Dr Chevassus was until January 2002 research director at INRA (National Institute for Agronomique Research). He has served in various capacities at INRA, including Director General from 1992-1996. He was the Director of Research at INRA's Laboratory of Fish Physiology in Juoy-en-Josas where he developed new methods for genetic for the genetic improvement of aquaculture species.
Since April 1999 he is President of the Administrative Board of AFSSA (French Food Health Security Agency). In July 1998 he was appointed Vice-President for the Biomolecular Gene Committee (CGB), which surveys the requests of dissemination in France of genetic modified organisms. He is member of the Scientific Council of CIRAD (International Center of Agronomic Research for Development). He has been recently appointed a member of World and Environmental Sciences Committee (CCSP) and of the National Natural History Museum Orientation Committee. He chaired the working group "OGM" of General Commissariat. He is associated to many debates and prospective studies on risk analysis and innovation.

He has published about 50 primary and synthesis articles and about 30 vulgarization articles regarding fish domestication and genetic improving methodology. He has been INRA Hydrobiology and Savage Fauna Department Chief (1984-1989), President Adviser (1989-1991) and then INRA Director General (1992-1996). He had participated in many laboratory evaluations, national (ORSTOM, IFREMR, CNRS, CEMAGREF) and int'l programs, in particular linked with developing countries (ICLA-RM in Philippines, global review of CGIAR, reorganisation of Agronomique Research in Guinea and Mali). He was a member of the advisory Panel of the "GIFT" program of ICLARM (1992-1996) and of the experts Panel of the external Review of the CGIAR (1997-1998).

Name: **GONZALEZ, Exequiel (Chile)**
Position: School of Marine Sciences, Pontificia Universidad Católica de Valparaíso, Chile.
Expertise: Economic and social aspects of capture fisheries and aquaculture development and management
Education: M. Sc. in Resource Economics, University of Rhode Island, USA (1993); Professional Title in Fisheries Engineering, Universidad Católica de Valparaíso, Chile (1986).
Experience: During the past 16 years, Mr. Exequiel González' has been working on different aspects of capture fisheries and aquaculture development and management, as well as, on coastal zone management. First in South East Asia with the International Center for Living Aquatic Resources Management - ICLARM (present WorldFish Center from the CGIAR Group) and later in Latin America with the Inter-american Center for Sustainable Ecosystems Development, until May 2004. He is presently working at the School of Marine Sciences, Pontificia Universidad Católica de Valparaíso, Chile. Between 1995 and 1999 he was adjoin professor of Natural and Environmental Resource Economics at Universidad de Santiago de Chile.

Mr. González has also conducted research and technical assistance for fisheries, aquaculture and coastal development and management in Belize, Brazil, Colombia, Costa Rica, Chile, Ecuador, Guatemala, Honduras, Nicaragua, Panama, Spain, East Timor, Australia, Bangladesh, Indonesia, Malaysia, the Philippines and Thailand.

Among the most relevant areas covered by his work are: (i) analysis of bio-economic and social conditions and aspects for the management of national and trans-boundary fishery resources; (ii) bio-economic modeling to assess the performance of marine and freshwater fisheries and aquaculture activities under sustainability conditions; (iii) sustainable development of the small-scale fisheries sector; (iv) valuation of social and economic impacts of fisheries and aquaculture development and management; (v) socio economic evaluation of development strategies in coastal zones and watersheds including: urban development, tourism, aquaculture, fisheries, agriculture and mining activities, among others; (vi) identification and analysis of theoretical, methodological and practical aspects of use rights in fisheries and the design of marine reserves in Chile; (vii) identification and systemization of alternative methods of conflict management in natural resources use; (viii) identification of participatory mechanisms for conflict management in the use of fishery and coastal resources and (ix) risk and social cost-benefit .analysis applied to the introduction of exotic species for aquaculture.

Mr. González has been author and co-author of scientific journal papers, FAO and World Bank technical report series and co-editor of an APEC Secretariat Technical Report on Marine Pests Introduction and Management. He is also Contributing Editor for the Marine Resource Economics Journal.

Name: **BLABER, Steve (Australia)**

Position: Chief Research Scientist, CSIRO Division of Fisheries / Marine Research

Expertise: Ecology, conservation and management of marine fisheries.

Education: PhD in Zoology, Rhodes University, Grahamstown, South Africa (1974); BSc. (Hons) 1st Class in Zoology, University of Reading, England (1970).

Experience: Current position since 2003; 2000-2002: program leader: Tropical and Pelagic Resources, CSIRO Marine Research (as well as CRS); 1998-present: Chief Research Scientist (CSOF8-3) CSIRO Marine Research, Cleveland, Queensland, Australia; 1990-1998: Senior Principal Research Scientist (CSOF8-2), CSIRO Marine Research, Cleveland, Queensland, Australia; April 1983 – 1990: Principal Research Scientist, CSIRO Division of Fisheries, Cronulla – Hobart (Program leader) – Cleveland, Australia; January 1983 – April 1983: Assoc. Professor of Zoology, University of Natal. (Merit promotion).1979-82: Senior Lecturer in Zoology, University of Natal, South Africa. Author of two major books (1997, 2000). At CSIRO Division of Fisheries / Marine Research, Dr Blaber has been leader of several major projects, among the more recent ones are: The conservation and culture of the fish "Terubok" in Sarawak (1993-ongoing); Population dynamics, genetics & ecology of the Hilsa Fishery of Bangladesh (1994-2000); The ecological sustainability of bycatch in the Northern Prawn Fishery (1996-1999); The ecology, conservation and fisheries management of "Terubuk" in Sumatra (1996-1999); The remediation of the barramundi fishery of Papua New Guinea (1998-2003).Dr Blaber is Editor (coastal fishes) of the *Journal of Fish Biology*, and a member of the editorial boards of the following journals: *MEPS, Fisheries Research, Reviews in Fish Biology and Fisheries.* He is author of more than 160 refereed scientific papers plus numerous contract reports, grey literature reports, book reviews and popular articles.

Name: **BALASUBRAMANIAN, N. (India)**

Position: Visiting Professor of Corporate Finance and Strategy, Indian Institute of Management Bangalore

Expertise: Corporate governance

Education: PhD in Business Finance, Bombay University

Experience: Dr. Balasubramanian holds his current position since 1994. He also serves as the Chief Editor of the Institute's quarterly journal, *IIMB Management Review*, and as Chairman of its Center for Development of Cases and Teaching Aids. He combines the benefits of exposure to both precept and practice. His three and a half decades of industry experience includes over twenty years of varied responsibilities in the Imperial Chemical Industries group of companies in India, and for a while in the United Kingdom; Board level responsibilities at Britannia Industries (a former Huntley Palmer and RJR Nabisco, and current Danone Associate); and, a stint as Corporate Executive Vice President Finance at the diversified Wipro Corporation (currently the leader in terms of market capitalization) and a member of its Executive Board.

Balasubramanian is a Fellow of The Institute of Chartered Accountants of India, All India Management Association, and member of several other professional bodies. His published work includes *Corporate Financial Policies and Shareholder Returns* (1993), and as editor and co-editor respectively, *Corporate Boards and Governance* (1998), *Managing Economic Liberalisation in South Asia* (1998), and *Management Perspectives: Essays on Managerial Priorities and Management Education* (1999).

More recently, he was a member of the Central Government Task Force on Corporate Excellence through Governance, recommending measures for legislation and

Name: **SINGHAL, Deepjee (INDIA)**

Position : Plasticizing Chartered Accountant (Partner – Pipalia Singhal & Associates

Expertise : Risk Management, Internal Controls, Internal Audit and Management Review

Education : B.Sc.(Chemistry), Chartered Accountant, India, Certified Internal Auditor – IIA, Florida.

Experience : Mr. Singhal is associated with many professional institutions in India and abroad, in various capacities. These include :

- Member - Academic Relation Committee IIA Inc. Florida 2003-06
- President of Institute of Internal Auditors India, Bombay Chapter in 1998. Also on the All India Council for last three years
- Member - ASSOCHAM Committee on Corporate Governance for the year 2002-2003
- Member - Indian Merchants Chamber Committee on Corporate Governance for the year 2003
- Member - Advisory Board for Internal Audit Services and Core Faculty Bombay Chartered Accountants Society

Mr. Singhal is also a regular guest faculty at IIM-Bangalore on Risk Management and Internal Controls. He has jointly designed course on Internal Audit Studies for Bombay Chartered Accountants Society. He has authored several articles and publications including a research paper on behalf of IIA Inc., Florida, USA, titled "Internal Audit : An Empirical

Framework On Small And Medium Enterprises In The Indian Environment" and "Future of Internal Audit". He has contributed to the development of " Internal Audit", a publication of Institute of Chartered Accountants of India and has been regularly writing articles on Business Risk Management and Internal Audit in "The Chartered Accountant" and is a joint author for Internal Audit article series in the "Bombay Chartered Accountant Journal" since last three years.

He has offered Business consultancy in several areas including Design & Documentation of Systems & Procedures Manuals, Implementation of Systems & Procedures including ERP implementation and Risk Management Services. He has conducted training programs on various professional subjects like RM, Internal Control, Corporate Governance, Assurance, etc. through participation in meets of major corporates in India and in various professional forums of ICAI, ICWAI, IIA, ISACA, NIFM and IIM - Bangalore. He was one of the workshop leaders in program on COBIT at Kuala Lumpur, Malaysia. He has also been organizing training workshops for Audit and Finance Professionals.

APPENDIX 2

TERMS OF REFERENCE
FOR EXTERNAL PROGRAM AND MANAGEMENT REVIEWS
OF CGIAR CENTERS

BACKGROUND

Context

1. The Consultative Group on International Agricultural Research (CGIAR) is an informal association of over 50 members that supports a network of 16 international research centers in agriculture, forestry and fisheries. The CGIAR aims, through its support to the Centers, to contribute to promoting sustainable agriculture for food security in developing countries. Because the Centers constitute the core of the CGIAR, the effectiveness of each Center is crucial to the continued success of the CGIAR (as a System).
2. Each Center is an autonomous institution operating within the mandate assigned to it by the CGIAR, and is governed by a legally constituted Board that has full fiduciary responsibility for managing the Center. To ensure accountability in an essentially decentralized system, each Center is expected to be responsive to the CGIAR, which provides financial support for its work.
3. The CGIAR has established a tradition of External Program and Management Reviews (EPMRs) to provide a mechanism of transparency and accountability to the Members and other stakeholders of the CGIAR System. EPMRs are the joint responsibility of SC and the CGIAR Secretariat, and are conducted for each Center approximately every five years. As each Center is autonomous, EPMRs provide a measure of central oversight and serve as an essential component of the CGIAR's accountability system.

Integrated System of Reviews of Each Center

4. Besides the EPMRs, Center Commissioned External Reviews (CCERs) are undertaken at each Center. These CCERs are commissioned by the Center Boards to periodically assess the quality and effectiveness of particular aspects of a Center's work. The terms of reference (ToRs) for each CCER are determined by the Center, based on broad principles endorsed by the CGIAR at ICW95 (ref. document entitled Improving the Quality and Consistency of CGIAR's External Center Reviews, dated October 24, 1995).
5. EPMRs complement the CCERs by providing a CGIAR-commissioned and comprehensive external assessment of the Center's program and management, especially its future directions and the quality and relevance of its research. The ToRs for the EPMRs (which update the "standard ToRs" endorsed by the CGIAR at MTM95) are provided below. Guidelines for undertaking the reviews are issued separately.

Objectives and Scope

6. EPMRs seek to inform CGIAR members that their investment is sound, or recommend measures to make it so. Members of the CGIAR and other stakeholders can be informed whether the Center is doing its work effectively and efficiently. EPMRs are both retrospective and prospective; and help ensure the Centers' excellence, relevance and

continued viability, and the CGIAR System's coherence. Each review is expected to be strategic in orientation and as comprehensive as the situation warrants.

7. The broad objectives of EPMRs are to: a) provide CGIAR members with an independent and rigorous assessment of the institutional health and contribution of a Center they are supporting; and b) to provide the Center and its collaborators with assessment information that complements or validates their own evaluation efforts, including the CCERs.

8. The EPMR panel is specifically charged to assess the following:

   a) The Center 's mission, strategy and priorities in the context of the CGIAR's priorities and strategies;

   b) The quality and relevance of the science undertaken, including the effectiveness and potential impact of the Center's completed and ongoing research;

   c) The effectiveness and efficiency of management, including the mechanisms and processes for ensuring quality; and

   d) The accomplishments and impact of the Center's research and related activities.

9. The topics expected to be covered by the EPMRs are listed below.

TOPICS TO BE COVERED

A. Mission, Strategy and Priorities

- The continuing appropriateness of the Center's mission in light of important changes in the Center and its external environment since the previous external review.
- The policies, strategies, and priorities of the Center, their coherence with the CGIAR's goals (of poverty alleviation, natural resources management, and sustainable food security), and relevance to beneficiaries, especially rural women.
- The appropriateness of the roles of relevant partners in the formulation and implementation of the Center's strategy and priorities, considering alternative sources of supply and the benefits of partnerships with others.

B. Quality and Relevance

- The quality and relevance of the science practised at the Center.
- The effectiveness of the Center's processes for planning, priority setting, quality management (e.g. CCERs, peer reviews and other quality and relevance assurance mechanisms), and impact assessment.

C. Effectiveness and Efficiency of Management

- The performance of the Center's Board in governing the Center, the effectiveness of leadership throughout the Center, and the suitability of the organization's culture to its mission.
- The adequacy of the Center's organizational structure and the mechanisms in place to manage, coordinate and ensure the excellence of the research programs and related activities.
- The adequacy of resources (financial, human, physical and information) available and the effectiveness and efficiency of their management.
- The effectiveness of the Center's relationships with relevant research partners and other stakeholders of the CGIAR System.

D. Accomplishments and Impact

- Recent achievements of the Center in research and other areas.
- The effectiveness of the Center's programs in terms of their impact and contribution to the achievement of the mission and goals of the CGIAR.

E. List of Strategic Issues identified at SC 4 by the Members, to be *addressed by the 3rd WorldFish Center EPMR Panel as a supplement to the standard EPMR ToRs.*

- Extent to which the center has moved from research into developmental activities (in response to donor impetus and opportunities) and understanding of the roles and comparative advantage vis-à-vis FAO and other developmental agencies.
- Demonstrated understanding of research impacts, research-to-policy interface and constraints to uptake. This might include some engagement in political economy research and governance processes - a broadening out from a more conventional science based approach.
- Research into (and with) innovative partnerships between (client) governments and private sector operators in order to foster public/private interaction and good governance.
- Appropriateness of Center's revised strategy – currently under development. What major priorities emerge from the new strategy and structure? Is the program structure effective: three global programs, and six (possibly eight) regional program strategies, within which emphasis is to be placed on major fisheries nations like China and Indonesia, and a renewed approach to Sub-Saharan Africa.
- Intersection between the fisheries and aquaculture domain and other sectors. How to best engage with other sectors outside of agriculture such as health, water and sanitation, education, etc. In other words, finding the right balance between more engagement with others vs. expanding their own scope within fisheries for achieving MDGs.
- Strategy for capacity building. Who WFC should be building capacity with and in what sector: government institutions (esp. in Africa) vs. research communities vs. fish farmers vs. NGOs.
- History, costs and accomplishments of the Abbassa, Egypt facility, and the building of the African program (with reference to a number of suggestions from the previous EPMR).
- Appropriate role of the Center in (a) international fora on fisheries and, (b) conservation of fish genetic resources.

APPENDIX 3

LIST OF DOCUMENTS PROVIDED TO THE PANEL

List of Documents

1. Terms of Reference and Guidelines

2. WorldFish Center's 2nd EPMR Report

3. Recent EPMR Reports - Other centers
   a. CIMMYT 5th EPMR report
   b. IFPRI 4th EPMR report
   c. IRRI 6th EPMR report
   d. ICRISAT 5th EPMR report

4. Recent CGIAR Stripe Studies (provided by SC Secretariat)
   a. Natural Resources Management Research in the CGIAR
   b. Water and the CGIAR - A Discussion Paper

5. CGIAR Vision and Strategy (provided by SC Secretariat)
   a. Toward a New Vision and Strategy for the CGIAR

6. Extracts of SC commentaries of WorldFish Medium Term Plans (provided by SC secretariat)
   a. Extracts from TAC, iSC and SC commentaries to Medium Term Plans 1997 - 2004

7. CGIAR Annual Report 2003 (provided by CG Secretariat)

8. CGIAR Brochure and Directory (provided by CG Secretariat)
   a. CGIAR Brochure
   b. CGIAR Directory

9. Summary of Proceedings of CGIAR meeting(s) (provided by CG Secretariat)
   a. AGM Business Meeting 2004
   b. AGM Stakeholder Meeting 2004

10. WorldFish Annual Report 2003

11. WorldFish Strategic Plan 2000-2020
    a. Supplement: Data and Evaluation by Region and Resource System

12. WorldFish Medium-Term Plan
    a. Program Overview
    b. MTP 2006-2008
    c. MTP 2005-2007
    d. MTP 2004-2006
    e. MTP 2003-2005
    f. MTP 2002-2004
    g. MTP 2001-2003

13. WorldFish Annual Funding Request
    a. 2004/2005

b. 2006 proposed

14. Achievements
    a. Overview of Achievements
    b. Publications 1999 - 2005
        - List of publications
        - List sorted by program
        - List sorted by scientist
        - Publication statistics
    c. Ex-post Impact Assessments
        - Genetically Improved Farmed Tilapia
        - Integrated Agriculture-Aquaculture
        - Publications on Impact of WorldFish Research
        - Aquaculture Extension Impacts in Bangladesh
        - Impact Evaluation of the Development of Genetically Improved Farmed Tilapia
        - Mariculture of Giant Clams: Management for Profit by Smallholders
    d. Videos
        - Malawi: Integrated Agriculture-Aquaculture
        - Bangladesh: Community-based Fisheries Management

15. Vision
    a. WorldFish New Strategy
    b. Future Investments in Science

16. Organization Structure , Management and Committees
    a. WorldFish Organizational Structure
    b. Executive Roles and Responsibilities
    c. Senior Management Team Roles and Responsibilities

17. Professional Staff CVs
    a. Staff CVs
    b. Staff Email and Current Location
    c. Staff Location 1999 - 2005
    d. Updated Staff List 1999 - 2005
    e. WorldFish Key Contacts
18. Center Commissioned External Reviews
    a. Overview
    b. Policy Research and Impact Assessment Program 2001
        - Policy Program CCER Report
        - Policy CCER Responses
    c. Coastal and Marine Resources Research Program 2003
        - Coastal Program CCER Report
        - Coastal CCER Responses
    d. Genetic Improvement of Aquaculture Species 2004
        - Genetics CCER Report
        - Genetics CCER Responses
    e. East and Southeast Asian Region 2005
        - CCER Report
        - CCER Responses
    f. Sub-Saharan Africa 2005
        - CCER Report

- CCER Responses

19. List of Reports of Major Planning Conferences, Expert Meetings (Word Format - 49 KB)

20. Self Studies of Center Programs and Management
    a. Risk Management
    b. Progress, issues and options for priority-setting by the WorldFish Center
    c. Library and Documentation Services

21. Response to last EPMR
    a. Summary of Responses to the 1999 WorldFish EPMR
        - Updated Responses
    b. Summary of Actions
    c. Relocation of WorldFish HQ to Penang

22. Agreements for Activities with other Centers and Institutions
    a. Agreements - 1999 to 2004
    b. Agreements - current
    c. Samples
        - MOU
        - LOA
        - MOA

23. Projects Implemented
    a. On-going and Recently Completed Contracted Projects
    b. List of projects 2000 – 2003

24. CGIAR Board of Trustees Directory (provided by CG Secretariat)

25. CGIAR Financial Guidelines and Manuals (provided by CG Secretariat)

26. Reference Guides for CGIAR Centers and their Board of Trustees (provided by CG Secretariat)

27. CGIAR Charter (provided by CG Secretariat)

28. Charter and Basic Documents Establishing the Center

29. Composition of the Board

30. Board Handbook or Rules of Procedure

31. Allowances, Benefits and Salary Ranges for staff

32. Personal Data on Professional Staff

33. Turnover of Staff

34. International Staff Vacancies

35. Information Management Systems and Procedures
    a. Library and Documentation Services

b. Business Processes
c. CGIAR Project Manager
d. Research Databases

36. Minutes of Board and Board Committee Meeting
a. 2000
b. 2001
c. 2002
d. 2003
e. 2004

37. Staff Manual
a. Internationally Recruited Staff Personnel Policy
b. Nationally Recruited Staff Personnel Policy (Malaysia)
c. Regionally Recruited Staff Personnel Policy (Malaysia)

38. Surveys
a. Local Compensation Survey
b. Staff Opinion Survey 2003
- Survey report
- Review of survey report
- Questionnaire

c. Staff Attitude Survey 2001
- Review of survey report
- Questionnaire

39. Reports of External Auditors
a. Audited Financial Statement
b. Management Letter

40. Most Recent Internal Audit Reports
a. Research Project Pipeline Management
b. Review of GPG1 Database Upgrade Project
c. Philippines Office
d. ERP Implementation
e. Internal Communications
f. Africa and West Asia

Additional Documents - Beyond the required list above

41. Working with Partners
a. Partnerships
- Portfolio
- National, Regional, International

b. Partner Surveys
- East and Southeast Asia
- Greater Mekong Subregion
- Sub Saharan Africa: Telephone survey of partners focused largely on partners in Malawi

c. Training Program

- Training Activity 1999 - 2005

42. Existing Major Policies (IP, germplasm use/ transfer/ biosafety)
    a. Intellectual Property Rights on Aquatic Genetic Resources
    b. Quality of Software Developed by the WorldFish Center
    c. Partnerships in Research and Related Activities

43. CG Performance Indicators
    a. Performance Management - Preliminary Results for 2004 as of 5 Sept 2005

44. Gender Staffing Analysis

45. Change Management - SAS HR (shared services, performance management)
    a. WorldFish Story
    b. Organizational Transformation
    c. Performance Management
    d. Shared Services

46. European Commission - Review of Genetics and Breeding Funded Work
    a. USAID B'Desh- DSAP Review
    b. EC review of Genetics & Breeding
    c. EC review of conservation projects
    d. DFID review of community based Fisheries Management

47. Fish To 2020 (IFPRI/ WorldFish Center publications)
    a. Fish to 2020: Supply and Demand in Changing Global Markets
    b. The Future of Fish: Issues and Trends to 2020 - 6pages
    c. Fish to 2020 flyer - 1page

48. Asia Fish Supply and Demand Project
    a. Main Report
    b. Appendixes

49. SAP ERP
    a. Minutes of Steering Committee (April 2005)
    b. Minutes of Steering Committee (May 2005)
    c. Minutes of Steering committee (Aug 2005)
    d. Audit of Implementation of ERP System - Phase I
    e. Audit of Implementation of ERP System - Phase II

50. Monitoring and Evaluation

51. Research Planning
    a. Building Critical Mass
    b. Priority Setting
    c. The Research to Development Continuum
    d. Science Week Reports
        - 18th BOT Meeting
        - 20th BOT Meeting
        - 22nd BOT Meeting
        - 24th BOT Meeting

- 16th Program Committee
- 26th Program Committee

e. FTE Budget Allocation

52. WorldFish Center Awards 2001 - 2005

53. Human Resources
    a. Staff demographics, vacancies, retirement/ contract expiry, total PhD
    b. Self assessment checklist
    c. HR Practices Matrix
    d. Staff nationality and consultant update
    e. Staff training

54. New Partnership for Africa's Development (NEPAD) - WorldFish Program Briefs
    a. Sustainable African Aquaculture
    b. Supporting Contribution of Small Scale Fisheries

55. Publications displayed 24 - 28 Oct 2005 at WorldFish HQ

56. WorldFish Key Performance Goals 2006

Presentations

1. WorldFish EPMR Introduction and Overview - S. Hall

2. Policy Economics and Social Sciences (PESS)
    a. Overview of PESS - M. Ahmed
    b. Fish to 2020 - M. Ahmed
    c. Fish Supply and Demand - M. Dey
    d. Co-Management & Community-based Fisheries Management - K. Viswanathan
    e. Resource Valuation and Implications for Institutional Reform and Governance - M. Ahmed
    f. Center Approach to impact Assessment, GIFT and Integrated Agriculture Aquaculture - M. Dey
    g. Sum up and Future Directions - S. P. Kam

3. Natural Resources Management (NRM)
    a. Overview of NRM - N.Andrew/ J. Bell
    b. NRM research in the Pacific - J. Bell
    c. Tsunami Response - M. Dey
    d. ReefBase - M. Noordeloos
    e. FishBase - N. Bailly
    f. Mekong Fisheries - E. Baran
    g. Coastal Fisheries in Asia - I. Stobutzki
    h. Future Directions - N. Andrew

4. Aquaculture and Genetics Improvement
    a. Overview of Aquaculture - M. Prein
    b. Present Status and Achievements: Genetic Improvement - R. Ponzoni
    c. International Network on Genetics in Aquaculture - A.G. Ponniah
    d. Integrated Agriculture- Aquaculture - M. Prein

e. Community-based Rice- Fish Culture - M. Dey
f. Lessons from Development of Sustainable Aquaculture in Bangladesh - H. Janssen
g. Future Directions: Aquaculture - A. G. Ponniah
h. Future Directions : Genetic Improvement - R. Ponzoni

5. Regional Portfolios
   a. Overview - P. Dugan
   b. Sub Saharan Africa - P. Dugan
   c. West Asia North Africa - P. Dugan
   d. East and South East Asia - M. Dey
   e. Greater Mekong - E. Baran
   f. Pacific - J. Bell

6. Science Coordination - J. Oliver

7. Corporate Services
   a. Corporate Services Division Overview - J. Oliver
   b. Annual Budget Development - J. Oliver

8. Business Development Office - H. Leitch

9. Information and Communications Program - S. Blok

APPENDIX 4

2ND ICLARM EPMR RECOMMENDATIONS: WORLD FISH CENTER RESPONSE AND PANEL OBSERVATIONS

Recommendations	WORLD FISH CENTER's 2005 Response	Panel Comments
Recommendation 1 *The Panel recommends that WorldFish Center further develop its tactical plan for Africa and West Asia paying attention to the balance between activities that can be carried out at the Regional Headquarters and those that need to be implemented at research sites elsewhere.*	Recognizing that development of a coherent regional strategy was an essential precursor for development of a well-targeted tactical plan, the Center developed a strategy for Africa and West Asia over the course of 2001. The main elements of this strategy are summarized in Figure 2. The strategy was prepared through an extensive consultation process involving regional and international partners and provided an important opportunity to engage a wider regional constituency in guiding the future development of our work. Since 2002 the strategy has provided the framework for specific efforts to strengthen the Center's capacity and program in the region and in particular in sub-Saharan Africa. As a result the Center has progressively increased staff within Africa and West Asia since 2002. This has contributed to steady growth in research activities in sub-Saharan Africa, but this has also led to recognition that the Center's work will not realize its full potential unless there is greater political and financial commitment to help foster aquaculture and fisheries development in Africa. It was in order to help address this that the Center has collaborated with NEPAD, FAO and other partners to convene the NEPAD-Fish for All Summit in Nigeria in August 2005. In recognition of the growing importance being given to Africa the Center appointed 3 Portfolio Directors for sub-Saharan Africa in September 2004, and the focus on SSA has been reaffirmed in the Center's Strategy Update approved by the BOT in September 2005. This sets out specific priorities for future investment in five country programs in SSA (Malawi, Zambia, Mozambique, Nigeria, and Democratic Republic of the Congo) and one in West Asia and North Africa (Egypt). The Strategy also commits to developing the Abbassa facility as the Center's primary location for pond and laboratory based	The Panel agrees and invites the Center to ensure implementation of planned activities.

	aquaculture research and as an Africa-wide training center. The research focus of Abbassa will be reviewed in 2006 during development of the new Aquaculture strategy for the Center, while the training role is being expanded as part of the tri-nodal approach (Egypt, Malawi, Nigeria) to aquaculture training in Africa that is being developed in follow-up to the NEPAD Summit.	
Recommendation 2 *The Panel recommends that steps be taken to ensure representation from other African and West Asian countries on the research and training staff of the Regional Headquarters for Africa and West Asia as a priority.*	In 2000 the Center continued to seek a regional economist to be appointed to the regional headquarters, but no suitable candidate could be attracted. Since 2001 four Internationally Recruited Staff (IRS) have been recruited to the Regional Headquarters and another IRS for a position under the Challenge Program on Water for Food. For one position a regional candidate (Nigerian) was identified but he declined the position in favor of one with another CGIAR center. For the other positions, all were advertised internationally and promoted within the region, but no regional candidates were successful. The Center remains committed to strengthening regional representation amongst staff working in Africa and West Asia. Current focus is however being placed on achieving this through recruitments in Zambia (January 2006) and the Democratic Republic of the Congo (July 2006). In addition, regional training and "technology transfer" programs are being developed with an emphasis on the use of regional trainers and researchers for shorter term positions at the Center's Abbassa facility.	Agreed but management should transfer staff currently residing in Cairo, ear-marked to SSA as Portfolio Directors

Recommendation 3 *The Panel recommends that WorldFish Center establish explicit mechanisms for external review of the quality of its research at the various phases of its projects. Such review mechanisms should be indicated in project proposals.*	WorldFish has continued to rely on internal review and controls as the first and primary mechanism for quality control of its research. This approach has now been further embedded with the creation of the Discipline Director positions, who are hired explicitly to provide the highest level of scientific review and analysis to projects and proposals in their respective areas. Discipline Directors are internationally respected leaders in their areas, and have many years experience in managing and reviewing research projects. In addition to their own judgement, they can also exercise the option of seeking external review of specific project outputs where this is felt to be desirable. An example of this is the current arrangement to bring an external consultant with expertise in modeling to review the BayFish model developed in the Mekong. The Centers overall program of monitoring and review of scientific outputs has been set out in detail in a separate submission.	The panel endorses this response but would like to draw the attention of WorldFish to the 3rd EPMR recommendations concerning quality of scientific publications and the suggestion for implementation of a rigorous internal review system for scientific papers.
	Done. A new policy was adopted at the 25th Meeting of the Board of Trustees in February 2004.	The Panel has no further comment

Recommendation 5 *The Panel recommends that the WorldFish Center Board and Management place the highest priority on locating and transitioning to a permanent headquarters site that meets WorldFish Center's criteria.*	One of the recommendations given the highest priority by the 2nd EPMR panel. Headquarters relocation from the Philippines to Malaysia was implemented and fully completed during 2000 – 2001.	Relocation completed smoothly. Construction and refurbishing of world class facilities completed in record time. The Center is to be complemented for efficiently handling the exit processes in the Philippines and commencement of operations in Malaysia.
Recommendation 6 *The Panel recommends that WorldFish Center continue on the path it is on, deviating to new themes only as a complement to its current activity, seek additional resources to capitalize on new advances in science that create significant potentials for breakthroughs in living aquatic resources management.*	From 1999 to 2004, WorldFish continued to consolidate the areas of activities it was engaged in within the context of a revised program structure that was put in place following the 1999 EPMR Review. Within this structure existing themes were further developed and consolidated, but, in line with the recommendation, no substantive new areas of activity were pursued. Capacity to attract additional resources to support key areas was enhanced during the period by the creation of the Business Development Office. During this period, further efforts were also made to identify priorities within the identified themes, culminating in the ICLARM Strategic Plan 2000-2020. A strategy review, undertaken in 2005 resulted in a strategy update in which the current broad areas of emphasis were validated, but within which additional avenues were identified to complement and extend current activities. For example, the need to increase work on tools and approaches for small-scale fisheries management, genetic improvement and institutional and governance analysis were among the areas that were identified for increased focus. Equally important, however, was the recognition of the need to increase the amount of comparative analysis and synthesis work at both global and regional levels. In addition, the strategy update identified those areas we do not feel we should pursue ourselves, thereby making explicit the areas that we feel represent the	The Panel agrees that WorldFish has continued to explore the more relevant areas corresponding to its mandate without deviating to new but anecdotal themes (e.g. pure lines of fish). The Panel acknowledges that the Center has made significant improvements in resource mobilization. However, the Panel it is not convinced that the Center has really reinforced its scientific potential (e.g. insufficient number of scientists, number of highly

	unwarranted "deviations to new themes" alluded to in the 1999 EPMR Panel's recommendations. With respect to attracting resources to support our strategy, our structural re-organization to disciplines and portfolios, the resultant clarification of roles and responsibilities for resource mobilization, and an improved integration of the activities of the Business Development Office into the organizational framework have all served to enhance our capacity further, as evidenced by the dramatic improvement in our project pipeline over the last two years.	qualified and internationally known science leaders, unclearly specified research domain and priorities) to actually be at the frontier of knowledge development, and provide breakthroughs in the area of fisheries and aquaculture. Thus, the Panel considers that this challenge is still to be addressed.

APPENDIX 5

1. LIBRARY AND INFORMATION SERVICES

This appendix is taken from a review report, "….from collections to connections…." prepared by Dr Johannes Keizer from FAO-GIL (Library and Documentation Systems Division) following a study tour of WorldFish, IWMI and CIFOR in March 2005. The purpose of the tour was to explore possibilities for new shared information and knowledge management services between the three CGIAR Natural Resource Management centers and FAO. WorldFish also wishes to use the recommendations arising from this report to reorient and upgrade its library to play a more central, and eventually leading role in managing knowledge. This includes integration of the library with other information and communication services such as print and online publishing.

Key points relate to the continued importance of access to peer reviewed journals, changing from paper to electronic subscriptions, the overall recommendation of this report was that the library should become the focal point of knowledge management exchange and dissemination in the center. Specifically:

- All knowledge management initiatives should be carried out in discussion and coordination with the library and trained information managers
- Libraries should remain open spaces and exploit their potential to host exhibitions, discussions, and presentations so as to become venues where knowledge is exchanged
- Library activities should be fully integrated into the web and publishing environment. The management of the library should be integrated with the management of the website and the intranet
- Delivery of information should be provided in digital format only
- Decentralization of physical collections should be targeted to places where digital access cannot be guaranteed and where hard copy materials (books) are most often used
- Other hardcopy materials should be professionally archived
- Library technology should be seamlessly integrated into other information technologies used in the Center. A review of the use of Inmagic is necessary.
- A survey to assess information needs should be conducted

Access to Peer Reviewed Journals: At the moment the supply of peer reviewed articles from scholarly journals does not satisfy all the needs of the researchers. On the one hand, subscription journals are not efficiently used; on the other, it is impossible (or very cumbersome) to get articles from journals without a subscription. In five or ten years from now, most scholarly material will be accessible through Open Archives. Until then getting access to scholarly publications from commercial sources remains of paramount importance, and a solution has to be found.

The WorldFish library is open to the public with books and journals regularly displayed on the shelves. There are no truly reliable statistics about "walk in" users of the library. During this study, the author observed and received confirmation that personal visits to the library on the part of researchers are decreasing steadily, whereas the library maintains a service counter that takes up staff resources to maintain.

The question needs to be asked as to whether the library should be reorganized to provide a totally virtual service without open spaces or facilities for visitors. This change would undeniably enhance efficiency, and allow library staff to concentrate on preparing and delivering better virtual services. On the other hand, this approach would lead to the loss of one of the spaces where people can meet and interact. If this is of real value, then the library should be revitalized as an open space where scientists and others meet and exchange ideas.

Most library items (75%) were loaned only once during the review period. This means that the library maintains these books/items only for one person. Further studies on loan patterns and inquiries from researchers should be made to clarify this issue.

The most practical solution would be to reduce the items in the library to only those that are frequently used by more than three persons, whereas all other items could be distributed to those researchers or units that most urgently need them, especially when they are not at Headquarters. Information on holdings will be maintained in the catalogue to ensure that items are also available for others.

Virtual Library Services

The library offers resources through the Intranet/Internet. Unfortunately, these services are not integrated into information management applications and platforms, but merely represent the library as a physical place on computer screens.

Appendix 5 Table 1.1 shows the number of journal titles used at WorldFish grouped into "Journals with a center subscription", "Journals offered by the CG consortium" and "other journals."

Appendix 5 Table 1.1: Usage of Journals			
	Subscribed	**Consortium**	**Others**
WorldFish	**56**	**42**	**46**

It seems from these figures that the researchers' needs are not covered by the existing subscriptions. In the column "others" only those journals are counted from which articles were obtained, mainly through Document Delivery services while articles obtained direct by researcher are not monitored. It is evident that the demand by researchers is much broader than the offered list of journals.

However, analyzing the use of individual articles gives a very different impression:

Appendix 5 Table 1.2: Usage of Articles			
	From Subscribed Journals	From Consortium Journals	From Other Journals
WorldFish	4120	83	58

Table 2 suggests that most of the researchers' needs are covered by existing subscriptions as more than 90% of the articles used are from the subscribed journals. This table obviously reflects ease of access to articles from subscribed journals. Table 1 might better indicate the discrepancy between the supply of scientific literature and demand.

Table 3 shows that the methods used to access articles has shifted strongly to the use of online versions of the journal .

Appendix 5 Table 1.3: Mode of Accessing Journal Articles				
Accessed	online	onsite	document delivery	Total
WorldFish	3801	408	52	4261

Cost effectiveness of the current subscription management.

WorldFish pays for journal subscriptions within the CG consortium as well as for titles not covered by the consortium.

Table 4 summarizes these expenditures and also compares journal subscription costs across WorldFish, IWMI and CIFOR.

Appendix 5 Table 1.4: Subscription expenditures			
	Consortium Titles	Center Titles	Total
IWMI	$2,000	$8,900	$10,900
WorldFish	$34,500	$38,400	$73,900
CIFOR	$860	$22,600	$23,400

2. ANALYSIS OF PAPERS PUBLISHED IN REFEREED JOURNALS

2.1. Journals used for publications (publication policy)

From 1999 to 2005, 146 articles are recorded as published in a "Peer reviewed journal". 87 different journals were used, most of them only once or twice during the period (Table 1).
Five journals contain 30% of the articles: Aquaculture Economics and Management (19), Aquaculture (13), Ambio (4), Marine and Freshwater Research (4) and African Journal of Aquatic Science (3).

Appendix 5 Table 2.1: Breakdown of refereed papers by journals

Number of articles per journal	1	2	3	4	13	19
Number of journals	61	21	1	2	1	1

70% of the articles are dispersed in the remaining 82 journals, i.e. 1.2 papers per journal during the period.
For a better characterization of these journals and publications, the Panel used a grid based on two criteria (table 2, see Appendix 1 for the list of journals):

- their status, according the Web of Knowledge data base (13793 journals were referenced in 2005 in this base): RIF (referenced with Impact factor), RNI (referenced but no calculated Impact factor), NRE (not referenced);

- their main field, for which we defined three types, AQUA (Aquatic Research), AGRI (Agriculture and development, GNL (Disciplinary and Academic sciences).

Appendix 5 Table 2.2: Breakdown of papers by journal type and area

Main Field	GNL		AGRI		AQUA		TOTAL	
Type	N. Jour.	N. Public.	N. Jour.	N. Public.	N. Jour.	N. Public.	**N. Jour.**	**N. Public.**
RIF	15	22	7	9	30	57	**52**	**88**
RNI	6	7	5	5	6	26	**17**	**38**
NRE	1	1	7	7	10	12	**18**	**20**
TOTAL	**22**	**30**	**19**	**21**	**46**	**94**	**87**	**146**

Journals devoted to aquatic research (fisheries, aquaculture, marine or freshwater biology) represent 53% of the journals (58% of RIF journals) and include 65% of papers. The presence of WorldFish in the "world" of academic research is thereby very small (3 to 4 papers per year).

To be more precise on the status of these journals, the Panel made a classification according their Impact factor (2004 value, i.e. based on the number of citations of papers published in 2002 and 2003) and compared it with the classification of about 129 RIF journals (Some journals are referenced in several areas: 129 is thereby an overestimate of the number of journals) of the Web of Knowledge in three areas related to aquatic research (Table 3): Fisheries, including aquaculture (40 journals), Limnology (14 journals), Marine and freshwater Biology (75 journals).

52 of the 87 journals used by WorldFish have a calculated IF and include only 60% of the papers. Less than a quarter of the 87 journals (20) have an IF higher than 1 and contain less than one third of the papers (44, i.e. a very small part of the 613 documents published during the period). In comparison with the "portfolio" of possible journals for publications in this field, the WorldFish positioning seems

to be focused on a "medium point", with an under representation of journals with IF lower than 0.5 or higher than 2.0.
The conclusion is that it doesn't seem to be a strong policy for choosing journals with high IF: 50% of papers in RIF journals are in journals with IF above 1.0 when 43% of the journals in the portfolio correspond to this criterion.

Appendix 5 Table 2.3: Breakdown of WorldFish publications by Impact factor of journals and comparison with the portfolio of RIF aquatic journals

Impact factor	No data*	0 to 0.49	0.5 to 0.99	1.0 to 1.49	1.5 to 1.99	2.0 & more
Journals used by WFC	35	6	26	9	8	3
Number of articles	58	6	38	15	25	4
% of RIF**		6.8	43.2	17	28.4	4.5
Reference (% 129 journals)		16.3	41.1	15.5	16.3	10.8

* NRE & RNI journals (see text)
** % of the 88 articles published in RIF journals

Accordingly, the total and average Impact factors of WorldFish publications are rather low and no progress can be observed during the period (Table 4).

Appendix 5 Table 2.4: IF of papers published by WorldFish

TYPE	1999	2000	2001	2002	2003	2004-2005	TOTAL
RIF	19	20	6	16	8	19	**88**
RNI	4	11	3	0	7	13	**38**
NRE	4	3	0	4	4	5	**20**
TOTAL	**27**	**34**	**9**	**20**	**19**	**37**	**146**
*TOTAL IF**	23.38	24.21	7.64	20.06	10.69	18.06	**104.04**
*average IF (RIF)***	1.23	1.21	1.27	1.25	1.34	0.95	**1.19**
*average IF (TOTAL)***	0.86	0.71	0.85	1	0.56	0.49	**0.72**

** Sum of the IF of papers, according their journal (IF 2004)*
*** Sum of IF divided by number of papers in RIF*
**** Sum of IF divided by total (= number of papers classified as "refereed" by WFC)*

2.2. Citation Index of WorldFish publications

IF of journals gives only an indirect and short term (two years) indication of the impact of a paper. That is why the Panel carried out a specific analysis of the number of citations referenced from 1999 to 2005 in the Web of Knowledge data base for the 76 papers (this figure is lower than the 88 papers of table 8, due to a cleaning of the data base) published in RIF journals during this period (Table 5, see Appendix 5b for details).

The number of citations ranges from 0 to 54, with a mean of about 6 citations per article, a figure that can be considered satisfactory. The distribution is, as classically, asymmetrical, with 72% of articles below this mean and only 16% of the article with 10 or more citations. The effect of the year of

publication, which is classical too, appears very high, but is mainly due to a few "reference papers" in the area of NRM (published in 1999 and 2000) having a very large number of citations.

Appendix 5 Table 2.5: Number of citations from 1999 to 2005 of 76 papers published in RIF journals and referenced in the WEB of knowledge

Citations	2004	2003	2002	2001	2000	1999	TOTAL
Number of papers*	13	7	17	6	19	16	78
0	8	2	5	0	1	1	**17**
1	2	3	4	0	3	3	**15**
2	2	0	1	1	3	2	**9**
3	0	1	1	1	1	1	**5**
4	0	1	0	0	0	2	**3**
5	0	0	2	2	3	0	**7**
6	0	0	1	0	0	1	**2**
7	0	0	0	1	1	1	**3**
8	0	0	0	0	1	0	**1**
9	0	0	0	0	1	0	**1**
10	1					1	**2**
11							**0**
12						2	**2**
13							**0**
14							**0**
15			1		2		**3**
16							**0**
17							**0**
18					1		**1**
24			1	1			**2**
27					1		**1**
35			1			1	**2**
52						1	**1**
54					1		**1**
mean	**1.2**	**1.4**	**5.8**	**7.7**	**9.5**	**9.5**	**5.756**

In terms of disciplines (Table 6) the area of natural resources management appears by far the most visible, in terms of number of papers, total and mean number of citations. Social sciences have a lower number of papers than aquaculture, but with a higher mean number of citations.

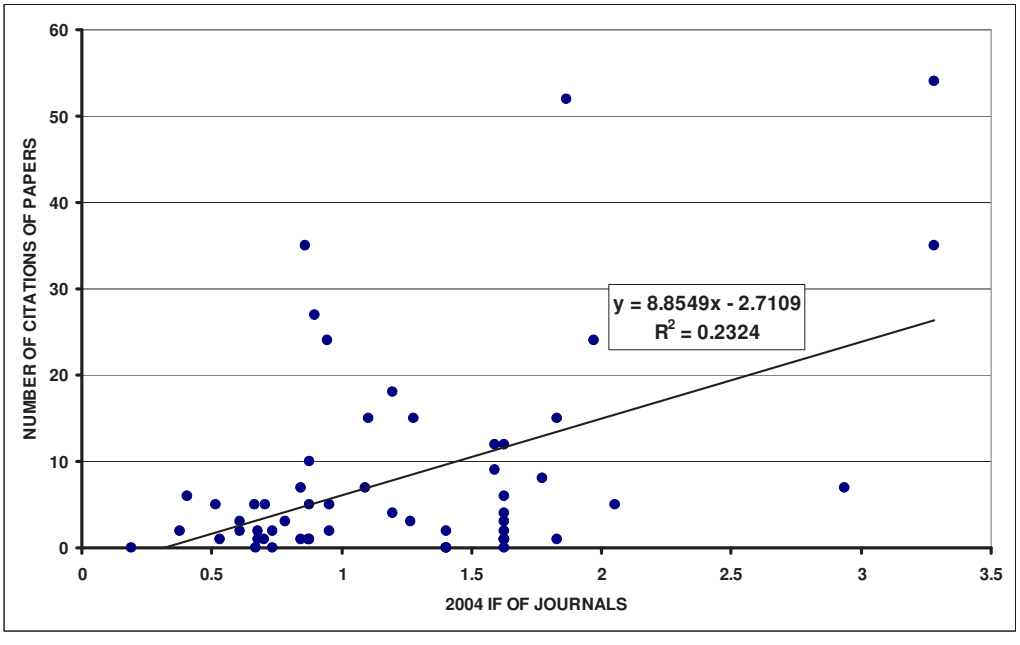
Appendix 5 Table 2.6: Citations by disciplines of 78 papers published in RIF journals from 1999 to 2005 and referenced in the WEB of knowledge

AREA	Papers	Cit : Total	Cit : Mean
AQUA	18	47	2,61
NRM	43	393	9,14
SOC SC.	12	49	4,08
EXE	5	7	1,40

In addition, the Panel explored the relationship between the number of citations of papers and the impact factor of journals in which they are published. According to Table 5, only the papers published from 1999 to 2002 (57) were considered (Appendix 5c). The results (Figure 2.1) indicate a significant, but rather low connection between the two variables (correlation of about 0.5). The cases of "Aquaculture" and "Ambio", which are among the three refereed journals most used during the period, should be considered with particular regard to their quite good impact factor, but low number

of citations of WorldFish papers. Nevertheless, it should be noted than 50% of papers published in journals with an IF higher than 1 have a number of citations higher than 5, versus 22% for papers published in journals with an IF lower than 1.

Appendix 5 Figure 2.1: Relationship between the number of citations of papers and the impact factor of journals in which they are published (57 papers published from 1999 to 2002, see Appendix 5b)



Appendix 5a: List and characteristics of journals used by WorldFish from 1999 to 2005

Order: Decreasing 2004 IF

Number = number of papers in this journal

NR Non referenced journal in ISI WEB OF KNOWLEDGE 2005 (13,793 journaux)

R Referenced journal but no calculated Impact Factor

Type: AQUA = Aquatic Research, AGRI = Agriculture and development, GNL = Disciplinary and Academic sciences

Journal	Type	Number	IF 2004	1999	2000	2001	2002	2003	2004	2005
Ecosystems	GNL	2	3.283	1	1					
Advances in Marine Biology	AQUA	1	2.938			1				
Mar. Ecol. (Prog. Ser.)	AQUA	1	2.052				1			
Can. J. Fish. Aq. Sci	AQUA	2	1.972			1			1	
Biological J. Linnean Soc.	GNL	1	1.935							1
Am. Zoologist (Integrative & comp. Biology)	GNL	2	1.866	2						
Coral Reefs	AQUA	2	1.828	1			1			
Marine Biology	AQUA	2	1.772		1			1		
Aquaculture	AQUA	13	1.627	3	3		3	3	1	
Marine Pollution Bulletin	AQUA	1	1.619						1	
J. Exp. Mar. Biol. Ecol.	AQUA	2	1.588	1	1					
Ambio	GNL	4	1.403				4			
Trans. of the American Fisheries Society	AQUA	1	1.278		1					
Ecological Economics	GNL	1	1.266		1					
Marine Biotechnology	AQUA	1	1.237						1	
Agriculture, Ecosystems & Environment	AGRI	2	1.207					1	1	
J. Fish Biol.	AQUA	2	1.198		2					
ICES J. Mar. Sci.	AQUA	2	1.105	1	1					
World Development	AGRI	1	1.1					1		
Acta Zoologica	GNL	1	1.089		1					
Marine & Freshwater Research	AQUA	4	0.955	1	2			1		
Coastal Management Journal	AQUA	1	0.943				1			
Fish. Res.	AQUA	2	0.932						2	
Am. Sci.	GNL	1	0.896		1					
Environmental Modelling & Software	GNL	2	0.876				2			
Ophelia	AQUA	1	0.875	1						
Agricultural Systems	AGRI	2	0.871				1		1	
Bull. Mar. Sci.	AQUA	1	0.859				1			
Environ. Biol. Fish	AQUA	2	0.844	1	1					
Society and Natural Resources (IF2003)	GNL	2	0.842	1						1
J. of Marine Biological As. of United Kingdom	AQUA	1	0.781			1				
Journal of Environmental Management	GNL	1	0.78					1		
Aquacult. Eng.	AQUA	2	0.733			1	1			
Biochemical Systematics and Ecology	GNL	1	0.704			1				
Human Organization	AGRI	1	0.701						1	
Aquacult. Res.	AQUA	2	0.676	1						1
J. World Aquacult. Soc.	AQUA	2	0.669	1	1					
Marine and Freshwater Behaviour and Physiol.	AQUA	1	0.667		1					
Zoological Studies	GNL	1	0.617						1	
J. Shellfish Res.	AQUA	2	0.608	2						
Mar. Policy	AQUA	1	0.571						1	
Food Policy Journal	AGRI	1	0.532				1			
Pop. Res. Policy Rev.	GNL	1	0.521						1	
Ocean & Coast. Manage.	AQUA	1	0.52						1	
Plant Production Science	AGRI	1	0.516							1
Journal of Natural History	GNL	1	0.514			1				
J. Appl. Ichthyol.	AQUA	1	0.478	1						
Fish. Manage. Ecol.	AQUA	1	0.471						1	
Aquacult. Int.	AQUA	1	0.405	1						
North American J. Aquaculture	AQUA	1	0.379		1					
Sociological Inquiry	GNL	1	0.291						1	
Journal of Sustainable Agriculture	AGRI	1	0.189		1					

Appendix 5a (continuation):

African Journal of Aquatic Science	AQUA	3	R					3		
Aquaculture Economics & Management	AQUA	19	R		7				1	11
Asian Fish. Sci.	AQUA	1	R			1				
Bull. Fac. Agric. Cairo Univ.	AGRI	1	R	1						
Nature (Correspondence)	GNL	1	R		1					
Egyptian Journal of Zoology	GNL	1	R	1						
Environment and Development Economics	AGRI	1	R					1		
Environment, Development and Sustainability	AGRI	1	R		1					
FAO Aquacult. Newsl.	AQUA	1	R			1				
Food and Nutrition Bulletin	AGRI	1	R		1					
Int. J. Soc. Econ.	GNL	1	R	1						
J. Inland Fish. Soc. India	AQUA	1	R						1	
Journal of Aquaculture in the Tropics	AQUA	1	R		1					
J. of the Egyptian German Society of Zoology	GNL	2	R	1		1				
J. of the Egyptian Society of Parasitology	GNL	1	R					1		
Pacific Conservation Biology	GNL	1	R					1		
Vet. Med. J., Giza.	AGRI	1	R					1		
ACP-EU Fish. Res. Rep.	AQUA	1	NR	1						
Alexandria J. Vet. Sci.	AGRI	1	NR	1						
Egyptian J. of Aquatic Biology and Fisheries	AQUA	1	NR						1	
FAOFish. Circ.	AQUA	1	NR	1						
Fish and Fisheries	AQUA	1	NR							1
Fishing Chimes	AQUA	1	NR					1		
Glogal Change, Peace & Sec (Pacifica Review)	GNL	1	NR					1		
J. Bay of Bengal Fish. Manage.	AQUA	1	NR	1						
Journal of Freshwater Biology	AQUA	1	NR					1		
Journal of Agrarian Change	AGRI	1	NR							1
Journal of Crop Production	AGRI	1	NR				1			
J. of Egyptian Ac. Soc. for Environmental Dev.	AGRI	1	NR				1			
J. of Resources and Developments	AGRI	1	NR		1					
Marine Resources Economics	AQUA	2	NR		1		1			
Proc. Gulf Caribb. Fish Inst.	AQUA	1	NR		1					
Suez Canal Veterinary Medicine Journal	AGRI	1	NR				1			
Uganda J. Agric. Sci.	AGRI	1	NR						1	
World Aquaculture	AQUA	1	NR					1	1	
TOTAL		**146**	**87**	**27**	**34**	**9**	**20**	**19**	**20**	**17**

Appendix 5b: Number of citations of papers in the WEB of Knowledge

Year	2004			2003			2002			2001			2000			1999		
number *	14			8			18			6			22			21		
	ID n°	Area	Cit.	ID n°	Area	Cit.	ID n°	Area	Cit.	ID n°	Area	Cit.	ID n°	Area	Cit.	ID n°	Area	Cit.
	572	AQ	0	151	AQ	0	203	AQ	0	281	AQ	2	365	SS	0	437	AQ	0
	55	NR	0	161	NR	0	210	AQ	0	284	NR	3	339	AQ	1	430	NR	1
	61	NR	0	145	NR	1	199	EX	0	279	AQ	5	352	NR	1	446	NR	1
	62	NR	0	149	NR	1	206	EX	0	285	AQ	5	354	NR	1	448	NR	1
	644	NR	0	152	SS	1	220	EX	0	280	NR	7	341	AQ	2	442	NR	2
	645	NR	0	144	NR	3	535	SS	1	282	NR	24	357	AQ	2	382	SS	2
	57	SS	0	142	SS	4	212	AQ	1				372	NR	2	441	NR	3
	65	SS	0	499	e(id 152)		213	AQ	1				342	AQ	3	440	NR	4
	53	SS	1				200	SS	1				370	EX	5	351	NR	4
	56	SS	1				207	EX	2				343	NR	5	433	NR	6
	564	NR	2				215	AQ	3				355	NR	5	449	SS	7
	615	NR	2				211	AQ	5				358	NR	7	447	NR	10
	60	NR	10				218	NR	5				364	NR	8	428	NR	12
	3	e(id 564)					202	NR	6				359	NR	9	451	NR	12
							201	NR	15				367	AQ	15	460	NR	35
							219	SS	24				371	NR	15	450	NR	52
							216	NR	35				353	NR	18	443	e(1998)	
							513	e(id219)					362	NR	27	454	e(1998)	
													369	NR	54	455	e(1998)	
													559	e(id365)		444	e(id354)	
													350	e(id437)		463	e(id450)	
													351	e(1999)				

* number of articles in RIF in the WFC data base
e = error : id = identical to another ID; (1998) = published another year;
Area = discipline code of the data base
(AQ= Aquaculture; NR=Natural resources management; SS= Social sciences; EX= Général)

Appendix 5c: Relationship between Impact factor of journals and number of citations of papers (1999-2002 data base = 57 refereed papers)

Journal	Type	IF 2004	CI	Year
Ecosystems	GNL	3.283	35	1999
			54	2000
Advances in Marine Biology	AQUA	2.938	7	2001
Mar. Ecol. (Prog. Ser.)	AQUA	2.052	5	2002
Can. J. Fish. Aq. Sci	AQUA	1.972	24	2001
Am. Zoologist (Integrative & comp. Biology)	GNL	1.866	52	1999
Coral Reefs	AQUA	1.828	15	2002
			1	1999
Marine Biology	AQUA	1.772	8	2000
Aquaculture	AQUA	1.627	12	1999
			4	1999
			1	1999
			1	2000
			2	2000
			1	2000
			0	2001
			3	2001
			6	2001
J. Exp. Mar. Biol. Ecol.	AQUA	1.588	12	1999
			9	2000
Ambio	GNL	1.403	0	2002
			0	2002
			2	2002
			0	2002
Trans. of the American Fisheries Society	AQUA	1.278	15	2000
Ecological Economics	GNL	1.266	3	2000
J. Fish Biol.	AQUA	1.198	4	1999
			18	2000
ICES J. Mar. Sci.	AQUA	1.105	15	2000
Acta Zoologica	GNL	1.089	7	2000
Marine & Freshwater Research	AQUA	0.955	5	2000
			2	2000
Coastal Management Journal	AQUA	0.943	24	2002
Am. Sci.	GNL	0.896	27	2000
Environmental Modelling & Software	GNL	0.876	5	2002
			1	2002
Ophelia	AQUA	0.875	10	1999
Agricultural Systems	AGRI	0.871	1	2002
Bull. Mar. Sci.	AQUA	0.859	35	2002
Environ. Biol. Fish	AQUA	0.844	1	2000
Society and Natural Resources (IF2003)	GNL	0.842	7	1999
J. of Marine Biological As. of United Kingdom	AQUA	0.781	3	2001
Aquacult. Eng.	AQUA	0.733	2	2001
			0	2002
Biochemical Systematics and Ecology	GNL	0.704	5	2001
Human Organization	AGRI	0.701	1	2002
Aquacult. Res.	AQUA	0.676	1	1999
			2	1999
J. World Aquacult. Soc.	AQUA	0.669	0	1999
Marine and Freshwater Behaviour and Physiol.	AQUA	0.667	5	2000
J. Shellfish Res.	AQUA	0.608	3	1999
			2	1999
Food Policy Journal	AGRI	0.532	1	2002
Journal of Natural History	GNL	0.514	5	2001
Aquacult. Int.	AQUA	0.405	6	1999
North American J. Aquaculture	AQUA	0.379	2	2000
Journal of Sustainable Agriculture	AGRI	0.189	0	2000

APPENDIX 6.1

BOARD OF TRUSTEES as of December 2005

Name	Gender	Nationality	Discipline	Trustee Since (in years)
Dr. S Ayyappan [1,2, c]	M	India	Fisheries	4
Dr. T Bjorndal [1,2,3,4, c]	M	Norway	Economics	4
Mr.Junaidi Che Ayub [4 a]	M	Malaysia	Agriculture	2
Dr. Wendy Craik	F	Australia	Zoology	1
Dr. Kunihiko Fukusho [2]	M	Japan	Agriculture/Fisheries	2
Dr. Serge Garcia [2 b]	M	France	Marine Fish Science	12
Dr. Stephen Hall [2,4, b]	M	U.K.	Marine Biology	2
Dr. Anne Kapuscinski [3,]	F	USA	Fisheries/Aquaculture/ Genetics	2
Dr. Asger Kej [1,a]	M	Denmark	Environmental Engineering	2 ½
Dr. Yehia Hassan Khalil [2,3, a]	M	Egypt	Food Science	8
Dr. Ida Siason [2,]	F	Philippines	Social Psychology	2
Dr. Stella Williams [2,3,]	F	Nigeria	Fisheries/Aquaculture	4
Dr. Linxiu Zhang [1,4, c]	F	China	Agriculture Economics	6

Note:

1 Audit Committee
2 Program Committee
3 Nominating Committee
4 Executive Committee

a. Country Nominee
b. FAO nominee
c. CG nominee

APPENDIX 6.2

ACTUAL AND RECOMMENDED STRENGTH OF BOARD (ASSUMING NO EXTENSIONS AT THE END OF CURRENT TENURE)

	Trustee Since	2006				2007				2008			
		JFM	AMJ	JAS	OND	JFM	AMJ	JAS	OND	JFM	AMJ	JAS	OND
Dr Zhang, Linxiu	Mar-00												
Dr. Ayyappan S	Sep-02												
Dr.Bjorndal, Trond	Mar-02												
Dr.Williams, Stella	Mar-02												
Dr.Kej, Asger	Sep-03												
Dr.Fukusho, Kunihiko	Feb-04												
Dr.Kapuscinski, Anne	Feb-04												
Dr.Siason, Ida	Sep-04												
Dr. Craik, Wendy	Sep-05												
Actual by December					7				4				0
Recommended No.					5				5				5
Surplus/Deficit					2				(-1)				(-5)

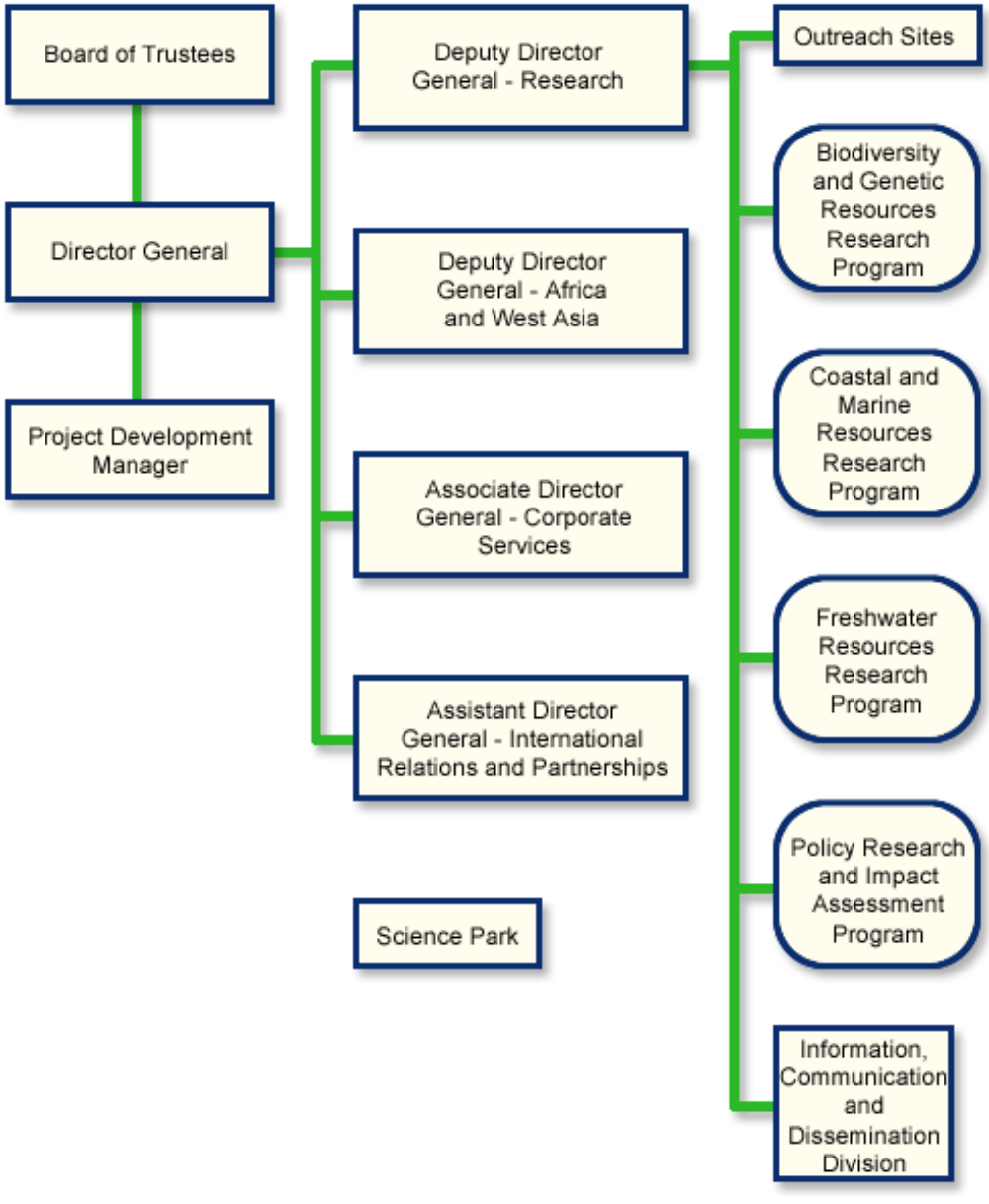
Movements													
At the year beginning		9				7				5			
Retirements		2				3				4			
Appointments		0				1				4			
At the year end		7				5				5			

Note: In addition to the above, there are four other trustees as follows: The Director General, Nominees of Host Countries – Malaysia and Egypt, and Nominee of FAO, all of whom will continue on the Board *ex officio*

APPENDIX 6.3A

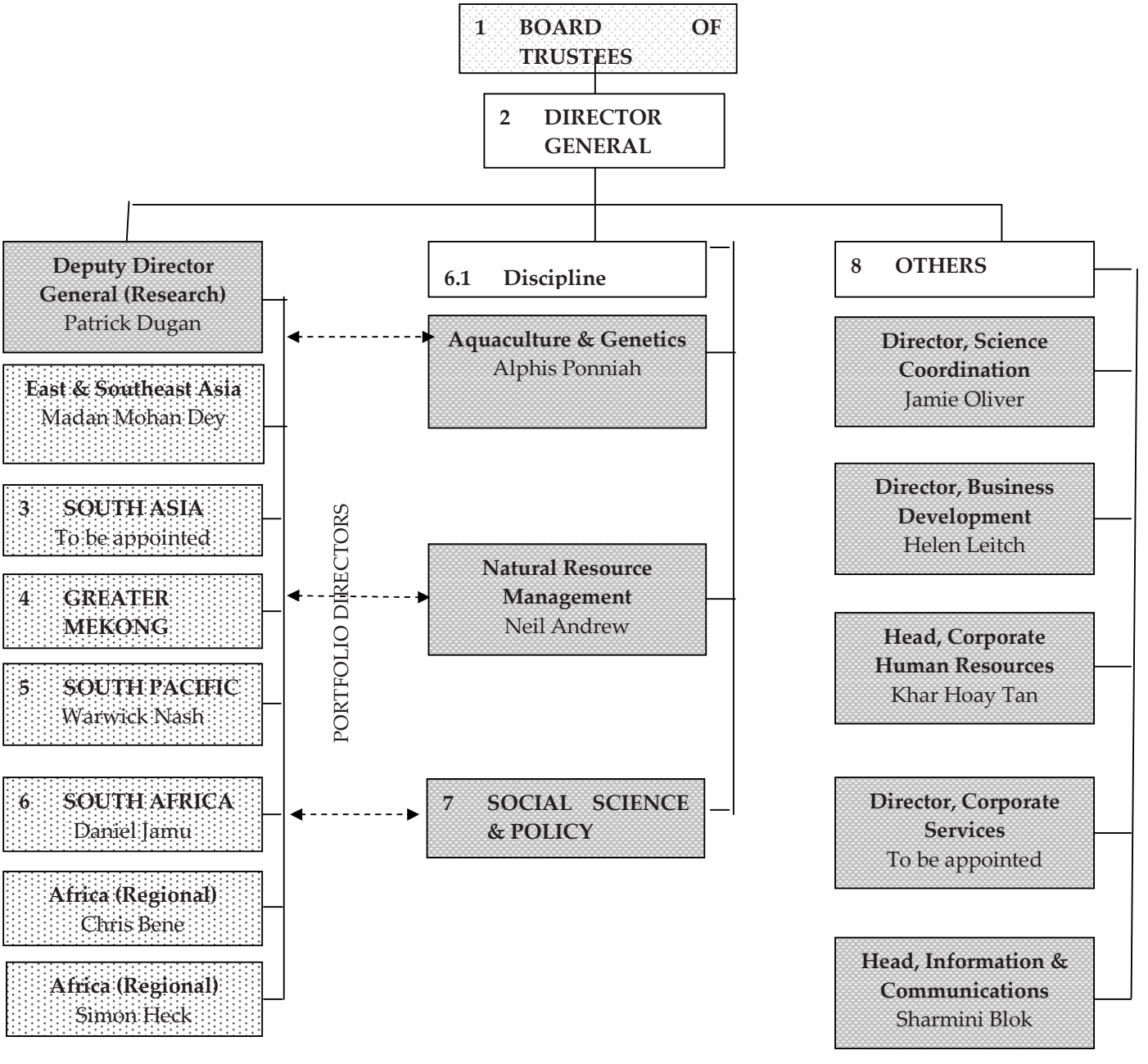
ORGANIZATIONAL STRUCTURE – WORLDFISH EXECUTIVE MANAGEMENT FEBRUARY 2004

(Extracted from the *Handover Brief to the Incoming Director General*, by Dr Meryl Williams, February 16, 2004, p.36)



APPENDIX 6.3B

Organizational Structure – WorldFish Executive Management
December 2005
(Based on a Presentation by WFC to the Panel in October 2005)



APPENDIX 6.4

Panel Survey of Trustee Views
Summary of Results

	Disagree	Neutral	Agree
1.Concerning Information and Material for Meeting			
Material is received well in advance	0	0	12
Material is adequate for meaningful participation at Board/Committee meetings	0	0	12

2. On Board and Committee Matters			
The present two meetings are adequate	6	1	5
If no, the number of times the meetings to be held? 4 Trustees suggest the meetings to be held 4 times and 3 Trustees suggested 3 times			
Some meetings may be held on audio-video conferencing mode	1	2	9
Board & Committee meetings need not be held at the same time	2	5	5
Some meetings may be held at Outreach Locations	0	2	10
Time allowed/ available for my participation at meetings is just right	0	1	11
Participation by other Trustees is just right	4	2	5
If no, on what matters more participation by others is desired? 5 Trustees suggest more participation is desired in the areas of Strategy, Finance and Accounting, and Funding; 2 Trustees desired in the areas of Legal & Compliance, CGIAR/SC Matters and Performance			

3. On Board Structure			
Gender balance on Board of Trustees 7 Trustees feel the gender balance is just right; 5 Trustees suggest there should be More women			
If geographical balance on Board of Trustees is not right, which geography needs to be further represented? 6 Trustees suggest there should be more representation from Africa; 5 Trustees suggested representation from South America and 1 Trustee suggested representation from Europe and Asia.			
Number of Trustees on the Board is just right	6	0	6
If no, what needs to be done? 6 Trustees suggested that Board Size be reduced, to between 6 and 10			

Skill set balance in the Board is just right	4	3	4
If no, which area(s) need(s) strengthening? 4 Trustees suggest that Board skills need strengthening in the areas of Finance/Legal/Accounting and Strategy			

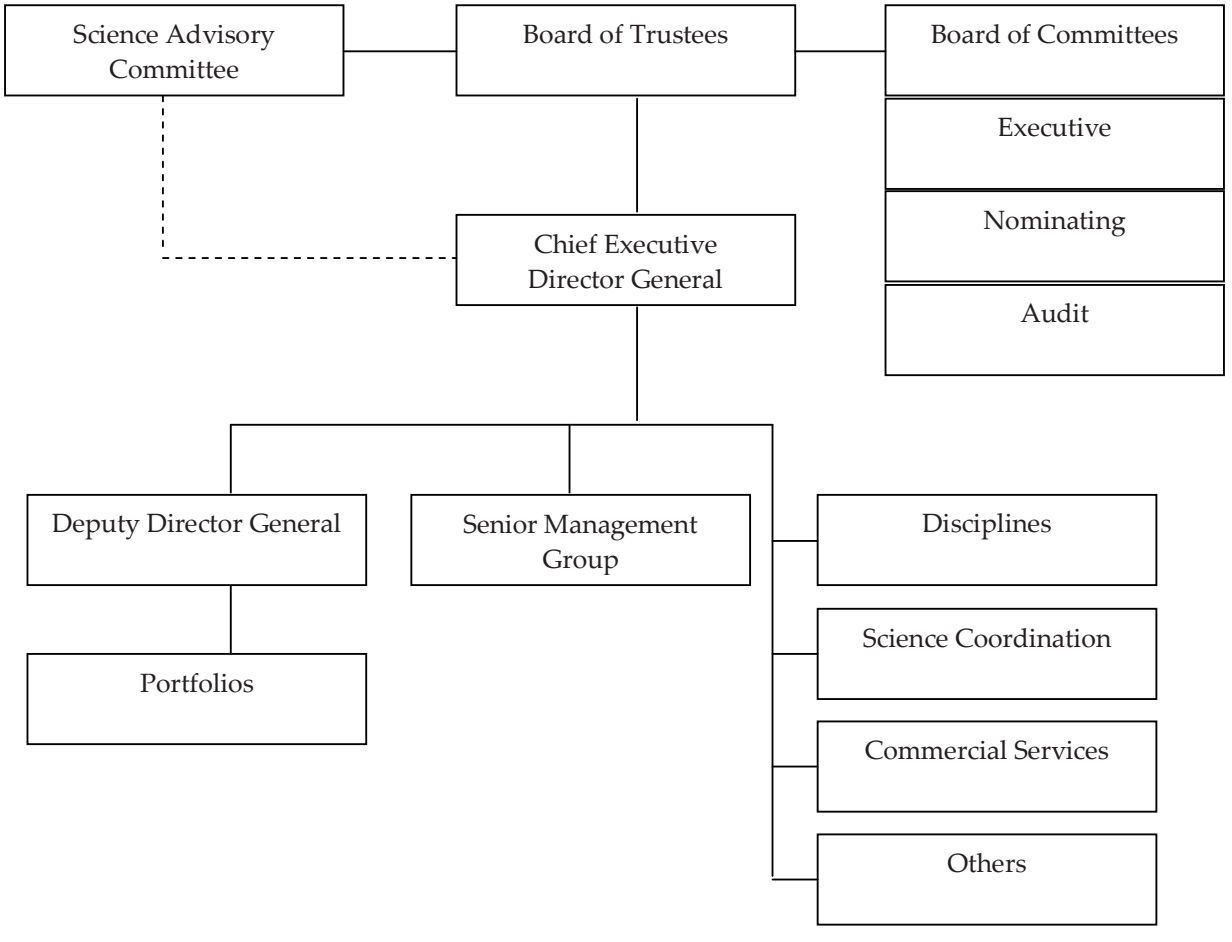
Board Committees as at present are just right	5	1	6
If no, what needs to be done? 5 Trustees suggest that the Program Committee to be Eliminated and to Add Finance/Science Committee; 1 Trustee suggests to combine Program Committee with the Board; 1 Trustee suggested eliminating Executive Committee;			
Membership balance on some Committees is not right	3	5	3
If no, which Committee needs to be reviewed? One Trustee suggested that the Nominations Committee to be reviewed			

4. On Trustee Contribution			
All Trustees contribute significantly to Deliberations	6	1	5
If no, how many do not contribute significantly? 4 Trustees feel 3 trustees do not contribute; 3 Trustees feel 2 trustees do not contribute and 1 Trustee feels 4 trustees do not contribute			
If no, in what area contribution can be improved? 8 Trustees feel contribution can improved in the area of Strategy; 4 Trustees feel in the area of Finance, Legal, Compliance; 3 Trustees feel in the area of Technology; and 2 Trustees feel in the areas of Host Countries Matters and Economics, Social Sciences.			
Personally I contribute significantly to Deliberations	1	1	10
If no, which areas contribution can be better? 3 Trustees feel contributions can be better in the area of Strategy; 2 Trustees feel in the area of Finance, Legal, Compliance; and One Trustee feels in the areas of Host Countries Matters and Economics, Social Sciences.			

5. On Personal Training & Orientation			
On Appointment as Trustee, I had satisfactory induction and orientation on the Center, its activities, and role as Trustee	2	1	9
If no, in what respects such induction required improvement? 3 Trustees feel induction can be improved in the area of Strategy; 2 Trustees feel in the areas of Finance & Legal and Board Structure/Processes; and One Trustee feels in the area of Host Countries Matters			
I do not need any further training or orientation now	4	2	6
If no, in what area (s) such training is required 4 Trustees suggests training is required in the area of Finance & Legal; 3 Trustees suggests in the areas of Strategy & Policy and Host Countries Matters; and One Trustee suggested in the area of Technology & Research			

APPENDIX 6.5

Recommended Governance Structure by January 2008



APPENDIX 7.1

Significant human resource policies and practices during 1999 – 2005

Year	Human Resource Policy/Practice	Remarks
1999	1. Salary Surveys	1. Before the shift of HQ from Philippines to Penang, a salary survey was conducted for the Malaysian market by Watson Wyatt in Philippines
2000	1. Salary Structures 2. Personnel Policies	2. Salary structures for most of the Regional Offices were in place. 3. Setting up of Policies and Procedures for new HQ office.
2001	1. Staff Opinion Survey 2. Training & Development	1. Conducted Center wide - Objectives of the staff opinion survey is to provide an understanding of how staff perceived the organization along different dimensions; essential to facilitate development and organizational changes; allows management to focus on needs and leverage on strengths; supply key information to fuel decision making and planning processes; provide management with employee feedback (both positive & negative) on the internal health of the organization; measures the impact of current programs, policies and procedures; identify ways in which staff support, commitment, morale and performance can be improved. 2. Ad hoc coordination of training as and when required
2002	1. Salary Surveys 2. Personnel Policies 3. Staff Opinion Survey 4. Training & Development 5. Job Classification/ Evaluation	1. Salary Survey was conducted for local staff at HQ 2. Preparation for ISO Certification for Corporate Services 3. Action Plans taken by staff advisory committee to address issues 4. Sponsored two staff for MBA, one from HQ and one from Bangladesh 5. Explore job classification exercise using competency based HR system approach
2003	1. Salary Surveys 2. Personnel Policies 3. Staff Opinion Survey 4. Training & Development 5. Job Classification/ Evaluation	1. Salary Survey was conducted for Egypt Office 2. Bangladesh Offices Personnel Policy Manual was reviewed 3. Conducted Staff Opinion Survey Center wide with same objectives as in 2000 4. Consolidate training needs and plan for HQ 5. Job Classification Project was initiated and completed on time

Year	Human Resource Policy/Practice	Remarks
2004	1. Staff Opinion Survey	1. Organizational transformation addresses majority of major issues from the 2003 survey
	2. Training & Development	2. Consolidate training needs and plan for HQ
	3. Job Classification/ Evaluation	3. However, before the implementation of the Job Classification model, the new DG, Dr. Steve Hall wanted a more robust and objective classification. Thus, Watson Wyatt was commissioned to conduct the Job Analysis, writing of Job Descriptions and then the Job Evaluation to measure job sizes and its internal relativity
	4. Culture Audit – revisit WorldFish mission, vision and values	4. Conducted a culture audit. New mission, vision and values statements were adopted
2005	1. Salary Surveys	1. Salary surveys were conducted for International positions; HQ, Philippines and Bangladesh Offices for external equity. Board of Trustees decided on compensation philosophy of meeting the 50th percentile of the market
	2. Salary Structures	2. Salary structures were reviewed and updated
	3. Personnel Policies	3. In line with changes to organizational values, the Center is adopting the OneStaff Concept and is harmonizing all personnel policies into a single common policy
	4. Staff Opinion Survey	4. Sets Key Performance Goals for staff satisfaction
	5 Training & Development	5. Consolidate training needs and plan Center wide with explicit budget allocated for training and development. Coordinated training programs for soft skills training
	6. Job Classification/ Evaluation	6. Job evaluation fully implemented for the whole Center
	7. Performance Management Systems	7. In line with changes in our organizational structure, the performance management system is being revised to cater for the matrix structure
2006*	1. Salary Surveys	1. Salary surveys will be conducted for Solomon Is., Egypt and Malawi offices
	2. Salary Structures	2. Salary structures will be reviewed and updated
	3. Salary Opinion Survey	3. A staff satisfaction survey will be conducted in the first quarter of 2006

*- Planned

Source – Human Resource Department – WorldFish

APPENDIX 7.2

Training and Development Courses held in 2005

Program	#Staff
a) Leadership/Development Courses	
Women's Leadership & Management Course	2
First Level Leadership Development Program (FLDP)	5
Professional Certified Coach Program	2
Train the Trainers for FLDP	2
Group Facilitation Skills	2
Change Management Leadership	1
Group Facilitation Skills for Participatory Decision Making	2
b) SAP – ERP / Computer Trainings	
SAP R/3 ABAP/4 Programming Workshop	2
SAP R/3 Advanced ABAP/4 Programming Workshop	2
SMI310 SAP Solution Manager: Implementation Tools In Detail	1
Survey Methodology & Statistical Analysis Using SPSS	11
MCSA & MCSE 2003	5
Microsoft Certified Database Administrator (MCDBA)	1
Microsoft Certified Systems Developer (MCSD.NET)	1
Microsoft Excel Advanced	1
Microsoft Tech-Ed Asia 2005	1
Microsoft Project 2003	8
c) Other Trainings	
6th International Workshop on Resource Mobilization	1
2005 Armidale Animal Breeding Summer Course	1
Seminar on Enhancing OSH at the Workplace	5
Emotional Excellence for Relational Building	90
Enhancing Personal Effectiveness	1
Occupational Safety and Health training	13
French Language Advanced Level 3	1
Intermediate and Advanced level English Language skills	24
SPSS	9
Negotiating for results	2
International Media & Environment Summit	1
Performance Management Skills	14
Proofreading Skills	1
WorldFish also sponsored staff for Phd. (1staff) and MBA (5 staff) courses.	

Source – Human Resource Department - WorldFish

Appendix 7.3 Staff Demographics as of 31 January 2006

	IRS				RRS				NRS				TOTAL
	M		F		M		F		M		F		
	PHD	OTHERS	PHD	OTHERS	PHD	OTHERS	PHD	OTHERS	PHD	OTHERS	PHD	OTHERS	
HQ	10	1	3	1	0	3	0	6	0	14	0	53	91
BANGLADESH	1	0	0	0	0	0	0	0	3	38	0	13	55
CAMBODIA	2	0	0	0	0	0	0	1	0	3	0	1	7
CAMEROON	1	0	0	0	0	0	0	0	0	0	0	0	1
EGYPT	5	0	1	0	0	0	0	0	7	75	0	7	95
MALAWI	1	0	0	0	0	0	0	0	0	12	0	1	14
NEW CALEDONIA	3	0	0	0	0	0	0	0	0	1	0	2	6
PHILIPPINES	2	0	0	0	0	0	0	0	0	4	1	17	24
SOLOMON ISLANDS	0	0	0	0	1	1	0	0	0	10	0	2	14
TOTAL	25	1	4	1	1	4	0	7	10	157	1	96	307

IRS - International Recruited Staff

RRS - Regionally Recruited Staff

NRS - Nationally Recruited Staff

Source - Human Resources Department - WorldFish

Appendix 7.4

Staff Attritrion : 1999 - 2005 (upto 31 December 2005)

Year	# as at end	# joined	# resigned	Attrition %
1999	319	19		
2000	257	28	-90	31,25
2001	258	63	-62	24,03
2002	291	60	-27	9,75
2003	317	66	-40	12,99
2004	318	59	-60	18,72
2005	307	55	-67	21,24
Average over 2000 2005				19,66
Average over 2001 2005				17,35

Department wise Average Atrition Rates

Department	Average	5 yrs
EMT/SMT	10,90%	13,08%
Research	12,60%	10,99%
Research Support	19,75%	19,58%
Finance	32,37%	30,66%
HR	20,00%	14,00%
IT	30,83%	27,00%
ICP	32,44%	22,27%
Other Admin	16,60%	14,92%
General Workers	16,63%	14,55%

Staff Attrition department wise 1999 - 2005 (upto 31 December 2005)
Source - Human Resource Department - WorldFish

	EMT/SMT				Research				Research Support			
	# as at end	# joined	# resigned	%	# as at end	# joined	# resigned	%	# as at end	# joined	# resigned	%
1999	4	0			29	1			107	7		
2000	5	1		0,00%	26	3	-6	20,69%	93	8	-22	20,56%
2001	7	2		0,00%	27	4	-3	11,54%	101	28	-20	21,51%
2002	7	1	-1	14,30%	33	7	-1	3,70%	111	26	-16	15,84%
2003	9	2	0	0,00%	34	5	-4	11,76%	125	33	-19	17,12%
2004	8	3	-4	40,00%	36	4	-2	5,71%	128	28	-25	20,00%
2005	10	3	-1	11,10%	30	3	-9	22,22%	118	22	-32	23,44%
Average over 2000 2005				10,90%				12,60%				19,75%
Average over 2001 2005				13,08%				10,99%				19,58%

Appendix 7.4 (cont.)

Staff Attrition department wise 1999-2005 (upto 31 December 2005)

	Finance				HR				IT			
	# as at end	# joined	# resigned	%	# as at end	# joined	# resigned	%	# as at end	# joined	# resigned	%
1999	22	0			4	0			6	0		
2000	18	5	-9	40,91%	2	0	-2	50,00%	5	2	-3	50,00%
2001	15	5	-8	44,44%	2	1	-1	50,00%	5	2	-2	40,00%
2002	17	4	-2	13,33%	2	0	0	0,00%	5	1	-1	20,00%
2003	17	8	-8	47,06%	2	0	0	0,00%	8	3	0	0,00%
2004	21	7	-5	29,41%	4	2	0	0,00%	5	1	-4	50,00%
2005	22	5	-5	19,05%	5	2	-1	20,00%	7	3	-1	25,00%
Average over 2000 - 2005				32,37%				20,00%				30,83%
Average over 2001 - 2005				30,66%				14,00%				27,00%

Staff Attrition department wise 1999-2005 (upto 31 December 2005)

	ICP				Other Admin				General Workers			
	# as at end	# joined	# resigned	%	# as at end	# joined	# resigned	%	# as at end	# joined	# resigned	%
1999	17	0			56	1			74	10		
2000	4	1	-14	83,25%	46	4	-14	25,00%	58	4	-20	27,03%
2001	12	8	0	0,00%	41	8	-13	28,26%	48	5	-15	25,86%
2002	11	2	-3	25,00%	51	13	-3	7,32%	54	6	0	0,00%
2003	10	2	-3	25,00%	55	8	-4	7,84%	57	5	-2	23,70%
2004	7	1	-4	36,36%	54	8	-9	16,36%	55	5	-7	12,28%
2005	8	4	-3	25,00%	56	10	-8	14,81%	51	3	-7	10,91%
Average over 2000 - 2005				32,44%				16,60%				16,63%
Average over 2001 - 2005				22,27%				14,92%				14,55%

Appendix 7.5 Table 5: Vacant Positions as of 31 January 2006

Advertised	Position	Category	Location	Remarks as at 31 January 2006
Jul-05	Discipline Director - PESS	IRS	HQ	Will readvertise in 2006
Ago-05	Scientist - Fisheries Resources (NRM)	IRS	HQ	Re-advertised again in Oct '05. 1st round of interview completed; 2nd round in mid-March 2006
Oct-05	ReefBase Pacific Coordinator (NRM)	NRS	NEW CALEDONIA	
Ene-06	SAP Functional Analyst	NRS	HQ	
Ene-06	Financial Accountant	NRS	HQ	
Ene-06	Management Accountant	NRS	HQ	
Ene-06	Senior Management Accountant	NRS	HQ	
Ene-06	Research Scientist - Fisheries Management (C	IRS	CAMBODIA	
Ene-06	Research Scientist - Coral Reefs (NRM)	IRS	HQ	
Ene-06	Post Doctoral Fellow (PESS)	IRS	HQ	
Ene-06	Regional Portfolio Coordinator (PESS)	IRS	HQ	

Source: Human Resource Department, WorldFish

Appendix 7.6

STATEMENT OF ACTIVITIES
(US Dollar '000)

	Dec 2005		Dec 2004		Dec 2003		Dec 2002		Dec 2001		Dec 2000		Dec 1999	
	Unrestricted	Restricted	Unrestricted	Restricted	Unrestricted	Restricted	Unrestricted	Restricted	Unrestricted	Restricted	Unrestricted	Restricted	Unrestricted	Restricted
REVENUES, GAINS AND OTHER SUPPORT														
Grants	7.272	6.026	6.476	7.670	6.625	8.007	6.046	6.446	6.346	5.779	7.014	5.365	6.139	5.467
Other revenues	146		879	-	1.365		110		431		495		259	
Total revenues, gains and other support	7.418	6.026	7.355	7.670	7.990	8.007	6.156	6.446	6.777	5.779	7.509	5.365	6.398	5.467
MEMO ITEM														
Operating expenses - By nature of classification														
Personnel costs	4441	2070	4.039	2.421	3.565	2.296	3.604	1.649	2.934	1.674	2.723	1.832	3.554	1.933
Supplies and services	4000	3196	2.159	4.557	3.998	5.055	2.326	4.302	4.647	3.699	2.596	3.123	3.017	3.171
Operational travel	1277	669	747	625	676	656	514	495	448	406	450	410	450	363
Depreciation	205	91	184	67	187	-	142	-	93	-	39	-	250	-
Indirect cost recovery	(619)		(793)		(774)		(748)		(778)		(678)		(446)	
Total expenses	9.304	6.026	6.336	7.670	7.652	8.007	5.838	6.446	7.344	5.779	5.130	5.365	6.825	5.467
CHANGE IN NET ASSETS	(1.886)		1.019		338		318		(567)		2.379		(427)	
Net ASSETS														
Beginning of the year	10.587		9.568		8.998		7.988		8.315		5.743		3.263	
Appropriated for acquisition of equipment			-		232		692		240		193			
	8.701		10.587		9.568		8.998		7.988		8.315		2.836	

Appendix 7.7

STATEMENT OF FINANCIAL POSITION

(US Dollar '000)

	2005 Dec	2004 Dec	2003 Dec	2002 Dec	2001 Dec	2000 Dec	1999 Dec
ASSETS							
CURRENT ASSETS							
Cash and cash equivalents	12.503	14.223	12.032	8.932	7.515	8.014	8.213
Accounts receivable							
Donors	2.890	2.135	4.238	3.700	3.012	3.075	2.443
Employees	102	104	118	114	193	261	100
Others	535	1.626	1.374	1.765	1.537	1.190	1.200
Other current assets	32	405	175	2.445	2.438	2.775	2.559
Total current assets	16.062	18.493	17.937	16.956	14.695	15.315	14.515
NON-CURRENT ASSETS							
Property and equipment, net	514	366	394	356	337	190	36
Other assets	107	107	79	325	320	320	302
Total non-current assets	621	473	473	681	657	510	338
TOTAL ASSETS	16.683	18.966	18.410	17.637	15.352	15.825	14.853
LIABILITIES AND NET ASSETS							
CURRENT LIABILITIES							
Accounts payable							
Donors	3.817	3.127	4.128	3.590	2.979	2.882	7.630
Employees	-	107	79	79	137	89	82
Others	1.549	2.106	1.888	896	401	968	36
Accruals and provisions	2.297	2.706	2.388	3.573	3.369	3.111	4.049
Total current liabilities	7.663	8.046	8.483	8.138	6.886	7.050	11.797
NON-CURRENT LIABILITIES							
Accounts payable - Employees	319	333	359	501	478	460	220
TOTAL LIABILITIES	7.982	8.379	8.842	8.639	7.364	7.510	12.017
UNRESTRICTED NET ASSETS							
Designated	1.111	2.998	2.670	1.994	1.302	1.095	-
Undesignated	7.590	7.589	6.898	7.004	6.686	7.220	2.836
TOTAL NET ASSETS	8.701	10.587	9.568	8.998	7.988	8.315	2.836
TOTAL LIABILITIES AND NET ASSETS	16.683	18.966	18.410	17.637	15.352	15.825	14.853

Appendix 7.8

Financial Performance Indicators & Comments	Benchmark	2005 Dec	2004 Dec	2003 Dec	2002 Dec	2001 Dec	2000 Dec	1999 Dec
1 Surplus/Deficit operating Result Indicator (USD '000)	Zero Deficit	(1.886)	1.019	338	318	(567)	2379	(427)
=(Total Grant Revenue-Total Expenditure)		(Deficit is approved by the BoT)						
2 Personnel Cost Ratio (%)	Less than 50% of total operating expenses	42,47	46,12	39,07	37,43	42,61	42,76	33,23
= (Personnel Cost) / Total Operating Expenditures								
3 Working Capital Indicator (days)	120 days							
=(Current Assets-Current Liabilities)* months to date (days) / Total Expenditures less depreciation		200	272	225	206	206	246	72
4 Spending/Equity Ratio (days)	90 days 25%	195	266	219	201	202	241	74
=Unrestricted Net Assets-Fixed Assets* months to date (days) / Total Expenditures								

Appendix 7.9

Cash and Cash Equivalents

	HQ	South Asia	Mekong	Pacific	Philippines	Egypt	Malawi	Cameroon	Caribbean	Total
	$	$	$	$	$	$	$			$
Dic-05										
Cash	3.487.210	179.974	32.112	42.725	30.603	105.375	39.108	134.000	-	4.051.107
Investment	8.452.488									8.452.488
Total	**11.939.698**	**179.974**	**32.112**	**42.725**	**30.603**	**105.375**	**39.108**	**134.000**		**12.503.595**
Dic-04										
Cash	6.137.923	856.476	3.558	66.478	25.114	66.613	6.188	-	-	7.162.351
Investment	7.060.791									7.060.791
Total	**13.198.714**	**856.476**	**3.558**	**66.478**	**25.114**	**66.613**	**6.188**			**14.223.142**
Dic-03										
Cash	5.066.843	269.776	51.477	46.724	49.593	73.789	(1.814)	-	412	5.556.800
Investment	6.475.507									6.475.507
Total	**11.542.350**	**269.776**	**51.477**	**46.724**	**49.593**	**73.789**	**(1.814)**			**12.032.307**
Dic-02										
Cash	2.374.735									2.374.735
Investment	9.140.362									9.140.362
Total	**11.515.096**	-	-	-	-	-	-			**11.515.096**
Dic-01										
Cash	1.819.496									1.819.496
Investment	8.042.409									8.042.409
Total	**9.861.905**	-	-	-	-	-	-			**9.861.905**
Dic-00	not available									
Cash										-
Investment										-
Total	-	-	-	-	-	-	-			-

APPENDIX 8

LIST OF ACRONYMS

ACIAR	Australian Center for International Agricultural Research
ACMRR	FAO Advisory Committee on Marine Resources Research
ACP	African, Caribbean and Pacific
ADB	Asian Development Bank
AFSSA	French Food Health Security Agency
AGI	Aquaculture and Genetic Improvement
AGID	Aquaculture and Genetic Improvement Discipline.
AGM	Annual General Meeting of the CGIAR
APEC	Asia-Pacific Economic Cooperation Council
ARI	Agricultural Research Institute
ARS	Aquatic Resource System
ASSOCHAM	The Associated Chambers of Commerce and Industry of India
BFAR	Bureau of Fisheries and Aquatic Resources
BGRP	Biodiversity and Genetic Resources Program
BGRRP	Biodiversity and Genetic Resources Research Program
BLUP	Best Linear Unbiased Prediction
BoT	Board of Trustees
CAPRi	Collective Action and Property Rights
CBFM	Corporate Banking and Financial Markets
CCERs	The Center for Continuing Education in Rehabilitation
CCSP	Cisco Certified Security Professional
CDB	Common Data Base
CECAF	Fishery Committee for Eastern Central Atlantic
CEMAGREF	Agricultural and environmental engineering research
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CAS-IP	Central Advisory Services for Intellectual Property
CGB	Biomolecular Gene Committee
CGIAR	Consultative Group on International Agricultural Research
CIDA	Inter-American Committee for Agricultural Development
CIFOR	Center for International Forestry Research
CIMMYT	International Maize and Wheat Improvement Center
CIRAD	International Center of Agronomic Research for Development
CLAR	Central Laboratory for Aquaculture
CMRRP	Coastal and Marine Resources Research Program
CNRS	Center National de la Recherche Scientifique
COBIT	Control Objectives for Information and Related Technology
CONSRN	Consortium to Restore Shattered Livelihoods in Tsunami-Devastated Nations
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CPs	Challenge Programs
CSIRO	Commonwealth Scientific and Industrial Research Organization
CSO	Civil Society Organization
DD	Discipline Director
DEGITA	Dissemination and Evaluation of Genetically Improved Tilapia Species in Asia

DFID	Department for International Development
DSAP	Development of Sustainable Aquaculture
EC	European Community
EICA	Egyptian International Center for Agriculture
EPMR	External Program and Management Review
ESA	East and Southern Africa
ESEA	East and South-East Asia
ESI	Environmental Sustainability Index
FACT	Fisheries Action Coalition Team
FAO	Food and Agriculture Organization of the United Nations
FLDP	First Level Leadership Development Program
FRRP	Freshwater Resources Research Program
GDP	Gross Domestic Products
GEBP	Germplasm Enhancement and Breeding Program
GFAR	Global Forum on Agricultural Research
GIFT	Genetic Improvement of Farmed Tilapia
GIS	Geographic Information System
GMR	Greater Mekong Region
HQ	Headquarters
HR	Human Resources
IAA	Integrated Agriculture Aquaculture
ICLARM	former name of WorldFish Center
ICRAF	International Center for Research in Agroforestry
ICRAN	International Coral Reef Action Network
ICT-KM	Information and Communications Technology – Knowledge Management
IDAF	Integrated Development of Artisanal Fisheries
IDRC	International Development Research Center
IF	Impact Factor
IFM	Institute for Fisheries Management
IFPRI	International Food Policy Research Institute
IFReDI	Inland Fisheries Research and Development Institute
IFREMER	French Research Institute for Exploitation of the Sea
IITA	International Institute of Tropical Agriculture
INGA	International Network for Genetics in Aquaculture
INRA	National Institute for Agronomique Research
IP	Intellectual Property
IPG	International Public Good
IRR	Internal Rate of Return
IRRI	International Rice Research Institute
IRS	Internationally Recruited Staff
IUCN	The World Conservation Union
IWMI	International Water Management Institute
KPG	Key Performance Goals
LOA	Letter of Agreement
LVFF	Low Value Food Fish
MDGs	Millennium Development Goals
MOA	Ministry of Agriculture
MOU	Memorandum of Understanding
MPAs	Marine Protected Areas
MTP	Medium Term Plan

NARS	National Agricultural Research Systems
NEPAD	New Partnership for Africa's Development
NFRDI	National Fisheries Research and Development Institute
NGO	Non-governmental Organization
NRM	Natural Resource Management
PDs	Portfolio Directors
PESS	Policy, Economics and Social Science
PMS	Performance Management System
PNG	Papua New Guinea
PRIAP	Policy Research and Impact Assessment Program
R&D	Research and Development
RM	Resource Management
SADC	Southern African Development Community
SC	Science Council
SEAFDEC	Southeast Asian Fisheries Development Center
SMG	Senior Management Group
SPC	Secretariat of the Pacific Community
SPSS	Survey Methodology & Statistical Analysis Using
SSA	Sub-Saharan Africa
SSF	Small Scale Fisheries
SWOT	strengths, weaknesses, opportunities and threats
UBC	University of British Columbia
UNDP	United Nations Development Program
USAID	United States Agency for International Development
WANA	West Asia and North Africa
WARDA	West African Rice Development Association (The Africa Rice Center)
WCA	West and Central Africa
WFC	World Fish Center

APPENDIX 9

STAKEHOLDER INTERVIEWS

Individuals or groups with whom the Panel held substantial discussions, in person or by telephone between October 2005 and February 2006 (other than current WorldFish Staff)

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