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Report of the Third External Program and Management Review (EPMR) of the International Water Management Institute (IWMI)

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Consultative Group on International Agricultural Research

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REPORT OF THE THIRD EXTERNAL PROGRAM AND MANAGEMENT REVIEW (EPMR) OF THE INTERNATIONAL WATER MANAGEMENT INSTITUTE (IWMI)

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THIS DOCUMENT CONTAINS:

- Extracts from the Summary Record of Proceedings of the Annual General Meeting 2007 (AGM07)
- Science Council Commentary
- IWMI Response to the Third EPMR
- Transmittal letter and Report of the Panel on the Third IWMI EPMR

Consultative Group on International Agricultural Research (CGIAR)

CGIAR Annual General Meeting, 2007 (AGM07)[1]

Agenda Item 6. Evaluation

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6.a IWMI EPMR

IWMI EPMR Panel member Jeff Bennett participated in the discussion through video conference on behalf of Panel Chair William Easter. He briefly summarized the key findings and recommendations of the Panel focusing on the need for IWMI to do more analytical and less descriptive science, the Center's drift towards more development activities in the research-development continuum, the Center's below average number of publications, and the need to redouble efforts on impact assessment.

R. Wang presented the ExCo12 recommendations.

Discussion:

- Concern was expressed over financial management in the Center.
- Regarding critical views of the EPMR on the scientific performance and orientation of IWMI, a number of Members supported the Center response that its mandate is research for impact on development. They also supported the response regarding the use of descriptive and analytical approaches to its research agenda.
- Members also recognized the value of IWMI's work on water management related to urban agriculture. It was agreed that a holistic approach addressing water, health, and environment issues should be adopted.
- Members reiterated ExCo comments and observations on HR management, i.e. the need for strategy, leadership and staffing.
- There was a renewed call for IWMI's leadership in addressing water management issues in collaboration with other CGIAR Centers (e.g. ICARDA).
- Colin Chartres, the new Director General of IWMI, briefly outlined what the Center has planned or started to do in response to the EPMR recommendations and other issues raised by Members. R. Rabbinge and a number of Members were pleased to hear the Director General's views and plans for the Center.

Conclusion and Decisions:

- *The CGIAR Chair thanked the EPMR Panel for its work and a well balanced review.*
- *The CGIAR endorsed the ExCo recommendations on the 3rd IWMI EPMR.*

[1] Extract from the Summary record of Proceedings of Annual General Meeting, 6-7 December 2007

- *The CGIAR is concerned about financial management at the Center and sent a signal to the entire System about the importance placed on this area, and expressed appreciation to the new DG on the steps he is taking to examine the issue more closely.*

Science Council Commentary
on the Third External Program and Management Review (EPMR) of
the International Water Management Institute (IWMI)

April 2007

The Report of the 3rd EPMR of IWMI was discussed at the Seventh Meeting of the Science Council (SC), held at ICRISAT, Patancheru, India. Dr. Jeff Bennett on behalf of the review team presented the main findings and recommendations of the Report. IWMI Board Chair Dr. Nobumasa Hatcho and the Director General of IWMI, Frank Rijsberman responded on behalf of the Center. The SC thanks the Panel for its comprehensive, perceptive and analytical assessment of the Center and, in particular, for its careful strategic analysis and forward looking perspective. The review report is well written and the conclusions clearly documented. The SC notes that the Center has responded positively to the review report's major findings and recommendations.

The SC commends the panel for the novel approach used to measure the quality and performance of the center, offering ideas for use in future EPMRs. In particular, it considered it both innovative and instructive for the Panel to request IWMI to nominate the key papers that illustrate the outputs of each program and to identify the key outcomes and impacts from each. The Panel in this case was able to make perceptive suggestions for refinements in research designs in order to improve the relevance and impacts of the outputs as a result of reading the nominated papers.

The 3rd EPMR has assessed an institute that has been largely restructured in response to the 2nd EPMR six years earlier. Since 2000, IWMI has undergone a substantial growth in funding – an almost tripling of its budget – with a corresponding expansion in research capacity. The panel found that the Center has become a more vibrant and more viable institution; it has improved its management, administration and research publications performance, and has produced a number of important achievements. In addition to improving its research publication rate, the report highlights IWMI's leadership and global influence through activities such as the Comprehensive Assessment of Agricultural Water Management, the WWF discussions and agenda, the Hyderabad Declaration, membership in the RAMSAR Conventions and the DG's paper on small scale water management selected for the Copenhagen Consensus. IWMI and its Director General are to be commended for these achievements.

The panel, however, concludes that IWMI has the potential to do much better, and has made 17 recommendations aimed at helping the Center become stronger. The key issues identified by the panel requiring IWMI's attention include: clarifying its specialized research niche (current niche and mission are wide ranging and ambitious), deepening the analytical component of its research, injecting a stronger disciplinary base in its research, and demonstrating impact. The SC believes that the report has highlighted key challenges facing IWMI that require a research effort at multiple levels, i.e., from local to global, from basic to applied, from upstream to downstream and from private to public. None of these are polar choices, but rather reveal the complexity of mixtures along the multiple continuums. The main recommendations of the panel, aimed at pushing IWMI above the CGIAR average, are related to the need for: (i) strategic planning, staffing and partnership review exercises, (ii) a more tightly focused research agenda, (iii) more effort directed to analytical research, (iv) recruitment of experienced and well established scientists and research leaders, (v) the development of an effective publications strategy, (vi) changes in the programmatic structure, and several others related to poverty, gender and impact.

Based on the panel's assessment and evidence provided, the SC endorses the panel's 17 recommendations.

The Center agrees with the vast majority of the report's recommendations and the SC notes that steps are already underway at IWMI to implement these, with a few exceptions. There were two recommendations 'noted', but not 'agreed to' by the center: #2 on merging of the Water and Cities theme into the Health and Environment theme, and #8 to appoint four experienced and well respected researchers in major disciplines (although agreeing to appoint a DDG for Research). These are discussed below.

Priorities and Strategy

With respect to its re-defined mission and mandate, IWMI has evolved from a Center focused on water management issues in irrigated agriculture to a Center with a greatly expanded scope that now embraces nature in its mandate and, accordingly, has re-oriented itself as a Center for Water, Food and the Environment. In doing so, IWMI has captured the concerns of the day, and is attempting to carve out a new niche for itself in a world with multiple institutions addressing the water sector at large. The SC believes the pendulum must swing back through the process of prioritizing the research agenda within this institutional context. The Panel recommends that IWMI initiate a strategic planning exercise in 2008 with the arrival of the new DG, and through this process identify clear priorities for itself that can serve the staff in more carefully defining their research programs. The SC strongly endorses this recommendation and urges the Center to pay particularly attention to the panel's strategic analysis and perspective on IWMI provided on pages 1-10 of the report. The assessment of IWMI's conceptual framework and poverty mapping merits careful consideration. The need for IWMI to reexamine the breadth of its mission within the context of a strategic planning exercise is of paramount importance.

IWMI has indicated that three of the panel's recommendations will be considered in the context of the strategic planning exercise, i.e., #4 which emphasizes greater priority on critical water management issues (e.g. sustainable groundwater management, groundwater depletion); #5 on reinstating the Policies, Institutions and Management theme; and #15 on constituting an Advisory Science Council for the Board. The SC agrees with this response but encourages the Center to consider during that process the issues and concepts put forward by the panel in their assessments and recommendations.

On the specific recommendations themselves, SC concurs that IWMI should enhance its effort on sustainable groundwater management. The need to strengthen IWMI's institutions and policies work is well made but care is required to ensure that this theme is pursued in close collaboration with other themes like water allocation and environmental flows in rivers to exploit the synergies that the panel correctly articulates. Finally, the Panel has expressed concerns about the vision and oversight functions of the Board and recommends that an external Scientific Advisory Board be put in place to provide more guidance. The SC endorses the notion of a need for such oversight, but accepts that the Board could take other action that could be equally effective and less costly. The strategic planning exercise would presumably also address issues of comparative advantage raised by the Panel, e.g. should wastewater management issues be addressed at all and if yes, should they be restricted to periurban agriculture or to disposal issues within a full-basin environmental context. At this point, the SC considers that IWMI's wastewater research was catalytic but that the health aspects may be now getting beyond its comparative advantage.

Research Leadership

The criticism of the senior research leadership team and generally insufficient experience among its scientists is a major strategic issue for the center. This is the motivation for the panel's lengthy and strong recommendation (#8) to appoint four experienced and well respected researchers in major disciplines and hire a DDG for Research, which the SC endorses. IWMI has been purposeful in the choice of a relatively young team with project management skills in preference to research experience. It has strongly defended this strategy. The SC was not convinced by the Center's response to the criticisms of the panel in this regard, i.e., that a focus on strong disciplinary skills comes at the expense of a multi-disciplinary approach. Strong research leadership can foster the desired multi- and inter-disciplinary interactions required of a mission-oriented institution like IWMI. Additionally, there are an increasing number of reputable journals that encourage multi-disciplinary innovations in research.

A related concern is the panel's assessment that too many studies at IWMI are descriptive and the need to be more dynamic, interdisciplinary, analytical and directed to outcomes and impacts by the addition of institutional and policy analysis. In the SC's view, the panel has provided an excellent analysis of descriptive vs. analytical research at IWMI, and correctly highlighted the need for more rigor and depth, and how this depends critically on having strong disciplinary skills as a necessary condition for establishing strong and effective interdisciplinary teams (rather than grouping generalists together – who may work nicely with each other but not necessarily produce the rigorous results). Thus, the SC strongly supports the panel in their recommendation on this issue.

Publications

IWMI questions the use of ISI as a primary indicator of a Center's performance, especially considering the multi-disciplinary nature of their work, i.e., not as easy to publish interdisciplinary research. The SC maintains that publications is one of the most widely accepted basis for evaluating research quality, and assuming the work is relevant, is likely to be a strong indicator of the potential for future impact. The SC does not agree with the Center's characterization of the Panel as giving IWMI advice to reform itself in the direction of "a university with disciplinary departments that favor 'deep science' and where publications dominates all else". Rather, in the SC's view, the Panel is urging the Center to establish a solid basis for conducting good, rigorous science such that results emerging are valid and robust that is more likely to lead to improved technologies, policies and institutions and, ultimately, to impact on the ground. The SC believes that good science and impact go together and suggests that lack of impact at IWMI may at least in part be explained by a slow drift away from good disciplinary-based science.

The Center's response to the adverse comments of the panel about their peer publication record by resorting to the argument that impacts are more important than publications is unconvincing. Firstly, these should not be viewed as substitutes but complements and secondly, and more importantly, IWMI is one of the poorest performing centers as far as the documentation of its impact is concerned in the 3a and 3b components of the PM exercise.

IWMI as a 'Knowledge Center'

At the time of the 2nd EPMR the Center had a strong research orientation and was focused on increasing the amount of 'crop per drop'. In the past six years this focus has changed to that of a Knowledge Center that involves not only IWMI's outputs but those of multiple partners. In-depth (disciplinary) research was de-emphasized in favor of inter-disciplinary research with its ancillary complexities and transaction costs. The Panel rightly suggests that this shift threatens the ability of the Center to "deliver cutting edge research outputs" and makes a number of remedial propositions such as improved mentoring of younger staff, restructuring of the leadership team and a professional development program. The SC accepts the analysis and agrees that some of the suggested remedies might alleviate the problem, but sees room for alternative measures that the new DG might wish to pursue.

The report suggests a move back to a stronger disciplinary-oriented scientific research paradigm. The SC concurs with the Panel that roles such as brokering, sharing, application should be complements to IWMI's research along the impact pathway and not alternatives. The forthcoming meta-review of EPMRs should assess whether such "pendulum swings" are justified or not.

Also, in the context of becoming a Knowledge Center, IWMI has inevitably greatly expanded its partnerships and drifted rather far downstream on the research – development continuum. The Panel questions whether IWMI could legitimately claim that 80% of its activities could be placed in the SP agenda that should lead to IPGs. Indeed, the panel's analysis of several of the IWMI's research programs indicates that much of the research is not IPG oriented and does not build on past research and comparative advantage sufficiently by way of synthesis reports. This requires attention. The SC would agree with the panel that the R-D balance be reconsidered in the context of developing a new strategic plan.

Partnerships

The panel noted that relatively few of IWMI's publications are with partners. It is of concern that IWMI's partnerships are questioned in a number of places by the panel. There are issues of their number and type and the need for IWMI to be more strategic and selective if it is to pursue an IPG agenda and if it is to become a center of preference for collaboration by other research providers. Of concern to the SC also is the apparent tensions between IWMI and IFPRI resulting in competing rather than collaboration in water policy research; and there are poor host country relationships.

There are tensions between the CP on W&F and IWMI as evidenced by the recent criticisms of the CP competitive grants process by some partners. The Steering Committee arrangements require scrutiny and the forthcoming review of the CP is timely. It is fortunate that Dr Bennett has agreed to be involved in the CP review as he now has a full understanding of IWMI and can approach the review of the CP with full information.

Scope of effort, devolution and critical mass

The Center decided that its new scope required a new basis of analysis and moved from perimeters to river basins. Though sensible and commendable, IWMI then proceeded to adopt a

rather large number of river basins in many parts of the world, some of which are highly complex. The result is that a critical mass is absent in many of the basins and the outputs in the Basin theme are disparate and require more focus and prioritization. The Panel suggests that IWMI revisits its decision to get involved in so many basins and the degree of decentralization that this implies. The SC concurs.

The SC agrees with the need to review the value and desirability of the massive decentralization that has occurred in recent years. It questions whether this phenomenon may have contributed to the decline in IPG research outputs.

Impact Assessment

The Panel believes and SC concurs that there is probably more influence or adoption of management practices derived from IWMI's work that could well be assessed and more effort by IWMI needs to be given to its documentation. The Panel was aware that IWMI is making a serious effort to explore a number of different approaches, such as outcome mapping, impact pathway monitoring, etc but encouraged the Center to keep the effort focused on documentation and limit experimentation with new methods.

In the SC's view it is clear IWMI requires a more conventional impact assessment team than it has now. It lies towards the bottom of the PM ranking in this regard and could push the frontiers on policy oriented research impact assessment vis-à-vis water institutions and policy research with a strengthened IA capacity. The panel is rightly critical of the center for a lack of ex ante and ex post impact assessment to inform priorities. The SC agrees with the recommendation about the need for a senior staff member in this area and a systematic evaluation of its past and future portfolio.

IWMI RESPONSE TO THE 3rd EXTERNAL PROGRAM AND MANAGEMENT REVIEW OF IWMI

INTRODUCTION

IWMI much appreciates the careful and in-depth evaluation the Panel has undertaken of its work over the period under review. IWMI is pleased that the Panel's overall conclusion is that IWMI has emerged from its period of rapid growth as a larger, more diverse, more proactive and generally stronger research organization. IWMI agrees there is now an opportunity for refinement, clear specification of research questions, deeper partnerships and a focus on generating and better measuring outcomes and impacts through this larger, stronger organization.

IWMI agrees with the large majority of the Panel's recommendations and fully intends to use the Panel's careful analysis as a guide for the way forward in the years to come, starting with a new Strategic Plan exercise in 2008.

In 2007 the center is recruiting a new Director General who will be charged with the implementation of the EPMR's recommendations; first and foremost the development of a new strategic plan that will be the primary vehicle for the implementation of many of the Panel's recommendations.

The review has also raised a number of questions, however, that appear to be going further than the review of IWMI alone, but touch directly on the mission and vision for the CGIAR as a research for development system as a whole. It may be a good moment to debate, as part of the IWMI review process, the difference in perspective on what the role and purpose of a CGIAR research institute is, and how that differs from a university, and how that may require a different approach to staffing and management.

In some ways the well-thought out advice the Panel is giving IWMI is to reform itself more in the direction of a university, with disciplinary departments that favor "deep science" and where publication records dominate all else.

IWMI agrees that publications are one indicator of research quality. IWMI has instituted during the period under review a policy that sets clear expectations that every researcher generates at least 2 peer-reviewed publications every year and this is evaluated carefully as part of every researcher's performance evaluation. As a result IWMI's publication performance has improved and is currently better than at any time in its history (see Figure 1). IWMI also agrees with the Panel that there is still room for improvement and it expects to see such improvement through carefully targeted research and publication policies.

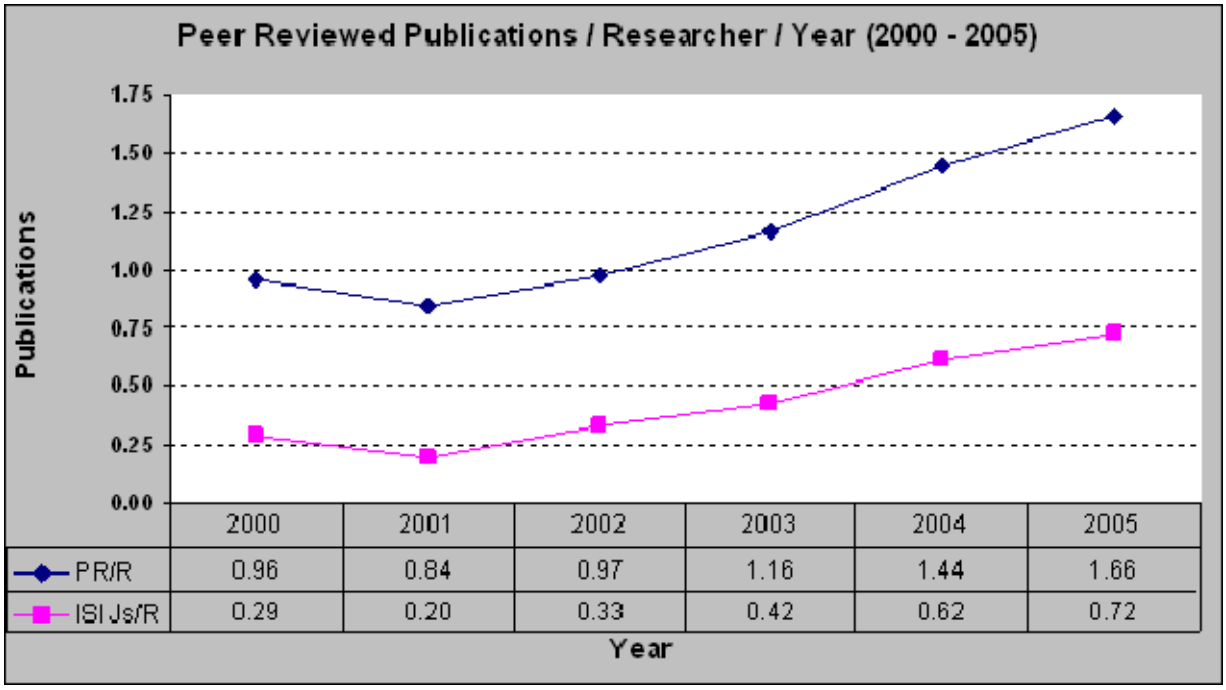

Figure 1. Peer-reviewed publications and publications in ISI-ranked journals per researcher at IWMI in the period 2000-2005.

Where IWMI disagrees with the Panel is that the publication record should not be seen as the singe most important test of the quality of the individual, the performance of the institution, or the suitability of individuals to be research managers. IWMI sees the publication performance as a necessary but not sufficient condition for the more important question: does the organization have impact on the ground. Particularly, IWMI does not believe that the publication record is the key indicator to determine the quality of a research manager. Some very good researchers have shown themselves to be lousy managers; this has been widely recognized in many formal research and education institutions. IWMI has deliberately recruited a small number of people who are better people managers and understand both project management and "development", without necessarily being well-published researchers. We also propose that making decisions about research and the impact of research is strengthened by mixing staff with managerial competence with those with research competence. We believe this is in line with management training and practice that encourages team results from the best use of individual skills from different people.

A key issue for IWMI is that it prides itself on being a multidisciplinary center; where research is formulated in terms of the problem (rather than the disciplinary research question) and where people are selected who are willing and able to look over disciplinary boundaries. In its recruitment, therefore, IWMI examines the range of experiences, both pre- and post-PhD, of its applicants and has selected several with non-standard career paths, which gives them a demonstrated edge in a multidisciplinary work and being able to relate to partners and beneficiaries of the research. This is in the midst of an era where integrated solutions to the important problems we face with water management are being encouraged at an international level as well as locally. The Panel takes the traditional view of counting only the discipline of a researcher's PhD and their experience as years after the PhD was obtained. The reference to 'time since PhD' is also somewhat narrow culturally and reflects a standard western academic research

career, i.e. the person studies and enters academia and thence builds a research-based career, whereas other degree and training schemes build on prior or parallel learning and research with the PhD being an outcome of research development, and not a ticket into research. Further, IWMI has also purposefully recruited some scientists who have taken the time to gain experience in management, or gaining wider multi-cultural understanding of the areas where they work, hence strengthening their roles and capability in a research institution; this would seem to support the Panel's emphasis on sound management, but does not follow the singular pathway that they have opted to promote and recommend for IWMI.

As a result, the Panel and IWMI have some differing perspectives on the disciplinary mix at IWMI; the suitability of the management team to manage the organization; and the question of whether there are enough disciplinary specialists at IWMI to mentor junior scientists.

CGIAR centers also differ from top-tier universities in that they serve the interests of both the research community as well as the CGIAR members to whom the relevance of the science to development and the ultimate impact on the ground are a very high priority. The bottom line is whether IWMI's final output is only measured in terms of ISI-journal publications, or whether CGIAR centers ought to go further downstream in ensuring that the knowledge they generate can be used, and is. This debate is not new and will continue and IWMI encourages its pursuit throughout the CGIAR: IWMI intends to remain at the centre of this debate and through experience and ongoing excellence in science *and* knowledge exchange to contribute through action, not just philosophy. IWMI has developed a strategy to become a "knowledge center", to ensure that its knowledge gets used and has impact, and we welcome the Panel's advice on placing more emphasis on how we assess impact. In IWMI's view the knowledge sharing activities are not a diversion of research funds to other purposes, but are intended to change the research itself, so that it becomes a more effective process in pursuit of our mandate. The panel favors an approach where IWMI leaves knowledge sharing and associated activities, that are "post-research functions" in its view, to other specialists and stick with its core function: generating knowledge and publishing that in ISI journals.

We accept that we need to continuously assess the balance and the effectiveness of these conjoint approaches and welcome comment by applied and more academic researchers and stakeholders.

RESPONSE TO RECOMMENDATIONS

Mission, Vision and Strategy

Recommendation 1. **The Panel recommends that IWMI should enter into a research planning exercise that would carefully define its mission, vision, priorities and research themes. The exercise should provide focus for IWMI's research activities and ensure the Institute takes advantage of its established comparative strengths so that only the most highly prospective potential areas of research are explored. An objective analysis of IWMI's research specializations within the context of the CGIAR system priorities would be required to inform that exercise.**

Response:
Agreed. IWMI agrees that it is time to undertake a new strategic planning exercise and it will task the incoming DG, currently under recruitment, with the development of a new strategic plan in 2008.

Research Programs

Recommendation 2. **The Panel recommends that IWMI completes and phases out the focus on urban agriculture in the current Theme 3, and simultaneously that it merges Theme 3 and 4 together to constitute a theme on Water, Health and Environment.**

Response:
Noted. IWMI does not agree that the issue of re-use of wastewater in urban and peri-urban agriculture is not important enough to be a strategic priority for the institute, particular given increasing competition between agriculture and urban uses for limited water. To the contrary, IWMI feels that the very important issues of water quality and pollution will be of strategic importance for decades to come. For IWMI, the most important water quality issue we have selected to prioritize is the interface between agriculture and cities (and the large flows of nutrients and pollutants both ways), with key impacts on human health and on agriculture, and at the same time with important opportunities for wastewater re-use as well. It is around this theme that IWMI feels it can break through a key disciplinary barrier in the water sector, i.e. the complete separation between sanitation and sewerage on the one hand and irrigation and agriculture on the other hand.

At the same time, we agree that as these relatively young themes (for IWMI) evolve, the environment and health research activities are being more focused on specific priorities that fit IWMI's agriculture-food-environment agenda as well as the GCIAR system priorities. Whether the agriculture-urban interaction ought, or ought not, to be a separate theme, IWMI would like to defer to the strategic planning exercise scheduled for 2008, in order not to change the theme structure twice (now in response to the EPMR and possibly again after the strategic planning exercise).

Recommendation 3. **The Panel recommends that IWMI's efforts be more directed at analytical research. Furthermore IWMI will need to develop a more tightly focused research agenda within each of its themes.**

Response:
Agreed. IWMI agrees with the Panel that IWMI's efforts should evolve in the direction of analytical, rather than descriptive research. As the Panel noted, IWMI has spent much effort in the development of (public good) water-related databases, the development of Remote Sensing and GIS methods to deal with water data-sparse environments, and the development and use of hydrologic and water resources models, exactly to enable it to conduct more analytical work, as opposed to some of the social science work conducted in the past that tends to be more descriptive. It also agrees that within the broad themes IWMI works on, the research questions need to be tightly focused. This is an ongoing process, driven by the MTP cycle and the new set of CGIAR system-wide priorities, and the development of the staffing profile and expertise that IWMI has worked hard to establish since the last review; this is poised to build on the base established and to conduct more analytical and cross-disciplinary research.

Recommendation 4. **The Panel recommends that IWMI give priority to addressing critical water management issues and opportunities identified from past IWMI programs. This would include an emphasis on sustainable groundwater management. IWMI should explicitly include research into groundwater depletion as sub themes of both Themes 1 and 2.**

Response:
Agreed. IWMI agrees with the panel that IWMI's current program should be based on critical water management issues and opportunities identified from past programs. IWMI recognizes that groundwater depletion and groundwater management is indeed a key strategic priority for IWMI in both Themes 1 and 2 and IWMI agrees that it should explicitly remain so. It could also be seen as a key strategic issue for Theme 4 given recent recognition of the inter-connectedness between ground and surface water ecosystems and human livelihood.

IWMI also recognizes that it needs to respond to emerging issues and to regularly address the balance between maintaining past program streams and adapting to the new. The strategic planning process will address this.

Recommendation 5. **The Panel recommends that IWMI re-establish its theme on Institutions and Policies.**

Response:
Agreed in part. IWMI agrees with the Panel that Institutions and Policies is a critical priority for IWMI. IWMI proposes that the decision whether that is best served as a separate theme or as a cross-cutting issue (as it is currently structured) should be addressed explicitly as part of the next strategic plan exercise.

Recommendation 6. **The Panel recommends that IWMI develop an effective Publication Strategy to improve its performance and influence its target audiences.**

Response:
Agreed. IWMI will develop and communicate a clearer Publication Strategy. IWMI's notes that its performance in terms of publications (both peer reviewed publications generally, and articles in ISI journals specifically) has improved steadily under the period under review (see Figure 1). However, IWMI agrees that its publication performance should be on par with that of other CGIAR centers, and will work hard to achieve this benchmark.

Cross-cutting Issues and Disciplines

Recommendation 7. **The Panel recommends that the cross-cutting issues of poverty and gender be clearly conceptualized, meaningfully integrated and mainstreamed into research by appointing a Task Force and specifying core resources for this purpose. IWMI should articulate the expected intermediate and long term impacts of this research and the milestones for measuring progress.**

Response:
Agreed. IWMI agrees with the Panel recommendation to appoint a Task Force to conceptualize, integrate and mainstream the key cross-cutting issues of poverty and gender into IWMI's research and will allocate core resources for this purpose. It is agreed that the work of this Task Force should lead to well defined expected impacts and milestones. IWMI will appoint a second Task Force to address the same issues for "institutions and policies".

Research Management

Recommendation 8. **The Panel recommends that IWMI appoint four experienced and well respected researchers to the positions of:**

- **Principal Physical Scientist;**
- **Principal Natural Scientist;**
- **Principal Economist; and,**
- **Principal Social Scientist/Policy Analyst,**

who would have responsibility across the Institute for research strategy development including research staff recruitment, staff development in their discipline area including mentoring junior staff, selection of PhD candidates and Post Doctoral Fellows, ensuring rigor in the application of their discipline, 'trouble shooting' discipline-based issues, and providing advice in project development. The Panel further recommends that IWMI appoints a Deputy Director General-Research. The person filling that role should be a highly experienced researcher with an established international reputation for excellence. It is also recommended that the four 'Principal Scientists' be appointed as the Theme Leaders to further strengthen the discipline focus they will bring to IWMI.

Response:
Noted. We have indeed replaced one of the Theme Leaders with a more senior researcher (who was earlier working as a senior scientist and mentor within the theme). With that move we are of the opinion that the current group of four theme leaders has the appropriate seniority required by their position. We note that in our view, some very senior scientists are better employed in (free) senior, intellectual, mentoring roles, rather than as managers (with the associated managerial and administrative burden), although they regularly assist with developing and implementing managerial decisions. The disciplinary match of the current group of theme leaders is not divided along the lines of the four disciplines, as recommended by the Panel, since the suitability to lead the problem area of the theme was considered a more important selection criterion than the disciplinary background of the individuals involved. IWMI will indeed undertake a strategic staffing plan (recommendation 16) and will ensure that the IWMI group of scientists has an appropriate disciplinary and seniority balance. We value the mix of benefits that comes with experience and seniority alongside that of youthfulness and awareness of new technologies.

IWMI agrees with the Panel's recommendation concerning the appointment of a DDG Research.

Recommendation 9. **The Panel recommends that at least five days per annum for discipline-based professional development be allocated in the time-tracker system.**

Response:
Agreed. Currently each researcher has 20 days of "un-allocated" time for various purposes, including professional development, IWMI agrees with the recommendation of the panel to allocate at least 5 of these days explicitly for professional development.

Recommendation 10. **The Panel recommends that IWMI ensures the CCERs it commissions are rigorous, regular and with coverage across all Themes.**

Response:
Agreed. IWMI will implement the recommendation through development of a program of CCERs, led by the Board.

Recommendation 11. **The Panel recommends that IWMI appoint its own specialist professional in the field of impact analysis and undertake a systematic evaluation of its research portfolio both past and future.**

Response:
Agreed. IWMI agrees with the recommendation and will implement it.

Partnerships

Recommendation 12. **The Panel recommends that IWMI prioritize its list of partners and develop a new partnership strategy that is linked to this list. IWMI must further make its decentralized research structure work in favor of improving relationships with its partners including sharing credit for outputs.**

Response:
Agreed. IWMI agrees that IWMI's strongly increased emphasis on a partnership-based approach to research has led to a very large expansion of the number of partners IWMI deals with, which may not almost lead to the most effective partnerships possible. IWMI proposes to develop a new partnership strategy, and work out the roles of each of the partners more clearly, as part of the new strategic plan. While IWMI is convinced that its decentralized, benchmark-basin focused structure has helped tremendously in forging closer links with partners and increasing IWMI's impacts, it agrees with the Panel that relationships with partners can continuously be improved and particularly the sharing of credit for outputs – as measured by publications co-authored with partners – can and should be improved considerably.

Recommendation 13. **The Panel recommends IWMI make a stronger effort to link up with top-tier universities/research institutes that have a reputation in the water resources area, and develop opportunities for their staff to play an active role in IWMI, including supervising PhD students, mentoring junior staff and assisting in the development of a strengthened research program.**

Response:
Agreed. IWMI agrees that a good relationship with top-tier universities is important; likewise IWMI plays a capacity building role with other, less strong universities, building their expertise in the water resources area. IWMI has traditionally had strong relationships with a small group of top-tier universities (Cornell and Wageningen, particularly). Under the period under review, IWMI has strongly expanded the number of universities with which it has joint PhD students; universities in Asia, Africa, Australia as well as the US and Europe. IWMI agrees that as part of a more focused partnership strategy (recommendation 12), it should also more clearly define its relationship with its partner universities.

Governance

Recommendation 14. **The Panel recommends that informative Board documentation be made available to Board members at the latest two weeks prior to each meeting as per Board rules, in hard copy if members so request, and that draft minutes of the meetings adequately reflect Board decisions and that they be sent at most one month after the meeting.**

Response:
Agreed. IWMI agrees with this recommendation and will implement it.

Recommendation 15. **The Panel recommends that the Board provide more strategic guidance to management on science and programs, that it keep more abreast of the programs' major strengths and weaknesses without getting involved in routine operational matters, and that it use the budget approval process as one tool to influence focus and priorities. The Center should also consider the creation of a Center Science Council or Advisory Board along the model used by other CGIAR centers.**

Response:
Agreed in part. IWMI generally agrees with this recommendation. The Board did consider appointing a Center Science Council, but has decided that rather than creating a new and external group, it has reformed the Program Committee from a committee-of-the-whole to a smaller, more focused and probably more effective Board Committee that is intended to meet the recommendation of the Panel.

We also agree that there should be more consistent Board involvement in the approval of program strategic directions and more regular strategic guidance to management on programs.

Management and Administration

Recommendation 16. **The Panel recommends that the Center prepare a long term staffing strategy immediately after the completion of its next strategic plan.**

Response:
Agreed. IWMI agrees with this recommendation and will implement it.

Recommendation 17. **The Panel recommends that the policy limiting employment at IWMI to ten years be replaced with a policy stating that contracts beyond ten years of employment be subject to an in-depth review by management which would take into account IWMI's long term staffing profile needs and the staff's performance.**

Response:
Agreed. IWMI agrees with this recommendation and will implement it.

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December 1, 2006

Per Pinstrup-Andersen
Chair, Science Council
Consultative Group on International Agricultural Research
305 Savage Hall
Cornell University
Ithaca, NY USA 14853-6301

Francisco Reifschneider, Director
Consultative Group on International Agricultural Research
The World Bank
1818 H Street NW
Washington, DC 20433 USA

Dear Drs. Pinstrup-Andersen and Reifschneider,

On behalf of the Panel, I am pleased to transmit to you the Report of the Second External Program and Management Review (EPMR) of the International Water Management Institute (IWMI). The Panel has reviewed IWMI's performance in the four broad areas of: i) mission, strategy and priorities; ii) quality and relevance of the science; iii) effectiveness and efficiency of management (including governance and finance); and iv) accomplishments and impacts. We have also endeavored to address the list of strategic issues raised by the Science Council.

The Panel finds IWMI a center that has experience major growth and transition since the last EPMR. During this period both donor funding and staff members have increased dramatically. The Panel views this growth as very positive. However, given this growth and the Panel's concerns about the lack of research focus, it is now time for IWMI to stop and take stock and refocus its research efforts. The Panel has made a number of recommendations which should

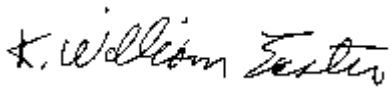
help IWMI refocus its research and make it more analytical and dynamic. This will also have an impact on IWMI's future fundraising and staff hiring. For example, the Panel recommends that IWMI appoint four experienced and well respected researchers to fill four key disciplines. This will help provide increased focus and depth to IWMI's future research efforts.

The Panel finds IWMI's governance much improved over the last EPMR. To further strengthen its role in the future, the Board could provide more strategic guidance to management on science and programs. This could help the center focus its research and might involve appointing an Advisory Board along the lines used by other CGIAR centers.

The Panel would like to express its thanks to the IWMI Boards, management and staff, who cooperated with us in every way and provided us with all the information and facilities we requested.

Finally, the Panel members join me in expressing our appreciation for the help of Tim Kelley, the SC Secretariat representative and our Panel Secretary and the opportunity to participate in the challenging task of conducting this Review. We hope that the Report will be used by IWMI and its partners, as well as the CGIAR to guide their future search on water resources.

Yours sincerely,



K. William Easter, Chair
Third EPMR of IWMI

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

SCIENCE COUNCIL AND CGIAR SECRETARIAT

Report of the Third External Program and Management Review (EPMR) of the International Water Management Institute (IWMI)

Review Panel: Edgardo Moscardi (Chair)
Malachy Akoroda
Jay Gopal
Donald McKerron
Julie Noolan
Carlos Pomareda
Alejandro Avedissian (Consultant)

SCIENCE COUNCIL SECRETARIAT

DECEMBER 2006

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The world faces a growing list of challenges associated with the management of its scarce water resources. Those challenges largely arise because of temporal, spatial and social variations in the supply of water as the demands for water for agricultural, domestic, industrial and environmental purposes steadily grow. Addressing the challenges requires research effort at multiple levels: local through global, basic through applied, upstream through downstream, private through public, etc. In this multi dimensional space, IWMI has identified its research niche as being holistic and hence interdisciplinary, international, basin-scale focused and public good orientated.

This niche has evolved considerably since the last EPMR under the guidance of the current Director General. IWMI has taken into account changes in the research community's understanding of the issues underpinning the world water challenge, the strategic direction taken by the CGIAR, funding circumstances and the capacities and requirements of its partners.

IWMI has emerged from this evolution as a larger, more diverse, more proactive and generally stronger research organization, with enhanced human resource management.

Mission, Vision and Strategy

A key part of the Institute's evolution has been the refinement of its Mission and Vision Statements. IWMI now aims to be a world class Knowledge Center pursuing research generation, sharing, brokering and application as it seeks to improve the management of land and water resources for food, livelihoods and nature. This Vision and its associated Mission are wide-ranging and ambitious. They correctly encompass the holistic nature of water management as part of the bio-physical and social systems. However, they do not provide a sufficiently strong focus for the research activities of the Institute. A necessary review of this focus should involve not only the requisite consultation with stakeholders but also an analytical assessment of comparative strengths, particularly noting those established in current and prior research initiatives. The role of IWMI in the upstream-downstream research continuum also requires monitoring given the CGIAR requirement that in the order of 80 per cent of the Institute's efforts should be devoted to the delivery of system priority research outputs.

A further component of IWMI's evolution has been the specification of an overarching research hypothesis and a conceptual framework within which the hypothesis can be tested. This is an important step in generating the research rigor that must be a feature of IWMI's future. Some further refinement of the conceptual framework is required, particularly to assist in furthering the analytical elements of IWMI research and to distinguish the impacts of interventions from the impacts of research.

Research Programs

IWMI's research effort is categorized into four themes and two systemwide initiatives. The array of research projects being undertaken by IWMI independently or with partners is extensive and wide ranging. A considerable element of the spectrum of research issues posed by the world

water challenge has been addressed by IWMI research work. This has caused IWMI's research effort to be thinly spread. This is demonstrated by the proportion of the Institute's work that has remained at a descriptive rather than an analytical level and by the relatively low number of papers that IWMI staff members have published in peer reviewed journals as well as the relatively low standing of many of the journals that have been targeted. To do better, IWMI must focus more in areas where it has comparative advantage and develop more analytical depth in those focal areas. Groundwater management, institutions and policy and the holistic treatment of water, environment and health are suggested as research fields where IWMI's strengths were apparent or where further strengthening would yield strong results.

Cross-Cutting Issues and Disciplines

Research on the relationship between water and poverty and gender should be at the core of IWMI's research effort and has been an important comparative advantage of IWMI research. Much excellent work continues to be pursued within IWMI on this topic yet there is some concern that a relative decline in social science capacity within the Institute has meant that relatively less is being done now than previously. Mainstreaming of both gender and poverty research issues would help deliver the required re-orientation of research across all themes. In contrast, IWMI resources have been directed to the generation of data bases and GIS capacity. An impressive array of research products with International Public Good (IPG) characteristics have resulted. The next challenge for IWMI is to ensure these elements of knowledge can play a meaningful part in its analytical research efforts across the Themes.

The representation within IWMI of some disciplines relevant to the water-food-environment nexus that is IWMI's research niche is lacking. In particular, there are relatively few economists and other experienced social scientists in the Institute. Their skills are clearly in demand from both within IWMI's project teams but also from its partners. Other discipline areas have shown considerable growth in numbers. More natural scientists have been employed to assist with the development of IWMI's capacity to tackle environmental issues. Getting the discipline mix right should be the subject of a strategic review of staffing.

Research Management

IWMI has made remarkable progress in improving gender and north/south equality in its staffing mix. It has implemented a matrix management system that appears to be working well, with some caveats. Its staff capacity in terms of research publication record remains below CGIAR average levels. The research record of the senior research decision making team as a whole is also relatively weak, demonstrating the relative lack of research experience in that team. Boosting the level of research experience in that team is seen as an important way of allowing IWMI to increase its overall research performance and this could be achieved by having more experienced and specific discipline oriented Theme Leaders. A highly experienced and internationally recognized Deputy Director General would take specific responsibility for the research task. This would leave the Director General, Regional Directors and regional Office Heads with clear fund raising responsibilities.

Research quality improvements could also be gained through a program of professional development based on individual disciplines. This would strengthen staff members' capacities to contribute to interdisciplinary teams. Quality gains are also likely to come from tightly set research priorities that are regularly monitored. CCERs are important to this process and IWMI is

encouraged to continue with their regular use and to take measures to ensure their rigor. Assessing the impacts of research is also key. IWMI has taken some limited measures in this regard but its importance warrants far greater attention.

Research Partnerships

Partnerships are integral to IWMI's Knowledge Center vision and the Institute has responded strongly to that need by assembling an impressive list of partner organizations. The decentralization of IWMI offices has been an important contributor to this success. The partnerships are particularly important in allowing IWMI to stay upstream in the research continuum and thus to the generation of impacts from IWMI's' research outputs. Making the most of these partnerships will be a challenge for IWMI because of the numbers involved and their diversity. A clear strategy including a prioritization of partners is required. Some specific issues involving relationships between IWMI and other CGIAR centers require resolution particularly in relation to the Challenge Program.

Governance

IWMI's well balanced Board has provided active oversight and support to the Center in the implementation of its many change initiatives over the past five years. However, the breadth of IWMI's activities makes this role a difficult one, especially in terms of providing leadership on programmatic issues. The Board may therefore consider moving in the direction of seeking independent outside advice in the form of a Center Science Council or Advisory Board so as to ensure adequate coverage of program matters while freeing time for the consideration of governance issues. The Board should also be more active in commissioning CCERs rather than leaving this function mostly to management. The Board has been diligent in examining its fiduciary duties and in assessing its own performance. A better flow of information to the Board through timely provision of informative Board documentation and meeting minutes is critical and would allow the Board to function even better.

Management and Administration

IWMI has benefited greatly from the leadership of a strong and dynamic Director General since 2000. Many innovative and highly successful managerial initiatives have been introduced such as the creation of Regionally Recruited Positions, leadership development programs, performance management and the use of multiple feedback instruments at the individual and unit levels. The Center has also significantly increased the diversity of its staff in terms of gender and origin; as a result it received a CGIAR diversity award in 2005. The CCER on HR Management considers, and the Panel concurs, that IWMI is at the forefront of CGIAR centers in the HR management area. The joint venture with WorldFish is another example of such managerial innovation at a scale that will require careful monitoring but has the potential for significant benefits. Some issues remain, particularly as management and administration relates to the research function. A long term staffing strategy is needed to reflect perceived imbalances in the staffing profile. Also, the current HR policy that limits employment beyond 10 years is at odds with the Institute's need for an increase in the proportion of staff who have the necessary experience to provide mentoring to less experienced colleagues and to direct the research effort. In view of recent issues in the Challenge Program, IWMI will also need to ensure that that appropriate monitoring and control policies and procedures are in place.

Finance

Donor funding of IWMI almost tripled during the review period. This is an impressive record and has put the Institute into a reasonably sound financial position despite a significantly reduced proportion of unrestricted funding. IWMI's working capital is within the CGIAR accepted norms and a shortfall in reserves is being addressed through an annual reserve set aside. Budget planning protocols are sound and sufficiently flexible to meet contingencies. Some improvements have been suggested in the financial accounting and treasury operation such as cash flow monitoring, recording of foreign currency transaction, or the safekeeping of financial information. The switch from EPICOR to SAP software (as part of the WorldFish joint venture) will help improve project budget monitoring as well as management reporting and should allow for quaterly reporting of financial information to the Board rather then bi-annually. The audit function is also sound and provides management and the Board with an annual assessment of the risks the Center faces, including the monitoring of the risks associated with the outsourcing of its Finance and HR function to the IWMI/WorldFish Joint Venture.

The Way Forward

IWMI has made considerable advances over the period since the 2nd EPMR. It has expanded its staff numbers and improved their research performance in tackling a much broader set of research topics. It has taken numerous steps forward in improving its management performance, especially in human resource management. In many of its innovations, it has been at the forefront of developments across the CGIAR system. Its research performance has improved but remains behind the average of the CGIAR centers. To progress beyond this point the Institute will require a refinement of the approach taken over the past five years. This review has made some specific recommendations in an attempt to help IWMI make these refinements. In particular, recommendations are aimed at improving the focus of IWMI's research effort so that it can deepen its analysis of key issues where it has a comparative advantage. To further develop the skills required to undertake this deeper level of research, an injection of research experience is required along with a renewed focus on the development of specific disciplinary skills.

List of Recommendations

Mission, Vision and Strategy

Recommendation 1. The Panel recommends that IWMI should enter into a research planning exercise that would carefully define its mission, vision, priorities and research themes. The exercise should provide focus for IWMI's research activities and ensure the Institute takes advantage of its established comparative strengths so that only the most highly prospective potential areas of research are explored. An objective analysis of IWMI's research specializations within the context of the CGIAR system priorities would be required to inform that exercise.

Research Programs

Recommendation 2. The Panel recommends that IWMI completes and phases out the focus on urban agriculture in the current Theme 3, and simultaneously that it merges Theme 3 and 4 together to constitute a theme on Water, Health and Environment.

Recommendation 3. The Panel recommends that IWMI's efforts be more directed at analytical research. Furthermore IWMI will need to develop a more tightly focused research agenda within each of its themes.

Recommendation 4. The Panel recommends that IWMI give priority to addressing critical water management issues and opportunities identified from past IWMI programs. This would include an emphasis on sustainable groundwater management. IWMI should explicitly include research into groundwater depletion as sub themes of both Themes 1 and 2.

Recommendation 5. The Panel recommends that IWMI re-establish its theme on Institutions and Policies.

Recommendation 6. The Panel recommends that IWMI develop an effective Publication Strategy to improve its performance and influence its target audiences.

Cross-cutting Issues and Disciplines

Recommendation 7. The Panel recommends that the cross-cutting issues of poverty and gender be clearly conceptualized, meaningfully integrated and mainstreamed into research by appointing a Task Force and specifying core resources for this purpose. IWMI should articulate the expected intermediate and long term impacts of this research and the milestones for measuring progress.

Research Management

Recommendation 8. The Panel recommends that IWMI appoint four experienced and well respected researchers to the positions of:

- Principal Physical Scientist;
- Principal Natural Scientist;
- Principal Economist; and,
- Principal Social Scientist/Policy Analyst,

who would have responsibility across the Institute for research strategy development including research staff recruitment, staff development in their discipline area including mentoring junior staff, selection of PhD candidates and Post Doctoral Fellows, ensuring rigor in the application of their discipline, 'trouble shooting' discipline-based issues, and providing advice in project development. The Panel further recommends that IWMI appoints a Deputy Director General-Research. The person filling that role should be a highly experienced researcher with an established international reputation for excellence. It is also recommended that the four 'Principal Scientists' be appointed as the Theme Leaders to further strengthen the discipline focus they will bring to IWMI.

Recommendation 9. The Panel recommends that at least five days per annum for discipline-based professional development be allocated in the time-tracker system.

Recommendation 10. The Panel recommends that IWMI ensures the CCERs it commissions are rigorous, regular and with coverage across all Themes.

Recommendation 11. The Panel recommends that IWMI appoint its own specialist professional in the field of impact analysis and undertake a systematic evaluation of its research portfolio both past and future.

Partnerships

Recommendation 12. The Panel recommends that IWMI prioritize its list of partners and develop a new partnership strategy that is linked to this list. IWMI must further make its decentralized research structure work in favor of improving relationships with its partners including sharing credit for outputs.

Recommendation 13. The Panel recommends IWMI make a stronger effort to link up with top-tier universities/research institutes that have a reputation in the water resources area, and develop opportunities for their staff to play an active role in IWMI, including supervising PhD students, mentoring junior staff and assisting in the development of a strengthened research program.

Governance

Recommendation 14. The Panel recommends that informative Board documentation be made available to Board members at the latest two weeks prior to each meeting as per Board rules, in hard copy if members so request, and that draft minutes of the meetings adequately reflect Board decisions and that they be sent at most one month after the meeting.

Recommendation 15. The Panel recommends that the Board provide more strategic guidance to management on science and programs, that it keep more abreast of the programs' major strengths and weaknesses without getting involved in routine operational matters, and that it use the budget approval process as one tool to influence focus and priorities. The Center should also consider the creation of a Center Science Council or Advisory Board along the model used by other CGIAR centers.

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Recommendation 16. The Panel recommends that the Center prepare a long term staffing strategy immediately after the completion of its next strategic plan.

Recommendation 17. The Panel recommends that the policy limiting employment at IWMI to ten years be replaced with a policy stating that contracts beyond ten years of employment be subject to an in-depth review by management which would take into account IWMI's long term staffing profile needs and the staff's performance.

1 IWMI AND THE WORLD WATER CHALLENGE

1.1 Panel Terms of Reference and Conduct of the Review

This is the report of the 3rd External Program and Management Review (EPMR) of IWMI. The composition of the Panel conducting the Review and the Panel's full terms of reference are provided in Annexes 1 and 2. The Panel's main charge was to assess the performance and institutional health of the Center, i.e. its mission, strategy and priorities, the quality and relevance of its science, the effectiveness and efficiency of its management and its accomplishments and impact with respect to CGIAR goals. In this Report, the Panel has made every effort to analyze IWMI's research programs and its governance and management so as to be able to offer a considered evaluation of the Institute and make constructive recommendations.

The entire Panel plus the Finance Consultant met at IWMI HQ in Colombo from 8-15 June 2006 for the first phase of the Review. During that time the Panel had frequent discussions with the DG and his Management Team and interacted extensively with other IWMI staff, primarily through presentations covering IWMI's three regional programs, its four MTP (and two SWP) projects and other research-support and management units. It also met with staff in small group settings and individually. The Panel Chair and the Member covering governance and management issues had in March 2006 attended IWMI's Board meeting in Penang and interacted with Board members there, and later individually with current and previous Board members. Panel Members' visited IWMI's Field Offices in India, Laos, and South Africa (Annex III) and had extensive interactions with both IWMI staff and R&D partners in the field. The Panel also contacted and had discussions with many of IWMI's stakeholders—NARS partners, clients, CGIAR centers, peers and donors (Annex IV). Prior to, during and after its first visit to HQ, the Panel received and read a number of documents and supporting material from the Center and the CGIAR and Science Council Secretariats (listed in Annex V).

The Panel visited IWMI HQ again during the Main Phase of the review, from 19 – 31 October 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 factual corrections and general feedback. On 31 October the Panel Chair made a presentation of the major findings and recommendations of the Report to IWMI's Board, Management and staff.

The Panel would like to express its appreciation to the Board and to the DG and his staff at the Center and in the various Field Offices for facilitating this Review through a very open and transparent process of engagement, and for the warm hospitality they received wherever they were.

1.2 The Evolution of IWMI

IWMI is a non-profit scientific organization, one of 15 research centers supported by the Consultative Group on International Agricultural Research (CGIAR). The Institute addresses water and related land management challenges faced by poor rural communities in developing countries, and works through collaborative research with partners in the North and South.

The Institute began in 1984 as the International Irrigation Management Institute (IIMI). Its initial mandate was to improve poorly performing irrigation systems, most that were built with a large public investment as part of the Green Revolution. The IIIMI approach was to improve system management. Much of the institute's work involved a large technical assistance component and research was sometimes only a by-product of that work. In 1991, IIMI became a member of the CGIAR System. The first EPMR of IIMI in 1994 recommended a shift to more strategic research. This shift was promulgated through 2000 when the research program began to address water management and irrigation issues with a central theme concerned with regional water scarcity. Consistent with this scarcity theme was the perspective that water management was best considered at the basin scale. With this new direction and strategic research focus, IWMI established itself, according to the EMPR, as a "strong science-based organization concerned with the more effective management and productive use of water as a key resource to ensure the continued increase in world food production."

1.3 The IWMI Challenge

Over the past six years IWMI has continued to build on the concept of river basins as the unit of analysis but recognizing that the world water challenges are influenced by the hydrologic cycle even at the global scale. Furthermore, at every scale it is not only natural phenomena that create an imbalance in the hydrologic cycle but more often human activities. These activities are influenced by population pressures, economic opportunities, social norms, institutions, and other geopolitical factors. The world water challenges are not a result of a shortage of water worldwide but rather due to increasing variability in precipitation, both spatially and temporally, coupled with a growing human population that demand more water, pollute it, and control its natural flow in unsustainable ways. The approach of "creating" water supplies for irrigated agriculture using dams and river diversions, which was the preferred approach for public investment through the 1970s and 80s, is becoming limited and in some cases these structures are now seen as a major part of the problem. The challenges are becoming more recognized because of increasing numbers of conflicts over use of water not only for agriculture but many other industrial and domestic uses. Significantly there is a much better understanding of the need to protect the water to sustain the earth's ecosystem. These biophysical issues are probably the easiest to define and research. For example, maps depicting water scarcity are generally based on the hydrologic situation in a region, while for the poor water scarcity can be a result of just being poor, institutionally isolated, or both. It is in this broad context that IWMI is now doing research with a goal of improving livelihoods of the rural poor by creating better access to water.

Research constraints resulting from taking a more holistic biophysical and social systems approach makes IWMI's research much more difficult than in the past but this approach will potentially produce more sustainable answers. However, only by careful and very strategic planning will research in this complex real world environment be successful in creating new water-related knowledge for development of technologies, policies, and institutions that can be quickly adapted to improve livelihoods of the poor.

IWMI's mission is to improve the management of land and water resources for food, livelihoods and nature. The mission of IWMI for the last EPMR focused primarily on water, food and poverty, and even then the water focus was mainly irrigation. IWMI now deals with "blue," "green," and "grey" water. Nature as used in the mission statement is a broad term that suggests involvement in ecosystems, environmental flows, biodiversity, and other natural concerns. IWMI has identified a broad scope for its research that begs to have clear priority focal topics identified.

1.4 Changes in the CGIAR Environment

Changes and reforms within the CGIAR since the last EPMR have had important implications for IWMI. 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 an 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 (TAC) 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 IWMI, 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 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.

1.5 Center's Responses to the Recommendations of the Second EPMR

IWMI's 2nd EPMR in 2000 made 13 recommendations – four related to governance, eight to the research programs and one to research management. Several of these recommendations address topics that are still relevant to the center today and the Panel has deliberated further on them in this Report. Nevertheless, following standard practice, the current EPMR Panel has reviewed the recommendations of the 2nd EPMR report, along with IWMI's updated response to them and provided in Annex VI its assessment of the present situation.

[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.

2 MISSION VISION AND STRATEGY

The 2nd EPMR found that IWMI had over the period 1995-2000, transformed itself from an irrigation management focused institution that was involved in a combination of research and technical assistance to a much more research-oriented organization. A key part of that transformation was the development of the IWMI paradigm effectively summarized by the expression "more crop per drop".

The six years since that assessment has seen IWMI undergo a further transformation. Now IWMI sees itself as a Knowledge Center involved in the generation, sharing, brokering and application of knowledge relating to water, food and the environment.

IWMI's Mission and Vision are both ambitious and challenging. The goal of this chapter is to assess them and to consider the viability of the strategy being used to achieve them.

2.1 Mission

IWMI's evolving state is well illustrated by changes in its mission statement since its inception as IIMI in 1984. Up until 1999, the mission was to:

> "*foster the development, dissemination and adoption of lasting improvements in the performance of irrigated agriculture in developing countries*"

when it was changed to be:

> "*contribute to food security and poverty eradication by fostering the sustainable increase in the productivity of water through the management of irrigation and other water uses in river basins*".

The clearly specified focus on "the productivity of water" as exemplified by the expression "more crop per drop", was viewed by IWMI as inadequate in the 2004-2008 Strategic Plan. In particular, it was argued that it did not account for issues of water quality, it ignored the multiple uses of water beyond crop production and it failed to incorporate 'green' as well as 'blue' water. Hence the current IWMI mission is to:

> "*improve the management of land and water resources for food, livelihoods and nature*".

The mission is set in the context of the "world water crisis" that IWMI seeks to understand and alleviate by addressing an overarching research hypothesis:

> *"Increasing river basin-scale water and land productivity alleviates hunger and poverty in a manner that maintains ecosystem services."*

Over the history of the Institute, the IWMI Mission has clearly been expanded. The shortcomings of preceding mission statements were argued to be largely derived from their too narrow focus. The current mission statement can be interpreted as a very broad mandate for research activity. Added to the previous statement have been references to "land" and "nature" to reflect the broader, basin-scale approach adopted. The IWMI "acquisition" of the International Board for Soil Research and Management (IBSRAM) coincided with this expanded interest as did the development of the Millennium Development Goals (MDGs).

The Panel commends IWMI for recognizing the need to consider water management in a holistic manner. The previous mission statements had the potential to restrict unduly the context of

research so its recognition of the biophysical and social interactions inherent in water management was a very positive step. The Panel is concerned that, the breadth of the mission statement does not provide sufficiently strong guidance to the prioritization of research effort for IWMI. The Institute has limited resources and it must prioritize the application of those resources to the various research tasks that are within its mandate. With such a broadly defined mission – one that could even be interpreted as covering many of the research fields of other CGIAR Centers – research managers within IWMI are not well served by it as a means for determining priorities. Rather, the Mission gives a great deal of freedom to proponents of research projects to pursue a wide variety of poorly focused and disconnected ideas.

The Mission was developed following a period of consultation with stakeholders and internal "brainstorming". The Panel commends IWMI for this consultative approach. Being aware of the opinions of its partners and donors has strengthened not only the mission statement itself but also the relationship between IWMI and its stakeholders. The sense of 'ownership' that the joint development of the mission statement must have engendered would have been advantageous to the Institute. However, the Panel is concerned that ensuring that all parties in such a consultative process are satisfied by the resultant mission statement can generally only be achieved by the development of one that was very broad. The Panel advises that the development of a research organization's mission statement should involve the development of an objective assessment of its comparative advantages – a function of its existing strengths and its potential – and its resources, both current and projected. Returns to research endeavor come from specialization, even for an organization the size of IWMI. The Panel saw no evidence of such an exercise being undertaken and advises IWMI to seek a process for stakeholder involvement that balances such input with objective assessment.

2.2 Vision

The specification of an Institute Vision statement is an innovation of the 2004-08 Strategic Plan. In that Plan, IWMI saw itself in 2008 as being:

> "*a world class impact, performance and service orientated Knowledge Center, specialized in research on Water, Food and Environment*".

The concept of a 'knowledge center' defines the breadth of IWMI's research activities. It involves IWMI not only being the source of knowledge from its research program but also acting to share that knowledge, facilitating its use in research partnerships and also developing partnerships that will see the knowledge applied. The vision statement also specifies something of the research culture IWMI is seeking: one based on securing impacts of its research outputs that is oriented toward staff performance and focused on delivering service quality.

Like its mission statement, the IWMI vision for 2008 is ambitious and broad. Later versions of the Vision statement go as far as to strive for IWMI to be "*the leading* international center". The Panel was impressed by the Institute's forethought in developing a vision statement and is very supportive of the view it provides. The aim expressed is laudable, the focus on impact is vital and providing staff with the goals of performance and service is sound management practice. In general, the Panel found the knowledge center idea to be convincing.

However, the Panel was concerned that the vision statement can be interpreted as being even more far reaching than the mission statement because it makes no reference to livelihoods and so neglects the fundamental interest the CGIAR has in poverty alleviation. It provides a sufficiently

large umbrella to cover the interests of other CGIAR centers and even the FAO. Nor does the vision statement make reference to other CGIAR or MDGs. Hence, despite the attention paid to the dissemination of the knowledge it generates, the vision is essentially inwardly focused.

The specification of a knowledge center as having research sharing, brokering and application roles in conjunction with the research generation function seen as primary by IWMI at the time of the last EPMR, has broader implications that gave rise to Panel concerns. First, if the Institute's scarce resources are allocated to these post-research functions, then fewer resources are available for the knowledge generation activity. This is particularly the case because IWMI sees itself as not only being involved in the sharing, brokering and application of its own research outputs but also the research findings of other organizations internationally. This is indeed ambitious even in the digital age particularly given the number of organizations entering the same field. The Panel recognizes that funds for research generation may come from different sources to those for sharing, brokering and application however, the concern regarding the distribution of funds remains.

The knowledge center vision also has implication for IWMI in terms of meeting the requirements of the CGIAR to allocate 80 percent of the center's resources to achieving system priority research outputs leaving 20 percent to be spent on nonsystem priority research and other more development and extension-type activities. Such is the apparent magnitude of the sharing, brokering and applying functions of the knowledge center that keeping within the 20 percent requirement would be challenging. Furthermore, if fewer resources (relatively) were allocated to the research generation function, it is doubtful that the institute could develop a sufficiently strong research reputation to make it visible to those seeking knowledge on the water food environment nexus.

A further feature of the Vision IWMI presents in its 2004-2008 Strategic Plan is the role of the Benchmark Basins. They are presented as the 'primary research sites and field laboratories' and are also advanced as the focal points for the other knowledge center roles involving collaboration and partnerships. The benchmark basin notion is recognized by the Panel as being a potentially very useful mechanism to develop consistent case study test beds for hypotheses. It would seem to provide IWMI with some degree of focus given the extraordinary breadth of the Institute's vision statement in other respects. However, the Panel recognized that IWMI has extended the number of benchmark basins to include not only its own but also those that have been included in the CGIAR Challenge Program on Water and Food, some of which (e.g. Nile, Yellow) are very large. This expands the focus to a point where resources will be stretched making it difficult to achieve any real depth of activity across all or even most of the basins.

The Panel concludes that IWMI's development of both its Mission and Vision statements is a worthwhile exercise and both show a considerable maturity in organizational development. However, it is also concerned that both the Mission and the Vision Statements have resulted in the spreading of IWMI's resources too thinly both geographically and thematically. The dangers in this are three fold. First, IWMI will struggle to develop a coherent integrated set of research objectives. Second, IWMI will be less likely to produce research outcomes that are of sufficient analytical depth to create impacts. Third, it will cause high transaction costs to be born by the Institute in developing and maintaining sets of partners at different levels. These dangers need to be addressed in order to maximize the usefulness of the statements.

2.3 Strategy

The 2004-08 Strategic Plan grew out of a Center Commissioned External Review (CCER) on the topic that was led by IWMI's stakeholders and a series of internal 'brainstorming sessions'. The process took into account the changing CGIAR priorities as well as the broader developments in the donor environment. The Plan set out the means by which the Institute hoped to achieve its mission. There are four key elements to the strategy: the fundamental research issue, the overarching research hypothesis, the thematic structure used to define the fields of research and the conceptual framework that establishes the methodological approach used to test the various sub-hypotheses arising within the themes. The research issue and hypothesis have been discussed in section 2.1. In this section, the research themes and conceptual framework are considered.

Research Themes

The perceived limitations of the 'more crop per drop' focus of the previous era of IWMI were addressed in 2000 through the formation of five research themes: 1) agricultural water management; 2) sustainable land and water management; 3) groundwater management; 4) water resources institutions and policies; and, 5) water, health and environment. These themes provided a clear broadening of focus for IWMI beyond irrigation water productivity. By 2005, some 'tightening' of the research structure was deemed by IWMI to be necessary and the current four themes emerged from a series of internal brainstorming sessions: 1) basin water management; 2) land, water and livelihoods; 3) agriculture, water and cities; and, 4) water management and environment. While reducing the number of themes may have simplified the management structure of IWMI, the Panel was unable to find an explanation of how the current themes involved a tightening of its research focus. The two themes that were terminated – groundwater and institutions – were said to be 'mainstreamed' into the four current themes, and the health and environment theme was divided into two.

In addition to the four core themes, IWMI's research activities also encompass the Comprehensive Assessment of Water Management in Agriculture (CA), the Challenge Program on Water and Food (CPWF) and the Systemwide Initiative on Malaria (SIMA).

The Panel concludes that this array of research fields is highly ambitious. The Themes have been developed to address the major issues encompassed in the 'water crisis' that IWMI sets out as its research focus. They are all research fields that are of importance to developing countries around the world. The Panel considers that IWMI has performed a commendable service even in defining these Themes. The breadth of issues covered by the Themes is consistent with IWMI's Mission but the Panel reiterates its concerns that there is a danger that the institute will spread itself too thinly across the issues it wishes to address.

This problem is somewhat ameliorated through the specification of 'Research Areas' under each Theme. For each Research Area, Outputs, Outcomes and Impacts are specified in the annual Medium Term Plans. The Panel considers this sub-division of themes and the specification of anticipated impacts as a valuable process and offers the potential to give real focus to the research effort. However, the Panel concludes that the current Research Areas are also specified too broadly. For instance in Theme Two, two of the research areas – 'Intensification of Low Productivity Systems' and 'Rehabilitation of Degraded Lands' – are sufficiently broad to encompass almost any productivity-enhancing strategy. Researchers in IWMI who are

attempting to use these Research Area specifications as guides to refine their own research focus or to determine if a tender call for research work 'fits' into the IWMI research strategy would find little guidance. The activities under the themes are assessed in Chapter Three of this report.

Conceptual Framework

The Panel commends IWMI for developing a conceptual framework to underpin its research endeavors. The Panel was also pleased to find IWMI has established an overarching hypothesis into which the conceptual framework fits. Having a sound conceptual framework is the first step to ensuring research rigor.

The IWMI conceptual framework comprises four elements. The first two elements involve the delineation of the research issue – the defining of the research problem. They are 'mapping water productivity' and 'mapping water poverty'. These are largely descriptive phases of research but some analytical work is suggested. For instance under mapping water productivity (WP), IWMI suggests that 'variables that explain WP variations (including soil/land degradation)' are analyzed at this stage. No similar explanatory step is described for mapping water poverty. This is seen as the process whereby 'target groups that could benefit from improved access to productive land and water resources' are identified. The Panel found the water poverty mapping element of the framework somewhat confusing. It is not clear from its name if this element is concerned with poverty (i.e. scarcity) of water or poverty arising from water scarcity. Assuming that it is the second, the expression is again confusing because it is clear that poverty is not a simple function of water. IWMI recognizes this but does not develop the issue as a research question. For instance, water access/availability is one of the factors that has an impact on poverty. There are many others. An analysis of that complex relationship would assist in determining if access to productive land and water resources would reduce poverty. Such 'cause-effect' relationships are not developed in a mapping exercise of poverty incidence and water access.

The next element in the conceptual framework is 'analyzing high potential interventions'. In this element, interventions, including technologies and/or policies, designed to improve water and land productivity, access to resources by the poor and environmental sustainability are identified, assessed and developed. This is the core analytical element in the framework.

The final element is the assessment of the impacts of the interventions. The impacts are specified by IWMI to be on water productivity, livelihoods, health and sustainability of resource use. The Panel found some difficulty in separating out the last two elements of the framework. It would appear to be appropriate to assess interventions – as required under the third element – with reference to the impacts of those interventions – as carried out in the fourth element. Perhaps the third element involves the use of cause-effect models to predict the effects of interventions on productivity, poverty and sustainability? Then the fourth element would carry out the assessment task by weighing up the costs of the interventions against the resultant benefits as predicted under the third element.

Part of the confusion for the Panel arises because research impact assessments have been included by IWMI under the fourth element of the conceptual framework. That is, the assessment of research projects has been bundled in with the assessment of the interventions that are the subject of the research. Put simply, the benefit cost analyses of interventions are different from the benefit cost assessments of the research. The Panel is of the view that the research assessment process should be considered outside the conceptual framework used in the research process

itself. This is despite the fact that information from the assessment of the impacts of intervention will be used in the assessment of the impacts of the research.

The Panel concludes that a conceptual framework is a worthwhile input into research planning but that the current version needs clarification for it to be useful.

Conclusions

The Panel's view is that IWMI has made some excellent progress in developing its mission, vision and strategy over the past five years. Indeed IWMI's overall agenda supports the CGIAR System Priority 4 – Combining Poverty Alleviation and Sustainable Management of Water Land and Forest Resources. Within this priority area, clear links are evident across all four sub-priorities and with some sub-themes under the CGIAR System Priority 5 – Improving Policies and facilitating Institutional Innovations to Support Sustainable Reductions of Poverty and Hunger. The Panel's concerns relate to aspects where the Panel considers improvements can be made.

The Panel recommends that IWMI should enter into a research planning exercise that would carefully define its mission, vision, priorities and research themes. The exercise should provide focus for IWMI's research activities and ensure the Institute takes advantage of its established comparative strengths so that only the most highly prospective potential areas of research are explored. An objective analysis of IWMI's research specializations within the context of the CGIAR system priorities would be required to inform that exercise.

Furthermore, as part of the recommended planning exercise, the Panel suggests that IWMI clarify its conceptual framework.

Given that the Strategic Plan's time frame has now been overtaken by the latest Medium Term Plan and given the stated intention of the current Director General to step down in the near term, the Panel suggests that it is an appropriate time for the Institute to commence the process of commissioning a new Strategic Plan, into which the suggestions and recommendations of the Panel can be injected.

3 IWMI'S RESEARCH PROGRAMS

At the time of the 1st EPMR covering the period 1988 to 1994, the Institute had 12 thematic programs. By the 2nd EPMR in 2000 these 12 programs were reduced to four programs plus one systemwide initiative. By 2002 the midterm plan (MTP) listed five program themes and two systemwide initiatives* including:

- MTP 1. Irrigation Water Resource Management for Agriculture (IWRMA) 1998-2004;
- MTP 2. Sustainable Smallholder Land and Water Management Systems (SSLWMS) 2002-2005;
- MTP 3. Sustainable Groundwater Management (SGM) 2002-2004;
- MTP 4. Water Resource Institutions and Polices (WRIP) 2001-2004;
- MTP 5. Water, Health and Environment (WHE) 1999-2004;
- MTP 6. Comprehensive Assessment of the Benefits and Future Directions of Water Management for Agriculture (CA)*;
- MTP 7. Systemwide Initiative on Malaria and Agriculture (SIMA)*.

Variations of MTP 1 through MTP 5 above were merged to create the current four themes (See Table 3.1 below from MTP 2006-2008). Development of the new program themes was influenced by assessment of IWMI research and by emerging global thrusts external to IWMI's research program. These included outcomes from the UN Millennium Goals and World Water Forums in Stockholm and The Hague that gave greater attention to ecosystem services, comprehensive water assessment, and global climate issues. The emphases on agriculture and irrigation were replaced by multi-purpose use of water; groundwater became a hydrologic component of the first two new themes (MTP 8 and MTP 9); health (as conceived in MTP 5 of 2004-06 MTP) was dropped as a theme, and WRIP (MTP 4) became a cross-cutting concern of all four new themes. The new Theme 3 (MTP 10) called Agriculture, Water, and Cities: making an asset out of wastewater emanated from work at IWMI's regional offices in Pakistan, Mexico and later India. The last strategic plan was designed to create a structure that would have greater connection across all the themes. The conceptual framework to link the new themes includes mapping of water productivity and poverty, analyzing high potential interventions, and performing an impact assessment.

Table 3.1 Former IWMI MTP Projects and linkages with Project Portfolio

Former MTP Projects		New MTP Projects
MTP Project 1: Agricultural Water Management	---------▶	MTP Project 8: Basin Water Management
MTP Project 2: Smallholder Land and Water Management	---------▶	MTP Project 9: Land, Water and Livelihoods
MTP Project 3: Groundwater Management		Ended, merged with MTP Projects 8 and 9
MTP Project 4: Water resources Institutions and Policies		Ended, merged with MTP Projects 8, 9, 10, and 11
MTP Project 5: Water, Health and Environment merged with MTP 10,11	---------▶	MTP Project 10: Agriculture, Water and Cities
	---------▶	MTP Project 11: Water Management and Environment
MTP Project 6: Comprehensive Assessment of Water Management in Agriculture	——————▶	MTP Project 12: Comprehensive Assessment of Water Management in Agriculture
MTP Project 7: Systemwide Initiative on Malaria and Agriculture	——————▶	MTP Project 13: Systemwide Initiative on Malaria and Agriculture

Table 3.2 is the annual expenditures for the past and current themes. Arrows between 2004 and 2005 indicate some merger of former themes into the new ones. The table suggests funding trends for each theme prior to 2005.

Table 3.2 Expenditures for past and current themes in millions of dollars③

Theme	2000	2001	2002	2003	2004	2005	2006②
IWRMA	1.2	3.2	2.3	2.5	2.4		
Theme 1 (BWM)						5.2	5.2
SGM	2.0	0.5	0.7	0.7	0.6		
Theme 2 (LWL)						3.1	4.6
SSLWMS	1.5	1.7	1.9	2.4	2.8		
Theme 3 (AWC)						1.0	1.3
WHE	0.6	1.2	1.1	1.3	1.3		
Theme 4 (WME)						1.1	0.9
WRIP①	1.0	2.0	6.6	2.5	2.4		

① Ended and merged across all new themes
② Budgeted
③ See Chapter 7 for complete expenditures

The Panel reviewed the outputs, outcomes and impacts of projects that were conceived primarily under themes that in most cases were initiated and terminated over the six years since the last EMPR in 2000, although elements of previous themes still continue in the current ones. A major part of the Panel's review of the quality and relevance of science within these themes was based on an evaluation of a set of publications selected by IWMI as representative of each theme.

3.1 Theme 1 – Basin Water Management

Introduction

The roots of Theme 1 extend back ten years or more to an earlier theme "Irrigation and Water Resource Management for Agriculture". The key challenge addressed in Theme 1 has been to improve food production for a growing population with increasing incomes through improved agricultural water management while meeting water quality and quantity requirements for other sectors. To do this Theme One's objective has been to "provide a better understanding of the trade-offs and applications and options in agricultural water management at the basin scale and contribute to improved quality and productivity in water through the development of appropriate tools and methodologies for analysis and management."

The key research areas are:

1. *sustainable water use in agriculture* with the aim to develop, test and apply analytical frameworks, water accounting methodologies and supporting tools to quantify and manage water resources for agriculture at a basin scale and to assist managers apply them in selected basins,
2. *understanding water productivity at the basin scale* with a focus on understanding the impacts of field, farm and system level improvements in land and water productivity at basin scale and provide methods and tools for planners to develop appropriate policies and supporting strategies to increase net basin level water productivity, and
3. *institutions, policies and economic instruments for better water management at the basin scale* with the purpose to analyze, contextualize, evaluate and recommend appropriate institutional arrangements to manage water resources for agriculture at basin scale, over a range of contrasting conditions, and with special emphasis on the balance between sustainable and productive use of water.

In each of these research areas IWMI aimed to produce a number of important outputs, including appropriate water accounting methodologies and allocation frameworks developed and adopted for use in developing country basin water management. This involved remote sensing and GIS tools as well as improved hydrologic science under the first area. The key outputs for the second area involved the development and reporting of trade-off analysis between sustainability and productivity at the basin level and policy recommendations and examples to show optimal strategies and trade-offs for basin scale balanced-development of rainfed and irrigated agriculture. Under the third research area the outputs were a set of policies, institutional models and supporting strategies for the management of agricultural water at the basin scale in a number of developing country conditions including IWMI's benchmark CP and CA basins.

Theme Assessment

In terms of quality outputs under Theme 1, the journal publications based on research done after 1999 appear to be somewhat limited given the large investment in this area over the last six years and its current estimated level of US$5.2 M in 2005 and 2006 and its allocation of 35 full time staff-equivalent scientists. In a draft synthesis of Integrated Water Management for Agriculture, in Chapter 3 of "More Crop Per Drop: Revisiting a Research Paradigm"(Results and Synthesis of IWMI Research 1996-2005), only four articles were cited with dates of 2000 or later, and these four had dates of 2000 and 2001 indicating that they were based on research started in the 1990s. In addition, of the ten papers suggested by IWMI as the key outputs of Theme 1, only three have

been published and only two of these in a well-known water journal. One published in Irrigation and Drainage in 2005 is based on the water and wastewater use within the Krishna Basin around Hyderabad. Van Rooijen et al. (2005) find that wastewater irrigation will make up for some of the irrigation lost due to increased water used by the city of Hyderabad. This is based on a new emphasis area of research for IWMI and is more concerned with water quality than it is about river basin management. Consequently it might better be listed under Theme 3. The second paper, published in Remote Sensing of Environment by Thenkebail et al. (2005), uses remote sensing to map the land use, land cover, and the irrigated area in the Ganges and Indus River basins. This research is an example of methodological development that might be used in the future to provide data for basin water management, and is a type of output IWMI identifies for research area one: sustainable water use in agriculture. An extension to this work was published in 2006 in the International Journal of Remote Sensing, and selected by IWMI as one of the six best papers for this year.

The paper by Turral et al. (2005) is based on the assessment of water markets in the Murray-Darling Basin in Australia. The authors focus on the trades of permanent water rights and found that, as would be expected, far fewer permanent water rights are traded relative to temporary (seasonal) water trades. Yet the water trading in the Murray-Darling is primarily for surface water in a developed country while most of water trading in developing countries are temporary groundwater trades because of the lack of water rights and poor governance.

Two additional papers are likely to be published in the near future based on work started since 2000. One, on the variability of solar radiation due to clouds and aerosols, is to be published in the International Journal of Climatology by Biggs et al. (2006). This is of interest to the climate science community but is only of marginal interest for those involved in basin management. The second article, which has been submitted to World Development by Lautze and Giordano[3], makes a strong argument for increased water development investment in sub-Saharan Africa. This is an interesting paper that promises to be of importance to river basin water managers and could influence future irrigation investment in sub-Saharan Africa.

Another draft paper that clearly fits under research area one in Theme 1, by Molden et al. "Agricultural Water Productivity and Savings: Policy Lessons from Two Diverse Sites in China," is based on the workshop paper published by ACIAR, Canberra in 2006. It provides an overall review of basin water use in two quite different basins in China. One of the basins gives a clear example of where reduced surface water delivery to farmers only increased groundwater use which comes from the same river. They go on to illustrate how multiple participants (farmers, irrigation managers, basin managers, broader society) influence water use but typically have quite different outlooks, objectives, incentives, and strategies for using or saving water.

An example of an important research area that is included in Theme 1 is the work on groundwater irrigation. Two good papers have been completed. One, on groundwater management in rural China, finds that there are many rural areas in northern China where they are not yet over drafting their groundwater like they are in most urban areas. Wang et al. in their draft chapter, "The Development, Challenges and Management of Groundwater in Rural China", point out that the government has done little to control groundwater extraction and that a multi-step response is needed to prevent even greater over-pumping in the future. The second paper

[3] Lautze and Giordano, submitted to World Development

(Shah et al. 2003) is based on the work on groundwater and energy in India which the panel will discuss under Theme 2.

The monograph edited by Murray-Rust et al. (2005) is an output that fits in research area one and provides a detailed physical evaluation of Zayandeh Red Basin in Iran using IWMI's integrated water management approach. A large number of physical models were used to evaluate the overall water balance in the basin including salt and groundwater conditions. The study appears to have done a thorough job on the physical side while the analysis on the social-economic and institutional side is quite superficial or nonexistent.

Molle (2003), in Research Report 72, "Development Trajectories of River Basins: A Conceptual Framework", is another output for research area one which starts out by reviewing some of the past river basin studies before developing and promoting an improved version of the IWMI integrated water management approach developed in the 1990s. Yet he doesn't consider the significant methodological work done in the 1950s and 1960s by researchers such as Otto Eckstein, John Krutilla and Maynard Hufschmidt working at Resources for the Future and Harvard University on USA river basins. The strength of the method suggested by Molle is that it disaggregates water by source and considers the state and state/citizenry relationships as important components in the analysis as well as other political and economic conditions.

Two additional papers that were not among the ten originally submitted to the panel by IWMI need to be highlighted in Theme 1. These papers, one on Integrated Water Resource Management published in the Economic and Political Weekly 2006 and one on Transboundary Water Law, were selected by IWMI as outstanding papers in 2006. This means that four of the six outstanding papers chosen by IWMI for 2006 are on topics in Theme 1 and illustrate the importance of outputs coming from this research theme.

The output and impacts from Theme 1 have been quite varied across research areas both in quality and quantity. The examples given by IWMI of its output of international public goods again tend to be in the first of the three research areas. They include outputs such as global irrigation and mapping, data storehouse pathways, drought monitoring, consortium for spatial information, diagnostic tools such as PODIUM and WATER SIM, basin level data sets and irrigation and drainage performance assessment guidelines. The "Proposed Framework on Transition to Integrated and Participatory Water Resources Management in the Ferghana Valley" prepared by IWMI and its partners was adopted in 2003 by the ministries in charge of water resources management in the three participating countries Uzbekistan, Kyrgyzstan and Tajikistan. More country or basin specific outputs include mapping of land use/land cover and irrigated area for Ganges and Indus river basin and spatially disaggregated poverty maps for Sri Lanka[4] and several books including "Irrigation and River Basin Management" edited by M. Svendsen, "Asian Irrigation in Transition" edited by G.P. Shivakoti and "The Institutional Economics of Water" by R.M. Saleth and Ariel Dinar. A number of other publications that are relevant to Theme 1 are discussed later under the section reviewing the Comprehensive Assessment.

The range of outputs is consistent with the distribution of research topics across the three research areas. Research in sustainable water use in agriculture has over half of the research projects while the other two areas divide up the remaining projects. In fact one of the projects

[4] MTP 2007-2009

listed for research area number three is a training program while another is related to the Tsunami and its impact on groundwater quality. This work resulted in an article in Water Resources Research, in 2006, that was selected by IWMI as one of its outstanding papers of 2006.

The upshot of such a broad comprehensive theme as basin water management is that it includes numerous projects, many of which are not closely related. This also spawns a wide range of outputs that do not have the same focus they did in the 1990s. For example, the monograph edited by Murray-Rust et al. (2005) with a comprehensive analysis of water allocation in the Zayandeh River Basin in Iran is very different from the papers on the effect of clouds and aerosols on solar radiation in the Krishna River Basin of India, wastewater use in Hyderabad India, and groundwater management in rural China. Of these only the Murray-Rust et al. (2005) monograph specifically addresses the issue of river basin water management. The end result is that it is unclear what the outputs should be for Theme 1, and if all outputs should be given equal weight. In addition, most of the global public goods outputs are in research area one and involve little in-depth analysis.

In terms of IWMI's strategic research framework, the two papers on Remote Sensing in the Krishna produced outputs listed for research area one. Three papers produced outputs that fall in research area two but did not provide any economic analyses of strategies or trade-offs. Four papers fit under a broad definition of outputs for research area three. Two other papers, one on climate and the other on wastewater, do not seem to fit under any of the research areas in Theme 1. Again this emphasizes the wide range of projects in Theme 1, some of which are not producing outputs that are specified in the strategic plan. The strategy for Theme 1 is quite broad; therefore, when projects cannot be fitted within such a broad research area it is time to phase out such research.

Complicating matters in Theme 1 was the addition of benchmark basins even though progress has been relatively slow in the original three benchmark basins: the Ruhuna in Sri Lanka, Rechina Doab in Pakistan, and the Olifants in South Africa. In the fourth benchmark basin, the Krishna in India, work has also been hindered by the three States in the basin not willing to share hydrological data. Part of the reason for this lack of sharing is the mismatch between river basin and political boundaries. Political decisions are made based on political boundaries and not watersheds or river basin boundaries. This may argue for the selection of research basins that are smaller, more compact and don't involve three or more countries or states, unless the research interest is institutional arrangements for transboundary basins.

Further adding to the complexity and the pressure on research staff are the six benchmark basins that were added as priority research sites under the Challenge Program (CP) (Indus-Ganges, Karkheh, Mekong, Limpopo, Volta and Nile). IWMI must be careful not to try to do something in all of these very large basins. It may be better to select fewer and smaller basins as was suggested by Molle in his recent draft paper, "River Basin Development: A Framework for Case Studies." For example, it may have been better for IWMI to focus on the Godavari Basin in India instead of the Krishna, since it would have been easier to obtain data for the Godavari Basin than it has been for the Krishna Basin.

Some of the same concerns were voiced in the CCER for Theme 1 report, working paper 97, 2005. Although the Panel found the 2005 CCER too general and absent any in-depth analysis, it is in general agreement with a key finding that the focus of Theme 1 is too broad. The authors said that "IWMI sees itself as a champion of the needed paradigm shift towards basin scale water

productivity, and integration across the complete hydrological cycle". Consequently, they found it is "difficult to see how understanding water productivity at the basin scale will achieve the necessary integration. Integration requires taking the prospective of a river basin manager, who must balance the complexities of all stakeholders". The Panel fully agrees that the objective of Theme 1 should be more focused on river basin management as a vehicle for IWMI to promote integrated water management.

In the future the Panel believes that IWMI needs to carefully review the scope of Theme 1 to determine if too many diverse topics have been grouped under the Theme which has tended to blur its focus. The objective of Theme 1 is to develop and analyze trade-offs and options for agriculture water management at the basin scale. As IWMI does the review it should assess whether in fact the three existing research areas provide enough focus and whether other research areas might be able to provide better focus, e.g. conjunctive water use? Highlighting such research areas will provide added focus to IWMI's work and help attract funding to critical research areas. In conclusion, the Panel holds that IWMI needs to review the scope of Theme 1 and determine how best to focus its research in this area.

3.2 Theme 2 - Land, Water and Livelihoods

Introduction

Theme 2: Land, Water and Livelihoods (LWL), identified first in the 2005 strategic plan, resulted from a refocusing of MTP 2, Sustainable Smallholder Land and Water Management (SSLWM), portions of MTP 3, Sustainable Groundwater Management (SGM) and MTP 4, Water Resources Institutions and Policies (WRIP). The evolution of Theme 2 resulted in part from a number of earlier programs and projects that had the central theme of 'technologies for more efficient agricultural water productivity' which was heavily focused on irrigation systems. Theme 2 has broadened the focus beyond irrigation to multiple uses of water and land including ecosystem services.

The Theme 2 objective is to identify and test high potential interventions to conserve resources and increase land and water productivity for improved livelihoods, health and equity across the continuum of water management options, within integrated socio-ecological landscapes.

The three key areas of research for Theme 2 are:

1. *intensifying low productivity systems* with the purpose to research technical, institutional and policy options for small-scale water management that can increase productivity and socio-ecological resilience of poor farmers, and address sustainable use of soil and water resources in rainfed and irrigated systems;
2. *multiple use catchments and systems* to provide tools and strategies that improve water productivity and landscape integrity to maximize environmental goods and services and ensure equitable accrual of benefits from increased production; and
3. *rehabilitation of degraded lands* to understand the impact of soil degradation on water availability and productivity and to identify management systems that restore resource quality and maximize sustainable use.

The four previous IWMI themes from which Theme 2 evolved all had relatively broad objectives so it is not surprising that the Theme 2 objective and key research areas represent an extraordinarily broad range of topics. In the Panel's opinion Theme 2, much like Theme 1, became the home for many ongoing activities with minimal focus.

Theme 2 is new so has little in terms of direct outputs. The Panel, therefore, is reviewing the themes that precede LWL including assessments of selected publications given to the Panel that relate to previous themes from which LWL partly evolved.

Theme Assessment

The purpose of the Sustainable Smallholder Land Water Management (SSLWM) was to do applied research to promote the uptake of appropriate smallholder land and water management systems in order to contribute to better rural livelihoods for the poor by reducing extreme hunger, empowering women and promoting environmental sustainability. SSLWM became the thematic home for small scale irrigation as well as rainfed agriculture, common to many poor farmers in Africa and the uplands of Asia. The SSLWM theme integrates seamlessly into Theme 2.

A CCER of the TATA Water Policy Research Project, one of the most visible of the SSLWM projects, was conducted in 2004 with the general finding that this was an effective program with a focus on livelihoods and water management. The project fits under the first research area of Theme 2, intensifying low productivity systems. IWMI refers to this program as "open-ended policy research". The project seeks to address about a dozen researchable questions through literally hundreds of small projects. One of the CCER recommendations was that the project needed to emphasize publishing in international peer reviewed journals. At present, with the TATA project nearly complete, over 30 peer reviewed articles have been published, with a reasonable number of them in respected journals. The CCER noted that India's tribal population was not benefiting from SSLWM technologies so the Central India Initiative (CInI) was established to focus on that group. Outcomes of the CInI are now spreading to more tribal areas aided by a grant-making program, a key addition to CInI.

When the International Board for Soil Research and Management (IBSRAM) was terminated with its program resources brought into IWMI, a host of ready-made research efforts dealing with soil conservation, erosion, and small watershed studies were subsumed under this theme. This included the Management of Soil Erosion Consortium (MSEC) program which was created to address the natural resource needs of upper watersheds throughout Southeast Asia. This ten-year-old project is being conducted in five SEA counties and includes a wide range of socio-economic to bio-physical research primarily focused on small farms in the steep uplands. MSEC is a program for which IWMI provides the needed institutional home but IRD appears to have the primary role in developing and conducting the research program. The program with IRD, in Laos at least, seems compatible and with some synergies but not really integrated into IWMI. MSEC has resulted in many primarily field-based research papers and reports. Many of the papers are in good international journals including *Catena*, especially those related to soil science. The research done through MSEC fits under the Theme 2 research area 3, rehabilitation of degraded lands, but does not appear to have changed much as a result of its association with IWMI. Therefore the Panel views this as an example of IWMI expanding its mission rather than deepening its capability. Furthermore, there seems to be little concern about how this research will inform IPG. As the MSEC project ends it will be essential that IRD and IWMI agree to a program that is more inline with IWMI's mission, especially in regard to IPG.

The Panel members observed that much of the research reported on during our visit to Luang Phrabang was being conducted by graduate students, post docs, or other young researchers with limited on-site senior mentoring. These researchers have creative ideas but the work is not

necessarily focused on any particular evolving research topic nor guided by the existing literature. It was not obvious during the visit who had responsibility for mentoring these students. In a more general sense the Panel heard from senior IWMI researchers in all three regional sites visited as well as from other current and former IWMI researchers that the opportunities to directly mentor graduate students and post docs was limited because of increasing pressure for their time. Fund raising and administrative responsibilities were the two reasons most often given for the time constraints. In Hydrabad, Pretoria and Colombo, as well as several Western universities, we spoke with university partners who served as advisors to graduate students who were generally quite pleased with their association with IWMI. Although we did not speak with anyone from the Institut National Agronomique Paris-Grignon the Panel was told that faculty from this institute and perhaps others were supervising the students in Luang Phrabang.

Articles that the Panel reviewed related to the SSLWM theme included a study by Chaplot, et al. (2005) that used field data from a small watershed with an existing empirical runoff model to estimate linear erosion as a function of land use and climate. This study is based on two runoff events; one to calibrate the model and a second to estimate runoff velocity. A concern of all the papers from small watershed sites is how typical these sites are when results are extended to other areas. In the case of this particular paper we were further concerned at how representative the two runoff events were to each other as well as other runoff events. This paper is published in *Catena*, a good international research journal. The authors of this paper all list their affiliation as IRD/IWMI/NAFRI which suggests good cooperation between institutes but makes it difficult to appraise IWMI's contribution.

A paper by Noble and Suzuki (2005) is a result of research over several years and has led to the first steps to transfer new technologies to poor farmers. The focus of this work is a particularly serious problem of degraded soils that appears to have a potentially inexpensive solution reported in the paper using locally available materials. The science behind this research is well done and the research itself appears quite innovative. A follow-on paper related to this one is currently in press that shows the potential of co-composting a locally produced acid waste product with bentonite to turn the combined material into a useful soil amendment. This work has already resulted in several hundred farmers adopting the technologies and many others are interested in trying it. While the study area is in northeast Thailand, officials in Vietnam have expressed interest in learning more about the technology. These two papers present innovative technologies that are potentially able to address serious fertility problems but there are two issues for IWMI: one the problem and solutions could be very localized (in the sense that it is not a global issue) and secondly it has little to do with water. The Panel found no proposed additional studies outside of SEA to suggest that the problem or solutions identified to solve it were being pursued.

The purpose of Water Resources Institutions and Policies (WRIP) was to identify and test policy tools, organizational options, institutional frameworks and support systems for local management of irrigation to improve water productivity in ways that reduce poverty and protect the environment. Irrigation management transfer (IMT) to local communities was a major activity under an earlier theme (Policies, Institutions and Management) as well as WRIP but is no longer an IWMI emphasis. An unpublished paper by Giordano et al.[5] assessed the impact of IWMI IMT

[5] A soon to be published paper by M.Giordano, M.Samad, R.Namara "Assessing the outcome of IWMI's research and interventions on Irrigation Management Transfer".

research that highlighted important lessons related to IMT uptake. Given the large public investment in irrigation infrastructure that is in need of rehabilitation in Asia, interest in Africa for expansion of irrigation, and the growing dependence on local management of irrigation, the Panel expected to see more ongoing research aimed at local organization structure to improve water access for the poor. This was one of the recommendations that came out of the 2005 IWMI synthesis report, "Pro-poor Intervention Strategies in Irrigated Agriculture in Asia" by I. Hussian.

A paper by Lestrelin and Giordano (2006), associated with the WRIP theme, is joint between IRD and IWMI researchers and looks at the complex social and political issues impacting the environment, ecology, and livelihoods of rural people in a community in Laos. This study, which fits the first research area of Theme 2, shows rather convincingly that government policies aimed at improving environmental and livelihood conditions for a community do exactly the opposite. This study, if collaborated in other similar studies, could serve to guide future policy formulation.

The paper by Smith et al. (2005) is an analysis of existing literature related to fishing in developing countries. The authors make the case that fishing in developing counties is assumed to be an occupation of the poor but in fact is diverse in every aspect, including income, for those who fish. The authors develop several scenarios representing this diversity and then hypothesize policy interventions that appear from the literature to be best for each. The authors stress, however, that this policy framework only provides guidelines that require refinement at the local level. The Panel's opinion is that this paper represents a topic in which IWMI does not have a comparative advantage. Sophie Khoa, co-author of this paper, is a joint researcher between WorldFish and IWMI. We believe her article, "Impacts of Irrigation on Fisheries in Rain-fed Rice-farming Landscapes" (Khoa et al. 2005) is a better representation of what IWMI's fish-related research should be.

The purpose of Sustainable Groundwater Management (SGM) was to research promising technologies to achieve sustainable groundwater systems and aggressively promote sustainable solutions. Prior to the last EPMR one of the world's leading applied researcher/outreach groundwater experts, Tushaar Shah, came onto the IWMI staff. He has long advocated the relative high value of groundwater and its potential access by the poor. The groundwater studies and outreach that he has led in India are recognized worldwide for their significance and thus he is a very positive addition to IWMI. Almost immediately after joining IWMI he published an empirical report, "Peddling Out of Poverty" (Shah, 2000), which is widely used as an example of an intervention that has high potential for helping the poor both in irrigated systems as well as for supplemental irrigation in rainfed agriculture. His studies emphasize the need to link to the broader context in which groundwater is used, including consideration of the hydrologic cycle, water reuse, and the importance of the commercial infrastructure and the market system. Although the report is focused on social impact of the IDE treadle pump technology in South Asia, the potential IPGs from this work are not only on use of this particular technology but rather on the potential to develop other low cost water control technologies that self-select the poor. While there has been considerable research on low cost water control technologies, the Panel did not see a lot of evidence that research on the required companion commercial infrastructure and market system had been conducted. We are aware of the total package of technologies, infrastructure and marketing coming together in a very significant way only in Bangladesh. "Peddling Out of Poverty" covers activities that clearly fall under the first research area of Theme 2.

A specific recommendation of the 2nd EPMR was that IWMI "increase its emphasis on the groundwater depletion problem" (Recommendation 2). In the Panel's view the purpose of the SGM theme to research promising technologies to achieve sustainable ground water systems and aggressively promote sustainable solutions lost IWMI emphasis when it was split between new Themes 1 and 2. Theme 1 focuses on tools for identifying and quantifying the issues while Theme 2 looks more to innovative solutions to improve sustainable production for the poor with largely innovative low technology solutions, such as discussed above. IWMI identified the key groundwater problem, at least in South Asia, is control of groundwater demand, and identified hypothesized solutions to the problem[6]. The vast majority of irrigation in South Asia is from groundwater pumped by electrical power. This has created a crisis in achieving a sustainable groundwater resource and has exasperated an already huge national economic burden because of the sub-optimal use of electricity. Presentations (at least from India) suggest that groundwater depletion is an even more serious problem now than it was in 2000, but this problem has not received increased emphasis from IWMI. The 2003 IWMI Research Report 70 entitled "Energy-Irrigation Nexus in South Asia" (Shah, et al., 2003) proposes a solution to the groundwater crisis in areas of falling water tables. In the report Shah and his co-authors state "appropriate policies for the supply and pricing of power offer a powerful toolkit for the indirect management of both groundwater and energy use." Unfortunately, there has not been aggressive IWMI follow-up to develop and test this toolkit. The TATA-funded project in North Gujarat, to increase farmers use of water saving technologies, is part of the toolkit but this alone is not likely to sustain groundwater tables. In Hyderabad we heard about additional bold measures to control demand for water that were hypothesized to have greater impact. These measures included flat-rate energy pricing and control of power to pumps. These, however, are not being explored further.

Shah's international reputation for his work and publications, including his ideas expressed in IWMI publication "Energy-Irrigation Nexus" or his chapter in "More Crop per Drop"[7], could be used to inform a major part of IWMI's core research. The inclusion of rain-fed agriculture as part of the holistic view of water taken by IWMI for its research program is very appropriate. Irrigation, however, whether as a solution to problems or the cause of them, more than any other research topic is an IWMI responsibility. The expanded vision of IWMI to address the long term protection of land and water resources through comprehensive basin analyses, and the Theme 2 vision of doing this with innovative technologies and approaches for improving livelihoods for the rural poor, fit the critically important issue of groundwater sustainability best if the approaches directly address the major causes of the groundwater depletion problem.

The panel concludes that by dropping SGM as a Theme and integrating it into the new Themes 1 and 2, the urgency of aggressively addressing this issue was lost. IWMI should, as recommended in the last EPMR, increase its emphasis in sustainable groundwater management.

Looking to the future, Theme 2, Land, Water and Livelihoods, places greater emphases on integrated landscapes, rainfed as well as irrigated land, multiple water uses, and the ecological sustainability including off-site impacts. Theme 2 is intended to examine a "broader range of management solutions" as compared to previous themes from which it evolved, and will require an even more rigorous approach to address the greater complexities. The last EPMR suggested

[6] IWMI is doing some interesting work on the water supply side with community groundwater recharging efforts both in Asia and Africa, including through one of the CPEF projects.

[7] M.Giordano, F.Rijsberman, and R.M.Saleth (ad), "More Crop per Drop: Revisiting a Research Paradigm Results and Synthesis of IWMI Research, 1996-2005". IWMI Draft, May 2006.

that IWMI focus its programs more. The LWL theme is broader than the ones leading up to it, and has become a collection of loosely associated research projects, where regional funding could have too great an influence on project choice.

The Panel believes the sub-themes of Theme 2 in the last MTP, particularly the first and third research areas, are far too broad to effectively produce IPGs, especially given the localized nature of individual projects. Even with multiple case studies and the use of modeling, generic outcomes will not likely be produced without strategic focusing on topics to be researched. Priority for this strategic focus should build on outcomes from previous IWMI and/or IWMI-related research. Planning for Theme 2 is consistent with the new CGIAR system priorities as well as preplanning of partner roles including other CGIAR institutes.

The outputs from Theme 2 have included outcomes of awareness of problems and promising opportunities to solve them. This is especially the case for the interface of water, food crops, and livelihoods with ecosystem services, natural resources, multiple water uses, livestock production, aquaculture, land degradation and the broad issues of sustainability. There seems to be few outcomes relative to tested solutions to food, livelihood, or environmental problems in large part because of the greatly expanded and complex systems that are addressed by Theme 2. The more than 30 specific output targets under these broad areas include a very large range of interventions from irrigation to fisheries. Included in these, but with no obvious priority, are outputs related to the interventions suggested in several IWMI synthesis reports[8]. The Panel concludes that IWMI should redouble its efforts to give priority to building from its past research where clear direction has been given before expanding into new areas of research where IWMI will have less of a comparative advantage. We also believe that greater focus will allow more in depth research and testing of promising solutions identified in the synthesis reports.

3.3 Theme 3 - Agriculture, Water and Cities

Introduction

The centerpiece of the work in Theme 3 has been research on wastewater irrigation. Briefly, the use of urban wastewater in agriculture has been receiving interest since the 1970's. As early as 1973, the WHO stated that the planned and regulated use of wastewater can put this valuable resource to use while at the same time avoiding risks to human health, crop productivity and the environment. In 1989 the WHO developed guidelines for the safe use of wastewater in agriculture. IWMI first became interested in the issue of wastewater through an MSc student attached to the institute who did work in this area towards her thesis. This was followed up with an extensive study in the southern Punjab which showed that the use of untreated wastewater in Pakistan was common and that the impact of wastewater irrigation on farm households was substantial. The study further demonstrated that by utilizing wastewater farmers could get high incomes, because of savings in fertilizer, and higher yields, allowing many to escape the poverty trap. Other case studies followed that documented how this significant economic activity supports livelihoods. By 2004, wastewater and urban and peri-urban agriculture had become a distinct theme area.

[8] IWMI, Cost and Performance of Irrigation Projects: A Comparison of sub-Saharan Africa and other Developing Regions. Draft Research Report, April 2006, see also Hussain (2005) and Shah et al. (2003).

The objective of Theme 3 is to identify and test interventions for the rapidly growing sector of urban and peri-urban agriculture that take advantage of urban resources while protecting environmental and human health.

The two key research areas for Theme 3 are:

1. *enhancing the safe and productive use of wastewater in irrigated agriculture* by making an asset out of domestic wastewater through efficient and viable interventions along the contamination pathway and reducing health risks for farmers and consumers; and
2. *managing urban demands on agriculture, water, sanitation and the environment* to minimize negative impacts of city growth on agricultural water demand and the environment via water and nutrient recycling for intensive production systems, stakeholder involvement, capacity building and policy support.

Theme Assessment

Of particular significance, and recognized as such by the Panel, is the contribution of IWMI to the Hyderabad Declaration on Wastewater Use in Agriculture, an outcome of the joint IDRC-IWMI workshop held in November 2002 in Hyderabad, India. The Hyderabad Declaration has influenced public health guidelines of the WHO, USAID and EPA. This kindled further interest in the health impacts of wastewater irrigation as it became clear that the full treatment of wastewater was not possible in most developing countries and that a complete ban on the use of untreated wastewater was also not pragmatic.[9] IWMI thus broadened its research expertise by hiring staff in the area of microbiology and parasitology as it also began to look into practical and affordable safeguards to health.

IWMI's current work on wastewater is concentrated in Ghana and in India, with some work elsewhere (primarily Sri Lanka and Bangladesh) under WASPA.[10] The Panel notes that IWMI has done some valuable work in the past five years in this area, which has documented the magnitude of the phenomenon of wastewater use for crop production, and brought recognition to wastewater-dependent livelihoods in and around cities. IWMI research has shown how people in urban, peri-urban and rural areas depend directly or indirectly on wastewater for their food security; growing everything with this water, from fodder grass and vegetables to paddy. IWMI research has documented the complementary factors that drive the increased use of wastewater in agriculture – water scarcity, reliability of wastewater supplies, lack of alternative supplies, livelihood and economic dependence, proximity of markets and nutrient value. It has looked (at varying degrees and with varying quality in its investigation) at the connected issues of tenure, employment, gender relations, water quality and costs of production. Moreover it has (particularly from the Hyderabad office) done fairly rigorous testing to determine the level of pathogens and resultant health hazards. Apart from microbial assessments of the kind that have not been carried out previously, IWMI has also been involved in projects that try to bring about wider awareness of the health risks (and resultant methods of controlling human exposure). Thus there is no question that IWMI has contributed both to the knowledge base on the fairly significant use of wastewater, and to disseminating information on how to curb health risks. IWMI has to be credited for flagging an issue that had not been systematically researched and for bringing rigor into the field testing of water quality. While it could be questioned if IWMI should be recruiting its own health specialists and straying into an area (epidemiological studies,

[9] The paper by Scott et al. (2000) on the negative economic implications of wastewater treatment has been often cited.

[10] Wastewater Agriculture and Sanitation for Poverty Alleviation in Asia.

quantitative microbial risk assessments) that is not strictly within its mandate, the Panel notes that the recruitment of the senior epidemiologist and her excellent work in the Hyderabad office has strengthened IWMI's research findings and contributed to an understanding of the wider and more critical implications of wastewater use in agriculture. Working with appropriate partners in Ghana has also demonstrated that this key health element can be brought in and used effectively by IWMI (see excellent article by Amoah, Drechsel, Abaidoo and Ntow on "Pesticide and Pathogen Contamination of Vegetables in Ghana's Urban Markets").[11] However, though the Panel understands that the most powerful entry points for health risk decrease are education and awareness creation, the Panel feels that getting into health and hygiene education, as part of IWMI's "farm to fork" perspective, would be exceeding IWMI's mandate and trusts that IWMI will leave this kind of work to other organizations better suited to do it.

Overall, the Panel feels that IWMI's applied action research has been of catalytic value and has been able to highlight the more positive health aspects of wastewater use that contribute to household food security, better nutrition and increased household incomes. IWMI has also convincingly demonstrated that there are significant trade-offs associated with irrigation using untreated urban sewage. Overall the Panel notes the good work done in the assessment of potential health risks, the most notable outcome being the fact that the WHO is using, in their new guidelines for wastewater use in irrigation, publications by Raschid-Sally et al. (2001), Einsink et al. (2004) and Van der Hoek et al. (2005), and also cite overview papers of Hussain et al. (2001,2002) and Van der Hoek (2004) and the summary book on research in Ghana (Obuobie et al. 2006). The Panel also notes the pro-active role IWMI has taken in challenging the WHO Guidelines and suggesting the incorporation of livelihood considerations and alternative entry points for risk reduction (Drechsel et al. 2002). It also notes with satisfaction the contribution of IWMI's research to the formulation of Ghana's policy on wastewater.

Solid field work not withstanding, the Panel is not convinced that this work should constitute the main substance of a discrete research theme (Theme 3). While the Panel recognizes that wastewater is a resource of global importance especially as scarcity of freshwater resources, urbanization and resultant wastewater volumes all increase, the Panel has some serious concerns as follows: 1) are the farmers who are actually cultivating with wastewater really the urban poor, or in some places are they fairly well-off male entrepreneurs who are in the "business" of wastewater cultivation as a temporary income-generation Endeavour, 2) that in many settings, the cultivators are actually transient and it is almost impossible to bring about any kind of regulation and/or awareness of the health hazards, 3) that in the short term in some areas wastewater use will continue to grow; but at the same time as urban pressures are driving land prices up, land is increasingly being taken out of agriculture thus making it a non-issue in many places, 4), that IWMI may be drawing attention to a phenomenon that is deemed illegal and thereby may have the unintended consequence of driving poor people out of their only means of survival, and 5) that the theme is in fact not part of the CGIAR's System Priorities.

The Panel is particularly concerned about where IWMI should draw the line in terms of its work in this area. While it can easily understand IWMI engaging in research that tries to understand the positive and negative economic impacts of wastewater use on agriculture, health and the

[11] In response to the last EPMR, IWMI stated that it would continue the health-irrigation work with a small interdisciplinary team of researchers making use of associate experts, interns and students where possible. It is noted by the Panel that the India office has chosen to recruit full time staff, while the Ghana office seems to have partnered with appropriate institutions as and when needed. Both strategies, though different from the last EPMR recommendation, seem to work.

environment in a broad way, the Panel feels that the next step, action research to come up with risk-reduction methods and approaches, is already at the outer fringes of what IWMI should be engaged in (though it recognizes that the work on promoting safer irrigation methods and what is being done under the Challenge Program to fine-tune intervention options is being done well and systematically). The Panel strongly feels that designing awareness programs in support of public health should be left to others. The Panel further feels that related advocacy work should be left to networks such as the Global Water Partnership or the Global Water Alliance.

Likewise the Panel questions IWMI's involvement in the project in Africa "Improving the rural-urban nutrient cycle through municipal waste composting" which targets for its output guidelines for composting and direct sludge application and which seems a program stretch for IWMI. The Panel understands that this is a project from the old IBSRAM days and suggests it be concluded early.

Heavy metals in Agriculture has also been part of Theme 3 and has resulted in 9 peer reviewed journal articles and 5 project reports. IWMI's Southeast Asia office has been undertaking research on heavy metal contamination and engaging policy makers in identifying and encouraging remediation efforts.[12] Its work on cadmium in rice in Thailand gave it phenomenal publicity and media coverage and raised IWMI's profile in Thailand and the region. The findings were used to lobby the Royal Thai Government to take action to address the cadmium contamination issue. The Panel understands that IWMI is still internally discussing whether it has a comparative advantage in going ahead with this kind of work, and understands the dilemma it faces.

Overall the Panel feels that IWMI has done impressive work in the area of wastewater agriculture and on heavy metals in irrigation, much of it inherited from IBSRAM but later linking with good partners and hiring staff in the health area for greater impact. The Panel feels that there is still some room for future research efforts in order to demonstrate convincingly: 1) that despite associated environmental and health risks, that especially the poor are benefited as wastewater is a valuable water resource under conditions of scarcity, 2) that there are low cost options for risk reduction on farms, in households and markets, 3) that there are legal and institutional reforms/legislation that can help municipal and national agencies support urban farmers and provide some clear policy guidelines to an hitherto "unplanned" activity, 4) that there are feasible and cost effective non-treatment management options and 5) that there are consequences of impairment of water quality for groundwater more generally. [13]

The Panel is not fully convinced that IWMI has provided an adequate rationale for "Agriculture, Water and Cities" continuing as a separate theme, and feels that the good work it is doing under the theme can fit into the broader water-food-environment mandate, and thereby deal with both the "cities interface" and the "ecosystems interface". The Panel feels that that IWMI should complete and phase out the current focus on urban and peri-urban agriculture research in the next one-two years, and simultaneously that it merges Theme 3 and 4 together to constitute a (new/old) Theme 3 on Water, Health and Environment.[14] In doing so IWMI can look at broader

[12] Heavy Metals in Irrigation Phase 111 (2001-2007). Initially driven by Dept of Agriculture and subsequently Land Development and other project partners. Information disseminated by IWMI through peer reviewed articles, conference presentations.

[13] We understand that WHO and FAO are waiting for a Catalogue of 20 low cost options for SSA and India and that the work is underway already.

[14] IWMI's earlier theme on Water, Health and Environment earned high appreciation. See, for example, the CCER:Consolidated Review, May 2003.

issues such as, for example, different investments in urban water supply and sanitation for wastewater quantity and quality and downstream impacts on agriculture and the environment, or explore wetland options to strengthen stream self purification processes and look at multiple use systems that cater to urban proximity.[15] There is also a major case for IWMI looking at drinking water not from a domestic-plus angle (which is done by many other organizations specialized in drinking water and sanitation) but rather from an irrigation-plus angle, and peri-urban areas particularly present key research opportunities for this. Agriculture and irrigation, for example, contribute to the degradation of water quality through erosion and through contamination of surface water and groundwater through residues of agriculture chemicals and/or microorganisms.

The suggestion to merge Themes 3 and 4 is based on the notion that the environmental interface has at least the following two dimensions: 1) water allocations to ensure the supply of "ecosystem services" and the impact of changing water management on ecological systems, and 2) pollution of water supplies with adverse effects on agricultural production potential, ecosystem services and human health. Hence human health can be viewed as one facet of the connection between water and the environment and folding themes 3 and 4 together would allow a more holistic approach.

The Panel concludes that in the last two years IWMI has done some significant research under Theme 3, but that in many ways it has reached the limits of what can be done in terms of more testing, refinement of final products and capacity building under the urban and peri-urban agriculture rubric, and that a move now to a more holistic view of water, environment and health would yield better research results.

The Panel recommends that IWMI completes and phases out the focus on urban agriculture in the current Theme 3, and simultaneously that it merges Theme 3 and 4 together to constitute a theme on Water, Health and Environment.

3.4 Theme 4 - Water Management and Environment: Balancing Water for Food and Nature

Introduction

Theme 4 in the IWMI portfolio is a comparatively recent initiative, having been developed in 2004 from the previous theme on Health and Environment. With the cessation of the research initiative on water management and malaria that had been a key element of the former Theme, the new Theme 4 is focused on identifying and testing interventions that safeguard the environment and associated delivery of ecosystem services vital to human well-being, while enhancing land and water resource management for agriculture.

The IWMI Strategic Plan 2004-2008 distils this to mean research in three key areas: addressing environmental requirements in basins, enhancing benefits in agriculture-wetlands interactions and valuing contributions of ecosystem services to livelihoods.

Theme Assessment

The Panel sees the continuing development of a research theme that investigates the links between water use in agriculture and the environment as an imperative. The fundamental

[15] Note Recommendation 7 of the last EPMR which specifically suggested work on effects of irrigation on downstream water resources.

elements of the theme are sound and the key research areas identified under the Strategic Plan are appropriate.

To aid in assessing the success of IWMI to date in achieving the stated goals of the Theme, eight peer-reviewed outputs provided to the EPMR Panel as key outputs of the Theme 4 over the 2000-2006 period were reviewed by the Panel. The outputs are also reviewed here to assess the quality of the research being undertaken within this Theme.

At the outset, it is acknowledged that the Theme is in its infancy and could not be expected to have already produced a complete array of outputs – and to have been successful in generating impacts – relevant to the Theme's stated objectives.

Finlayson et al. (2005) is a useful synthesis document but could not be considered to be 'original' research.[16] It should also be noted that Finlayson was primarily involved in this project prior to being employed at IWMI. Furthermore, the Ramsar Convention resolutions cannot be regarded as a research output. The resolutions are policy documents that (hopefully but not necessarily) have arisen on the basis of research findings.

Matsano and van der Hoek (2000) is a largely descriptive paper that details the land use activities undertaken in a park catchment and changes in a down stream lagoon ecology over time.[17] No causal relationships are established between land use and lagoon ecology beyond what can be regarded as "casual empiricism". Suggestions for change in catchment management and associated institutions that are made in the paper are not substantiated with evidence of likely impacts.

Amerasinghe, et al. (2002) is primarily a descriptive piece focusing on the environmental condition of coastal lagoons.[18] Some analysis is apparent in the bivariate correlations that are drawn between water level and bird species diversity. However, other potential factors that may cause such changes have not been identified or considered in the analysis. Conclusions are thus largely speculative or at least conjectural.

Stanzel, Oze, Smakhtin, et al. (2002) presents a relatively straightforward spreadsheet-based model of an irrigation system draining to a saltwater wetland/lagoon system.[19] Simulations in the model predict changes in water level & salinity. However, there is no analysis of the consequences of these predicted changes on either the ecology or people involved. Put simply, the paper doesn't answer the key question "do the changes matter?". Perhaps because it doesn't offer much new by way of either modeling or policy development, the paper has not been published in a refereed journal.

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[16] Finlayson, C.M., R. D'Cruz, N. Davidson (2005). Ecosystems and Human Well-being : Wetlands and Water Synthesis. A report of the Millenium Ecosystem Assessment. World Resources Institute, Washington, DC.

[17] Matsano and van der Hoek (2000). Impact of irrigation on an aquatic ecosystem. Int. J. of Ecology & Env. Science 26:223-233.

[18] Amerasinghe, F.P., Y. Matsuno, R.I. De Silva, S.C. Piyankarage, C.N.B. Bambaradeniya and A. Mallawatanthri (2001). Impact of irrigation on water quality, fish and avifauna of three coastal lagoons in southern Sri Lanka. Asian Wetland symposium, 27-30 August 2001, Penang, Malaysia.

[19] Stanzel P, Öze A, Smakhtin V, Boelee E, Droogers P. (2002). Simulating impacts of irrigation on the hydrology of the Karagan lagoon in Sri Lanka. International Water Management Institute, Colombo. (IWMI Working Paper 44).

Arthington, Tharme et al. (2003) provides a methodological review. The paper lacks an interdisciplinary perspective in so far as it looks at the determination of environmental flows from the perspective of environmental health only. No consideration is given to methods that assess the economic / social trade-offs involved in achieving environmental goals of river flows. This is particularly noteworthy because the Symposium at which the paper was given specifically targeted livelihoods as well as biodiversity.

McCartney, et al. (2005) reported an application of a process aimed at assessing wetlands for agricultural production potential that is based on a version of multi criteria analysis.[20] While this research direction is appropriate in that it involves the assessment of trade-offs between economic, environmental and social outcomes of land use change it employs a methodology that has serious conceptual weaknesses.

Smakhtin, et al. (2004) provides a GIS-based assessment of global water requirements necessary to maintain freshwater ecosystems. Notwithstanding the technical competence displayed, this is a largely misdirected research initiative in that it provides outputs that are essentially meaningless as inputs into policy. This is because of two factors. First, the scale at which it is directed is inappropriate to real policy decisions. Water allocations are not made at a global level. Rather, they are made on case by case situations which offer an enormous diversity of water scarcity conditions. Second, because it ignores the case by case trade-offs involved. Different cases not only have differing bio-physical conditions but they also have different socio-economic characteristics, which in turn provide important elements of the definition of scarcity.

A number of key points emerge from the Panel's reviews. It is clear that the outputs demonstrate little progress toward achieving the Theme's goals. Where outputs are aligned well with the Theme's objectives (for instance with the McCartney et al. and Smatkin et al. papers), there are several methodological issues that compromise the outputs' effectiveness. Furthermore, there seems to have been no effort in the reviewed output directed at the issue of valuing ecosystem services' contributions to livelihoods.

Given these inadequacies in the work produced so far under the Theme 4 banner, it is instructive to consider the projects that are currently underway to determine if 'work-in-progress' is filling the perceived gaps. Ten key project areas are listed as on-going in 2006 under Theme 4. They are:

1. Environmental flows: Theory and application.
2. Pre-development biodiversity of the Ude Walawe.
3. Mitigating diffuse agricultural pollution.
4. Improved livelihoods with dam management.
5. Inland wetlands in Southern Africa.
6. Sustainable wetland management in Southern Africa.
7. Sri Lanka wetlands mapping and database.
8. SWIM and IWRM in the Mekong Basin.
9. Global wetlands mapping and database.
10. IWMI collaboration with Ramsar.

Further details of six projects arising from these areas have been provided by IWMI for the EPMR:

[20] McCartney, M.P., M. Masiandima and H.A. Houghton-Carr (2005). Working Wetlands: Classifying wetland potential for agriculture. IWMI Research Report 90.

Global

- Agricultural-wetlands interactions.
- Sustainable management of wetlands.
- Wetlands Inventory assessment.
- Water allocation and environmental flows.

Sri Lanka

- Expansion without extinction: how can biodiversity be preserved in irrigated systems?
- Identifying sustainable options for the mitigation of diffuse agricultural pollution.

Again it is important to note that many of these projects are yet to be completed and so assessment is somewhat premature. However, a few points are apparent.

A number of the projects show strong potential to provide research outcomes that will not only be innovative but also be policy relevant. In particular, 'Sustainable Management of Wetlands' is a well structured project. It has an appropriate focus on the modeling of causes and effects in the hydrology side of the research and follows that through in the analysis of social and economic impacts. The emphasis on trade-off analysis provides a useful step toward making this research policy-relevant. However, it lacks a specific component to develop appropriate institutional settings needed to bring into being the changes in management that the analysis indicates as worthwhile.

Most of the other projects could be improved significantly by incorporating elements of the "Sustainable Management of Wetlands" project. A key feature of what they offer is an assessment of the current state of wetlands. Many adopt a 'mapping' or a descriptive approach. For instance, the inventory assessment is a stock take. The environmental flows project focuses on the development of indicators of environmental stress in rivers, culminating in a global assessment of flow "requirements". The two Sri Lankan projects, similarly, are largely descriptive with only conjectural conclusions regarding cause-effect relationships being drawn to date. While the development of the 'knowledge base' is useful, it is only so when that base can be used to develop an understanding of the impacts that management of change would have on the condition. For instance, a river's ecology may be stressed but if an increase in environmental flow would not change the health of the river, transferring water from profitable agricultural pursuits to an environmental flow would be detrimental to society as a whole. Such work is planned by IWMI but is yet to be completed.

Hence a reformulation of the suite of projects so that they placed a greater emphasis on the modeling of 'cause-effect' relationships in environmental management would be a positive step. This would enable a focus on potential changes that would improve society's well being. However, to take that to its logical conclusion, the trade-offs identified by the change analysis would require evaluation. That means a greater role for economic and social science analysis in conjunction with the development of policy/institutional instruments to achieve desirable changes. The skills to deliver these latter infusions are currently undersupplied in the Theme.

The pattern of concentrating on descriptive, 'snap-shot-in-time' type research that was detected in the review of the eight IWMI-designated representative outputs is thus reflected in the summaries of on-going projects. However, the "Sustainable Wetlands Management" project is indicative of the type of approach that could achieve the Theme's goals. With only minor re-

focusing and appropriate staff realignment, the "Water Allocation and Environmental Flows" project could follow suit. Both of these projects, if carried out successfully, have the potential to deliver powerful research and policy outcomes.

To achieve such outcomes and consequential impacts for all projects will also require a stronger emphasis on policy alternatives to achieve change. It will be important in developing project elements to deal with policy/institutional issues that a focus be maintained on the overall IWMI mission, that is, improving the management of water and land for food, livelihood and nature. The relevance of trade-off analysis given potential for conflict between the livelihood and nature goals is clear.

In summary, a review of Theme 4 indicates some inadequacies in terms of the relevance of the research projects (both completed and in progress) to the goals of the Theme. This is especially apparent in terms of the research goals that involve economic and social values of services provided by aquatic ecosystems. In addition, much of the biophysical research being conducted is descriptive rather than analytical and static rather than dynamic. Without analytical biophysical research and economic and social valuation studies that focus on the dynamic impacts of changing management strategies, the objective of being able to identify changes in management strategies that will yield improved livelihoods, health and equity will remain illusive.

The potential to achieve this goal is apparent through the development of the "Sustainable Management of Wetlands" project. Extending that project's logic to the other projects in this theme would be advantageous. That would require a greater depth of analysis, and such a shift may have resource implications. However, the deepening of the research to incorporate dynamic analytical models in both the bio-physical and socio-economic dimensions in a smaller number of applications would provide greater research benefits. An example of that type of reorganization is apparent in the "Water allocation and environmental flows" project. There, the existing geographic focus is very broad. A more targeted approach would be more likely to provide research outcomes that were significant both intellectually and practically.

This is consistent with the conclusion drawn in the previous section, that Themes 3 and 4 be merged. Rather than generating further research 'spread', a merging of these themes would enable a more concentrated, holistic appreciation of the interactions (both forwards and backwards) between water and land management, the environment and human well-being. However, to achieve that appreciation, research activity would need to be even more tightly focused on specific cases where the greatest potential for generalizing results could be achieved.

The prospects of the Theme's research activities for generating impacts would be enhanced by greater focus and stronger links to the policy realm. With a budget allocation of around USD1m per annum for the last two years, and previous budgetary allocations prior to that from the Water Health and Environment Theme of around half that amount, the investment in this research area is significant. So far, little by way of impact has been recorded. Certainly the confirmation of IWMI as the Fifth International Organization Partner of the Ramsar Convention in 2005 gives recognition to IWMI in the field of wetland management and offers a potential conduit for achieving research impacts. However, the suggested refocusing will assist in generating appropriate outputs for that and other conduits and hence a justification for on-going investment.

It is concluded that Theme 4 research activities would be strengthened by being more tightly focused on a smaller number of projects, more closely directed toward the goals of IWMI, shifted from being predominantly descriptive and static to being more dynamic and analytical, strengthened with the application of economic and social science expertise, and made more directed to outcomes and impacts through the infusion of institutional and policy analysis.

3.5 Comprehensive Assessment of Agricultural Water Management

Summary of Approach and Objectives

IWMI was the convening center for the first CGIAR system-wide initiative on water management (SWIM) which had a fairly broad mandate—enhancing the productivity of water—and very much part of the core objective of IWMI (re: 2nd EPMR report). The Comprehensive Assessment for Water Management (CA, or SWIM 2), was formed out of the former SWIM in 2000. It is an effort that has brought together some 300 researchers, under the leadership of IWMI for an assessment in the tradition of international assessments on ozone or climate change. The assessment is co-sponsored by the CGIAR, FAO, the Convention on Biological Diversity and the Ramsar Convention on Wetlands. It is expected to contribute to the International Assessment on Agricultural Science and Technology for Development (IAASTD) and to inform many R&D organizations and government and non-government bodies about critical aspects of water management in agriculture.

The Comprehensive Assessment, as was described in chapter 2, was part of IWMI's large initiative to increase water productivity. Water productivity includes crop yields, crop values, fisheries, ecosystem services and social benefits such as improved health. Its focus was on developing methods and strategies to help resolve the conflict over the competition for water between agriculture and the environment. Its objective is to provide information and research results that would enable government and water users to make better decisions concerning water use and management. The CA is assessing the benefits, costs, and impacts of water development since the 1950s along with the water management challenges and solutions that have been developed during this period. The overreaching objectives are to develop and manage water use for agriculture to:

- Help end poverty and hunger;
- Ensure environmentally sustainable water management practices; and
- Find a balance between food and environmental security.

A number of organizations participated in the CA and helped develop key questions, synthesize past research, and initiate gap-filling research. Over 30 research projects were awarded through competitive grants and contracts. According to IWMI, the main outputs of this phase are a set of peer-reviewed research reports and a book series providing state-of-the-art analysis of topics such as rainfed agriculture, aquaculture-agriculture conflicts in the coastal zone, groundwater, water productivity and water laws. Other outputs include assessment tools and information such as an updated PODIUM, global mapping and assessment approaches, capacity building and networking. Student training has been important as part of capacity building as has the interaction with partners in the developed and developing world. The networking and communication of results will continue into 2007 as a number of targeted audiences will be addressed. In November 2006 CA's research outputs are to be formally handed over to CPWF at the CPWF Synthesis Conference.

Major Accomplishments of the CA

Four major sets of achievements and outcomes were identified by the Panel, but these relate to the CA at large and not only to IWMI:

- *Research Outputs:* To date, over 150 written outputs have been produced by Assessment participants, providing research backing to the Assessment, including the first two books of a series (published by CABI) on Water Productivity and on Coastal Issues, and 11 titles in the CA Research Report series.
- *Capacity Building:* The CA supports capacity building of all involved in the process through hands-on experience and knowledge sharing. Additionally, the CA has supported 11 Ph.D., 16 M.Sc. students and 4 intern students focusing on water, food, and environment issues.
- *Participation in Major International Workshops and Conferences:* The CA has played an important role in delivering key water, food, livelihood and environment messages at several important meetings.
- *Raising Public Awareness:* The CA has contributed to raising public awareness especially through interactions with the media. CA activities received high publicity globally, in particular during and after the Stockholm Water Symposium in 2004 and 2006, through press and radio interviews. CA results have been used as input into the CSD process in collaboration with the Government of Sweden, as well as in the latest CoPs of the Biodiversity, Ramsar and the Climate Change Conventions. The Challenge Program on Water and Food is a main user of CA results.

Assessment of Research Outputs

In terms of the research output of reports and books, so far three books are available and eleven CA research reports have been published by IWMI. These research reports cover a range of topics from virtual water trading to integrated water management and intersectoral water transfers. Some of the reports seem to clearly fill research gaps, such as Research Report 7 on the "Impacts of Irrigation on Inland Fisheries: Appraisals in Laos and Sri Lanka" (2005), while others seem to be designed to promote an approach, or review past research, such as "Integrated Land and Water Management for Food and Environment Security" (2003), Research Report #1. (see Annex VII for a more detailed review).

The bulk of the research has been on assessment of water management in agriculture including Research Reports # 2, 3, 5, 6, 8 and 9, and two of the three books. These assessments range from those that emphasize environmental requirements to those that do a historical review of irrigation in a particular region of the world or river basin. The two books focused on assessing what the potential was for increasing water productivity in agriculture. Finally, Research Reports 4, 7 and 11 plus one book considered new areas for research. This includes the impact of virtual water trading, the prospects for salinity irrigation, inland fisheries appraisal, and coastal zone management.

In terms of capacity building and policy changes, again it is too early to really assess the impacts. The assessment summary for decision makers was presented at the World Water Week in Stockholm, in September 2006 and the Brisbane 9th International River Symposium. This has all been very positive for IWMI and is likely to have an impact on future policy and research directions. IWMI has made an important contribution to this system-wide program. Not only have many of its researchers written research reports and book chapters that have helped characterize and define the major water management problems facing agriculture and the environment today, but IWMI has provided essential management of the CA through its

Secretariat. What will be important for its future impact is how the research results are extended through IWMI's partners and how research gaps that were identified, such as coastal zone management and irrigation with saline water, will be addressed in the future. Although the CA did fund some research its major output so far has been the broad assessment of where we stand regarding our current knowledge about water resources and their use and management.

The Panel's current overall assessment of CA based on the books, research reports and other outputs is that it has helped fill research gaps in several important areas. However, some of the research reports are too country specific, primarily historical, and many failed in their attempts to address socio-economic questions. The Panel considers the program to have been fairly effective at this stage. However, since most of the books are not published, it is too early to make a clear judgment concerning whether or not the program has really filled the most important research gaps in the water resources field.

The Panel trusts that the Science Council will commission an external review of the systemwide program on CA once it is completed.

3.6 System-Wide Initiative on Malaria and Agriculture (SIMA)

The 1994 EPMR recommended that IWMI should pay more attention to environmental and health aspects related to irrigation. It was suggested that these aspects be taken up as part of the SWIM. At the end of 1996, a formal Health and Environment Program was established with a mandate for global research on environmental health issues in relation to agriculture. The main thrust of the program was to identify the impacts of irrigation on human health and to look at water management options to achieving improved health. IWMI decided to focus on malaria, looking initially at Sri Lanka, India and Pakistan. The last EPMR commended IWMI on its work and recommended that it "retain the research component dealing with irrigation-related health issues." (Recommendation 6)

The last EPMR highlighted, in particular, the malaria work in strengthening the economic arguments in favor of managing water levels in streams through periodic releases of water from upstream water reservoirs as an important means of malaria control. Also in response to the last EPMR and the specific reference to continuing health-related work, IWMI had stated it would obtain funding to look at controlling *schistosomiasis* through water management.

The Systemwide Initiative on Malaria and Agriculture (SIMA), launched in 2001, was a collaborative program headed by IWMI with the involvement of other CGIAR Centers, international organizations and national partners in Africa.[21] IWMI accepted the invitation made by the Committee of CGIAR Directors (now the Alliance Executive) to develop and convene the initiative based on its work on water resources management which links with reducing or limiting the impacts of malaria. Other CGIAR Centers involved with SIMA during the past five years have included IFPRI, ILRI, IITA, WARDA, IPGRI, ICRAF, CIAT, ISNAR, and ICRISAT. The program's major objective was to understand the links between malaria and agriculture and to test innovative interventions that would assist existing malaria control strategies under different agricultural systems, based in part on the initial success of the Asian program. SIMA was also to have a strong capacity building and information dissemination component.

[21] The vast majority of malaria cases are in Africa where the disease is also associated with economic losses estimated at about US$ 12 billion annually.

SIMA project activities included implementation of eight substantive projects in seven African countries including Kenya, Uganda, Tanzania, Zimbabwe, Ethiopia, Ghana and Mozambique, the publication of a special issue of *Acta Tropica* on malaria and agriculture, publication of a SIMA Profile article in EcoHealth, successful completion of four Masters theses on malaria control, and the completion of a three-month investigation on policies related to use of DDT as an option on malaria control. In addition, IWMI staff brought out papers and abstracts for the SIMA special seminar that was held at the ICID 18th International Congress on Irrigation and Drainage.

Further studies included an Analysis of Impacts of Climate Variability on Malaria Transmission in Sri Lanka and the Development of An Early Warning System. This study was conducted jointly by IWMI and ILRI and both institutions have asked for a no-cost extension to complete the outputs. Three peer-reviewed articles have already come out on this work. The SIMA-IDRC Mwea Phase II Project in Kenya tried to evaluate the impact of integrated anti-malarial interventions on malaria vector populations and to ascertain prevalence of malaria parasites within the community. The research further tried out the feasibility of seasonally rotating rice and soybean cultivation as an agro-system strategy for simultaneously enhancing household incomes, improving nutrition and reducing malaria-vector breeding habitat. Positive results on all counts were obtained. The last study was Water Management for malaria control in an area of the Huruluwewa Watershed (Sri Lanka). This study has not been able to come up with a conclusive set of findings as a longer-term monitoring program is needed to assess the true impact of control measures.

The Panel concludes that SIMA has been a valuable program that brought about several collaborative research projects over the last five years and allowed IWMI the opportunity to create conceptual and partnership linkages in agriculture as related to health and development. SIMA allowed for integrated interventions or a series of "integrated anti malarial portfolios" that have proved to reduce malaria in specific conditions. The Panel feels that its suggestion to merge Theme 3 and 4 and look more at ecosystem approaches to human health, should encourage IWMI to continue at least some elements of this important research.[22] However SIMA has faced difficulties in securing support for future activities as a CGIAR System Initiative. A fairly substantial proposal to the Grand Challenges in Global Health 2004 did not get funded and a proposal to the African Development Bank is still under consideration. IWMI's 2006-2008 MTP stated that if additional funding was not forthcoming, SIMA would begin winding down its activities. In light of the above, the IWMI Board in 2005 accepted the recommendation to relocate the program to an African organization and this was accepted later by the CDC/Executive Alliance. This year therefore is a transition year and by the end of 2006, SIMA will cease to be a formal CGIAR system-wide initiative. The Panel believes this is a reasonable and natural evolution for this program.

[22] Especially because of the renewed interest of WHO and governments in DDT and other potent chemical controls, which has further underlined the importance of the work done under SIMA.

3.7 Overall Assessment

In the previous sections of this chapter, the Panel reviewed the four current themes and the two system-wide initiatives and made specific suggestions and recommendations as they related to some of them. The Panel feels that there are common and critical issues that permeate IWMI's research themes more generally and these are discussed here along with the relevant recommendations.

Descriptive versus Analytical Research

The research process of describing a research issue, identifying the relevant theory, formulating a set of hypotheses that apply the generalized theoretical concepts to the specifics of the research issue, applying a methodology to test the hypotheses and the formulation of conclusions can be applied at two fundamental levels: descriptive and analytical. Descriptive research involves the development of data that describe the issue under consideration (how much water is diverted for irrigation? what income is earned by farm households?) and to generate comparisons across space, time and people. Analytical research goes to the next stage of attempting to understand the cause-effect relationships integral to the issue at hand. This work focuses on the "why" questions (why is water diverted for irrigation? why does one group earn more than another?). Clearly descriptive research is a precursor to analytical research. Equally, analytical research is the precursor to the development of assessments of alternative futures because it enables the prediction of outcomes under differing circumstances.

IWMI's focus on developing countries has meant that it often has faced research contexts where little data exist to establish the extent of issues in a rigorous fashion. Hence, it has had a strong emphasis on descriptive research. As the Theme 1 CCER states, IWMI research has focused on demonstrating the complexity of the issues involved. The continued emphasis on 'mapping' exercises in the IWMI research portfolio (including the GIS/remote sensing effort) furthers this descriptive bent.

It is the view of the Panel that in many areas IWMI has not progressed sufficiently beyond descriptive research. Without rigorous analytical research, the assessment of alternative institutional arrangements will not be well founded. Knowing the severity of the problem is not a sufficient basis for the formulation of solutions. Each potential solution requires assessment. That requires the prediction of outcomes and that in turn requires a rigorous understanding of the relevant cause-effect relationships, confirmed by empirical analyses. The adoption of a clear research process in all IWMI studies that establishes theoretically-based hypotheses with clearly linked methodologies to afford the testing of these hypotheses is a strategy to ensure research rigor. This process should be at the heart of IWMI's conceptual framework discussed in Chapter 2.

The Panel recommends that IWMI's efforts be more directed at analytical research. Furthermore IWMI will need to develop a more tightly focused research agenda within each of its themes.

Focus versus Dispersion

The Panel concluded that both the Mission and Vision Statements of IWMI have allowed it to spread its research resources too thinly both geographically and thematically (see Ch 2). The scale at which IWMI conducts most of its research is the basin scale and this has proved to be crucial in

delineating its primary unit of analysis for much of its work.[23] However its holistic approach to water and management – the water-food-environment nexus – has to be more focused on key issues and to be able to study them in depth. The Panel's recommendation to merge Theme 3 and 4 is based on the belief that IWMI would be better able to focus its research efforts on selected areas of the interaction between water, health and the environment. The Panel suggests that in merging Theme 3 and 4, that IWMI also specifies two or three key sub themes.

The Panel is also concerned that IWMI, within some themes, is moving into areas not immediately of relevance to its core interests. As an example the Panel would cite some of the soil physiology work that has come out of the IBSRAM legacy. IWMI needs to be more strategic in the critical research issues it is pursuing and position itself to address them. Sustainable groundwater management for example would be one such critical issue as it continues to be a serious concern in many parts of Asia and is also extending to Africa. This was a highly acclaimed area of past IWMI research which would give it a strategic advantage. The Panel suggests that the issue be revisited and explicitly dealt with in the next Strategic Plan.

The Panel recommends that IWMI give priority to addressing critical water management issues and opportunities identified from past IWMI programs. This would include an emphasis on sustainable groundwater management. IWMI should explicitly include research into groundwater depletion as sub themes of both Themes 1 and 2.

Project Management versus Research

The Panel noted that IWMI has tended to become involved increasingly in project management rather than being responsible for the research, with the attendant issues of project supervision and reporting. In large part this has to do with funding requirements/arrangements and with the degree to which IWMI has had to follow donor-driven imperatives. The Panel shares IWMI's concerns that the low portion of funding it receives as unrestricted compels its scientists to spend disproportionate amounts of time on proposal preparation and (for some individuals) fund raising. Though the Panel notes that IWMI still manages to draw about a third of its budget from core funds, the Panel is concerned that the overall (competitive) funding climate maybe unduly influencing the research agenda and hopes that the core/unrestricted funds pipeline can be increased to give researchers more latitude in pursuing work that matches IWMI's declared mission and vision.

Upstream versus Downstream Research

The Panel's view is that IWMI needs to assess carefully its niche in terms of downstream versus upstream research. The IPG nature of water research straddles the whole length of this continuum and IWMI by necessity has to position itself in terms of its basic research agenda somewhere along it (Chapter 5). The Panel notes the challenge IWMI faces in assessing the downstream-upstream implications of technology and policy changes and feels that in the period under review, IWMI has lost some of its upstream advantages. The Panel further concludes that IWMI has reduced its concentration on one of its main research contributions in doing away with the Policies, Institutions and Management program and feels that the new approach, by incorporating such considerations into all themes, has downplayed their importance and therefore the attention and resources given to them.

The Panel recommends that IWMI re-establish its theme on Institutions and Policies.

[23] Perhaps smaller basins or sub-basins might be better for IWMI as stated by partners in Chapter 6.

Outcomes versus Impacts

Outcomes, as defined by the CGIAR, are the external use, adoption and/or influence of a Center's output(s) by partners, stakeholders or clients. A number of important outcomes have been identified by the Panel in their overall assessment of the Themes. Some of the key ones include IWMI's role in shaping the WWF discussions and agenda, IWMI's role in the Hyderabad Declaration, IWMI recognized as the fifth International Organization Partner of the RAMSAR Conventions (on wetlands) and the DG's paper on small scale water management that was selected for the Copenhagen Consensus. While the Center is to be commended for these and other relevant to CG-mission outcomes, the Panel believes there is probably more influence or adoption of management practices that could well be documented. More effort by IWMI needs to be given to its documentation. The Panel is aware that IWMI is making a serious effort to explore a number of different approaches, such as outcome mapping, impact pathway monitoring, etc. and encourages the Center to keep the effort focused on documentation and limit experimentation with new methods.

The CGIAR, as part of its annual Performance Measurement exercise requires all Centers to submit information on outcomes achieved. Centers report the five most significant outcomes that appeared in the previous year of outputs targeted from the previous MTP. The Centers are rated by the Science Council on the basis whether they are truly outcomes, how well specified they are and whether there is a verifiable source for the outcome. The Panel notes that for 2005, IWMI received a score of 11 out of a possible 15, just below the average of 12 for the CGIAR.

Centers report on two indicators of impact in the PM exercise: one relates to the overall impact assessment effort that describes the Center's ex-post IA studies, innovations in and advancement of IA, communication/dissemination of IA and their impact culture; the other is focused on quality and rigor in conducting ex-post IAs (two are submitted by the Center). Both are rated by the SC. In 2005, IWMI scored a 6 out of 10 (average for the System) for the first impact indicator and scored 1.7 out of 10 for the second indicator, the lowest in the System (6.4 was the average). Partly, this is because of the difficulty of the task, i.e. IWMI's research results being far up the impact pathway. But other CGIAR centers with similar mandates did much better. The Panel feels that clearly a more serious effort will be required and this matter is further addressed in Chapter 5.

Publicity and Publications

IMWI has significantly increased its public profile, as the Panel was told by many of the partners and international donors. IWMI, and especially the DG, must be commended for steps that have been taken in this direction. However, to become a recognized leading research institution IWMI must not only be represented at international conferences and forums but must publish often, in good journals.

The Panel had to use multiple search engines to locate IWMI ISI publications. This was because some papers are not clearly identified as being published with IWMI authors. At least one of the publications given to the Panel by IWMI for consideration did not even identify an author as being from IWMI. The failure to give proper attribution in publications is a serious concern, and considerable evidence was found indicating that this is a problem for IWMI and one that should be corrected.

IWMI as an institute produced 225 articles in ISI journals in the past five yeas, or an average of 45 ISI articles per annum. The Panel notes that in 2001 IWMI's research output was only 15 ISI articles, which is very low for any international research institute the size of IWMI seeking to maintain its reputation for research scholarship. The number of ISI publications has steadily climbed from 15 in 2001 to 61 in 2005, a welcome increase. In 2004 IWMI produced 64 ISI publications. Part of the increase in publications is due to an increase in number of researchers, but the number of articles per researcher has also increased. However, even at the 2005 rate of publication, IWMI is still below its better peers in the CGIAR system. Most international research institutions, including the CGIAR centers, recognize that their reputation will be judged on their performance, which increasingly is measured by their publications in highly cited journals. Performance data indicate other CGIAR centers also have a positive publication rate trend line although we saw no data to suggest any others are increasing as rapidly as IWMI.

The journal impact factor is the frequency with which the "average article" in a journal has been cited in a particular year. Impact factor therefore measures a journal's relevance, particularly as compared to others in the field, and has become an important measure of research quality. The journal impact factor varies slightly from year to year. In Table 3.3 we used 2002 for a reference. The impact factor for the very best journals is often above 10 (e.g. Science, Nature or The Lancet) but in general, for most fields appropriate to IWMI, the better journals have an impact factor above 1.0. For example many IWMI's publications are in water resource journals where the top 10 all have impact factors above 1.0.

Acta Tropica, Water Resources Research, and Tropical Medicine & Int. Health are three of the best journals that IWMI publishes in, with impact factors of about 1.7 to 1.9. Because of the increased emphasis on soils, more researchers are publishing in Catena and the European Jr of Soil Science which typically have impact factors over 1.0 to 1.5. The average impact factor for all IWMI ISI publications has increased from 0.6 to over 1.2 from 2000 to 2005. The five journals in Table 3.3 are those that IWMI has published in most during that last five years.

Table 3.3 Journals in which IWMI researchers have most frequently published in 2001/05

Journal	Publications	Publications/year	Jr Imp Factor (2002)
Irrig & Dainage	20	4.0	0.36
Water International	16	3.2	0.67
Ag Water Mgt	15	3.0	0.67
Acta Tropica	12	2.4	1.90
Phys & Chem Earth	10	2.0	0.34

An IWMI researcher, L. Smit, was co-author on two articles on pesticide use in developing countries published in 2002 in The Lancet, a journal with an impact factor of about 15.[24] IWMI's contribution to this article came out of its program looking at pesticide use in irrigated agriculture.

[24] Eddleston,M.; Karalliedde, L.; Piola, J.C.; Smith, T.; Buckley, N.; Isbister, G.; Singh, S.; Fernando, R.; Wilkinson, R.; Konradsen, F.; Senanayake, N.; **Smit, L**.; Kappagoda, S. 2002. Addressing pesticide poisoning in the developing world: A minimum pesticides list. Lancet, 360:116301167, and
Eddleston, M.; Karalliedde, L.; Buckley, N.; Fernando, R.; Hutchinson, G.; Isbister, G.; Konradsen, F.; Murray, D.; Piola, J.C.; Senanayake, N.; Sheriff, R.; Singh, S.; Siwach, S.B.; **Smit, L.** 2002. Pesticide poisoning in the developing world: A minimum pesticide list. The Lancet, 360:1163-1167.

IWMI is to be commended for the significant improvement in externally peer reviewed publications from the rather poor situation in 2001. However IWMI is currently not publishing at a rate comparable to the better CGIAR Centers and it is publishing in some excellent journals but also in some that are relatively obscure. IWMI has published in more than 80 journals in the last five years which reflects the breadth of research being done but also the lack of focus required to establish an international reputation for its mission through its publishing. The Panel concludes that IWMI must improve its track record on this issue consistent with its mission and if it wants to compete with the best CGIAR centers. The Panel feels that to do this, IWMI has to revisit its overall research strategy.

The Panel recommends that IWMI develop an effective Publication Strategy to improve its performance and influence its target audiences.

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4 CROSS-CUTTING ISSUES AND DISCIPLINES

4.1 Cross-cutting Issues

Poverty

The last EPMR stated as follows: "the Panel recommends that IWMI's work in poverty, with special emphasis on its relationship with gender, be pursued in two directions namely: 1) investigating more precisely the relationship between poverty, gender and access to water; and 2) incorporating more explicitly poverty and gender concerns in the design and conduct of research activities in programs other than PIM; and consider the implications of research results for the poor."[25]

The first point to make is that IWMI is doing more work under the poverty heading in the period under review than in the previous six years, as evident in its publications. Some of these publications – especially by senior researchers Saleth and Samad, and in the slightly earlier period by Hussain - are of high quality. Considerable refining of the framework for studying poverty-irrigation linkages is also being done out of the Hyderabad office.

IWMI has stated in its Strategic Plan 2004-2008 and its Medium Term Plan 2006-2008 and repeatedly in other key documents, that an essential block of its research framework is "water poverty mapping" (one of four essential blocks of its research framework). The Panel would like to make the following observations: 1) the word "mapping" has confused researchers inside and outside IWMI as to what the term might infer methodologically. The Panel spoke to many researchers within IWMI who were either not able to articulate what the term meant or confused it with everything ranging from participatory rural appraisal methodologies to outcome mapping; 2) "mapping water poverty" seems to be based on the intrinsic assumption that access (or rather non-access) to water technologies is a major indicator and determinant of poverty. In other words, there is the danger that poverty is defined simply as a problem of direct access instead of being seen as a more structural feature of unequal social relations; 3) as with all mapping exercises, there is a danger that a dynamic issue such as poverty is being measured as a static one-time phenomenon; 4) "water poverty mapping" (whatever the definition) has not been used systematically or throughout the organization and it not always clear why "mapping water poverty" has been done by IWMI and for what result; 5) IWMI has claimed (see IWMI MTP 2006-2008) that it has refined its research framework of which "mapping water poverty" is one of four critical elements but it has not specified what it wants to achieve in respect to this in the next three-five years other than expanding the same work to the Krishna, Karkheh and Syr Dar Basins.

The heart of the current "water poverty mapping" work is Andhra Pradesh (India). The principal researcher working on this moved to Hyderabad and had access to a comprehensive data set under the DFID Rural Livelihoods Project. As a result he has been able to continue the excellent work he has been doing in this area. However the Panel questions the Center's commitment to making this work the core of its research framework.[26]

[25] To reiterate IWMI's major research question: "How can we help poor farmers grow more food and sustain rural livelihoods with less water in a manner that is socially acceptable and environmentally sustainable?"

[26] For example the senior researcher working on this has not been asked to give training to bring other researchers on board on this framework.

Some good work is being done by the IWMI-Tata Program (ITP) under the poverty rubric focused on India in general and in Gujarat in particular, thanks largely to the Principal Researcher who is internationally recognized and has a tremendous network that he brought to the program. The Central India Initiative has allowed research into the water-livelihoods area and – both on the conceptual and policy fronts – into areas affecting some of the poorest and socially most vulnerable people in the country.

Most of IWMI's best known work in the area of poverty during the period under review has been with IDE on Micro-Irrigation Technologies and under the ADB supported project "Pro-poor intervention strategies in irrigated agriculture in Asia". The latter was implemented by IWMI in collaboration with key national partners in six countries in Asia. Funded by the ADB, this looked at poverty in irrigated agriculture and examined a range of factors that influence irrigation performance, along with poverty linkages. The research resulted in about 60 written documents/articles and offered a generic framework for designing pro-poor interventions in irrigated agriculture.[27] The analysis was based on a large and rich primary data set obtained from around 6000 households The Final Synthesis Report (May 2005) does a useful summary of issues, lessons, options and guidelines. This research – but especially the ADB publications which were many and were targeted to a wider and more general audience - has generated interest globally and at different levels and was/is widely referred to and celebrated by many in the international community. While the Panel notes the substantial contributions of this project, it wonders how and why IWMI did not capitalize on the outputs from such an important research endeavor or yet manage to convince donors to fund further work.

In line with the recommendation from the last EPMR, IWMI has conducted some limited but good research linking water, poverty and gender, including an overview of issues and policies. The paper by Saleth et al (Water Policy 5 (2003) 385-398) does an analytical review of the extant literature and also identifies the research gaps in the water-poverty-gender interface. It concludes rightly that there is a heavy demand for multidisciplinary data, methodologies and expertise, and that research of such a comprehensive nature requires tremendous collaboration across organizations.

IWMI has developed an analytical framework that formalizes the linkages between irrigation and rural poverty to allow a more and integrated and comprehensive treatment of the issues.[28] The paper provides evidence both for the declining impact of irrigation over time as well as for the change in the relative significance of its employment and productivity effects. Mention must be made of the useful publication edited by Hussain and Giordano on Water and Poverty Linkages (2002) which looks at case studies from three Asian countries.

Until recently IWMI skirted research issues surrounding drinking water though it clearly declared that it was concerned with research to do with rural livelihoods, gender and poverty. Drinking water has the clearest and most direct link to poverty. Further women disproportionately make up the poor and are managers of many water resources but particularly those in the domestic sphere. IWMI currently works with multiple use systems which is an

[27] The Panel found it hard to figure out how much of these outputs couild be attributed to IWMI staff.

[28] See paper by Saleth et al. "Dynamics of irrigation-poverty linkages in rural India: analytical framework and empirical analysis". Water Policy 5 (2003) 459-473.

important step in the direction of looking at integrating services in both the productive and domestic sectors.[29] IWMI should be looking more at non-agricultural benefits of water use in irrigation systems, water quality for basic human needs in irrigated areas, and other related issues that fall within the interstices of irrigation and drinking water. They can do this by further developing strategic partnerships with IRC and others, and by clearly identifying the host of issues in domestic water supply (and sanitation) that directly relate to wider uses of water, in this case what we can call "irrigation-plus" rather than "domestic-plus" so that the entry point for IWMI is clearly from the agricultural production end.

Overall, some significant work has been done in the period under review in the area of poverty both under large multi-country donor –assisted projects (notably the ADB's pro poor project) and by two-three individuals.[30] The Panel notes the high quality outputs of both these kinds of research efforts but questions the general claim that "water poverty mapping" underpins the Center's research framework and that poverty considerations underpin the Center's research agenda. It reiterates its concern that while issues of poverty and poverty impacts should form the central research agenda of the Center, much of the expertise remaining in this area is concentrated in a few researchers who have maintained their interest in furthering this research but are working in relative isolation. The Panel further questions the fact that research still simplistically adheres to the view that access to water technologies is a major indicator and determinant of poverty when it should be asking questions related to access, rights and control including looking into how water produces and generates unequal social relations and poverty. The Panel further notes the delay in producing peer-reviewed publications from the high profile and multi-country ADB funded project, when the Center has much (in the IPG realm) to provide and gain from such a significant project.

The Panel feels that the CoP that has assumed the poverty work under the Social Science and Economics Group has not done much so far to come together with a focus or direction.

The current research done on water poverty mapping and the gains made in refining the methodology should be used more widely by the Center in informing its research projects. The Panel feels that IWMI should recognize that poverty is intrinsically tied to difficult questions of water allocations, water "politics", and water budgets and ensure that its research reflects this and goes beyond studying mere access to water technologies. In fact there is need for IWMI, if it serious about its poverty focus, to get into studies in the area of pro-poor water governance. This means looking directly into water laws, policies and institutions that set the context within which water management takes place and the poor have access to water resources**.** The Panel feels that IWMI should strengthen its social science capacity so that it is able to undertake these kinds of analyzes with the needed rigor. IWMI should also take a renewed look at research issues that fall under the rubric of drinking water (and sanitation) as these directly affect the poor, and can be subsumed under Theme 2, and that it furthers the collaboration with researchers and institutions working in the area of drinking water.

Gender

The last EPMR commended IWMI on its role in advancing an understanding of the gender dimension of water management (also as it relates to poverty). It noted that an informal survey of

[29] For example Research Report 98 on "Multiple-Use Water Services to Advance the Millennium Development Goals"

[30] One of the key senior researchers working in this area and responsible for many of the outputs, has left.

world literature on women and water indicated that the little literature that did exist, was in fact undertaken by IWMI.[31] In this pre-2000 period, IWMI held an important Women and Water Workshop (1997) and implemented the Ford/SIDA project on Gender and Poverty in Africa and Asia 1998-2001. IWMI also pioneered the Gender Performance Indicators for Irrigation: Concepts, Tools and Applications (IWMI Research Report 59, 2002).

In the current period under review, IWMI adopted a Gender Strategy at the Annual research Meeting in 2004 which basically said that IWMI would pursue capacity building and innovative research which would be integrated with other concerns (e.g. under the MUS), while also pursuing gender-specific work e.g. gender and agricultural growth in Africa. This was followed by the Strategic Plan 2004-2008 which stated as follows: "*Recognizing that gender is still relatively isolated within IWMI, we will develop mechanisms for mainstreaming gender issues into research across IWMI themes. To this end, for each theme we will identify gender related topics requiring research attention, and we will monitor incorporation of gender issues in all areas of research. To ensure inclusion of gender issues, reporting on gender aspects of research will be integrated into the task of Project Leaders, Theme Leaders and Regional Directors."* (2004).

While IWMI has made some significant steps towards explicitly recognizing women as important water users under the current period under review[32], it would be fair to note that most studies have not explicitly addressed gender questions and only with varying degree, have incorporated some aspect of gender in others.[33] Partly because of the fact that there is no institution-wide incentive or monitoring system to ensure that gender gets priority, and partly because there is no systematic effort to mainstream the conclusions of the former IWMI gender work into other and new research, and partly because of a decrease in staff expertise, the research gains of the previous period have been lost. As stated by one of the senior social scientists "gender research whether mainstreamed or specific, takes scarce staff time and other resources. Gender is given no 'extra bonus points' in IOPs."

The Panel is of the opinion that there is little evidence for the claim that "gender has been mainstreamed;" "gender proofing" of some projects has been done but that by and large, the inclusion of a strong gender perspective that permeates the research agenda is not apparent.[34] This is all the more evident with several key projects which had a potentially high gender profile (e.g. the CP Multiple Use Water Supply Systems or the ADB Pro-poor Irrigation Project) and that could have been exploited to further these goals.

The Panel has also been told that gender concerns are kept alive by the eight person CoP that has been established around the issue, called the Gender and Development Working Group. To date the CoP is a loosely constituted e-group that has had limited discussion on how to take the gender agenda forward. The Panel feels that more than an informal grouping such as this is

[31] For example the excellent work by Margreet Zwarteveen and Barbara van Koppen during this earlier period.

[32] In particular the excellent Synthesis Report, Zwarteveen 2006 "Effective gender mainstreaming in water management for sustainable livelihoods: From guidelines to practice." Also the Panel noted that there was a workshop "Women Feeding Cities" held in 2003 in Accra.

[33] Some good work has been focused on gender differences in multiple water use. The work done for IFAD resulting in eight case studies on "Agricultural Water Development for Poverty Reduction in Eastern and Southern Africa" focused in detail on poverty and gender.

[34] The Panel understands this to be incorporating gender in IWMI's general ongoing research, where relevant. This should be in addition to continuing focused, in depth gender research which can then inform the broader ongoing research projects.

needed to build an appropriate and strong gender research agenda or give legitimacy to such research throughout the organization.

One of the key issues that come to the fore in any discussion on poverty and gender is the issue of domestic water supply. Women – especially poor women – carry the burden of providing (safe) drinking water to their families. IWMI must and should transform its thinking into considering not irrigation systems, but *water systems per se.* IWMI can approach this issue by entering via the irrigation/environment/health route where it already works. For example, agro chemicals or arsenic into the food/drinking water chain has very great risks for human health and seems to fit nicely with Theme Three. Through its research on multiple use systems, IWMI is beginning to consider these issues and the Panel feels that with some further strategic partnering and a stronger 'livelihoods approach,' IWMI can bring a strong gender focus to the research.

The Panel suggests that if indeed IWMI is serious about its gender agenda, it should continue to use poverty as a (good) entry point for work in the area of gender and come up with a stated conceptual position for IWMI that recognizes that water rights and water powers are distributed between men and women and a broader political and economic analysis is required to get a full understanding of how this operates; and that there has to be a strong gender perspective if good governance is to be established in the water sector. IWMI should conduct really sound research that makes a difference and can be used as "proof". Establishing credibility, sadly, is still required and IWMI still needs to get publications in the gender area into mainstream journals. As experience elsewhere has shown, IWMI must have champions at the top of the organization as a strong gender (and poverty) perspective requires an insistence that gender concerns are addressed in all research (and not merely in the gender ratio of researchers!), and who allocate dedicated resources in support of this.[35] The current gender strategy (draft) is well formulated but IWMI needs to develop and implement a gender monitoring plan with an incentive structure to undertake gender research, both mainstreamed in general projects and as specific gender research. Assigning clear responsibilities and clear-cut resources for the same is critical for its success. IWMI must strengthen partnerships with existing gender and water initiatives, including IFPRI's Gender Task Force, the UN Gender and Water Task Force and the Gender and Water Alliance.

The Panel recommends that the cross-cutting issues of poverty and gender be clearly conceptualized, meaningfully integrated and mainstreamed into research by appointing a Task Force and specifying core resources for this purpose. IWMI should articulate the expected intermediate and long term impacts of this research and the milestones for measuring progress.

Modeling, Databases and GIS

IWMI has developed a rich toolbox for use by IWMI staff, other CGIAR centers and in most cases the general public that includes data bases, hydrologic, economic, policy dialogue and other types of models and GIS data and technologies for management. A major effort is directed at collecting existing free data, models and other products and making them easier to access. Below is a sampling of what we learned about these resources.

[35] IFPRI for example set up a Gender Task Force that was able to insist that there was one person from each division represented in the Task Force and that all projects had to show the inclusion of gender as an integral and important component. It is striking that the modus operandi was that project managers had to justify why gender concerns were NOT relevant to their particular project, rather than the other way around.

Modeling: IWMI developed the hydrologic model WaterSIM that works in tandem with the policy dialogue model PODUIM. PODIUM was a model used by IWMI at the time of the last EPMR. Watersim was developed with assistance from IFPRI and others to look at issues between food security, water and nature. It basically provides a scientific basis for discussions of tradeoffs resulting from such actives as international trade of food crops and the effect of that on "virtual" water flows. Watersim was found to be a useful tool when applied to Challenge Programs and one such example was presented to the Panel. Other modeling activities relate to improving understanding of the hydrologic cycle on a global, regional or basin scale.

At the IWMI Annual Research Meeting during the main phase of the EMPR Panel members listened to a presentation from two PhD students doing hydrologic modeling on the Walawe River Basin in Sri Lanka. They were using the US EPA Soil and Water Assessment Tool (SWAT) which is freely downloaded from the internet. The objective of the project was to quantify hydrologic response of the watershed land use changes due to development. The SWAT model was also being used on the Krishna River Basin in India by an IWMI researcher in Hyderabad. Since SWAT requires a significant amount of input of carefully collected field data for proper calibration the Panel wondered why it was chosen for such a large basin as the Krishna. The paper and presentation by the two researchers in Sri Lanka, which was excellent, might have answered our question. N. Weragala and V Smarkhtin concluded that the simple model worked as good as the complex deterministic physically based models but that neither well as needed. Their presenters conclude that "if long term hydro-meteorological data collection programs are not established……lack of available data for application of hydrologic models well remain a major problem."

Databases: IWMI is becoming an international repository of "Global Pubic Goods" that can be freely accessed to support resource management. The public goods include global data bases for scale, technologies and policies that have international application and maps. IWMI also is the home for the public goods of other CGIAR centers. Much of the focus of these data bases is the Challenge Program benchmark basins.

IWMI developed and manages a set of Knowledge Gateways that provide temporal and special statistics and maps through the free website Google Earth. This tool has been used for purposes like developing maps of annualized irrigation areas of the world. It also can be used to develop crop calendars and other useful information.

GIS: Mapping seems to be central to much of what IWMI does and remote sensing and GIS play an important part in the input to those maps. Just one example of the use of GIS coupled with modeling is the program aimed at predicting the global pattern of droughts for use in rapid response. However, we also saw examples of the use of IWMI's GIS in projects in Africa, India, and Laos.

The Panel concludes that IWMI has followed the last EPMR recommendation to invest in researching the use of relevant information technology, modeling, remote sensing and GIS and continues to primarily focus on using existing tools and our sense is that these efforts are valued by a range of clients, as evidenced by continuing requests and downloads.

4.2 Disciplines

Social Science/Policy Analysis

The review of the cross-cutting areas of poverty and gender in the previous chapter emphasizes the importance of well-trained social scientists - sociologists, institutional specialists, policy analysts - to the organization. The Panel is concerned that by dropping the Theme area of Policies, Institutions and Management, IWMI has lost its concentration of research into a key niche area and with it, experienced senior social scientists who looked at both de facto and de jure systems and situations, and made recommendations in institutional processes for participation and management. The Panel acknowledges that IWMI continues to do some work on institutions and policies as sub themes of Theme 1 and also as part of Theme 2 (with a large proportion of the work under CPWF). However the Panel feels strongly that this area needs senior and experienced researchers who can generate mission-relevant IPGs.

Inadequate legal, regulatory and organizational arrangements are a common occurrence in the water sector. In the context of a growing scarcity in water and an increasing shift from the physical aspects of the water problem to concerns about socio-economic and institutional issues, the Panel feels that IWMI concomitantly should strengthen its social science research capabilities. In particular, IWMI should be capable of rigorous institutional, socio-economic and socio-political analyses. Such analyses would, for example, be able to identify and assess policy solutions to the issues that IWMI has "mapped," or look into governance issues more broadly including transaction cost analyses of alternative policy and management regimes.

The South Africa Regional Office is currently doing some excellent work on African Water Laws[36] and African Models of Transboundary Governance. [37] The Panel understands that the two social scientists (one of whom is the senior gender specialist) working on these studies will complete their contracts during the next one to two years. The discontinuation of the services of the Regional Director of the South Africa Office, a recognized Social Scientist, has further jeopardized social science capacity at a senior level.

At present, IWMI has a number of younger, less experienced social scientists. These scientists are doing much of the field work and are an important resource for the research effort. However the Panel feels that IWMI needs more experienced social scientists[38] to lead, mentor and assist them in their career development.

The Panel concludes that IWMI should strengthen its overall social science capacity. This includes the appointment of a Principal Social Scientist/Policy Analyst as early as possible. The Principle Social Scientist should be responsible for the oversight of the research in social science including quality control and research direction. The Scientist should play a key role in mentoring less experienced staff members.

[36] Including the African Water Law Conference in 2005.

[37] This is an interdisciplinary examination of water users, uses and sources over time and from different perspectives.

[38] The Panel counted 10 relatively senior researchers with training in geography and feel that while they may bring in some strong social science capabilities, they may not have the requisite training for example in sociological field investigations, data collection and analysis, or a strong policy/institutional background.

Economics

Economic analysis features to varying extents in all four themes and systemwide initiatives. As the discipline that focuses on the allocation of society's scarce resources, its importance to IWMI's mandate is clear. Yet over the period of the EPMR, economics as a contributor to the organization's research effort has declined. This is in stark contrast to the rise of the discipline in the analysis of water resource management issues in academia and government agencies internationally. Frequently in the panel's discussions with the NARs and partner agencies, economics was specifically identified as an area of their need. Yet economics was also identified as a deficiency in IWMI's skill base.

The potential contribution to be made by economics is particularly evident in a number of areas of interest to water managers. Some of these areas are well developed in the economics literature and while not 'path-breaking' within the discipline, they are required as components of broader multi-disciplinary research efforts. For instance, standard benefit cost analysis and livelihood assessments are important ingredients to studies of emerging technologies, policy instruments, infrastructure investments, etc.

In addition, there are research areas where economics is addressing emerging issues. For instance, the development of markets and pricing mechanisms for water, taking into account the intricacies and peculiarities of the specifics of cases in both the developed and developing world is a rich source of research hypotheses. This type of analysis is founded in turn on an analysis of institutions required to form markets – well defined and defended property rights.

The role of economics in the consideration of environmental and health issues – specifically choices between water use for wealth creation and the allocation of water to protect the supply of ecosystem services – remains under explored. In particular, the estimation in monetary terms of the values of non-marketed ecosystem services and the risk of adverse health impacts continues to occupy the attention of research economists.

A further aspect of environmental economics that is relevant to IWMI's mission is the consideration of long term sustainability of water use. With its specific interest in the development of pro-poor water management strategies, IWMI research projects should be looking to detect water uses that have environmental impacts that will have long term impacts on the ability to generate livelihoods from the resource. Such studies involve strong linkages being established between environmental science and economics.

The analysis of policy instruments that embody elements of markets – known as market based instruments – is of relevance to water managers. For instance, experiments with marketable permits and quotas have proven prospective in cases involving pollution and fisheries. Their use in the context of water pollution is in its infancy and deserves attention.

In addition, the discipline of economics is useful to research planning within IWMI. Ex ante and ex post evaluations of research relies heavily on economic analysis, largely benefit cost analysis. However, this type of analysis, especially in the context of research involving natural resources where environmental and human health consequences are integral, is an area of continued research interest. Because research monitoring and evaluation should be such a crucial component of IWMI's research management agenda, the application of resources in this field would be most appropriate.

It is concluded that staff appointments in the economics discipline would greatly enhance IWMI's capacity to deliver on its mission. Moreover the appointment of a Principal Economist would ensure that appropriate oversight of IWMI's research agenda in economics would be provided as well as leadership/mentoring to the more junior staff economists.

Biophysical Science and Engineering

Engineering has always been an important disciplinary strength of IWMI and appropriately remains so. Engineering is a key disciplinary requirement across all the IWMI themes. However, as IWMI's mission has broadened to include land, ecological services and water quality there has been a need to have more diverse expertise within engineering. The recent emphasis on engineers with stronger disciplinary backgrounds in water resources, GIS, environmental engineering, and ecohydrology is appropriate although there still remains the need for agricultural, irrigation, and civil engineers.

The largest disciplinary growth in IWMI over the last five years has been environmental scientists, natural scientists and ecologists. This group now makes up nearly 20 percent of the research staff and includes six soil scientists who address soil conservation, land use and productivity issues. There are a few biologists who focus primarily on health related issues.

The Panel considers the current balance of biophysical scientists and engineers to be appropriate. The Panel has two concerns, however, that relate to all the disciplines but perhaps most directly to its biophysical sciences and engineering. First, IWMI has taken very seriously the global mandate that development be done in ways that protect the environment. However, the need to develop secure and adequate food for the poor is still a central mission of IWMI. So while the current balance of environmental scientists and engineers to those who are concerned with agriculture and irrigation is considered appropriate, the trend is clearly to natural scientists. Second, in the larger scheme of all the disciplines, there is likely to be a greater need for increased human resources in the social sciences and economics. This might in the long run be solved by adding more staff in those areas but in the short run would likely take place by replacing engineers or physical scientists. Thus long term staff strategic planning should be done in a holistic and systematic manner to guide each new staff hire.

5 RESEARCH MANAGEMENT

IWMI's mission of "improving the management of water and land for food livelihoods and nature" is to be achieved through the generation and application of resources and is subject to numerous constraints. The most obvious of these is the availability of funds but other limits also play significant roles. The existence of constraints requires management choices to be made and these choices reveal critical tensions within the organization. In its review of IWMI, the Panel has identified a number of key managerial tensions. The ways in which the Institute addresses these tensions help define the organization's strategy for achievement.

In this chapter, the resources available to IWMI and their management are reviewed. This review is supplemented by the considerations of Administrative and Human Resource Management in Chapter 8 and Financial Management in Chapter 9. Here, the quantity and quality of the resources as well as the manner in which they are organized and how these in turn affect the relevance and quality of research are explored.

5.1 IWMI's Asset Base

Human Resources

Structure

In January 2006, 363 people were employed by IWMI, a growth of more than 100 people since the last EPMR. The current IWMI research staff comprises 118 individuals including 67 internationally recruited research scientists (IRS), 16 regionally recruited research scientists (RRS), 18 nationally recruited research scientists (NRS), and 16 post doctoral fellows (PDF). The Panel has included only staff with a job grade that includes the word 'researcher' or 'scientist' (i.e. Principal Researchers, Senior Researcher, Researcher or Doctoral Researcher). This represents a considerably greater research capacity than in 1999 when 40 researchers were at IWMI. Over the same period, the growth in support staff has not been so great. Currently, 244 people are employed by IWMI in support positions. This ratio of researchers to support staff is considered to be adequate by the Panel.

The IWMI IRS researchers when grouped into four general categories include 28 Engineers (engineering and hydrologists), 19 Natural Scientists (environmental science, ecology, entomology, biology), 16 Social Scientists (economics, sociology, political science, policy analysis, and communications), and five Soil Scientists (soil science, agronomy, and plant science). This reflects a major increase over the review period in the natural science disciplines.

IWMI has an objective to increase staff diversity in terms of gender and origin. Overall, 53 percent of current research staff members are from the South and 31 percent are female. The current research IRS staff includes 48 men and 20 women. As shown in Table 5.1, about a third of the IRS men are from developing countries and that figure is a little less than 20 percent for women. Table 5.2 indicates when IRS staff members were hired by IWMI and when those who have PhDs received them. These data show that the majority (62 of 68) of the IRS staff was hired after 2000. This is partly a result of the "10 year limit" that IWMI has on continuous employment and partly a function of the Institute's growth. In parenthesis in Tables 5.1 and 5.2 are the number of senior research decision-makers in each category. IWMI has achieved a gender balance in the senior decision-making group but only two of the nine senior research decision makers are from developing countries.

Table 5.1 Gender and Country of Origin Status for IRS staff

Gender	Developed*	Developing*	Total*
Men	31 (4)	17	48 (4)
Women	17 (3)	4 (2)	20 (5)
Total	48 (7)	20 (2)	68 (9)

* ( ) Indicates number of senior decision makers in each category.

Table 5.2 Year IRS Staff Joined IWMI and Attained PhD

Gender	Year joined IWMI*				
	<1996	1996-00	2001-05	>2005	Total
Men	3	7 (1)	34 (3)	4	48 (4)
Women	0	3	15 (5)	2	20 (5)
Total	3	10 (1)	49 (8)	6	68 (9)
	Year attained PhD				
	70s	80s	90s	2000-06	n.a.
Men	3	11 (2)	16 (2)	7	11
Women	0	0	8 (2)	8 (2)	5 (1)
Total	3	11 (2)	24 (2)	15 (2)	16 (1)

** ( ) Indicates number of senior decision makers in each category.*

The ability of IWMI researchers to do high quality research depends on a number of attributes. The Panel has chosen to use several conventional metrics as primary indicators of individual research ability. These include publications over the past five years, especially peer reviewed publications, and research experience since receiving the PhD. These are common metrics used at many research institutions as performance measures for researchers. There are clearly many other attributes needed to be a good researcher but an ability to produce peer reviewed publications and a post-PhD research history of around 12 years are normally expected of internationally recognized researchers.

Publication Record

There is a wide range of performances across IWMI researchers as one would expect with 119 researchers ranging in age from 28 to 61, with differing educational backgrounds and often unique research and other experiences. On average, IWMI researchers have each published 3.4 peer reviewed journal articles and a total of six peer reviewed pieces including books, book chapters and other publications from 2001 to 2005. Peer reviewed journal articles were therefore being published at a rate of 0.68 per year per researcher over the past five years.

Because IWMI research is necessarily of an applied nature and needs to bridge the new knowledge to outreach organizations, the production of peer reviewed publications other than those in internationally recognized journals is considered by the Panel to be part of the Institute's role. Over the past five years the average number of all peer reviewed publications per IWMI researcher was 1.2 per annum compared to a Center expectation of 2.0 publications per year per researcher.

The Panel also notes that IWMI's record in cooperating with developing country outreach organizations to produce outputs, has not been strong relative to other CGIAR centers. The

percentage of refereed papers, conference and workshop proceedings that IWMI researchers published with developing country partners was 22.8 percent in 2005. This is compared to the CGIAR average of 46 percent.

IRS researchers would be expected to give IWMI its international recognition for research and this group is publishing at a higher rate than the average across all IWMI researchers. However, their performance is also below the CGIAR average (see Table 5.3). IRS researchers over the past five years have annually published, on average, 0.84 journal articles and 1.49 journal articles plus other peer reviewed publications. On average, those in disciplines grouped as Social Science are publishing at a rate somewhat less than those in Environmental Science or Engineering with those grouped under Soil Science publishing the most at about 1.2 articles per year.

Table 5.3 Publications per IRS Researcher per Year (past five years)

Discipline group	Number of staff	Peer reviewed journal articles	All peer reviewed publications	All publications
Engineering	28	0.86	1.36	3.09
Environmental science	19	0.73	1.36	2.77
Social science	16	0.83	1.71	3.21
Soil science	5	1.20	2.04	4.08
Average	68	0.84	1.49	3.10

As shown in Table 5.4 those IRS research scientists who were with IWMI the longest published, on average, more than those who joined later. This is probably because they are older and have longer experience and perhaps the opportunity to mentor more Post Doctoral Fellows and PhD students, and thus co-author papers with them. A few of those who joined IWMI after 2002 might have also finished their PhDs about that same time and although new PhD students generally have a high rate of publishing upon completion of their PhDs they might not have published much prior to receiving their degrees. The data in Table 5.4 are for the five-year period 2001 to 2005. Therefore, the 13 researchers who joined IWMI in 2006 would be unlikely to have any IWMI publications, but rather would have publications from their previous jobs (which are included in this analysis).

Table 5.4 Publications per IRS Researcher per Year (past five years) by date of Joining IWMI.

Year joined IWMI	Number of staff	Peer reviewed journal articles	All peer reviewed publications
<1995	3	1.30	2.50
1996-98	5	1.52	2.72
1999-2001	18	1.05	2.07
2002-05	35	0.86	1.16
2006	13	0.40	0.80

Table 5.5 includes a comparison of IWMI's publication record with other CGIAR centers that have had recent EPMRs. These data for the last five years show that IWMI is on the low end of performance when compared against these five CGIAR centers in regard to number of peer reviewed journal articles. IWMI had an average of 0.68 peer reviewed publications per researcher

per year. Only WorldFish with 0.5 journal articles per year per researcher published less. Equally troubling is that more than 20 percent of IWMI research staff has not published a peer reviewed journal article in the last five years. Other metrics used to indicate research performance in Table 5.5 include percent of staff on editorial boards, that have reviewed papers and that have received honors and awards. IWMI is comparable to the other four centers in these measures.

Table 5.5 IWMI Compared with Other CGIAR Centers

Center	% staff publish peer articles	% staff publish all peer reviewed	ave # peer reviewed articles/staff/year	ave # all peer reviewed/staff/year	% editorial board members	% review members	% Honors & Prizes
ILRI	85.9	89.7	1.9	3	17.9	20.5	36
CIFOR	77.8	82.2	1	2.1	10	30	19
WorldFish	79.5	92.3	0.5	0.8	10	20.5	28
CIMMYT	92	92.3	1.9	2.7	20.7	13.4	
IFPRI			1.4				
IWMI (IRS)	78	88	0.84	1.49	26	35	22
IWMI (All)	75	87	0.68	1.20	19	26	21

Research Leadership Quality

An analysis of the publication performance of IWMI's Senior Research Decision Makers is also insightful (see Table 5.6). The senior management team includes the three Regional Directors, the Director of Research and the Director General. (This management team also includes the Director Corporate Services who holds a non-research position and so is not included in this analysis. The Panel is also aware of the roles of the Director General that take his attention away from a research project role). In addition, the four Theme Leaders have responsibility to select research priorities, guide research, and insure its quality. These nine research staff members (known hereafter as the senior research decision making team) have the primary responsibility to guide and make decisions about the collective research program within IWMI.

Seven of the research leaders, individually, also have key responsibilities to select and guide IWMI research either in a region or for a theme. Most of the decisions of what research will be done are made by this group in consultation with other senior researchers. Theme Leaders, Regional Directors, and Regional Office Heads jointly review research for quality before submitting it for publication or presentation to the public.

The discipline makeup of the senior research decision making team includes four engineers, two geographers, a soil scientist, an environmental scientist and an ecologist. Missing is anyone whose primary discipline is economics or any of the social sciences. Given the importance of economic, policy and institutional analysis to the IWMI mission, especially as it relates to poverty, the lack of social science in the research decision-making group is a serious gap.

Several of the senior research decision making team, while having strong credentials as managers, directors, and leaders of programs, do not have particular strength in research, especially actually conducting research. In addition to needing a strong background in understanding research and how to conduct it, there is a need to have leadership with an international reputation and credentials for the research they have done and expected to lead.

One member of the management team received her PhD within the last four years and two have yet to be awarded the degree. While these three research leaders have creative talents and rich experiences, a PhD followed by significant research experience is generally expected to be recognized as a research leader by the international research community. Several of IWMI's leaders appear to have weak or inappropriate backgrounds for the role of research leadership and direction for IWMI.

Table 5.6 Analysis of IWMI's Senior Research Decision Makers' Research Performances

Position	Discipline	PhD Date	Joined IWMI*	2001-2006 Ref Pubs*	All Peer ref Pubs*	Other Pubs*	ISI IWMI #	ISI Total #	Yrs since PhD	ISI total pa since PhD
DG	Eng	1987	2000	7	9	19	2	8	19	0.42
Res Director	Geog	2002	2002	6	8	12	4	4	4	1.00
Leader Th#1	Eng/ Nat'l Sciences	1994	2001	15	17	46	13	17	12	1.25
Leader Th#2	Soil Sc	1996	2002	5	7	8	5	11	10	1.10
Leader Th#3	Ecology/ Environ	1992	2001	11	22	50	11	35	13	2.69
Leader Th#4	Environ/ Ecology	In prog	2002	2	3	25	0	2	0	Na
Dir Global	Physical Geog	na	2003	0	0	0	0	0	0	0
Dir Asia	Eng	1989	2001	1	6	8	1	3	17	0.18
Dir Africa	Eng	1995	2005	6	8	21	0	14	10	1.40

**Calculated from IWMI provided resumes*
 # Calculated from ISI search and resumes

Research experience

The Panel is of the view that the level of research experience across IWMI's research staff is relatively low, particularly given the proportion of research staff who could be classified as having limited research experience. One argument in favor of that staffing mix is that such 'early career' researchers are more likely to be highly productive and particularly innovative compared to more experienced, 'later career' researchers. While the analysis of IWMI's publication performance displayed above tends to refute this, it is also important to note the attributes brought to a research team by later career people – notably, experience including 'corporate knowledge' and 'institutional memory' and an international reputation that can be used in seeking research funds. Such senior staff members, with sound publication records, help to ensure the research reputation of the organization and hence further enhance its chances of success in both securing new research funding opportunities and having its research findings accepted (and hence taken up).

Research success is, in part at least, dependent on achieving the right balance between these traits. For instance, early career researchers can be advantaged through a strong system of

mentoring while later career researchers may find their careers 're-invigorated' by interaction with early career staff when a suitable balance is found.

The Panel considers that the amount of research experience – as measured by years since being awarded their PhD, or even the number of years of experience doing research – held collectively by the senior research decision making group is less than would be expected of leaders in an international research organization. Exposure to doing the range of tasks required in research is necessary to be a leader of a research team. Rarely does someone with a wealth of non-academic experience succeed as a researcher without also having a significant and peer-reviewed research history. Indeed at an individual level, the premature appointment of relatively inexperienced researchers to management positions can have detrimental impacts on their career progression because they have not been given the time to develop the necessary depth of research experience.

The most common, and arguably the best, measure to recognize an individual for their research quality is their publication record in high impact journals. This is particularly true if the evolving publication record addresses a topic of significant importance to scientists in other respected research institutions. The researcher becomes well known for their work on that topic.

It is the view of the Panel that IWMI's rapid increase in staff numbers, the increased number of post-doctoral (currently 20 positions) and PhD students associated with IWMI (currently numbering around 50) and the departure of a number of key senior staff over the past six years has left an imbalance in the staff profile particularly in terms of research experience. In particular, the Panel identified a deficit in the collective research experience of the senior research decision making team. It also observed that there is an over-representation of bio-physical science and engineering backgrounds in that team.

The panel concludes that IWMI should take action to increase the proportion of experienced research staff who can lead, manage and have the capacity to be effective mentors of more junior staff, including the significant numbers of post doctoral fellows and doctoral students.

The Panel recommends that IWMI appoint four experienced and well respected researchers to the positions of:

- ***Principal Physical Scientist;***
- ***Principal Natural Scientist;***
- ***Principal Economist; and,***
- ***Principal Social Scientist/Policy Analyst,***

who would have responsibility across the Institute for research strategy development including research staff recruitment, staff development in their discipline area including mentoring junior staff, selection of PhD candidates and Post Doctoral Fellows, ensuring rigor in the application of their discipline, 'trouble shooting' discipline-based issues, and providing advice in project development. The Panel further recommends that IWMI appoints a Deputy Director General-Research. The person filling that role should be a highly experienced researcher with an established international reputation for excellence. It is also recommended that the four 'Principal Scientists' be appointed as the Theme Leaders to further strengthen the discipline focus they will bring to IWMI.

The panel suggests that the allocation of Themes to Principal Scientists should reflect discipline relevance. Existing staff members of IWMI may well be appointed to these positions. The people

taking on these key research roles would need to be selected on the basis of their experience in terms of post-PhD active research, their capacity to produce peer reviewed journal papers and their breadth of discipline knowledge for them to be able to fulfill their diverse roles as outlined above. For instance, the Principal Economist would need to have an established and highly recognized international reputation in a particular field but would also need a working knowledge of broader discipline issues, much the same as an editor of an international journal has of their discipline.

To ease the transition to the recommended structure, the Panel suggests a phasing in of change over a two year period, consistent with the period suggested for the merging of existing Themes 3 and 4 recommended in Chapter 3 and also consistent with staff contracts that we understand to be of two years duration. This period would also allow change to be synchronized with staff turnover. The Panel also recognizes the difficulties associated with making such senior appointments. It is suggested that IWMI explore innovative mechanisms to fill these positions including secondments and sabbaticals from universities and other research institutes.

The Panel has not commented directly on the need for senior IWMI staff to be responsible for fund raising to support the Institute. The Panel considers that the Director General along the Regional Directors and Regional Heads should continue to provide leadership for this critical function. But the Panel also suggests that, with the climate for securing research funding becoming more difficult, all research staff will need to be proactive and share the responsibility for raising funds, especially for the projects they will lead.

Staff mix

It is also clear that IWMI has been very successful in developing a recruitment strategy that has raised the proportion of staff members who are female and from developing countries. The Panel commends IWMI for its successes in improving its staff diversity over the past six years, a key recommendation of the previous EPMR.

The Panel understands that so long as applicants for staff vacancies at IWMI can demonstrate they meet the stated requirements of the position, preference will be given to women over men and people from the South over applicants from the North. This strategy reflects the view that previously, research job opportunities were inequitably allocated, with males from developed countries being favored. The question this strategy raises is whether it has had any impact on the quality of the research being undertaken in IWMI. The answer depends on the capacity of IWMI to attract quality researchers to its staff. Certainly there is a growing number of women (and men) from developing countries who have qualifications from leading universities in the developed world. The case of recruits from developing countries where there are significant sectors that are highly developed (e.g. South Africa) is also problematic in regard to classifying according to the North/South 'divide' and the panel understands IWMI's dilemma in this regard.

Notwithstanding this availability of skilled female researchers from developing countries, if in the IWMI appointment process a better qualified person is overlooked in favor of someone who is female and from the South, then negative (relatively) research consequences could result. This is even though both candidates meet the 'minimum' requirements for the position.

Similarly, if IWMI's compensation packages (including factors such as the location of positions and facilities available) are not sufficiently attractive to higher performing researchers, applicants for vacant positions will tend to be lower performers. The Panel was made aware of a recent case

where a potential IWMI staff member was recruited by another CGIAR centers where the remuneration package was significantly better. While in the IWMI staff satisfaction survey the question "I feel IWMI's compensation is similar to that of other organizations" received some 62% positive responses from researchers, 15% of responding researchers gave negative responses and that figure is more strongly negative for male research support staff (only 40% positive and more than 30% negative responses). The answers are also more negative in Africa and Asia than in Sri Lanka. The matter of competitive remuneration packages is further discussed in Chapter 8 in the section on human resources management.

It is the view of the Panel that the staff recruitment policy adopted by IWMI in order to improve its diversity performance may have some negative efficiency (outcome) impacts. The Panel suggests that research staff appointments be made on a purely competitive basis, with preference being given to women and developing country applicants only when they are of equal standing on the selection criteria to the best of the other applicants. IWMI should further ensure that its compensation package is competitive with that of other CGIAR centers.

Other Assets

The Panel visited IWMI regional offices in Colombo, Hyderabad and Pretoria and the field site in Laos. The information technology assets and support, library facilities (including on-line access to journals), buildings, access to data bases and external library facilities found at those offices all appeared to be adequate to the research task and no staff complaints were heard.

5.2 Organizational Structure and Research Management

IWMI's assets are organized in two dimensions to achieve the organization's mission. The first dimension is along thematic lines. The second dimension is geographically based.

Research staff members are allocated to the regions and research funds are allocated to the Themes. Regional Directors (and the Director General) are responsible for raising funds even though the Theme Leaders have responsibility for recommending the allocation of funds. In addition, the Theme Leaders are called upon to provide research leadership including project proposal generation and output quality control.

Matrix Management

The Panel spent considerable time discussing this approach to management (referred to as "Matrix Management"). This was in part because over the course of the EPMR, some restructuring of the senior management team took place. IWMI's contention is that the tension generated by the divisions of responsibility and the allocation of budgets across the management team is positive to the management process, with a degree of competition and compromise being generated. IWMI also contends that the division of staff into "researchers" and "managers" provides a recognition of alternate career paths for scientists based on their skills and inclinations. The Panel feels that with IWMI's decentralized research structure, matrix management may be warranted and needed, and that the approach has to date proven workable. However the Panel notes the potential for a management impasse in the event of a serious disagreement arising between Regional Directors (managers) and Theme Leaders (researchers) over the allocation of funds, the potential negative incentives for Regional Directors to raise funds in their region when the funds are distributed on thematic grounds and a potential loss of integration across disciplines. The Panel further feels that the division of responsibilities may not match skills sets thus weakening the key "matrix cells" to which staff are assigned.

Decentralization

Within the regional structure, IWMI has chosen to decentralize further its operations. For example, within the Africa Region, three regional offices have been created: the Africa Region Headquarters in Accra and two Regional Offices in Pretoria and Addis Ababa. While in 1999, around 80 percent of research staff was located at headquarters in Colombo, that figure has now been reduced to about 40 percent.

Table 5.7 Regional distribution of IWMI researchers

Researcher location	December 1999	January 2006
HQ / hosted programs	0	4
Global Research Div.	33	42
Asia (outside HQ)	3	42
South Asia	3	19
South-East Asia	0	17
CWANA	0	06
Africa	1	30
West Africa	1	13
Southern Africa	0	10
East Africa	0	07
LAC (Mexico)	3	0
Total	40	118

This decentralization has allowed staff to focus on problems facing specific geographic areas in their research. Such research has greater attraction to donors and partners because it moves further downstream in the research spectrum. This is particularly the case given that the Regional Directors have key responsibilities to raise funds. However, in general, the more specific the research is to the detail of individual cases, the more there is a departure from the CGIAR mandate of producing international public good (IPG) research.

On the other hand, dispersion alone does not indicate the degree to which research lies along the continuum between public good research that provides non-excludable knowledge and private good research that can yield excludable, profit making outcomes. Nor does it mark a distinction between research results that are restricted to geographic or political boundaries rather than those relevant to the international community. Legitimate IPG research requires hypotheses to be tested in specific circumstances and case study research facilitates such work. Furthermore, multiple case studies testing across varying circumstances, strengthens the confidence to be had in the generality of the theory so established.

This depiction of the tension regarding dispersion is further complicated by cost and other logistic considerations. A decentralized research operation involves coordination costs including multiple office servicing and staff travel. This is particularly the case when research is decentralized but research decision making is centralized. The Panel noted that two of the Regional Directors are now located in Colombo. These coordination costs may be in excess of costs associated with staff accessing case study sites from a centralized location. Furthermore, decentralization imposes potential burdens on staff that relate to the maintenance of a sufficient operational size in each location to ensure a research environment that will nurture peer exchange of ideas (particularly when they are specific to a discipline) and the associated

synergies. These costs must be weighed against the practicalities of partner countries requiring IWMI to establish a local office before permitting operations. The potential for office 'rationalization' must also be balanced against the long term returns made possible by IWMI's investment in the partnerships with local NARS.

It is the view of the Panel that the costs of IWMI's decentralized operation may well be in excess of the benefits so achieved although no analysis along these lines was carried out. This view is reinforced by the growth over the past five years in the costs associated with Regional Office Operations. In 2002 these costs were US$1.784M but by 2006 they were budgeted to rise to US$3.227M. The serendipitous nature of IWMI's acquisition of many of these offices gives rise to further questions of their on-going viability.

Given that no systematic evaluation of the decentralized structure of operations has been carried out, the Panel suggests that a rationalization of branch office locations be subjected to a careful financial analysis along with a consolidation of the organization's 'case-study' research focus.

Interdisciplinary research

An element of the way in which IWMI has organized its assets is the degree to which research is single versus interdisciplinary. IWMI has sought to distinguish itself from other research organizations through its capacity to investigate research questions using a combination of discipline approaches. Hence, water use issues are considered by teams of researchers - sometimes from across Regions - with differing disciplinary backgrounds. Because water use issues by their nature involve interactions of biophysical, social and economic aspects, this approach is entirely appropriate. This, however, does not make it straightforward. Not only does it require rigor in the application of each discipline but it also needs the researchers involved to have an appreciation of the contributions to be made by others from different discipline backgrounds and the capacity to integrate what can be different conceptual approaches. Overcoming these obstacles takes effort: effort that may distract researchers from maintaining and developing their single discipline expertise. Interdisciplinary research will fail if the rigor and currency of the individual disciplinary contributions are inadequate or if the oversight provided by senior researchers is inadequate.

The complexity of such interdisciplinary research also brings into question the relationship between the task involved and the size of IWMI's research staff. Over the time period covered by this EPMR, IWMI has gone from a basic focus on irrigation, agriculture and poverty to land, multiple uses of 'blue', 'green' and 'grey' water, livelihoods and the environment. Even when its focus was limited to irrigation and agriculture, IIMI limited its research activities to involve primarily government run surface irrigation systems in order to achieve the critical mass of research effort to gain an international reputation. Adding three or four more factors into that study mix gives rise to exponentially increasing degrees of complexity and hence required expertise. Expecting researchers to be able to cover multiple fields of endeavor in an effort to cope with that increased complexity is likely to result in a dilution of capacity and hence an inability to deliver cutting edge research outputs. While the interdisciplinary niche that IWMI is seeking to establish is laudable, there is a danger of individual researchers falling behind in their disciplinary bases.

The Panel recommends that at least five days per annum for discipline-based professional development be allocated in the time-tracker system.

5.3 Ensuring the Quality and Relevance of Research

Research Planning and Priority Setting

IWMI's process for developing its long term priorities is centered on its Strategic Plans. These were produced for 2000-05 and 2004-08. The most recent Plan was developed on the basis of an external review carried out by representatives of IWMI's regional partners and an internal strategic planning exercise. Medium Term Plans – the most recent of which is for 2007-09 – provide more immediate direction to the research effort.

However, these tend to be generalized documents and deal with broad directions. The process of implementing the plans comes down to the development of individual project planning. This starts with the identification of key research topics within each of the four thematic areas in consultation with the Regional Directors. Projects are then proposed, including budgets, from researchers in the three regions. Responses to solicitations for research work are considered in a similar way. Projects seeking core funds are ranked by the Theme Leaders and passed onto the senior management team where decisions are made as to which projects will be funded and at what levels of funding. The 2007-2009 MTP suggests that the new CGIAR System Priorities are also used to give priority in selecting projects for funding.

The Regional Directors are given target goals for funding each year. The DG and other senior staff consult with the donors to encourage project funding. If a regionally developed project is funded, the Regional Director and/or Regional Leader is/are responsible for conducting the research project while the Theme Leader continues to have responsibility for quality control of the project research output. The Panel is concerned that the fund raising imperative in the development of research projects does not dominate the objective of producing high quality international public good research outcomes that are consistent with the overarching mission of IWMI. This is especially a concern given the decentralization of the organization.

By hiring research leaders new to IWMI, the DG has greater assurance that they will support him in his leadership of the Institute. The hiring of all new people into these research management positions, however, has resulted in having none of the top senior research decision makers having any direct institutional memory of IWMI's history and past research. Thus, the direct link to IWMI's past research program now depends on about seven staff who joined IWMI before 2000. IWMI should be expected to build, where possible, from its institutional experiences. Hence the Panel is of the view that the senior research decision making group is handicapped in exploiting new research opportunities that are based, in part, from IWMI's past research activities by not including members who link back to earlier administrations.

IPG tensions

In determining the research direction taken by IWMI through its selection of projects, the senior research decision making team must take into account the mandate of the organization, as defined by the Board in the context of the CGIAR's mission. Specifically this is the provision of research that delivers outcomes that can be classified as IPGs. This is the linchpin of both the Strategic Plans and Medium Term Plans of the organization and sets the overall direction of the organization's research. The implication is that the benefits of the research carried out are available to all – internationally - once they are produced. They will not offer the potential of a direct revenue flow to the research provider. Complying with this mandate creates funding pressures for IWMI in that it restricts the range of funding sources to which it can appeal. In

contrast, research can be directed to providing excludable profit generating private goods, especially at a geographically localized scale. Because of the exclusive nature of this type of research product, clients are willing to pay for its provision. This is the province of the private consulting company and potentially academic organizations with particular localized connections.

The public/private local/global dichotomies are not so clear cut in practice. Most research work involves elements of all types of outputs. The research spectrum is thus better described as a continuum between the extremes of pure public and pure private, pure local and pure global. So while IWMI has the mandate of providing IPG research, there is appeal in securing funding by moving toward research that has a greater proportion of private or local public good outputs. Such funding may be provided by donors seeking to improve the well being of particular farmers in specific developing countries and so may be difficult to distinguish from IPG research, especially when poverty issues muddy the relevance of profits as an element in the definition of private goods.

The choice as to how far along the public/private, local/global spectrum of research is therefore one that involves tension that is not readily resolved.

The tension is manifest in the degree to which IWMI becomes involved in the extension of its research findings. IPG research findings may be technically available to all once the knowledge is created but significant barriers may exist to its dissemination to those who may benefit from it. The degree to which IWMI becomes involved in delivering its findings to potential beneficiaries in some ways describes the path between public and private research.

It is suggested that IWMI better monitor its efforts to develop mechanisms – including the formation of partnerships with other organizations such as government agencies NARs and NGOs – to facilitate the up-take of its findings without direct involvement in the extension process in order to ensure the benefits of its research can be identified and valued without breaching its CGIAR mandate to provide IPG research.

The Panel recognizes the value of the Strategic Plan and Medium Term Plan approach adopted by IWMI in providing overall direction to the research task and particularly commends the use of partner inputs into the strategic planning process, it remains concerned at the lack of systematic, objective ex post and ex ante evaluations of research in the process. For example, there have been very few formal ex post assessments of research projects on which to base decisions regarding the potential returns to be achieved from future possible research investments. Nor do research priorities appear to be established with reference to the findings of ex ante assessments of proposals submitted by researchers. As has been described, research priorities have rather been developed largely in consultation with donors and through internal discussions and appear somewhat *ad hoc.* Fund raising opportunities have clearly been critical in determining research direction.

The Panel concludes that the existing means of developing research priorities lacks sufficient objective assessment and finds this troublesome given the strong recommendation of the previous EPMR Panel to increase the Institute's efforts in research evaluation. The Panel is of the view that IWMI should place increased emphasis on the development of research evaluation processes – both ex ante and ex post – as a means of informing research priority setting.

Research Monitoring and Evaluation
CCERs have been used by IWMI as a means of monitoring progress toward achieving MTP and Strategic Plan goals. The Panel commends IWMI for taking these initiatives of self-imposed external assessment. Their value to the Institute has been mixed. The quality of the CCERs has been mixed. The panel was particularly impressed by the CCER of the IWMI-Tata Water Policy Program conducted in 2004. That CCER included specific recommendations for increased publication of research results in international journals and that more emphasis be given to tribal communities. To IWMI's credit, subsequent to the Review, the rate of publication increased and the new strategy includes a specific Tata-funded project aimed at assessing the livelihoods of Tribal Communities. Similarly, the CCER on Water Health and Environment was useful. However, the Panel was disappointed with the lack of analytical rigor evident in the CCER conducted for Theme 1 in 2005.

A number of other mechanisms are used by the Institute to ensure the relevance and quality of its research. These include:
1. the annual review meetings and associated knowledge fairs;
2. the Program Committee of the Board reviewing processes;
3. Science Council reviews of the Mid Term Plans;
4. annual staff appraisals;
5. CGIAR performance measurement;
6. periodic Theme meetings; and,
7. internal and external publication review processes.

While items 3 and 5 are imposed upon IWMI by the CGIAR, the Panel considers the ones IWMI imposes on itself to be useful contributions to an overall goal of improved research performance. However, it also considers that there is room for improvement. This is especially the case given IWMI's performance in the CGIAR Performance Measurement Exercise of 2005 and its standing amongst recently reviewed CGIAR centers presented earlier in this chapter.

The Panel recommends that IWMI ensures the CCERs it commissions are rigorous, regular and with coverage across all Themes.

Impact Assessment
It was concluded under section 3.3.1 that IWMI should pay closer attention to the evaluation of research investments in order to inform its research priority setting. The same conclusion is relevant in connection to impact assessment. Despite the emphasis placed on impact assessment by the previous EPMR, this has been a relatively low priority for IWMI. Some initiatives have been taken – particularly the conceptual framework paper on impact assessment of 2003, participating in the CGIAR's Standing Panel on Impact Assessment (SPIA) natural resource management impact study, the commissioning of two ex post assessments in 2005 and two more in 2006 and internal events such as that witnessed by the panel at the Institute's Annual Research Meeting in 2006. These are commended by the Panel. However, the Panel does not consider the effort to be sufficient. For instance, one of the two impact assessments submitted in 2005 was rated the worst from across all the CGIAR centers.

The plan, formulated since 2005 and more recently formulated jointly with WorldFish, to appoint a post doctoral fellow to be the key resource person to handle this area is considered to be asking too much of a junior position. Impact assessment is growing in importance from the perspective

of donors and the CGIAR. This arises from the desire of funding agencies to be able to justify the investments made in research. Only with sound impact assessment – most notably in the form of benefit cost analyses of commissioned projects – will IWMI be able to justify its on going activities. This degree of importance should be reflected by the appointment of an experienced economist to lead the impact assessment process.

While the conceptual framework for such evaluations is well established, their practical application is complex, particularly in cases where non-marketed environmental benefits and costs are concerned. With IWMI's increasing focus on trade-offs between livelihoods and the environment, this is problematic for the organization. It is important therefore that IWMI play a leading role in the on-going development of these assessment tasks. However, it is important for IWMI to be wary of impact assessment tools that stray from the principles of benefit cost analysis. Frequently, these tools seek to 'short cut' difficulties that confront the use of benefit cost analysis in assessing the impacts of natural resource management research investments. However, in taking these 'short-cuts' the alternative assessment tools become conceptually flawed. Furthermore, techniques such as 'outcome mapping' have to be recognized as partial assessments – involving the prediction of physical changes resulting from the research and not progressing to the next stage of evaluation, the estimation of the value that society places on those changes.

The Panel recommends that IWMI appoint its own specialist professional in the field of impact analysis and undertake a systematic evaluation of its research portfolio both past and future.

6 PARTNERSHIPS

6.1 Introduction

IWMI's vision for 2008 is to be a world class knowledge resource center on water, food and environment. IWMI states that it intends doing this through knowledge generation, sharing and brokerage via strategic partnerships with a set of core partners throughout Asia and Africa. The Strategic Plan 2000-2005 explicitly mentions IWMI's intention to work primarily with and through partners. The 2004-2008 Strategy puts further emphasis on the need for a collaborative working style in which partnerships form a key strategy. IWMI's Partnership Strategy (2004), gives a broad outline of why IWMI should partner and also suggests the purpose and scope for partnership in very general terms.

6.2 Partners Met and /or Contacted by the Panel

IWMI's relationships with stakeholders were assessed by the Panel through meetings held by Panel members with senior staff of several agencies, universities, and NGOs in Sri Lanka, India (Hyderabad), and South Africa. The visit to Laos was to the field sites out of Luang Prabang and thus interaction was limited to staff from IRD. Relationships between IWMI and the stakeholders met were varied, with some as in the University of Kelaniya (Sri Lanka) being only one of subcontracting out the project, to ones where staff were seconded to work directly on IWMI projects. The Panel also contacted several CGIAR Heads, bi-lateral and multi-lateral donors and spoke to a wide range of individuals who had been associated with IWMI in the past in various capacities. (See Annex IV for a list of partners/stakeholders met and /or corresponded with).

6.3 Type of Partnerships

The Panel was provided with a short paper which described IWMI's partnership strategy in very general terms. IWMI maintains that it has different sets of partners, each adding value to its work in different ways: partnerships to gain access to cutting –edge research, partnerships to build capacity for water management research in the South, partnerships to gain international influence for results of its research, and partnerships with organizations that can be downstream of IWMI and do more of the extension parts in the research-development continuum. The Panel however was given a listing of partners which highlighted some as key partners and these were simply described as those the Center had "active interaction with". The Panel found it difficult to understand whether this meant in terms of funding, frequency of meeting or some other characteristic, underscoring the fact that IWMI needs to prioritize its list of partners in a systematic way if it is to link it effectively with its partnership strategy. A look at the list given showed 76 NARS partners, 24 NGO partners, 90 academic institutions (both advanced research and universities), 6 multilateral banks and donors[39] and several CGIAR Centers.[40]

[39] Only the Swiss Development Corporation was listed as a donor!! We are assuming that the World Bank, ADB and others are sometimes partners but at other times donors.

[40] The list was not complete hence the above numbers are not accurate but still shows the numbers relative to each other.

6.4 General Perspective

IWMI, by the very broad nature of its current research mission, has expanded its traditional partner base and is now collaborating with a whole host of new partners in the areas of environment, health and sanitation. Its absorption of IBSRAM has also brought in a set of new partners in the areas of soil and land management. While most of these have been strategic, the Panel gathers that some partnerships have been more ad hoc and determined by the nature of the funding arrangements. The Panel particularly commends the partnerships in South Africa that have allowed IWMI an entry into the policy arena and influence into policy guidelines, and with the Ramsar Wetlands Convention, IUCN and the Nature Conservancy as part of the new and developing area of wetland management.[41] Other relatively new key partnerships have been in the area of health and sanitation including collaboration with IRC and the Stockholm Environment Institute. Given that IWMI had very few partners in the period before 2000, the array of current partners is impressive.

6.5 IWMI 's Decentralization and Building of Partnerships in the Regions/Countries

One of the key reasons for IWMI's research decentralization efforts has been to move researchers closer to their field activities and to be able to undertake country/region-specific research and ensure its uptake. The Panel sees this in the Africa program, with some key strategic partnering in Ethiopia, South Africa and Ghana where IWMI has made substantial investments in establishing offices. The India offices in Hyderabad and New Delhi have forged some useful partnerships though many are in a nascent stage, while the Anand office has built on the strong partnerships that already had been established by the Principal Scientist there. Indeed the partnership with the Sri Ratan Tata Trust has been key to some of the impressive work that has been done in India as documented in the CCER of IWMI-Tata Water Policy Research Program (WP94). This partnership is now in its second five year phase (2006-2010). The North-Gujurat Groundwater Initiative and the Central India Initiative are two examples within this overall partnership. The Southeast Asia office which has only recently moved from Bangkok to Penang (with the WorldFish merger) has made a few inroads into making key and strategic partnerships especially with local universities and research institutes.

The Panel feels that IWMI's intentions to decentralize its research operations is a good one and in line with the thinking of donors and others in the research and development arena worldwide. With this strategy IWMI has been able to work in a wide range of countries and within these, with a wide array of national (and regional) partners. This kind of partnering, the Panel feels, has given IWMI the opportunity to define its ground research questions more thoroughly. However the Panel feels that with a few exceptions, there needs to be more effort at developing alliances dedicated to producing upstream knowledge. Indeed the real challenge for a decentralized research structure is to produce IPGs and these can only be done if there are strategic alliances made towards these ends. IWMI has developed partnerships in this respect primarily through networks and programs, where IWMI often represents "tropical ecosystems" (or the South), i.e. the Global Water System Project of IGBP/HDGCP/Diversitas, PUB of IAHS, HELP of UNESCO as well as some partnerships in this category through the CPWF. For basin level results, IWMI has partnerships with several universities through their students. These have worked to varying degrees and not all have produced the intended results.

[41] We heard from several NARS that IWMI scientists have been instrumental in providing inputs into the reform process in South Africa on institutional issues ranging from WUA's to water laws and rights.

The South Africa partnerships as mentioned earlier are significant and strong and are cited here as the Panel was able to witness them first hand. These had the following key elements which made the partnership a positive one: 1) an appreciation by the partners of the senior IWMI staff who had stature and standing in the research field and as a consequence were included in high level agency meetings, in standing committees and for grant proposal screening; 2) an appreciation of specific disciplinary skills (in this case, social science) that IWMI brought to the partnership; 3) an appreciation of IWMI's international standing and perspective that introduced comparative views; 4) the perception that IWMI could be an 'honest broker' in situations that were contentious/sensitive (e.g. with the water allocation reforms); and
5) an appreciation that IWMI was in South Africa for the long haul.

In Hyderabad the interactions with government agencies were very cordial but not as strong though the current Head is working hard to improve the situation. It was noted that some of the NARs were not always fully aware of IWMI's research mandate, and in one situation, actually confused IWMI (the new entrant) with ICRISAT. To make the Regional Office concept work to its fullest, more effort needs to be put into developing key partnerships in country/region. But as remarked by one of the donors, IWMI tends to do better in countries where the agriculture research infrastructure is weaker. This may be the reason why true partnering with the NARS in India is somewhat harder whereas good and effective partnerships with NGOs are more evident.

6.6 Relationship with other CGIAR Centers

The Panel understands that there is a joint ICARDA/IWMI appointment in Central Asia, two WorldFish/IWMI joint appointments in Southeast Asia and another in South Asia. In addition ILRI and IWMI will appoint a joint scientist by the end of 2006. IWMI and IRRI continue to undertake the promising work on wet and dry irrigation. The relationship with WorldFish is an important and unique one and the two centers are beginning to cooperate in support services of HR, ICT and Finance. The Panel comments on this new corporate services structure in Chapter 8.

The IWMI Hyderabad office is situated in the ICRISAT campus. By coming under the ICRISAT umbrella, IWMI is somewhat inured from the rather stringent Government of India rules and regulations and is able to have an office, receive foreign funds and employ staff.

In terms of program collaboration, ICRISAT senior researchers indicated that IWMI could do much more to collaborate and that the current India Head was far more receptive than the last in doing so. They also indicated that the ICRISAT and ILRI collaboration was an especially good one and hoped that IWMI would likewise engage in more joint projects. ICRISAT pointed to the IWMI upstream work (policies/institutions, basin level) and said that useful synergies can be created with ICRISAT's downstream work in the watersheds. The Panel endorses the view of ICRISAT senior management that IWMI, working on upstream issues can more effectively partner with ICRISAT working on downstream issues, to the mutual benefit of both.

The IFPRI-IWMI relationship has been a tenuous one in the recent past. Having started off as two joint appointments (for about three years), with IWMI covering about 25% of the salaries, the appointments have now been terminated. The work – before it encountered problems in expectations from the two Centers, generated some good outputs that were co-published and /or co-attributed by IFPRI and IWMI, most notably the book, Rosegrant, Cai and Cline (2002) *World Water and Food to 2005: Dealing with Scarcity.* The book has been highly acclaimed and also

generated much media attention. The second major joint work involved the Water Impact Model – taking the IFPRI global IMPACT model of world food supply and demand and combining it with the IWMI PODIUM model. IWMI contributed the services of several scientists to work with the IFPRI researchers, with IWMI and IFPRI each responsible for a set of deliverables. Overall it seems that IWMI and IFPRI have their relative strengths (e.g. on the modeling work, IWMI is stronger on the hydrologic side while IFPRI is stronger on the economic models) but so far the collaboration has been difficult and now in fact has ceased.

In discussion the Panel learnt that many of the lessons on joint appointments are common with other CGIAR centers also, especially when such appointments involved very senior staff[42] with a strong public profile identified with one of the centers. This it seems creates problems of attribution and perceived division of labor that lead to discontent from the institution that is perceived to be secondary. It is also evident that now, far from collaboration, the two organizations seem to be in competition e.g. on work in the area of climate change. This is unfortunate because in terms of future collaboration, there seems to be real opportunity for joint work between IWMI and IFPRI in the areas of global water security and food security. There are also some areas in the past where collaboration has paid off – e.g. in water rights issues and gender (under CAPRi for example) and there have been joint events and publications. IFPRI continues to have a critical mass of researchers working in the areas of institutions, policy analysis and economic aspects of water management and it can also contribute to social science methods – all areas that are somewhat weak now at IWMI.

IWMI is actively involved and provides leadership to CGIAR system-wide programs such as the Consortium on Spatial Information, the Strategic Advisory Service on Human Resources (SAS-HR) program, the ICT-KM program, a shared Media position and the Gender and Diversity program.

Other CGIAR DGs interviewed felt that there is a large role and niche for IWMI as the "traditional" agenda of irrigation investment in terms of large public investments appears to be re-surfacing. They reiterated the fact that future development of IWMI – as is the case for many of the CGIAR centers – is to work hard to position itself on a number of limited IPGs in an environment where more and more players are competing. Almost all of them commented on the success IWMI has had in a competitive environment, in more than doubling its size financially.

6.7 IWMI's Other Partners and Stakeholders

Overall the Panel is of the view that some partners work much more closely with IWMI and as such have been able to observe and comment more objectively (and sometimes more critically) on IWMI. Others have an "arms length" approach and in our interviews were only able to give a superficial commentary. Unfortunately some of the bi-lateral donors and several of the government agencies fell into this category. Again, NGO involvement has been varied. Some like COSI in Sri Lanka have taken the lead and provide much of the staff expertise, while others are playing a minor role. Partners like the IUCN in Sri Lanka are keen to have research outcomes that they can use in their "extension" activities and spoke very positively about their collaboration.

[42] The Panel has understood that joint post-docs work more smoothly as they do not have to deal with the identity of the Center but only have to focus on the one project they are associated with.

By and large the NARS we spoke to have a favorable opinion of the Center. The situation in Sri Lanka is unique as the HQ's is situated in Colombo and the high expectations of the local NARS for involvement with IWMI are not always met and recent engagement is certainly not at the level it once was. There is the view that, as in the formative years of the Center, IWMI should be doing more field research in Sri Lanka and also making the effort to translate publications into the local languages. It has been particularly hard for the local government departments/ministries to understand the IPG nature of IWMI's work.

The Panel was struck by the limited nature of communication with the Global Water Partnership which has funding from IWMI, particularly the South Asia Regional Water Partnership which is housed in the IWMI HQ building.[43]

The Panel looked at the CGIAR PM Exercise Stakeholder Perceptions 2006: Center Report and noted that IWMI seemed to perform lower than average on most counts. Particularly striking was the score for fully and meaningfully involving its partners in important decision making and whether IWMI staff are responsive to the needs of partners and clients. In the light of IWMI's regionally decentralized structure, it was also striking that IWMI performed below average on the score for facilitating access of partners to the best available knowledge. The Panel also noted that IWMI was second from the bottom on the percentage of scientific papers per scientist that are published with developing country partners in refereed journals, conference and workshop proceedings in 2005.

In undertaking this review the issue of attribution has sometimes surfaced and it is not always clear how much of the outputs can be attributed to IWMI staff and their research and how much should be given to its partners. According to the Stakeholder Perceptions 2006 survey, IWMI was slightly below the average for the CGIAR Centers in the score for sharing credit for the success of projects with the partners involved.

IRD has a unique relationship with IWMI especially through its Southeast Asia office. IRD scientists have been deputed to work with IWMI in Laos and have taken over much of the role of IBSRAM in the previous era. The Panel was struck by the fact that: 1) IRD scientists and not IWMI staff were the majority of scientists working on the projects; 2) they were reporting to their research divisions in France, and their performance monitoring was also by IRD; 3) their research into land degradation was nothing new or exciting and raised serious methodological questions; and 4) the only social scientist attached to IRD was a post-doc working on a single independent study and social science inputs into the other research work was lacking.

This kind of partnership – as evident with IRD – also brings up serious questions of IWMI building long-term capacity in the region. IWMI is only a five-year player in the region and needs to establish itself as a serious research organization in the region. IWMI has a very able and internationally recognized soil scientist as the Head/SEA – who is also able to manage the IRD relationship well - but he needs staff and resources to help establish IWMI in the region.

In looking at the documentation (Lessons Learnt and Looking Ahead) in relation to the Global Dialogue on Water, Food and Environment, most partners felt that a lot had been achieved but that lots more could have been done. A critical review of the structure for the Dialogue revealed

[43] This applies as well to the Sri Lanka Water Partnership. The GWP Resource Center has more links perhaps because the Coordinator is paid directly by IWMI.

that most partners felt it was too complex and broad and with unclear roles and responsibilities for each partner. Most of the Dialogue partners felt that there was weak ownership of the program as a whole; different visions sometimes in contradiction to each other, added to the problems.

6.8 The CGIAR Challenge Program on Water and Food

IWMI is host to two CGIAR System-Wide Initiatives, both of which have been considered in an earlier section**.** In addition the CGIAR Challenge Program (CPWF) is hosted by IWMI and is an international, multi-institutional research initiative with a strong emphasis on north-south and south-south partnerships.

One of the major queries from partners outside IWMI has been whether there is a clear demarcation between IWMI and the CPWF. IWMI takes the view that there actually is little separation because the research question in System Priority 4, "increasing water productivity" is the same for both IWMI and the CPWF. However one clear difference is that while CPWF addresses the whole research question of how water productivity in agriculture can be increased, IWMI addresses only a select part of that broader question; for example, IWMI does not concern itself with the development of drought resistant varieties.

IWMI believes that it has a clear and well defined niche at the basin scale where it conducts most research. IWMI currently has four benchmark basins and in addition works closely in six of the CPWF's nine basins. In most cases, the IWMI research sites represent only parts of the basin, whereas the CPWF as a whole attempts to bring the results of research together at the basin scale and to monitor impacts of the knowledge generated through the program. The Panel believes this articulation of roles and responsibilities is sensible and should in theory result in complementarities and synergies, and less duplication of effort.[44] The Panel observes however, that IWMI research in other cases extended beyond a sub-basin focus. It also agrees with the comments of the SC that the Center's most recent MTP provides more clarity regarding the linkages between IWMI and the CPWF—although there is still a need to articulate more fully the exact nature of CPWF's links to IWMI's new research framework and theme structure. Whether in fact these synergies actually emerge depends on how effectively IWMI and its partners cooperate. Some partners with whom the Panel spoke felt that the approach to implement research did not always ensure integration at the basin level. This is perhaps why the CPWF launched the Basin Focal Project (BFP) initiative to fill the gaps.

IWMI uses the CPWF as a primary vehicle for working with other partners and CGIAR Centers. These partnerships have been at times difficult. Many partners are not satisfied by the way in which the CPWF calls for and manages the (time consuming) competitive grant process. They have been very critical of the CPWF process and sees that it has been a vehicle for IWMI to get most of the resources and that the changes to the Steering Committee (where the current DG IWMI is the only one from the CGIAR Centers) has worked against it being an open decision making body.[45] Partners the Panel contacted also felt that partnering was too ambitious, creating large transaction costs and inevitably getting too many people involved for whom the CPWF is

[42] However for example, the Panel understands that one of the BFP was developed by a few IWMI scientists with little consultation with others already working in the basin, thereby duplicating efforts. This BFP was further granted to IWMI with apparently no competition and its implementation caused confusion within the two original projects under implementation there.

[45] For example, the very fact that there was an anonymous letter of complaint that provoked an audit.

only a small part of what they do so that they are not as responsive in terms of narrative and financial reporting etc. There have also been a lot of "unfunded mandates" or meetings where project leaders have to attend for which they get no additional funds to cover their travel or time. As a result while the CPWF has resulted in a whole range of new partnerships, perceptions of IWMI and indeed of the CGIAR from these new partnerships have not always been positive. The latest communication from the CPWF Coordinator interrupting contract negotiations on the six winning bids – after people have revised and renegotiated with downstream partners - has now added to the strained relationships.

6.9 Host Country Relationship

The Panel understands that the overall relationship with the Sri Lanka government has had its fair share of difficulties. IWMI has also – wrongly – been the recipient of bad press in recent times. This has had more to do with the political agenda in Sri Lanka rather than with anything of IWMI's making. However the Panel wonders if IWMI management has made sufficient effort to try and redress this situation. The Panel does take note of the tsunami-related work that IWMI undertook to look at contamination of coastal aquifers and commends the support offered at a time of national disaster.

6.10 Training and Capacity Building

The Panel understands that the formal program of capacity building was launched in 2000 and included Policy Roundtables, PhD scholarship programs, NARS partnerships, a postdoctoral fellowship program, a private sector program and workshops.[46] The Capacity Building Program is administered by a Review Committee which meets three times a year for the purpose of reviewing applications for PhD support. The committee also nominates research supervisors for approved PhD students. The Panel questions the composition of the Review Committee and feels that drawing the committee from the Regional Directors does not give it the needed disciplinary breadth. Rather the Panel strongly suggests that a discipline – driven committee made up of the Principal Scientists recommended as the theme leaders (see Chapter 5), be instituted as the Review Committee.

The Center has carried out about 50 workshops per year on average on a wide variety of themes specific to the needs of its partners and its own mission. With the start of the CGIAR Global Food and Agriculture University, IWMI is involved in developing course material for distance learning at the Masters level on irrigation and water management. We note from the documentation given to us that Policy Roundtables have not happened in 2005 and 2006 and wonder if this confirms the Panel's view that less efforts are now being made on the upstream activities.

The Panel gathered from interviews with selected IWMI partners that some of the most important results in capacity building have come from informal relationships between IWMI senior staff and the institutions and networks they work with in the regions. The input of senior social scientists to the water reform process in South Africa is considered to be one such good example. A major priority for IWMI is to partner with the NARS to enable scaling up through targeted institutional capacity development. The general decline in the capacity of the NARS combined with IWMI's spread of institutional partners may have diverted attention from many

[46] These have been identified to be roundtable discussions at the highest possible level, using high-profile internationally known persons. The target is 2-3 per year.

of the NARS. In the materials presented to the Panel, only a few examples of capacity strengthening involving the NARS were noted.

The Panel has noted that in the list of IWMI–associated universities, many are second tier and regional universities. The Panel further observes that there is very little effort to get faculty to come to IWMI on a sabbatical or other short term leave. The Panel feels that the association with PhD students can sometimes work well and points to the example in Ethiopia with Cornell University.[47] However the Panel feels that not all PhD and MSc students get adequate mentoring and are often attached to an IWMI research project with little supervision.

6.11 Knowledge Center

The new thrust in the period under review is the Knowledge Center initiative. According to the Strategic Plan 2004-2008, the Knowledge Center is based on two key stated principles: first that IWMI should be in the knowledge business and second, that IWMI must make impact, performance and service central to its organizational culture.

According to IWMI the following are seen as important: knowledge generation, knowledge sharing, knowledge brokerage and knowledge application. IWMI sees its major role as being in knowledge generation but also intends to make its knowledge and the knowledge of others widely available to the larger public. IWMI also feels that it can help develop research alliances between research organizations in the north and south and develop impact pathways with appropriate partners so that research knowledge can be effectively applied. By doing this IWMI states that it hopes to better position itself along the research to development continuum and strengthen the impact of its research outputs.

In 2005, IWMI supported by the CGIAR's ICT-KM program, initiated a pilot effort to improve the impact of agricultural research development by building communication mechanisms directly into the research process. Ten CPWF and IWMI projects are involved in which project leaders are provided knowledge-sharing training programs to help them incorporate knowledge sharing into the research process.

Within its knowledge brokering role, in 2004-2005 IWMI and ICRISAT helped to broker interactions between researchers and policymakers from India and East Central Africa (ECA) to share India's experiences in agricultural water management. The Government of India has now approved a strategic partnership agreement between the Indian Council of Agricultural Research and the Association for Strengthening Agricultural Research in Eastern and Central Africa to strengthen agricultural and natural resource management research and help in building research capacity in ECA countries. IWMI has also formed alliances with World Vision in the Oilfants Basin to provide research, policy and capacity building support to the Government of South Africa, and is working with a number of NGO's in Asia and Africa such as Catholic Relief Services World Vision and International Development Enterprises to improve and make more productive use of small-scale water supplies.

The Panel has provided its assessment of the Knowledge Center initiative in Chapter 2. The Panel does however note here that IWMI has not done enough to institute a framework for measuring

[47] Since 2001, students from the south amounted to a total of 51 (with 16 being women). There have been three recruitment drives for Post-docs, in 2001, 2003 and 2005. There were 18 post doctoral scientists in 2005 of whom 12 were from the south.

impact and that this was a serious flaw that was flagged by the last review and has still not been adequately addressed.

6.12 Conclusions and Recommendations

The Panel concludes that IWMI has expanded its partner base significantly in its endeavor to be more effective in its new Themes. Much of it also reflects IWMI's desire to position itself correctly in the research-to development-to-extension continuum. With the information made available and the meetings with partners, the Panel feels that IWMI has found boundary partners that complement its own expertise and has worked effectively with them. However the diversity and number of partners has made it harder to manage the relationships and include them fully in priority setting. This may be what is reflected in the low scores in the CGIAR surveys. Clearly not all partnerships have been effective and IWMI researchers would do well to assess where these have not worked.

The Panel concludes that in the first instance IWMI should prioritize its list of key partners and focus on fewer longer term collaborations, as indeed they state is their intention. This is all the more important with foundations and bilateral donors when unrestricted funds are being pursued. The Panel notes that there are certain cases where IWMI has functioned only as a conduit of funding and brings little intellectual input into the partnership but overall, feels that IWMI has sought and brought complementarities to the relationship.

The Panel recommends that IWMI prioritize its list of partners and develop a new partnership strategy that is linked to this list. IWMI must further make its decentralized research structure work in favor of improving relationships with its partners including sharing credit for outputs.

The Panel recommends IWMI make a stronger effort to link up with top-tier universities/research institutes that have a reputation in the water resources area, and develop opportunities for their staff to play an active role in IWMI, including supervising PhD students, mentoring junior staff and assisting in the development of a strengthened research program.

7 GOVERNANCE

7.1 Legal Status

The legal status of IWMI was described in detail in the previous EPMR. Since then several important events occurred but none had an impact on the legal status of the Institute:

- the Sri Lankan parliament ratified the change of the Institute's legal name from IIMI (International Irrigation Management Institute) to IWMI (International Water Management Institute) in August 2000. In practice the Center had already been operating under the new name at the time of the previous EPMR.
- IWMI opened new offices in India (ICRISAT - Hyderabad) – September 2000, South Africa – October 2000, India (Anand) – December 2000, Ghana – April 2001, Thailand – April 2001, Uzbekistan (ICARDA – Tashkent) May 2001, Ethiopia (ILRI – Addis Ababa) – February 2003, Iran – May 2003, and India (New Delhi) – August 2005.
- In 2001 IWMI took over the activities of IBSRAM. While this is commonly referred to as the "merger" of IBSRAM into IWMI (which would have required legal changes) it was a liquidation of IBSRAM by its Board and IWMI took over some of the activities and staff of the defunct IBSRAM and the donors transferred their financial contributions from IBSRAM to IWMI.

7.2 Board size and composition

According to its Charter the IWMI Board is composed of no less than 12 members and no more than 20. The current Board size (including the Director General and one host country representative who are *ex-officio* members) is 12 although a 2001 Board decision, apparently not reversed, states that it should not drop below 13. At large members are elected by the Board for a three year term renewable once. The name, gender, country of origin, area of expertise and period of service of each Board member during the review period are indicated in Table 7.1. Six of the twelve members of the current Board are from the South (i.e. 50% compared to 38% in 2001) and seven of the twelve are women (i.e. 58% vs 15% in 2001); five of these women being from the South. Not only does IWMI's Board clearly have more women and more representatives from the South than it had in 2001, but the proportion of women on its Board is higher than in most organizations, whether in the CGIAR or outside, and three of the Board's five leadership positions are held by women: vice-chair (a rotating position), chair of the Nominating Committee and chair of the Program Committee. The other two leadership positions are held by men: Board Chair (who is also Chair of the Executive and Finance Committee) and Chair of the Audit Committee. The Board Chair is elected by the Board members from within the Board. The current Board chair (formerly the Program Committee Chair for 3 years) started his tenure as Board Chair at the March 2006 Board meeting but was elected to the chairmanship more than a year before its start, thus giving him ample time to prepare for the role.

The composition of the current IWMI Board in terms of main expertise is as follows: irrigation engineering (1) civil engineering (1), sociology (1), soil science/environment (1), environment (1), ground water (1), economics (1), governance/finance (4). While other centers may not have enough Board members versed in managerial, financial and governance matters, the IWMI Board is well equipped in these areas. Several Board members have multidisciplinary experience including some whose governance/finance expertise came from experience on other Boards or in senior managerial positions rather than from their educational background. The IWMI Board also

includes three members who have served on other CGIAR center Boards (CIFOR, CYMMIT, ICARDA) and one who is currently serving on the Board of the WorldFish Center (see below).

The Panel chair and one other Panel member each attended part of the Board's March 2006 meeting and examined current and past Board documents in detail. This March 2006 meeting was held in Penang, the headquarters of the WorldFish Center, at the same time the WorldFish Board was holding one of its own meetings. As part of the cooperation efforts between IWMI and WorldFish, described in chapter 8, the two boards held several common sessions during which they exchanged views and discussed possible areas of cooperation between the two centers, including at the Board level. As a step in that direction, one of the new IWMI Board members is also a member of the WorldFish Board. This person had previously been on the Board of IWMI and therefore knows both organizations well. The IWMI Board discussed further governance collaboration between the two centers, from increasing the number of common board members up to an ultimate full merger of the two boards, but it decided to remain, for the time being, at the current level of more limited governance cooperation. The Panel notes that some donors expressed concern about a possible merger of the two boards.

The Board also discussed recent changes in the Boards of other centers, especially CIMMYT and WorldFish, both of which now have smaller boards and constituted their own science council. WorldFish, in particular, has reduced its board from 12 to 8 members but increased the frequency of its meetings to 4 per year with a correspondingly reduced role of its executive committee. The IWMI Board decided to maintain its size and frequency of meetings which the Panel feels are satisfactory. Nevertheless, the Board established an internal task force on Board restructuring which was scheduled to submit its recommendation to the Board at its October 2006 meeting, while the Panel was finalizing its report.

7.3 Board Member Orientation

The previous EPMR recommended that the Board implement an ongoing Board development program to help it meet its responsibilities for strategic planning, policy formulation and monitoring of performance. The Board sent some of its members to CGIAR-organized training, including a CGIAR Board orientation program. It also invites new Board members to attend a Board meeting as an observer prior to taking office. However, not all new members have attended the CGIAR Board orientation program and there does not seem to be a structured center–specific orientation program although the Nominating Committee, at its November 2005 meeting, suggested that the Board consider setting up such an orientation program. The Panel feels that the intent of the last EPMR's recommendation has not been fulfilled and strongly suggests that, at minimum, it be made mandatory for new members to attend CGIAR orientation (unless the member has served in the CGIAR in some capacity) and Board-specific orientation.

7.4 Board Meetings

The full Board meets twice a year. During the eleven Board meetings held between May 2001 and March 2006 there has never been more than two absentees (six meetings with one absentee and four meetings with two absentees). Six of these 14 absences were by the representative of Pakistan. As part of its policy not to renew Board members whose contributions and performance are not deemed satisfactory by the Board, the Board informed the government of Pakistan that the *ex-officio* position it enjoyed on the Board was abolished.

Like in many Boards, the agenda and discussions of the meeting were heavily influenced by the Director General. Nevertheless, the Panel feels that most Board members did not have any problem expressing their views and opinions forcefully although some board members feel that there is excessive politeness and that honest disagreements are not always encouraged. While the discussions were generally good, the Panel noted that there was at times lack of clarity as to what was decided, what was only suggested and what needed further discussion. Also, items requiring action should clearly indicate a timeline and the person responsible for the action to be undertaken.

7.5 Board Oversight, CCERs

It appears from discussions Panel members had with several Boards members and with the current and previous Board chairs that the Board clearly endorsed all major decisions significantly affecting the Center over the last few years, e.g. the research orientation, the change in themes, the governance and monitoring of the Challenge Program, the major HR change initiatives, the management team restructuring, and the non-renewal of contracts of senior scientists who reached the ten year limit for employment in IWMI (this limit predates the period under review and was also the cause of a significant number of departures in the 1995-2000 period). The Panel reassured itself with the internal auditor that the Board was active in terms of its oversight and governance roles.

In 2004 the Board discussed its fiduciary duties and examined whether it was exercising them in a responsible and best practice manner. To further inform its discussion it requested a background paper on the subject from management. This paper was discussed at the Board's May 2005 meeting. Based on CGIAR guidelines the paper clarifies for the Board what are its fiduciary duties and what are the respective roles of the Executive and Finance Committee, the Audit Committee, the External Auditor and the Internal Auditor. The Panel commends the IWMI Board for wanting to assure itself that it is exercising its fiduciary role properly.

IWMI conducted several CCERs over the review period. Those relating to programs were discussed in previous chapters; the one on HR is discussed in chapter 8. While minutes of Board meetings show that the Board discussed the results of the CCERs, the Board is not the major driver in the definition of a multi-year program of CCERs. The Panel strongly urges the Board to be more active in defining a program of CCERs as a tool for exercising its oversight and in assuring that lessons learned from the CCERs are applied by the Center.

7.6 Board Committees

Boards exercise their oversight in large part through sub-committees focusing on particular aspects of the oversight function. The IWMI Board has constituted several sub-committees similar to those found in other CGIAR boards: Executive and Finance Committee, Nominating Committee, Audit Committee, Program Committee.

The Executive and Finance Committee (EFC) is comprised of the Board Chair (also chair of the EFC), the chairs of the other Board committees, the DG and one or two other members of which one is the host country representative but it also meets as a committee of the whole Board. EFC meetings are scheduled so that, in fact, all members of the Board can attend. The EFC reviews the financial policies and condition of the Center, the budget, personnel policies and legal matters and Board rules and procedures. It also deals with issues arising in-between Board sessions. It

meets formally twice a year in conjunction with Board meetings although its terms of reference mention that it meets "at least twice a year", one of which in conjunction with the full board meeting. The ToRs should be amended to reflect reality. At each of its meetings the EFC reviews the financial situation of IWMI as well as the latest financial projections for the year.

The Nominating Committee (NC) is composed of at least three members who have been on the Board at least two years. The Director General cannot be a member, which is as it should be, but is a resource person who can attend meetings if invited by the Committee. At the March 2006 meeting the three members, all women, felt a need for more gender balance and the Board Chair was added as a fourth member. The NC meets at least once a year in conjunction with full board meetings and more often if needed and it conducts some of its business by mail or electronic communications. The NC strives to submit to the Board at least two names for each Board appointment. It obtains names of potential Board members mostly from recommendations of current Board members, members of the CGIAR, officials of IWMI's host counties, and from a CGIAR Secretariat database; it keeps a running list of persons considered for Board membership in the past. The NC looks at Board vacancies up to six years ahead and pays attention to the impact of these vacancies on the Board's diversity in terms of gender, origin and expertise and it strives to phase the vacancies so as not to have too many new members join at the same time. The NC evaluates the persons proposed for the Board along a set of criteria which were updated in 2004 to include academic or political connections. The NC also recommended that donor representatives should be considered for Board membership. To support their work, committee members receive a set of documentation, which includes detailed minutes from the Committee's previous meeting as well as the NC's Terms of Reference.

The Audit Committee (AC) was created in 2000 following a recommendation of the previous EPMR. It is composed of three members who currently all have governance/management expertise. It meets twice a year in conjunction with Board meetings. The AC is responsible for the oversight of the annual audit of the financial statement, for ensuring the financial integrity of the Center, the existence of adequate accounting, financial and internal control systems; it also ensures that the Center has a Risk Management Framework in place. As explained in Chapter 9 – Finance, the internal audit unit presents its proposed multi-year work program to the AC for endorsement and later approval by the Board. The internal auditor also submits a twice yearly report to the AC which covers, among other things, risk management. Because the joint venture IWMI/WorldFish IRSS is in its implementation phase, the AC is monitoring it as part of its risk management assessment. In view of recent problems in the bidding process of the Challenge Program, the AC should also include it as part of its risk management. As a resource for its own work and oversight, the AC is kept apprised of the Good Practice Notes prepared by the CGIAR's Internal Audit Unit.

The Program Committee (PC) is composed of the DG and at least three other Board members with backgrounds relevant to the IWMI's mandate. In practice, and as is customary in most CGIAR centers, most if not all Board members attend the PC meetings. Theme leaders and researchers are invited to attend the meetings of the PC as appropriate. The role of the PC is to ensure the relevance, suitability and quality of IWMI's research and other activities, the effectiveness of its relations with other partners and beneficiary countries, and the impact of the Institute's activities. In its self-assessment the Board was not entirely satisfied with the effectiveness of its strategic guidance to management on science and programmatic matters. At the meeting the Panel observed, Board members indicated that this was a difficult issue and that few CGIAR Boards have been satisfied with their performance in this area. Management agreed

that it had always been difficult for the PC to "get it right". To try to improve their performance in this area, some centers have opted to create their own science council, composed mostly of outside experts with limited representation of Board members, instead of having a Program Committee. IWMI has decided to keep the traditional PC format but may want to examine the pros and cons of having a center science council.

7.7 Board Support and Documentation

An important factor in a board's effectiveness is the support it gets from management and the quality and timeliness of documents received. In IWMI, the Secretary of the Board used to be the DDG-Operations. Since his departure in 2005, the function has not been performed consistently and the Panel urges management to select someone with sufficient stature to provide this support. With respect to timeliness of documentation, the Board rules are that Board documentation is to be made available on IWMI's intranet at least two weeks prior to the meetings and that the draft minutes of each meeting be sent at most one month after the meeting.

A review covering the last seven Board meetings shows that in half the cases Board documentation was sent less than two weeks in advance and in all but one case the draft minutes were not sent within a month after the meeting (in some cases they were sent up to four months after the meeting). In addition, one Board member commented in the Board self-assessment that Board decisions should be formally documented in the minutes.

The Panel found that the documentation submitted to the Board was generally of good quality, that it was well presented and that it was clear whether the documents were submitted for discussion or for decision making. However, the Board self-assessment indicated that several Board members felt that the documentation provided was only marginally informative for its purposes.

The Panel recommends that informative Board documentation be made available to Board members at the latest two weeks prior to each meeting as per Board rules, in hard copy if members so request, and that draft minutes of the meetings adequately reflect Board decisions and that they be sent at most one month after the meeting.

7.8 Evaluation of the Director General

The evaluation of the DG by the Board did not occur at the meeting the Panel members attended; it occurs at the Board's fall meeting. The evaluation process was changed in 2005. It now includes a face-to-face feedback from the whole Board to the DG in addition to the evaluation meeting the Board Chair conducts with the DG. As part of the process the DG does a self-evaluation and a 360 degree feedback exercise is conducted.

7.9 Board self assessment

The Board reviewed its self assessment process in 2005. It asked the head of IWMI's Program Office to make suggestions based on best practice for board self assessments and on current practice in the CGIAR. As a result, the Board decided to conduct one type of self assessment annually prior to its November meetings and another form of self assessment every other year or when there is a major change (i.e. new DG or Board Chair). The Panel reviewed the results of the

self assessment conducted at the November 2005 meeting. Eight of twelve Board members responded. The key areas that need Board attention are:

- ***the Board's effectiveness in giving strategic guidance on science and program policies;***
- ***the Board's knowledge of strengths and weaknesses of major programs;***
- ***the Board's discussion of the annual budget and the allocation of IWMI's resources.***

It is worth noting that on half the questions asked, at least some Board members were somewhat dissatisfied or neutral, the scale being: very satisfied / satisfied / somewhat satisfied / neutral / somewhat dissatisfied. This indicates that there is room for improvement in Board effectiveness.

The Panel recognizes that the tendency in other organizations may be for their Boards to move away from excessive program involvement and more towards governance, but, given its earlier findings with respect to the Center's vision, mission, strategy, conceptual framework, priorities and focus, and their application through the Center's research programs, the panel feels that more guidance is needed in these areas.

The Panel recommends that the Board provide more strategic guidance to management on science and programs, that it keep more abreast of the programs' major strengths and weaknesses without getting involved in routine operational matters, and that it use the budget approval process as one tool to influence focus and priorities. The Center should consider the creation of a Center Science Council or Advisory Board along the model used by other CGIAR centers.

In view of the DG's decision to leave IWMI in the next few months, the Board will have to exercise one of its most important role: the selection of a DG. The Panel hopes that its assessment and recommendations will help the Board in defining the profile and key requirements for a new DG.

Table 7.1 MEMBERS OF THE IWMI BOARD OF GOVERNORS , 2001 - 2006

NAME & FIRST YEAR		END TERM	NATIONALITY	EXPERTISE	GENDER	TYPE OF MEMBER	2001	2002	2003	2004	2005	2006
Dr. Shahrizaila Abdullah	1/1/1997	31/12/2001	Malaysia	Civil Engineering	M	Board	PC					
Dr. Benoit Lesaffire	1/1/1996	31/12/2001	France	Water Supplies	M	CGIAR	PC, EFC, AC					
Dr. Toru Mase	1/1/1996	31/12/2001	Japan	Irrigation Engineering	M	Board	PC, NC					
Dr. Klaas Jan Beek	1/1/1997	31/12/2002	Netherlands	Social Science	M	Board	C, C-EFC	C, C-EFC				
Dr. Mona El-Kady	1/1/1997	31/12/2002	Egypt	Civil Engineering	F	CGIAR	C-NC, PC, EFC	C-NC, PC, EFC				
Dr. Eugene Terry	1/1/1997	31/12/2002	Sierra Leone	Plant Pathology	M	CGIAR	PC, NC	PC				
Dr. Walter Huppert	1/1/1999	31/12/2004	Germany	Engineering	M	Board	PC	PC, EFC	PC, EFC	PC, NC		
Ms. Joan Joshi	1/1/2000	31/12/2002	USA	Intl Management	F	Board	AC, NC	AC, NC	C-NC, AC	C-NC, EFC, AC		
Mr. Remo Gautschi	1/1/1999	31/12/2004	Switzerland	Civil Engineering	M	Board	VC, VC-AC, EFC, NC	VC, C-AC, NC, EFC	C, C-EFC	C, C-EFC, PC	C, C-EFC, PC	
Dr. Asger Kej**	1/1/1997 1/1/2006	31/12/2002 31/12/2008	Denmark	Governance/ Finance	M	Board	C-PC, EFC	C-PC, EFC				PC
Appointee of Govt. of Pakistan ***	8/10/2001		Pakistan (HC)		M	Pakistan	PC	PC	PC	PC	PC	PC
Appointee of Govt. of Sri Lanka	1/8/2000		Sri Lanka (HC)		M	Sri Lanka	PC	PC	PC, EFC	PC	PC	PC
Director General (incumbent Prof. Frank Rijsberman)	1/8/2000	Ex-officio	Netherlands	Civil Engineering	M	*Ex-Officio DG*	PC, EFC	PC, EFC	PC, EFC	PC, EFC	PC, EFC	DG, PC
Prof. Nobumasa Hatcho	1/1/2002	31/12/2007	Japan	Agricultural Engineering	M	Board		PC, EFC	C-PC, EFC	C-PC, EFC	C-PC, EFC	C, C-EFC, PC, NC
Dr. U. Tan-Kim-Yong	1/1/2002	31/12/2007	Thailand	Sociology	F	Board		PC, AC	PC, NC	PC, NC	PC, EFC	VC, VC-EFC, PC

Ms. R. Daba Fall	1/1/2002	31/12/2007	Senegal	Soil Science/ Environment	F	Board		PC, EFC	C-AC, PC, EFC	C-AC, PC	VC, VC-EFC, PC, AC	C-NC, EFC, PC
Ms. Cecilia López M.	1/1/2002	31/12/2007	Colombia	Economics	F	Board			VC, PC NC	EFC, NC	PC, NC	PC, NC
Dr Rivka Kfir	1/1/2003	31/12/2008	South Africa	Governance/ Finance	F	Board			AC	PC, AC	C-AC, EFC, NC	C-PC, EFC, NC
Dr. Akiça Bahri*	1/1/2003	31/12/2005	Tunisia	Engineering	F	Board			PC, NC	VC, VC-EFC, NC	C-NC, EFC, AC	
Dr. Margaret Catley-Carlson	1/1/2004	31/12/2006	Canada	Governance/ Finance	F	Board					PC, AC	PC, EFC, AC
Dr. Sunita Narain	1/1/2005	31/12/2007	India	Environment	F	Board					PC	PC
Dr. Fatma Attia	1/1/2006	31/12/2008	Egypt	Groundwater	F	Board						PC
Dr. John Skerritt	1/1/2006	31/12/2008	Australia	Governance/ Finance	M	Board						C-AC, EFC

C - Chair
VC - Vice Chair
EFC - Executive & Finance Committee
PC - Program Committee
NC - Nominating Committee
HC - Host Country

Board Composition (Gender) 2006		
Male	Female	Total
5	7	12

Board Composition (Region) 2006						
Asia	Europe	Latin America	North America	Sub-Saharan Africa	WANA	Total
6	2	1	1	2	-	12

**Term ended in 2004 in order to accept a position as IWMI's Regional Director for Africa*
*** Rejoined the Board in 2006*
****Did not attend meetings from November 2002 to 2005*

8 MANAGEMENT AND ADMINISTRATION

8.1 Leadership and Management

Since the last EPMR, IWMI has been led by a strong and dynamic DG. With the support of his board and through his skills as fund raiser and strategist he has steered the organization through a period of significant growth which has led to a more than doubling of its budget. He has been a driving force in the creation of the Comprehensive Assessment and the Challenge Program on Food and Water. For most of the period under review the DG was assisted in its management of the center by a Director of Finance and Administration (promoted to Deputy Director General Operations in January 2004), who oversaw the non-programmatic functions, and a large team composed of the Director Research, the regional directors and theme leaders. Because of its size, this group was not functioning as a real management team and was not as effective as could have been. When the DDG Operations left for IPGRI in September 2005, IWMI was already under discussions with WorldFish with a view of creating a joint support services unit. As a result, the DDG was not replaced and, instead, a joint IWMI/WorldFish position of Director of International Research Support Services (IRSS) was created to supervise the joint services unit (see section 8.5 below) and the financial, human resources and administrative support services remaining in IWMI were placed under a Director Corporate Services.

At present, IWMI does not have a deputy-director position (compared to two such positions at the time of the previous EPMR) and the DG is supported by a reduced management team composed of the Director Research, the three regional directors and the Director Corporate Services (see Table 8.1 for IWMI's Organization Chart). This management team is fairly new but, given its reduced size, should have a better chance to evolve into a cohesive team. To help it in that direction the team attended the First Level Leadership Program (see section 8.2.4) as an intact team, for which it should be commended. The Panel is concerned, however, that the low frequency of its meetings (currently about once a month) might be an impediment to its effective functioning. Yet the cohesion and effectiveness of the team will be all the more important since the DG announced, before the main phase of the EPMR, that he would be leaving IWMI within a year. Given the absence of an experienced deputy and the concerns expressed in Chapter 5 – Research Management, and despite the management team's own confidence in this matter, the Panel is concerned about a leadership vacuum should the DG decide to leave sooner rather than later. The fact that the DG continues to be fully in charge of IWMI business while traveling or when on short leave raises the issue of delegation and it is a sign that either there is no one sufficiently groomed to stand in for him or that he doesn't feel confident that any of his direct reports has reached that stage yet. Overall, this raises the question of appropriate and timely succession planning which should be an integral part of forward looking leadership. With regard to the replacement of the DG, the Panel trusts that the Board will deal with the search of a new DG as a matter of urgency.

While the Panel has concerns, expressed earlier in this report, about the scientific direction of the center, it wishes to strongly commend the DG for having brought IWMI to the forefront in the area of Human Resources Management (see section 8.2) by promoting, among other, the One Staff concept, the Regionally Recruited Staff positions, an increased level of diversity, a leadership development program and a new performance management system. He also promoted the use of feedback instruments such as staff surveys, internal client surveys and a 360 degree feedback exercise for all managers. Indeed, the DG has been described, including by

some of his detractors, as a stimulating and challenging driver of change, full of ideas, an exceptionally bright and fast thinker and the 2005 Staff Satisfaction Survey shows a high level of satisfaction with Corporate Leadership and Corporate Culture. The Panel is puzzled, therefore, by the fact that the DG seems, at the same time, to be perceived by many as intimidating if not domineering and as having a hard time dealing with views different of his own. The Panel is concerned that this may create an environment where staff may not feel comfortable expressing themselves freely (while this item is rated fairly positively in the 2005 Staff Satisfaction Survey, it received more negative answers than most, especially from women staff – close to 30% for women researchers).

Over the last few years, and to this day, IWMI has undergone fast-paced change. There is no such thing as a "right" pace of change. It very much depends on the state of the organizations (systems, policies, procedures, delegation, etc.); on the opportunities, threats and challenges it faces; on the profile of its staff (skills, abilities, desire to change, comfort with change, capacity to absorb change); and on the leadership and charisma of its senior management. In view of the fact that a number of staff, including among the decision making group, expressed concern to the Panel about the pace of change in the organization, IWMI management may want to assess whether it has reached a breaking point, whether it is "too much too fast" as one person put it or whether it feels comfortable continuing at the same pace.

8.2 Human Resources Management

External Audit of Human Resources Management (CCER)

In 2001 IWMI commissioned a review by an external consultant "to identify the HR initiatives IWMI needed to take to complement the vision in its Strategic Plan". The consultant found that a number of areas required significant enhancements and that "some of the Institute's past practices fell well short of the expectations of a contemporary research organization". The consultant's 24 recommendations covered major and wide-ranging changes. In 2004 the same consultant conducted an Audit of Human Resources Management on behalf of, and overseen by, the CGIAR Internal Audit Unit. The audit concluded that 22 of the 24 recommendations had been acted upon and the two remaining were not significant in the overall context. In addition to these recommendations, IWMI has taken other important HR-related initiatives. In its report, the consultant stated that IWMI was "probably at the leading edge of the CGIAR practices for managing and developing people". In a recent letter to the Panel, he confirmed that "since 2001 there has been a remarkable transformation" and "[IWMI probably has] a better idea than most of where their problems lie, the scale of those problems, and where they have to concentrate their future efforts."

The panel fully concurs with the report and commends IWMI for this major turnaround. The following list illustrates the extent of changes implemented: the hiring of an expert HR manager; a new competency based job classification system; a new salary structure; a new Personnel Manual; a new reward program; a new leadership development program; a new performance management system; 360 degree feedback for managers; a new HR information system; staff surveys; customer satisfaction surveys; the one-staff concept. The Panel notes that staff satisfaction with HR services increased in the 2006 customer satisfaction survey compared to the 2003 survey (see section 8.3 for more details on customer satisfaction surveys). Positive responses were in the 70% to 90% range.

Table 8.1 IWMI Organization Chart

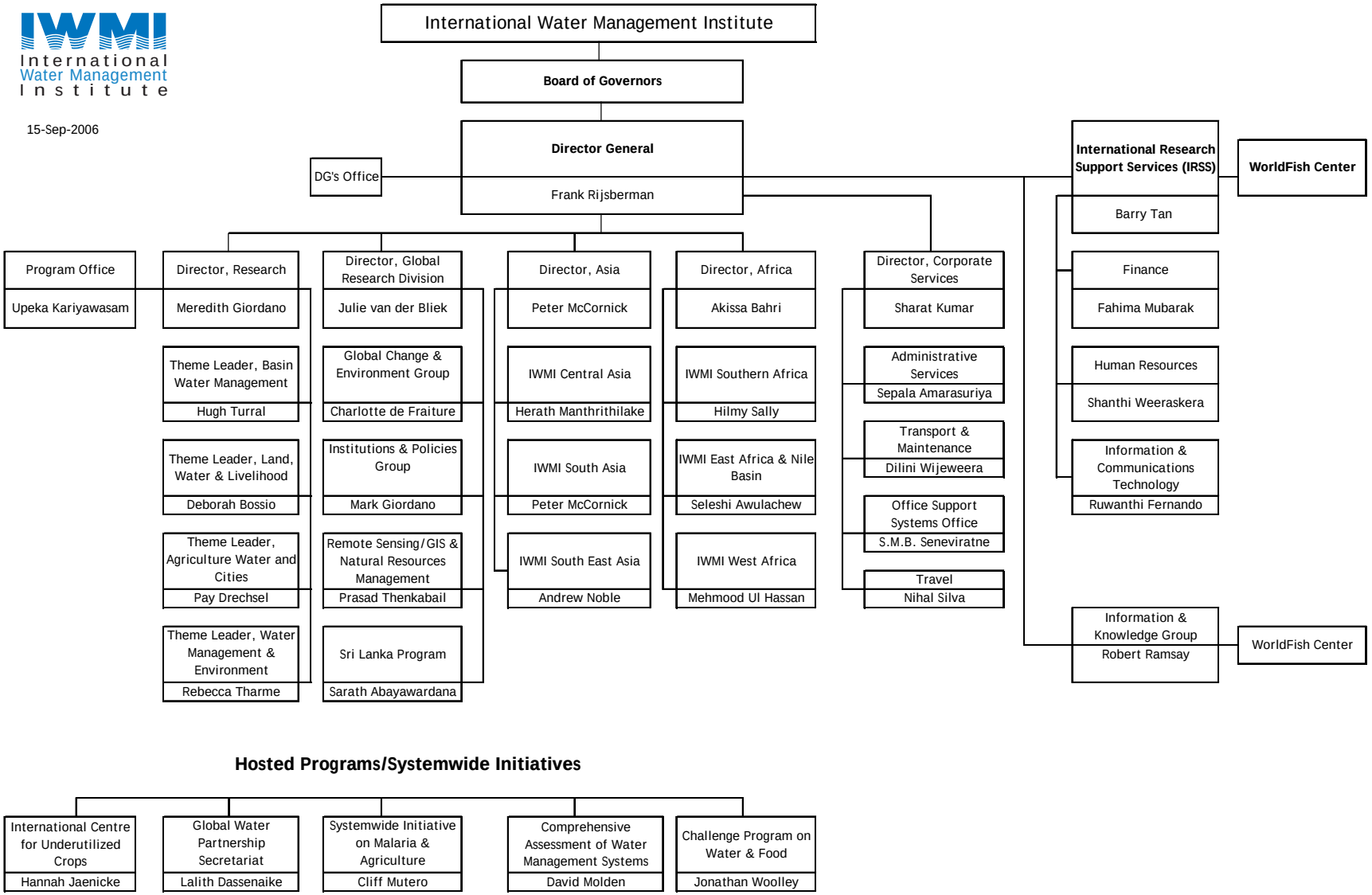

Table 8.2 Summary of Staff Movements - Arrivals and Departures during 2001-2005

Year	Total Staff by Category as of 1 Jan			Total Staff as of Jan	Total Departures during the year by Category & Turnover Rate						Total Departures during the year		Total Arrivals during the year by Category						Total Arrivals during the year		Total Staff by Category as of 31 Dec			Total Staff as of 31 Dec	% Increase over previous year
	Researchers	Research Support	Non Research		Researchers		Research Support		Non Research				Researchers		Research Support		Non Research				Researchers	Research Support	Non Research		
2001	51	61	133	245	12%	6		0	3%	4	4%	10	41%	21	18%	11	18%	24	23%	56	66	72	153	291	19%
2002	66	72	153	291	11%	7	1%	1	3%	5	4%	13	52%	34	39%	28	20%	31	32%	93	93	99	179	371	27%
2003	93	99	179	371	15%	14	20%	20	11%	19	14%	53	14%	13	17%	17	9%	17	13%	47	92	96	177	365	-2%
2004	92	96	177	365	16%	15	27%	26	14%	24	18%	65	15%	14	14%	13	12%	22	13%	49	91	83	175	349	-4%
2005	91	83	175	349	26%	24	23%	19	23%	41	24%	84	36%	33	28%	23	19%	33	26%	89	100	87	167	354	1%

Note: 1) This is an update of Table 5.9 appearing in the previous EPMR report

2) The above captures departures due to all reasons - voluntary departures, non-renewal of fixed term contracts, end of Post-doc contracts, redundancies, retirements, death, etc.

Staffing, Recruitment, Separation

Table 8.2 shows total staffing as well as departures and arrivals by major staff categories and by year from January 2001 to December 2005. Over the period total staff increased by 44%, researchers increased by 96%, research support by 43% and non-research staff by 25%. The increase occurred in 2001 and 2002. Since 2003 total staff decreased by 5%; research support and non-research staff decreased by about 9% but the number of researchers kept increasing by 10%. IRS, not shown on this table, roughly tripled during the whole period. The turnover rate (departures during the year over staff on board at January 1) increased steadily from 4% in 2001 to a high of 24% in 2005; it was low, 4%, during the two years of rapid expansion (2001 and 2002) and then increased significantly. For researchers the turnover rate was fairly steady from 2001 to 2004, between 11% and 16%, but it jumped to 26% in 2005, a level similar to what it was from 1995 to 1998. When excluding Post Docs and fixed term consultants the rate was only 7% in 2005. For research support the turnover rate was non-existent in 2001 and 2002 and then jumped to 20% to 27% over the last three years. For non-research staff there was a steady increase from 3% to 23% over the period. For researchers the turnover rate reflects a combination of the fixed-term nature of their contracts and of the short term presence of many Post Docs. For the other categories of staff the increase in the turnover rate over the last few years reflects a major staff reduction in the Pakistan office and the closure of the Bangkok office on December 31, 2005.

IWMI has filled its positions through a mix of internal promotions, internal and external open competition and headhunting; the latter for positions in the corporate services areas where traditional advertising may not have enticed candidates from the private sector to apply. The Center has organized recruitment drives where 20 to 30 applicants were invited to the Center for a full week of interviews, presentations and induction. In some cases candidates interviewed for one position were offered another one that seemed a better fit with their skills. While this mix of approaches has the advantage of speed and flexibility in filling positions, it runs the risk, when not all positions are filled on a competitive basis, of creating the impression that internal candidates may not be given a fair chance. As discussed earlier in this report, IMWI's determined pursuit of improving its diversity balance (in terms of gender and origin), as suggested by the previous EPMR, has also created the belief among some staff that these factors are taking precedence over skills and experience. It is worth noting that Recruitment was the only item in the 2006 customer satisfaction survey for HR not to have shown any improvement since 2003.

In Chapter 5-Research Management, the Panel highlighted what it felt were serious deficiencies in the overall profile of staff and the need for a systematic and long term staffing strategy. Center management acknowledged the need for a staffing strategy and mentioned that this item was one of its three HR priorities for 2004 and that it was included in the 2005 work program of the CGIAR HR Strategic Advisory Services Program (SAS_HR) in which the Center is a partner. Because of internal problems, SAS-HR failed to deliver on this area of its program in 2005 and 2006 and management has planned the development of a staffing strategy for 2007.

The Panel recommends that the Center prepare a long term staffing strategy immediately after the completion of its next strategic plan.

As already mentioned in this report, IWMI offers its researchers recruited from regional and international markets (IRS) only two year fixed term contracts not renewed beyond 10 years of service. While exceptions to this policy can be requested from the Board, the Panel underlined

the risks it sees with such a policy, i.e. losing institutional memory and the skills and experience brought by high performing senior scientists with significant experience. There is a need to maintain a sufficient cadre of senior experienced scientists.

The Panel recommends that the policy limiting employment at IWMI to ten years be replaced with a policy stating that contracts beyond ten years of employment be subject to an in-depth review by management which would take into account IWMI's long term staffing profile needs and the staff's performance.

This would replace a negative policy (no more than 10 years) with a positive one: high performing scientists who fit IWMI's long term staffing needs can stay beyond 10 years. The Panel notes that in the new joint Personnel Policy Manual shared with WorldFish, both centers will offer three year contracts to their staff. Staff who currently have indefinite contracts (e.g. non-research staff at headquarters in non-temporary positions) will continue to have these contracts.

While the Panel heard that some job candidates decided to accept offers elsewhere because the compensation package was too low, IWMI states that its compensation package is competitive and that it has not lost candidates on that basis. Yet satisfaction with compensation has decreased from the 2003 to the 2005 overall staff satisfaction survey and the level of satisfaction was lowest (and dissatisfaction highest) with staff in the Africa and Asia regions. Men in research support positions seem to be the least satisfied. The level of satisfaction among researchers is about 60% and the level of dissatisfaction about 15%. To retain its competitiveness IWMI conducts comparative salary surveys every other year for NRS staff in the various countries where it operates. For IRS compensation IWMI keeps track of where it stands in comparison to other CGIAR centers but it does not conduct international comparative compensation surveys.

One Staff Concept

One of IWMI's most significant achievements in the area of HR during the period under review has been the implementation of a One Staff concept. Like most other CGIAR centers, IWMI had two sets of policies and practices, one for IRS and one for NRS staff, which created real or perceived inequities, created discontentment among NRS, limited opportunities for NRS staff and made the management of human resources more complicated. The purpose of the One Staff concept was to bridge the gap between the two categories of staff. IWMI created a common set of rules and policies for all staff, one job classification structure, new salary bands (different by location but uniform across employment categories) designed to make equal pay for equal work a reality and more uniform benefits policies. One way to bridge the gap mentioned above was the creation of Regionally Recruited Staff positions. At the beginning of 2006 IWMI had 23 RRS staff (8 researchers, 8 senior researchers and 7 non research staff). Some RRS staff were recruited directly at that level while others were promoted from NRS to RRS. The One Staff concept has undeniably offered increased opportunities for NRS staff and has increased fairness and equity among staff. It should be noted that during the time when these major changes were developed and implemented, the HR function was reporting directly to the DG, thus underlining his direct commitment to these changes. Once the core recommendations were implemented, HR moved back under the DDG Finance and Administration.

Staff Development

To further make the One Staff concept a reality, IWMI made a major effort on staff development. The institute designed its own Leadership Development Program (LDP) geared towards high potential performers, especially women and staff from the South. The LDP is not simply a course but a program extending over a two year period and including skills development courses, development retreats, mentoring by members of the management team, secondments to different activities and close monitoring by the head of HR and the DG. Goals are set for each participant prior to the program and their progress is reviewed over time. Two programs of 12 staff each were conducted so far. A measure of the program's success is that ten of the twelve participants in the first program have been promoted to higher positions.

IWMI also has sent close to 30 managers and supervisors, including its senior management team, to attend the First Level Leadership Development Program. This is a program conducted jointly for six CGIAR centers by the Strategic Advisory Service for HR but led by IWMI's head of HR (recently promoted to Director of Corporate Services). The core module of the program is a five day residential course. Similarly to IWMI's LDP, the program uses various forms of feedback and self awareness instruments.

Apart from these two programs, a training calendar is published annually and placed on the intranet; it is based on the aggregate development needs identified in the individual performance and development plans. On average staff receive three days of training per year. While not insignificant this is still low compared to more progressive organizations which have targets of at least five days per staff per year. Nevertheless, there has been a marked improvement in the level of staff satisfaction with training and development activities from 2003 to 2006.

With regard to promotions, and in order to ensure fairness and equity, IWMI has established a promotion committee which has to approve all proposed promotions. The committee is composed of the DG, the Director of Research and the Director of Corporate Services. To be submitted to the committee promotions have to receive the endorsement of at least three managers. Merit increases, as discussed in the next section, are based on performance.

IWMI's staff development efforts have been received positively and staff are reasonably satisfied with their career opportunities, especially men in research support. Staff are less satisfied with the degree to which their supervisor identifies development needs, especially staff in Africa and women in research and in non-research positions. Some staff commented that more needs to be done now for staff levels below managers and supervisors.

Performance Management

Also as part of the implementation of the One Staff concept, IWMI introduced a new performance appraisal system which is used for all staff categories. It seems to have been accepted without significant or unusual resistance. Its application varies, of course, with the commitment of supervisors but HR has provided supervisors with training and assistance on evaluating performance objectively, giving feedback, and developing individual plans and objectives. Staff's satisfaction on that item, as expressed in the overall staff survey, has improved slightly from 2003 to 2005. In the HR customer satisfaction survey satisfaction increased significantly from 2003 to 2006. The performance appraisal is performed on an annual basis. Apart from being evaluated by their supervisor, staff perform a self appraisal. Detailed

operational objectives are agreed upon and serve as one of the measures of performance for the following year. Areas for improvement are also identified during the performance review process and are aggregated into an IWMI training plan which is made available on the intranet. The system has four performance categories: unsatisfactory, good, superior and excellent. Staff whose performance is classified as Good receive only a structural salary increase but no merit increase. Supervisors are expected to identify unsatisfactory performers and not to put all staff in the top two categories. Aggregate ratings by organizational units (divisions, regions, etc.) are put on the intranet which allows all staff and supervisors to see which supervisors might be excessively lenient and which might be excessively tough. This forces the lenient supervisors to be more realistic in their assessments and the tough supervisors to adjust their possibly excessively high expectations.

At the end of 2004 IWMI conducted its first 360 degree feedback exercise for its then 15 person management team. At the end of 2005 this same exercise was repeated and expanded to all 32 of its managers/supervisors. A new exercise is scheduled to start at the end of 2006. The questionnaire is similar to those used by other CGIAR centers and it is administered by the same outside consulting firm. The feedback is discussed between each manager and his/her supervisor and the results are used as input in the performance appraisal process.

Diversity

The previous two EPMRs suggested that IWMI improve its diversity both in terms of gender and origin. Over the review period IWMI made a conscious effort of recruiting and developing women and staff from the south. As a result, it received in December 2005 a diversity award from the CGIAR's Gender and Diversity Program. IWMI's gender balance among its IRS/RRS staff increased steadily over the recent years, from 23% women in 2002 to 34 % in 2005 compared to an average of 18% for the CGIAR in 2005. IWMI is similarly ahead of the rest of the CGIAR for other staff categories. The percentage of staff from the south among the IRS/RRS researchers has also steadily increased over the past few years. It was 25% in 2002 and 44% in 2005 compared to an average of 51% for the CGIAR as a whole in 2005. IWMI should be commended for its efforts on diversity but at the same time it needs to pay attention to the perception that diversity is taking precedence over competence and experience. IWMI annually submits a report to its Board on gender and diversity issues. See Table 8.3 for a detailed distribution of staff by gender and origin.

In the pursuit of its diversity goals IWMI works closely with the CGIAR's Gender and Diversity program and in November 2004 introduced flexible working arrangements and a spouse employment policy. The latter provides for short term appointments on specialized professional consultancies for spouses/partners of already appointed staff. In a few cases IWMI also has appointed spouses to staff positions when they had the required skills and profile. Since concerns were expressed to the Panel, the Panel suggests that IWMI pay special attention to the proper application of its spouse employment policy so as to avoid the perception of preferential treatment.

Staff Satisfaction Surveys

IWMI conducted its first Staff Satisfaction Survey in October 2003 and a similar one in December 2005. If not the only one, IWMI is certainly among the few CGIAR centers to have done such surveys and should be strongly commended for doing so. Both surveys were conducted by an outside consultant who also provided IWMI with a detailed analysis of the results according to

gender, regional locations and staff categories. The survey had 37 questions organized in 10 different categories (e.g. corporate culture, corporate leadership, relationship with supervisor, compensation, general satisfaction). The 63% response rate for the 2005 survey was lower than in 2003 (69%) but was still high and can be considered representative of staff's views. It is possible that asking for the gender, location and staff category may have discouraged some people from answering for fear of being recognized. Of some concern is the sharp drop in response rate from male staff and the low 37% response rate from staff in the Asia region compared to the 69% response rate from the staff in Sri Lanka. Respondents were asked to rate each question on a 5 point scale from "strongly agree" to "strongly disagree".

Table 8.3 IWMI Diversity at Different Organizational Levels

	Male			**Female**			
Board of Trustees	**North**	**South**	**Sub-total**	**North**	**South**	**Sub-total**	**Total**
	3 27%	**1** 9%	**4** **36%**	**1** 9%	**6** 55%	**7** **64%**	**11** **100%**
Management Team	**2** 33%	**1** 17%	**3** **50%**	**2** 33%	**1** 17%	**3** **50%**	**6** **100%**
Researchers	**32** 27%	**50** 42%	**82** **69%**	**23** 19%	**13** 11%	**36** **31%**	**118** **100%**
Breakup of Researchers							
Principal Researcher - I	11	7	**18**	4	1	**5**	**23**
Senior Researcher - I	7	7	**14**	5	0	**5**	**19**
Senior Researcher - R	0	6	**6**	0	2	**2**	**8**
Researcher - I	11	5	**16**	7	3	**10**	**26**
Researcher - R	1	3	**4**	1	3	**4**	**8**
Researcher - N	0	16	**16**	0	2	**2**	**18**
AE's/Post Doc's	2	6	**8**	6	2	**8**	**16**
Sub Total	32	50	**82**	23	13	**36**	**118**
Research Support (NRS)	0 0%	57 72%	**57** **72%**	0 0%	22 28%	**22** **28%**	**79** **100%**
Non-Research Staff	0 0%	94 57%	**94** **57%**	4 2%	68 41%	**72** **43%**	**166** **100%**
Breakup of Non Res. Staff							
IRS	0	2	**2**	3	3	**6**	**8**
RRS	0	2	**2**	0	5	**5**	**7**
NRS	0	90	**90**	1	60	**61**	**151**
Sub Total :	0	94	**94**	4	68	**72**	**166**
Total IWMI Staff	32	201	**233**	27	103	**130**	**363**

The overall results are very good. Staff expressed a very high level of general satisfaction (90%); 96% are proud to be a member of the IWMI team; 92 % are satisfied working with IWMI; and 86% would recommend it to others as a good place to work. Of the 37 questions none has less than 54% positive responses and only four have less than 60%. No item has more than 20% negative responses and about half of the items have less than 10% negative responses. However, on some specific items some categories of staff have up to 40% negative responses which means that there remain areas for improvement even though the 2005 results are significantly better than in 2003. The majority of items saw an increase in the level of satisfaction and all items saw a decrease, often significant, in the level of dissatisfaction. The highest rated categories (above 80% positive responses) were: General Satisfaction, Corporate Culture, Relationship with Supervisor and Corporate Leadership. The lowest rated categories (between 10 and 20% negative responses) were: Compensation (the only category to have decreased since 2003), Career Development, Communication, and Quality of Supervision.

Overall there was significant improvement from 2003 to 2006, both in increased satisfaction and decreased dissatisfaction. Nevertheless, IWMI needs to move ahead and understand and work on the fact that women, especially women researchers, had lower levels of satisfaction and higher levels of dissatisfaction on almost all 37 items. IWMI also needs to address the fact that its staff in Africa are significantly less satisfied and more dissatisfied than their peers. In some cases so are the staff in the Asia region.

HR Information System

During the period under review IWMI created its "HR Online" site on its intranet. The site offers an extensive range of HR related information. The systematic posting of rules, policies, procedures, training plans, aggregate performance results, etc, on the site has significantly increased the level of transparency in the area of human resources management.

IWMI is now developing with CIFOR and WorldFish a more elaborate HR system called HR4U. The system is in its final stages of development and should be launched in early 2007. IPGRI, ILRI and ICRAF have expressed interest in using the same system.

Staff Association

The Panel notes that IWMI currently has no functioning staff association to represent staff's interests. In the implementation of its many change projects IWMI management relied on *ad hoc* task forces and committees. While this is a good solution the Panel feels that this does not replace a staff association which could, for example, have a role in the resolution of staff grievances. The Panel urges IWMI management to create the appropriate environment for such an association to emerge and it urges staff to take the initiative in the creation of an association representing them.

8.3 Customer Satisfaction Surveys

In late 2003 and early 2006 IWMI conducted detailed internal customer satisfaction surveys for 10 of its support functions. Staff were asked to rate their level of satisfaction with a number of items specific to each service function, e.g. 9 items for HR and 12 items for Information, Communication and Technology. Despite the number of surveys that each staff was asked to fill the response rates were generally high. Each service unit was provided with an analysis of the responses by region, a comparison of the results between 2003 and 2006, and with suggestions for

improvement. This gave each unit a good indication of how well they were serving their clients in each region and of what they needed to focus on to improve. To the Panel's knowledge no other CGIAR center has conducted such internal customer satisfaction surveys and IWMI should be commended for this effort in improving the quality of its internal services.

8.4 Corporate Services

The Panel could not devote much time to an examination of other corporate services but noted that:

- The Information and Communication Technology unit (ICT) is now part of the joint IWMI-WorldFish International Research Support Services (IRSS). It provides support for *SAP*, HR, eLibrary, ePublishing and other business solutions and deals with network and communications, hardware, software development, helpdesk and ICT strategy. The unit has developed a set of detailed policies and procedures in collaboration with other CGIAR centers (WorldFish, CIMMYT and ICARDA) and is in the process of developing a business continuity plan. The unit's ratings in the 2006 customer satisfaction survey were generally high, mostly in the 80 to 90% range, which represents an improvement over already high results in 2003.
- In the area of procurement, purchases of less than US$1,000 can be made directly by approved managers, purchases from US$1,000 to US$5,000 require two quotations and purchases from US$5,000 to US$25,000 require three quotations. Other purchases require competitive bidding. Major exceptions are computing equipment, for which there is a coordinated policy of buying directly from Hewlett-Packard in Singapore, and vehicles which are bought directly from Toyota Lanka at prices lower than those offered by suppliers on the UN list. IWMI is also harmonizing its purchasing policies and procedures with WorldFish.
- While some services are already outsourced, e.g. cafeteria, travel, janitorial services, IWMI should periodically examine the cost/benefit of outsourcing others, e.g. printing.

8.5 Joint Venture with WorldFish

IWMI and WorldFish have initiated a cooperation that goes further than any other CGIAR centers have done. In 2005 the management of the two centers met to examine areas for possible synergies in corporate services. As a result of their discussions, the two centers prepared a joint venture agreement, which is in the process of being approved by their respective boards, for the creation of an International Research Support Services (IRSS). The agreement was reviewed by legal staff at the World Bank. The IRSS is hosted by IWMI. It does not have separate legal entity. It is headed by a director selected by the Steering Committee. The DGs of IWMI and WorldFish and the director of the IRSS constitute the joint venture's Steering Committee. The IRSS is structured so as to be able in the future to (a) accept other centers as partners and (b) sell its services to other non-CGIAR research organizations. Discussions have been held with ILRI and ICRAF which are also developing their cooperation in the corporate services area.

A well structured business plan explains the objectives of the IRSS, as well as the key success areas, the costs, benefits and risks of such a venture, the proposed structure, and the implementation plan. The IRSS' four objectives are to:

- offer better value through cost effectiveness;
- offer better quality services than the centers could offer on their own;
- develop new and innovative services and delivery tools and mechanisms;

- facilitate synergies between member organizations through alignment of business systems and processes.

The IRSS started with the harmonization of policies and procedures between IWMI and WorldFish in the areas of Finance, HR and Information Technology services. As of this writing staff from the respective units concerned in IWMI and WorldFish physically remained in their location but their reporting relationship has (in the case of IWMI) or will shortly (in the case of WorldFish) switch to the Director of the IRSS. These service units are now operating as service providers to IWMI just as an outsourced service provider would. IWMI has retained one senior staff in HR and one in Finance to be their interface with the IRSS and the managers of the service contract with the IRSS. IWMI's regionally based Finance remain with IWMI for the time being. Whether or not they will join the IRSS at a later point remains to be decided. Service Level Agreements will be signed later between IRSS and IWMI to define the type and level of service expected as well as the performance criteria. One performance criterion would be that future customer satisfaction surveys would show satisfaction levels at least equal to those in the most recent survey.

While the potential benefits of such a joint venture are clear and are stated in the above objectives (possible cost reductions, better services, innovation, synergies), the risks may be less obvious but are well highlighted in the business plan. They could be, for example: a major disruption in service; an added layer to the process; services too far removed from the beneficiaries; the IRSS does not provide the expected benefits; it might be difficult to reconstitute the services in house if the joint venture were dissolved; the IRSS might neglect its current clients for the benefit of other better paying customers; it might increase its costs beyond what IWMI would find cost-effective; IWMI's strategic priorities in these vital areas of Finance, HR and ICT might be ignored; IWMI might not be adequately protected and its liabilities expanded. If the model is cost neutral the joint venture would still be worthwhile if services are improved over what each center could do separately. A careful crafting of the joint agreement and of the service agreements between IWMI and the IRSS and a careful oversight by the two founding partners should limit those risks.

At their March 2006 board meetings held concurrently in Penang, the two centers also started more systematic contacts between their boards (see chapter on Governance for more detail) and they also started a process to increase the programmatic cooperation between the centers. As explained earlier in the report, a group of scientists from both centers met to start a bottom-up effort to identify areas for programmatic cooperation. The IWMI DG mentioned that there was a natural cooperation between the water and fisheries groups in FAO and that a similar cooperation should be possible between IWMI and WorldFish. With respect to communication, information sharing and knowledge management, the two centers are sharing views and experience and have recently hired a staff on a joint position to further develop that aspect of the cooperation. This area of cooperation does not fall under the IRSS.

Should this joint venture model of cooperation succeed, the benefits should be in better systems and higher quality services offered to the participating centers without each of them having to "reinvent the wheel". From a cost perspective, the expected savings might be offset by the creation of additional positions (e.g. the IRSS Director of Corporate Services).

The Panel wishes to commend both centers for their innovative efforts at cooperation within the CGIAR and suggests that IWMI monitor the situation closely during the initial period of

implementation. The Panel understands that the Board has requested a risk analysis from IWMI management.

8.6 Management and Governance of Challenge Program on Water and Food

The Challenge Program on Water and Food (CP) is an unincorporated joint venture of 19 partner organizations which signed a common agreement. IWMI is the leading partner of the CP and hosts its secretariat. The oversight body of the CP is a Steering Committee composed of 19 persons who represent the 19 partner organizations. IWMI, as the lead institution, nominates the coordinator who is appointed by the Steering Committee. The Steering Committee also appoints the 5 CP theme leaders and the 9 basin coordinators. The Steering Committee met twice a year for the first two years but currently meets only once a year although it holds virtual meetings during the year. It approves the work plan and budget. While the Panel did not observe the Steering Committee in action it believes that, by virtue of its size, it cannot offer the degree of guidance, oversight and monitoring similar even to that of CGIAR Center Boards. From what the Panel could observe, the IWMI Board oversees only that part of the CP for which IWMI is the implementing agency but it does not provide oversight of the whole CP. The Panel suggests that, since the CP is an unincorporated joint venture, the IWMI Board should examine its own role and responsibilities in terms of CP oversight especially in view of recent issues raised with respect to the CP's bidding process. It should also examine who is accountable in case of problem since all CP funds transit through IWMI and the extent to which the CP is drawing away time and resources from other activities in IWMI.

The CP is managed by a coordinator supported by a management team which used to be composed of all theme leaders and basin coordinators. The management team is currently composed of only 6 people: the coordinator, a program manager based at IWMI, a representative of the theme leaders, a representative of the basin coordinators, a representative of the North and a representative of the South. The management team runs the CP on a day-to-day basis. The CP operates on a project basis. Project proposals are prepared for which funding is then sought and the management team makes calls for competitive proposals for which various organizations (IWMI, other CGIAR centers, ARIS, NARS, the private sector or various combinations of those) can bid. The management team identifies independent reviewers to review the bids; the names of the potential reviewers are sent to a scientific panel which ratifies the process but not the actual selection.

By contract each implementing organization is responsible for the execution of its part of the project and carries the corresponding liability. IWMI's liability is limited to those projects for which it is the implementing agency. IWMI's liability and financial risk for the projects executed by other organizations is limited. IWMI, however, as the lead agency, carries a reputational risk should anything go wrong in the CP.

An audit of the CP carried out in 2005/2006, and submitted in September 2006, by the CGIAR Internal Auditing Unit made recommendations with respect to the number and skills of CP staff, the follow-up of outstanding annual audited financial statements, the requirements for project audits, the type of contracts with partners, the need for service level agreements with IWMI and/or the IRSS and the CP financial monitoring. While the audit considered the day-to-day CP controls as operating satisfactorily, the Panel is concerned by the limited financial, budgetary and operational reporting within the CP. The audit did not make any recommendation with respect to the CP's bidding process which later became the subject of a complaint by one of the bidders.

Another audit was then commissioned to review the bidding process. While this second audit found no basis for the allegations of conflict of interest and undue influence by IWMI, and while it found many positive attributes in the control environment within the CP, it nevertheless found the controls over the process of awarding competitive grants to be unsatisfactory and made a number of recommendations in that respect, including the cancellation of the first call for bids and the deferment of the second call. These unfortunate circumstances underline the possible financial risks and most certainly the reputational risks carried by IWMI as the lead institution of the CP. This reinforces the Panel's view that the IWMI Board needs to be very diligent in its oversight of IWMI's roles and responsibilities in the CP and it needs to satisfy itself that appropriate monitoring and control policies and procedures are in place.

In terms of budgetary presentation it is not always clear where the IWMI budget ends and where the CP budget starts. The fact that all CP monies flow through IWMI doesn't facilitate matters. Nevertheless, the Panel feels that in all its presentations and documentation, whether budget, staffing, etc., IWMI should always clearly distinguish what is IMWI and what is CP. This will facilitate monitoring and follow-up by management, the Board, donors and the CGIAR. It would also allow for easier comparisons with other CGIAR centers. The Panel understands that there were differing views within the CGIAR as to how centers should report Challenge Program expenditures. For the first few years of the CPWF, IWMI did indeed include the CPWF expenditures in the IWMI financial report (making it harder to distinguish). For the last two years IWMI has reported "non-IWMI CPWF expenditures" in a separate line, and starting with the financial report for 2006 there will be a completely separate financial report for the CPWF and IWMI.

In terms of project identification and implementation, the Panel feels that there is not always a clear differentiation between IWMI projects and CP projects. In fact, some CGIAR Centers and organizations participating in the CP feel that IWMI is using the CP to fund some of its core projects as opposed to IWMI participating in core CP projects. As one interviewee put it, "IWMI tries to pay its researchers with CP money".

While IWMI has undoubtedly been in the forefront of the development of the Water and Food Challenge Program, it needs to more clearly distinguish it from its own programs, it needs to improve the CP's policies, procedures and monitoring systems and in order to maintain good working relations with its partners it needs to avoid being perceived as funding its own programs with CP money.

The Panel understands that an external review of the Challenge Program will be carried out in 2007 and it endorses that decision.

9 FINANCE

9.1 Funding

IWMI's unrestricted and restricted donor funding for the years 2000 to 2005 is shown in Table 9.1. Unrestricted funding as a percentage of total core funding, excluding non IWMI Challenge program, has varied between 32 and 45% over the years 2000 to 2005. While it declined as a percentage of total core funding (from 45% in 2000 to 33% in 2005), it increased in nominal US dollars from US$ 3.9 million in 2000 to US$ 7.9 million in 2005 (an increase of 104%).

On the other hand, restricted funding as a percentage of total funding has varied between 55 and 68% over the years 2000 to 2005. The restricted funding has not only increased by 13% of total donor funding but also increased in nominal US dollars from US$ 4.8 million in 2000 to US$ 16.0 million in 2005 (an increase of 231%).

Overall, donor funding almost tripled during the period under review: from US$ 8.7 million in 2000 to US$ 24.0 million in 2005 (+ 174%). Since 2002 the major donors to IWMI (US$ 1 million or more of combined restricted and unrestricted funds during at least one of the years) were: ADB, Canada, FAO, France, Netherlands, Sweden, Switzerland, United Kingdom, USAID, World Bank.

Table 9.1 Unrestricted and Restricted donor funding trends for 2000 to 2005.(US$ million)

Year	Unrestricted		Restricted Core		Total Core	Of which IWMI CP	Non-IWMI CP	Total IWMI
2000	3.908	45%	4.855	55%	8.763	-	-	8.763
2001	4.887	44%	6.121	56%	11.008	-	-	11.008
2002	6.593	32%	14.310	68%	20.903	.632	-	20.903
2003	6.825	35%	12.759	65%	19.584	2.542	2.588	22.172
2004	7.227	35%	13.712	65%	20.939	1.671	2.106	23.045
2005	7.963	33%	16.075	67%	24.038	1.595	5.603	29.641

9.2 Revenue and Expenditure

IWMI's revenues, which include other revenue in addition to Donor funding, and expenditure for the years 2000 to 2005 are shown in Table 9.2. The Center ended the years with a surplus with the exception of 2003, in which there was a deficit of US$ 0.72 million. The Center had a surplus of US$ 0.74 million and US$ 0.43 million for the years 2004 and 2005 respectively. This was possible because since the beginning of 2005 IWMI had already built in its operating budget US$0.5 million in each year to improve the level of reserve.

Table 9.2. Revenue and Expenditure trend 2000 to 2005

(US$ million)

	2000	2001	2002	2003	2004	2005
Revenue						
Unrestricted	3.908	4.887	6.593	6.825	7.227	7.963
Other revenues*	0.352	0.530	0.186	0.180	0.170	0.455
Sub total	4.260	5.417	6.779	7.005	7.397	8.418
Restricted	4.855	6.121	14.310	12.759	13.712	16.075
Total Revenue	**9.115**	**11.538**	**21.089**	**19.764**	**21.109**	**24.493**
Expenditure						
Unrestricted	3.940	5.322	6.676	7.729	6.657	7.985
Restricted	4.855	6.121	14.310	12.759	13.712	16.075
Total Expenditure	**8.795**	**11.443**	**20.986**	**20.488**	**20.369**	**24.060**
Surplus/(Deficit)	**0.320**	**0.095**	**0.103**	**(0.724)**	**0.740**	**0.433**

**Other revenues include investment income, bank interest, exchange gains and sundry income.*
The above figures exclude non IWMI Challenge program.

9.3 Program and Non-Program Expenditure

IWMI's expenditure showed an increase of 174% which was in line with the increase in donor funding for the period 2000 to 2005. However, the non-program expenditure showed an increase of 38% only (from US$ 2.7m in 2000 to US$ 3.8m in 2005), leaving more funds for program related activities which increased by 216% (from US$ 6.7m in 2000 to US$ 21.2m in 2005). The break down of program and non-program expenditure is shown in Table 9.3.

Table 9.3 Expenditure broken down into program, non-program and total for 2000 to 2005 and Budget 2006. (US$ '000)

OPERATING	2,000	2001	2002	2003	2004	2005	Budget 2006
Program							
Admin Budgets - Base Projects	152	652	465	623	602	258	239
Irrigated Water Management Agriculture (IWMA)	1,225	3,237	2,286	2,487	2,248		
Basin Water Management (BWM) Theme 1						5,156	5,193
Sustain Smallholder Land & Water Mgt. (SSLWMS)	1,562	1,664	1,872	2,417	2,844		
Land, Water and Livelihoods (LWL) Theme 2						3,136	4,606
Sustainable Groundwater Mgt (SGM)	2,046	540	695	748	627		
Agriculture, Water and Cities (AWC) Theme 3						978	1,291
Water Resources Ins. & Policies (WRIP)	1,024	1,980	6,567	2,500	2,419		
Water Management and Environment (WME) Theme 4						1,077	969
Water Health & Environment (WHE)	559	1,210	1,139	1,327	1,340		
Systemwide Initiative on Malaria & Agriculture (SIMA)			493	339	520	420	116
IN-KIND & Cash Grants *						2,722	424
Comprehensive Assessment			1,691	2,689	2,551	1,649	1,420
Dialogue Secretariat			652	558	335	5	-
Other Hosted Activities						113	390
Challenge Program			632	5,130	3,777	7,198	10,409
Less: Non-IWMI Challenge Program				(2,588)	(2,106)	(5,603)	(8,208)
Global Water Partnership			575	517	426	923	736
Regional Office Operational Costs			1,784	1,207	1,477	2,236	3,227
Capacity Building & Training				244	342	314	385
EPMR	163						110
General				350	365	683	480
Sub - Total	**6,731**	**9,283**	**18,851**	**18,548**	**17,767**	**21,265**	**21,787**
Non - Program							
Governing Board	203	247	250	253	319	254	177
Finance and Administration	839	860	1,100	1,001	1,225	1,314	1,642
Office of DG	472	386	451	509	630	565	638
Communications & DR Office	559	508	631	737	670	745	781
General operations	191	195	202	260	261	467	266
Depreciation	488	450	432	465	447	455	550
Sub – Total	**2,752**	**2,646**	**3,066**	**3,225**	**3,552**	**3,800**	**4,054**
Indirect Cost Recovery	(688)	(486)	(931)	(1,285)	(950)	(1,005)	(925)
GRAND TOTAL	**8,795**	**11,443**	**20,986**	**20,488**	**20,369**	**24,060**	**24,916**

** Prior to 2005 these amounts were reported under Sustain Smallholder Land & Water Mgt. (SSLWMS)*

9.4 Expenditure by Natural Classification

IWMI's personnel cost increased by 150% during the period from 2000 to 2005 which is less than the overall increase in expenditure of 174 % for the same period. The personnel cost as a percentage of the total expenditure decreased from 62% in 2000 to 57% in 2005.

Table 9.4 Expenditure by Natural Classification for 2000 to 2005 (US$ '000)

	2000	2001	2002	2003	2004	2005
Personnel Cost	5,458	7,189	10,726	11,672	12,590	13,642
Supplies and Services*	1,935	2,828	8,180	4,117	3,222	4,161
Travel**	914	976	1,648	2,037	2,144	2,002
Collaborations - Partnerships	-	-	-	2,197	1,966	3,763
Depreciation	488	450	432	465	447	492
Total	**8,795**	**11,443**	**20,986**	**20,488**	**20,369**	**24,060**

**Water Dome expenditure of US$ 4.3m included in 2002.*
*** Increase after 2002 are mainly due to IWMI-Challenge Program activities.*

9.5 Resource Allocation by Developing Region (%)

IWMI's percentage resource allocation by developing region is shown in Table 9.5. The proportion going to Sub Saharan Africa grew significantly from 9% to 38 % during the period 2001 to 2005. The allocation for Latin America grew from 5% to 11% and the allocation for West and North Africa grew only by a modest 2%. Asia saw its allocation decrease almost by half, from 80% to 43%.

Table 9.5 IWMI Resource Allocation by Developing Region (%)

Region	2001	2002	2003	2004	2005
Sub-saharan Africa	9%	13%	19%	28%	38%
Asia	80%	76%	70%	63%	43%
Latin-America (LAC)	5%	4%	5%	4%	11%
West Africa and North Africa	6%	6%	6%	5%	8%
TOTAL	100%	100%	100%	100%	100%

Source: CGIAR document for Panel briefing on CGIAR Finance

9.6 Financial Indicators

Long term financial stability is measured by the *adequacy of reserve indicator* (unrestricted net assets less net fixed assets over operating expenses per day). IWMI had an adequacy of reserve indicator of 65 days and 71 days at the end of 2004 and 2005 respectively. This is slightly short of the CGIAR recommended level of 75 to 90 days and well below the CGIAR average of 145 days and 137 days for 2004 and 2005 respectively. IWMI is aware of this situation and beginning in 2005 built in its operating budget an amount of US$0.5 million each year to improve the level of reserve.

Liquidity is measured by the *working capital* (current assets including long term investments less current liabilities over operating expenses per day excluding depreciation). IWMI had a working capital of 91days and 96 days at the end of 2004 and 2005 respectively. This is just within the CGIAR norms of 90 to 120 days and well below the CGIAR average of 170 days and 163 days for 2004 and 2005 respectively.

The *current ratio* (current assets over current liabilities) was 1.46 at the end of 2004 and 2005. This was considerably lower than the healthy current ratio of 2.91 and 2.28 for 2000 and 2001 respectively.

The efficiency of operations is measured by the *indirect cost ratio* (management and general administration expenses over program related expenses; the lower the ratio the better). IWMI's indirect cost ratio was 22% in 2004 and 2005, about the CGIAR average.

9.7 Financial Administration

IWMI's Finance Department had 13 staff in 2005 as against 9 in 2000. This was necessitated by the overall increase in the budgeted expenditure during this period. Its expenditure was US$ 0.22m in 2005 compared to US$ 0.09m in 2000, which was 0.93% of total expenditure in 2005 and 1.00% of total expenditure in 2000. Apart from the headquarter-based Finance function being "outsourced" to the IRSS, as explained in the previous chapter, there has also been a restructuring in the Finance function: some staff were made redundant while others, with a different profile, were hired. Not all IWMI staff understood the rationale for hiring financial staff after others had been let go.

9.8 Budget Planning and Control

The Budget planning exercise for the subsequent year begins in August of the current year. Project leaders, Theme leaders, Regional Directors, Program office, Budget officer, Head of Finance, Research Director and Director General are involved in different stages of the process. The proposed budget is presented to the Board's Executive and Finance Committee for their deliberation and recommendation to the Board for approval. The entire budget planning process is sound and flexible enough to adjust internally at a given point of time to reflect any increase or decrease in actual grant revenue. There are continuous discussions on budgetary control between Program office, Budget office and Project leaders to adhere to restricted Donor grant agreement. The Budget office is also eager to look for scope for improvement while migrating to SAP. The panel commends the entire team involved in the Budget planning exercise at IWMI.

9.9 Financial Accounting and Treasury

Cash flow and investments

IWMI's investments are handled by its Treasury unit in Finance and IWMI's excess funds are placed by its bank in interest bearing investments so as to generate better returns. It is important for management to periodically review cash flow statements because they not only provide the opportunity to better invest the Institute's excess funds but they also allow management to better monitor the status of grant receipts and thus avoid potentially lengthy delays. Hence the panel suggests that an investment committee consisting of DG, Director Corporate Services and Head of Finance meet on a weekly or bimonthly basis to review the cash flow statement as well as the status of donors' grant receivable/payable status. This will enhance the cash position and strengthen donor relations through early and appropriate follow up.

Foreign currency translations

IWMI is following the practice of using the month beginning exchange rate for translating and recording into U.S. Dollars its transactions in other currencies. Even though this is an acceptable practice, it may not be the most beneficial for IWMI, especially for grant receipts which are usually high in value. *The panel suggests* that IWMI record the amount based on actual exchange rate on the date of grant receipt rather than using the month beginning exchange rate.

Staff cost accruals

Staff costs, other than the salary and allowances which are paid out on a monthly basis, are accrued to reflect the actual or estimated cost to be charged to projects/cost centers and create an equal amount as liability. Currently IWMI is accruing staff cost either annually or biannually. *The Panel suggests* that the staff costs be accrued on a monthly basis in order to reflect the true cost of the projects at any given point of time.

Safe keeping of financial data

After IWMI lost substantial accounting data due to hard disk failure in their regional office in Pakistan, the external auditors recommended in 2002 that backup copies of financial data be stored at a location away from the main office at regular intervals so as to avoid data loss in case of a catastrophe. The volume of transactions will determine the frequency at which back up data need to be stored at the offsite location. IWMI's management responded: "*Agreed. Procedures were in place but not adhered to by staff* ". However, at the time of the Panel's visit in June 2006, the backup files of headquarters were not safeguarded at another location. *The Panel urges* the management to take action.

Monthly financial reports

It is essential that the monthly financial reports prepared by the Finance department be accurate, informative and timely so that end users can make meaningful use of the information. It helps the researchers and managers to keep abreast of their project expenditure and to have mistakes rectified quickly. The panel noted that the first financial report covering the period January to April 2006 was sent to users only by the end of May 2006. Some of the researchers the Panel spoke to were very unhappy with this delay and some of them have maintained their own records to keep track of how much they are spending on their projects. This could result in project managers "managing in the dark", making decisions with little, no or inaccurate information. Apart from this specific problem, the 2006 Customer Satisfaction Survey for Finance showed a low (and decreasing compared to 2003) level of satisfaction and a high (and increasing

when compared to 2003) level of dissatisfaction with all items relating to project expenditure reporting. It is expected that the implementation of SAP (at headquarters in 2006 and in the regions in 2007) will resolve this situation since it will essentially provide managers and project leaders with live information.

Contents of Financial reports

The Panel noticed that there is scope for improvement in IWMI's financial reports. The Statement of Expenditure sent to users does not provide for current month budget and year-to-date budget figures for comparison to actual expenditure. The Panel checked that this feature is now provided in SAP. Financial Reports are sent biannually to the Audit Committee and Executive and Finance Committee of the Board. Six months is a long gap to undo the wrong, if any. *The Panel suggests* that the reports be sent to these Board committees on a quarterly basis. This corresponds to a suggestion made by the IWMI Board itself at its May 2001 meeting. The Panel is surprised, therefore, that reports are only sent biannually to the Board.

9.10 Financial System

IWMI uses the EPICOR software package for its financial accounting and reporting functions. There were problems with the current system, including the delay in releasing the first financial report in 2006, and it generated a very high level of dissatisfaction in the 2006 Customer Satisfaction Survey for Finance. To resolve this situation, and as part of moving its Finance function to the IRSS, IWMI was in the process of migrating to SAP at the time of this EPMR review and it adapted WorldFish's financial reports for its own needs. The Panel noticed that the WorldFish's sample report shown (Statement of Center-wide Operating Results) did not have the current month budget and current month actual figures. IWMI is confident that these will be addressed in SAP. IWMI should make sure that the new system is flexible enough to address the add-on information based on user requirements.

9.11 External Auditors

CGIAR Financial Guideline Series No.3 "CGIAR Auditing Guideline" which governs the selection of external auditors for CGIAR Centers strongly recommends that centers should have a formal policy of rotation of external auditors every 5 to 7 years. IWMI has finally adhered to the above Guideline by changing their external auditors to Ernst & Young at the beginning of the 2005 financial year after having Price Waterhouse Coopers (PwC) as external auditor for over fifteen years. The External Auditors conduct the audit in accordance with the International Standards on Auditing. The Board's Audit Committee ensures that accounts and financial statements are properly audited by the External Auditors and reviews and recommends for Board approval the external audit plan and objectives for the subsequent year. The quality of external audit and the communication between the External Auditors and the Audit Committee of the Board were found to be satisfactory.

9.12 Internal Auditors

IWMI has obtained internal audit coverage from a combination of services provided by the CGIAR Internal Audit Unit (IAU) since 2002 and by the local representatives of one of the "Big 4" audit firms. The IAU undertakes the more complex audit assignments requiring a more strategic view, in particular those requiring a good knowledge of the CGIAR System and good practice among the centers, and can draw on various internationally experienced personnel for

these assignments. IAU audits are not limited to financial audits but deal with all issues that impact the center. The local audit firm (KPMG till 2005 and PwC from 2006) provides more cost effective sourcing of routine assurance assignments and those requiring a good knowledge of the local environment.

IAU, in consultation with the DG, prepares a comprehensive work plan and submits it to the Audit Committee of the Board for their deliberation and further approval by the Board. The medium term internal audit plan for 2006-2008 was approved in November 2005. IAU provides periodical status reports to the DG and the Audit Committee on audit work program assigned for the year. The Center's management indicated that it was very well served by the IAU. The Panel confirms that IWMI's internal audit is in the hands of competent professionals at IAU and well supplemented by the local audit firm.

9.13 Outsourcing to International Research Support Services (IRSS)

As described in the previous chapter Management and Administration, IWMI has outsourced its Finance function to the IRSS. This need not be covered in any more detail here.

9.14 Risk Management

IWMI has put in place a well documented Risk Management Policy and Framework. The Framework sets out the methodology for risk analysis across a broad range of internal and external risk categories. Major and Principal risks including foreign exchange risk, IT risk, fraud/embezzlement risk etc., were identified. IWMI's management completed, with facilitation by the CGIAR Internal Audit Unit (IAU), a detailed risk assessment matrix at the Institute level in March 2005. Along with a summary of major and principal risks arising from the analysis, this assessment was shared with the Audit Committee of the Board in order to enable the Audit Committee and management to develop a shared awareness of these risks. This supported the preparation of the Board Statement on Risk Management adopted by the Board at its May 2005 meeting. As part of its monitoring of potential risks for IWMI, the IAU has indicated to the Panel that it will specifically monitor the implications of the outsourcing of IWMI's Finance function to the IRSS.

10 OVERALL ASSESSMENT

10.1 Achievements and Outcomes

Since the 2nd EPMR in 2000, IWMI has undergone a substantial growth in funding and an expansion in its mission. Not only has land been added to its portfolio but its definition of what can be included in water has expanded. IWMI, and especially the Director General, are to be commended for more than doubling the Center's budget and for the substantial increase in research staff, both of which are critical for fulfilling its research mission. In increasing its staff, IWMI has also significantly increased the number of women and the share from the South.

Based on IWMI's past research efforts and the emerging results of the Comprehensive Assessment of Water Management in Agriculture, IWMI is using the water-food-environment nexus as the key to its vision. IWMI has entered into new research areas such as urban and peri-urban agriculture and is looking across the hydrologic-cycle at blue, green and grey water. IWMI has begun to look at multiple water uses and to assess potential trade offs between agricultural productivity, human health and the environment. The Panel commends IWMI for recognizing the need to consider water management in a holistic manner, with the overarching mission to "improve the management of land and water resources for food, livelihoods and nature." IWMI's river basin concept, with some refinement, has turned out to be an important unit of analysis and has grounded much of the field research. During this period, IWMI has also taken major responsibility for the CGIAR Challenge Program of Water and Food, with implications for managing research projects across several benchmark basins.

At the international level IWMI research projects have led to some important outcomes over the last five years. These include the Hyderabad Declaration on Wastewater Use in Agriculture, the revision of WHO Guidelines as influenced by IWMI's work on the safe and productive use of waste water, and the Copenhagen Consuensus in which it was accepted that small scale water technologies for livelihoods, and research on water productivity in food production provide important opportunities for achieving Millenium Development Goals (MDG). IWMI has also become the Fifth International Organization Partner of the Ramsar Convention.

During the period under review, IWMI has substantially increased its regional programs and with it, has shifted nearly 40% of its program and staff to Africa, and 20% to new areas in Asia. Both of these changes are significant and have resulted in some very effective programs and partnerships. The Panel notes with satisfaction that IWMI has kept abreast of other research and development organizations in becoming a globally dispersed organization that is able to respond to regional and global challenges.

As a result of this significant growth and decentralization to the regions, IWMI has been able to work with an array of institutional partners. The Panel noted the efforts of the regional offices in engaging their partners and enhancing synergies at the regional and sub regional levels. At the same time, IWMI has been conscious of the need to make a clear distinction in its activities and in the way they are managed and funded in support of national/downstream activities and those that provide IPGs.

The transformation that has taken place in programs is backed by the impressive managerial changes that have been instituted. With the dynamic leadership of the Director General, IWMI has done a remarkable turnaround in the area of human resources management. From an

institute where, as indicated in the CCER on HR, "past practices fell well short of the expectations of a contemporary research organization", IWMI has moved on to one that is "probably at the leading edge of the CGIAR practices for managing and developing people". Some of the significant changes are the implementation of a One Staff concept, the creation of Regionally Recruited Staff positions, an increased level of diversity, the introduction of a leadership development program and of a new performance management system, the use of feedback instruments such as staff surveys, internal client surveys and 360 degree feedback for all managers.

IWMI has developed an extensive cooperation with the WorldFish Center to a level not yet seen in the CGIAR. This has resulted in a joint venture agreement for the creation of an International Research Support Services (IRSS) to which the two centers are in the process of outsourcing some of their services, (e.g. Human Resources, Finance, and Information and Communication Technology). The IWMI / WorldFish cooperation is now extending to the Board level and to programs. Since the IRSS is a recent creation it is too early to judge how effective this innovative (for the CGIAR) approach to inter-center cooperation will be but the Panel commends the Director General on trying to stay ahead in a competitive research environment.

10.2 Remaining Weaknesses and Future Challenges

The Panel has taken note of the significant and positive changes in IWMI since the last EPMR. The Panel feels that it is opportune now to assess the challenges that face IWMI and suggest ways to move forward. The Panel feels that several priority actions need to be put in motion and these have been summed up in the recommendations of the report.

The Panel feels that IWMI is well served by its holistic and comprehensive approach to water resources management. However, much like the last EPMR, and more so now given the size of the Center today, the Panel is concerned with the breadth of IWMI's expanded mission and vision, and the tendency this has caused for IWMI to overextend itself in areas where it has no comparative advantage. The Panel recognizes the value of the Strategic Plan and the Medium Plan documents but believes that the Center needs a clearly articulated strategy that defines its priorities, and that resources are thereafter applied stringently towards addressing them. IWMI must continue to focus on the critical issues involved, sharply define and prioritize the research questions and thereafter ensure that these are periodically reviewed. In particular, the Panel feels that there is need for clearer delineation of research topics/questions within the themes and their specific application to filling the knowledge gaps.

One of the strong recommendations of the last EPMR was the need for IWMI to adopt a more formal process for priority setting and impact assessment. IWMI has not done enough in this regard. The Panel feels that IWMI must with some urgency address this issue both by hiring dedicated staff and cooperating with other CGIAR Centers in systematic impact assessment.

The Panel has noted the strides made towards interdisciplinary research and especially the ability of IWMI researchers to work at the interstices of the water-food-environment nexus. At the same time, the Panel feels that the rigor required in some disciplines has been diluted. The Panel has also raised the issue of focus and encourages IWMI to address the concern of overstretching with too few researchers in too many regions.

The Panel has concerns about the relatively inexperienced overall staff profile, the absence of a relatively senior second tier management, an absence of a strategic staffing strategy and about a possible leadership void after the departure of the current Director General. The Panel feels strongly that there should be a better staffing balance and that the Center should recruit a Deputy Director General-Research, and senior discipline-based professionals so that IWMI by providing quality research leadership, can solidify its reputation.

The Panel finds that IWMI, starting from a low base in 2000, has increased its publication rate considerably. However, IWMI is still below what other CGIAR Centers have achieved. This is an area that IWMI needs to continue to work on by focusing on publishing more by researcher and in more high quality international journals. IWMI has done a great deal in training and capacity development but it could develop longer-term relationships with some key universities working in the area of water resources.

The Center has an excellent leadership training program that brings staff together across the organization. This appears to have had very positive effects in building the organization's program management skills and general morale. However the Panel has expressed its concerns about the current Management Team and the need for senior discipline-based researchers to elevate its profile.

Partnerships have become increasingly important for IMWI with its new push to become a world class knowledge center. This requires expanded efforts in knowledge sharing, brokering, and application. This would not be possible without shifting sizable parts of IWMI's research budget to this outreach effort while increasing partnering with other organizations to do much of the knowledge extension. The Panel commends the Center for its bold new vision but cautions it against overstepping its primary research mandate.

The last EPMR stated that the Board needed to run a "tighter ship with clear delineation of responsibilities between the Board and Management". It is the Panel's judgment that this has occurred in some areas, particularly with regard to finance. The Panel notes that the Board has done a good job of monitoring HR and other major initiatives suggested by the Director General, but feels that the Board still needs to provide more program oversight, and suggests a Science Council reporting to the Board to improve due diligence.

In conclusion, the Panel believes the scarcity of land and water for food production, particularly water, will increase in the decades to come. IWMI is very well placed to research the many dimensions of global water scarcity by bringing new insights into the broader water-food-environment challenge. The Panel strongly believes the new Director General will have a solid base on which to build.

Annex 1
IWMI 3rd EPMR Panel Composition and Biodata

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Expertise: Management, management consulting and executive coaching in the international, public, private and non-profit sectors, strategic planning, organization development, executive development.

Education: Master in Business Administration, New-York University, 1972.; Master in Economics, Université de Nancy, France, 1969.

Experience Current position since 2000 - Independent Management Consultant and Executive Coach; Management audit of international agricultural research centers; One-on-One coaching of managers at the World Bank, International Monetary Fund, Inter-American Development Bank, ICRAF and private clients. Between 1983 and 1999 held different positions at the World Bank, Washington DC: Senior Internal Management Consultant; Manager, Internal Management Consulting Unit; Manager, Economics and Sector Training Programs, Manager of a major service unit; Previous positions: Senior Management Consultant with Booz.Allen & Hamilton International based in Algeria and Egypt; Independent Management Consultant working for small and medium size French companies, for Booz.Allen & Hamilton International and for Qatar Petrochemical Company. Co-founder and first manager of a small consumer cooperative, Cofac, France. Participated in project appraisal, supervision and evaluation missions for the World Bank to assess/evaluate the effectiveness of proposed/actual organization structures, policies, systems and procedures of public sector organizations in Burkina Faso, Burundi, Colombia, Egypt, India, Ivory Coast, Kenya, Mauritania, Mexico, Peru, Senegal,Tanzania, Vietnam. Participated in the EPMRs of four CGIAR centers: CIAT, ICRISAT, CIP, WARDA.

WALTER, Michael (USA)

Position: Professor, Biological and Environmental Engineering, Cornell University.

Education: PhD in Water Resource Engineering, University of Wisconsin, Madison.

Expertise: Civil engineering, agricultural engineering, water management.

Experience: A specialist in water management, Walter joined Cornell University in 1974 after completing his graduate studies. His prior experience includes work as a civil engineer for the Bureau of Water Resources of the Illinois Division of Waterways. At Cornell he has served on the Faculty Council of Representatives and the University Council. He teaches hydrology, watershed engineering, and soil and water conservation engineering. Walter is a member of the American Society of Civil Engineers, American Society of Agricultural and Biological Engineers, and the Soil Conservation Society of America. Selected research projects: Non-Point Source Pollution Control for Animal Agriculture , Variable Area Hydrology in NY City Water Supply, Irrigation Support Project for Asia and the Near East ; Hill Area Land and Water Development Project-India); Diversified Cropping-Philippines ; Private Tube Well Development-Pakistan ; Transport Pathways and Fate of Cryptosporidium parrum Oocryps from Infected Dairy Wastes. He has served as the BEE department chair since 1994.

Annex 2
Terms of Reference
for External Program and Management Reviews
of CGIAR Centers

BACKGROUND

Context

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).

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.

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

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).

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.

TERMS OF REFERENCE

Objectives and Scope

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.

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.
The EPMR panel is specifically charged to assess the following:
The Center 's mission, strategy and priorities in the context of the CGIAR's priorities and strategies;
The quality and relevance of the science undertaken, including the effectiveness and potential impact of the Center's completed and ongoing research;
The effectiveness and efficiency of management, including the mechanisms and processes for ensuring quality; and
The accomplishments and impact of the Center's research and related activities.

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 practiced 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 by the Science Council to be Addressed by the 3rd IWMI EPMR Panel as a Supplement to the Standard EPMR ToRs

1. What is the IPG nature of IWMI research? Is there sufficient consideration ex-ante of constraints and options for uptake of the foreseen results of the research?
2. Does IWMI have an appropriate strategic alliance with partners for IPG research? Does the large number of partners give added value to the IPG research? At what cost are the large transaction costs for the partnerships?
3. What strategic changes, if any, should IWMI make to respond to the new System priorities? What areas of research do not fit the Systemwide priorities (i.e. the 20 percent); what research has IWMI forgone in response to the new system priorities?
4. What is the demarcation between the CP water and Food and IWMI programs?
5. Assess where the comparative advantage of the Center lies in the context of the CGIAR System priorities. How has IWMI developed a niche on water issues?
6. Is there an appropriate mix of social versus biological and related sciences considerations? What role does social science have in the research program (e.g. in investigating allocation and access issues, water markets)?
7. How will natural resources and environment be considered and dealt with in the IWMI research agenda? Has IWMI suitably involved other centers such as WorldFish and World Agroforestry in the planning of its research at the catchment and landscape scale?
8. How successful has IWMI been in integrating the International Board for Soil Research and Management (IBSRAM) into its program? To what extent has soil related research been integrated with water research?
9. Does IWMI Board have in place an independent and effective CCER program; how can the IWMI CCER system be improved to streamline the next EPMR?
10. IWMI is implementing a strategy to become an international knowledge Center on water, food and the environment. Is the Knowledge Center approach an appropriate vehicle to re-orient the role of IWMI as an international research center vis-à-vis its partners?
11. In the context of its recent growth and expansion (from US$8.6M (1999) to US$22M (2005), has the Center maintained an appropriate balance between research and other activities (facilitation, coordination, knowledge sharing), between the global and national programs, and between strategic and applied research?
12. Does IWMI's work focus sufficiently on the relationship between poverty, gender and access to water and incorporate these concerns explicitly in research design?
13. How has the Health and Environment Program evolved since the last review? Has the scope been defined appropriately as research on the environment and health topics that are endogenous to irrigation? Has IWMI given high priority to work in the area of irrigation related health issues relating to the provision of safe water for the poor?

Annex 3
Itinerary of the EPMR Panel

Schedule:	6-9 March, 2006:	Bill Easter and Jean Yves Maillat attend the IWMI Board Meeting in Penang, Malaysia (incl. joint sessions with WorldFish Center Board).
	8-15 June, 2006:	Initial phase: entire Panel, including panel consultant, visit IWMI headquarters in Colombo, Sri Lanka.
	16-19 June, 2006:	Bill Easter, Jeff Bennett and Mike Walter visit field sites and IWMI (ICRISAT HQ) office in Hyderabad, India.
	24-26 July, 2006:	Shyamala Abeyratne visits field site and IWMI office in Hyderabad, India.
	29-31 July 2006:	Mike Walter and Shyamala Abeyratne visit field sites and IWMI/IRD office in Luang Phrabang, Laos.
	15-18 Oct. 2006:	Bill Easter, Mike Walter, Shyamala Abeyratne, Jeff Bennett visit field sites and IWMI office in South Africa.
	19-31 Oct. 2006:	Main Phase: entire Panel visited IWMI headquarters in Colombo.

Annex 4
People Contacted/Interviewed by the Panel

Government/Ministry

Sri Lanka

T M Abayawickrama, Secretary, Ministry of Agriculture, Irrigation and Mahaweli Development, Colombo
K A U S Imbulana, Director, Water Resources Division, Ministry of Agriculture, Irrigation and Mahaweli Development, Colombo
J. A. S. A. Jayasinghe, Executive Director, River Basin Planning and Management, Mahaweli Authority
N. C. M. Navaratne, Project Director, Uda Walawa Left Bank Project, Mahaweli Authority
B.M. Samasekera, Director General, Irrigation and Water Management, Dept of Irrigation, Colombo
H. M. Jayatilleke, Director, Irrigation and Water Management, Dept of Irrigation, Colombo
Karunasena Hettiarachchi, Chairman, Central Environmental Authority, Colombo

India

S P Tucker, Principal Secretary to the Govt. of AP, Irrigation and Command Area Development, Hyderabad, A.P.
Sanjay Gupta, Addl. Commissioner, Command Area Development Authority, Ministry of Irrigation, Hyderabad, A.P.
S Narasing Rao, Commissioner, Rural Development, Hyderabad, A.P.
Subba Rao, Secretary, Ministry of Health, Hyderabad, A.P.
Vengala Reddy, Head of Social Development, Andhra Pradesh Urban Services for the Poor (APUSP)
Gayathri Ramachandran, Environment Protection Training and Research Institute, Hyderabad, A.P
R.C. Jain, Superintending Hydrogeologist, Ministry of Water Resources, New Delhi
S.K. Sinha, Sr, Scientist, Ministry of Water Resources, Haryana
Chinmaya Kumar Acharya, Project Mgt Specialist, USAID, New Delhi
S. Chandra, Principal Scientist and Vice President, ISWAM, Indian Ag. Res. Inst., New Delhi
S.K. Kamra, Principal Scientist, ICAR, Central Soil Salinity Research Institute, Haryana
Ashwani Kumar, Director, ICAR, Water Technology Center for Eastern Region, Bhubaneswar

South Africa

Francois Van Der Merwe, Water and Forestry
Ashwin Seetal, Water and Forestry
Barbara Schreiner and staff, Dept of Water Affairs, Pretoria
Gerahard Backberg, Water Research Commission
Sizwe Mkhize, Chief Director: Engineering Services and Resource Management, Dept of Agriculture
R.J. Sebola, Director, Dept of Agriculture
Ashwin Seetal, Director, Water Allocation, Department of Water Affairs
Francois van der Merwe, Senior Specialist Engineer, Department of Water Affairs

NARS

Ratna Reddy, Center for Social and Economic Studies, Hyderabad, A.P.
B Ramamurty, Program Director, Environment Protection and Training Institute, Hyderabad, A.P.
K V Raju, Institute for Economic and Social Change, Bangalore, India

Mishack Molope, Group Executive, Agricultural Research Council, South Africa
Lindiwe Sibanda and Douglas Merrey, FANRPAN, South Africa

Advanced Research Institutes

Alain Pierret, Management of Soil Erosion Consortium, IWMI/IRD Team, Laos
Hoanh Chu Thai, Management of Soil Erosion Consortium, IWMI/IRD Team, Laos
Olga Vigiak, Management of Soil Erosion Consortium, IWMI/IRD Team, Laos
Stefano Farolfi, University of Pretoria/CIRAD, South Africa

Ernest Letsoalo, Rearcher, University of Limpopo (UL)
Graham Jewitt, Associate Professor, University of Kwazulu Natal, South Africa
Jean Marie Fritsch, Professor, Institut de Recherche pour le Development, South Africa
Janitha Liyanage, University of Kelaniya, Sri Lanka
Margreet Zwarteween, Waganingen University, The Netherlands
Henri Vidal, CEMAGREF, France
Patrice Garin, UMR G-EAU, CEMAGREF, France
K. Palanisami, Director, CARDS, Tamil Nadu Agricultural University, Tamil Nadu, India
K.K. Singh, Professor, G.B. Pant University of Agriculture and Technology, Pant Nagar, India
Sylvana Y. Li, Agricultural Research Advisor, USDA, Washington, D.C., USA
Rivka Kfir, Water Research Commission (WRC)
Gerhard Backeberg, Director: Water Utilisation in Agriculture

NGOs

Anshuman Saikia (and staff), Program Coordinator, IUCN, Colombo
Channa Bambaradeniya, IUCN, Colombo
Palitha Jayaweera, COSI, Sri Lanka
Arun Pandhi, IWMI – Sir Ratan Tata Trust Partnership, Gujarat
Kinsuk Mitra, Winrock International, India
Bob Yoder, Consultant, IDE, Colorado (also ex-IWMI staff)
Stephen Mcfarlane, World Vision, South Africa
Kusum Athukorale, Sri Lanka Water Partnership
Niyangoda, Sri Lanka Water Partnerhip
I.P. Abrol, Director, CASA, New Delhi, India

CGIAR Center Staff

Joachim von Braun, DG, IFPRI
Ruth Meinzen-Dick, IFPRI
Mark Rosegrant, IFPRI
Claudia Ringler, IFPRI
Carlos Sere, DG, ILRI
Michael Blummel, ILRI-IWMI collaboration
Steve Hall, DG, WorldFish Center
Patrick Dugan, WorldFish
William Dar, DG ICRISAT
Cynthia Bantilan, ICRISAT
V Balaji, ICRISAT
Barry Shapiro, ICRISAT
Suhas Wani, ICRISAT
Dyno Keatinge, ICRISAT
Jonathan Wooley, Diretor, CPWF
Massoud Shaker, Coordinator, CPWF Limpopo Benchmark Basin Coordinator
Bob Ziegler, DG, IRRI

Dennis Garrity, DG, ICRAF
Brent Swallow, Theme Leader, Principal Scientist, ICRAF
Kanayo Nwanze, DG, WARDA
Mahmoud Sohl, DG, ICARDA
Emile Frison, DG, IPGRI
Joachim Voss, DG, CIAT
Pamela Anderson, DG, CIP
Peter Hartmann, DG, IITA
David Kaimowitz, DG, CIFOR
Masaru Iwanaga, DG, CIMMYT
John Fitzsimon, Head, Internal Audit Unit, CGIAR
Vicki Wilde, Gender & Diversity Program Leader, CGIAR
Manny Lantin, Secretariat, CGIAR
Namita Datta, Governance Adviser, CGIAR Secretariat
Shey Tata, Finance Adviser, CGIAR Secretariat

IWMI Board

Nobusama Hatcho, current Board chair
Remo Gautschi, former Board chair
Rivka Kfir, current Board member
Margaret Catley-Carlson, current Board member
Akiça Bahri, former board member

Ex-IWMI staff

Randy Barker,
Michael Devlin,
Patrick Fuller,
David Governey,
Ania Grobicki,
Initizar Hussein,
Ian Makin,
Douglas Merrey,
Francois Molle,
Hammond Murray-Rust,
Gerry O'Donaghue,
Frits Penning de Vries,
Chris J. Perry,
R. Sakthivadivel,
Chris Scott,
Douglas Vermillion

Donors

Theo Van de Sande, Netherlands
Eija Pehu, Advisor, Agriculture and Rural Development Department, World Bank
Salah Darghouth, Senior Water Advisor, Agriculture and Rural Development, World Bank
Ariel Dinar, World Bank
Preeta Lal, Swiss Development Corporation, India
Sommer, Swiss Development Cooperation

Wouter Arriens, Asian Development Bank, Manila
Robert Bertram, USAID
Scott Bode, Natural Resources Advisor, Office of Environment and Science Policy, USAID
Timothy Miller, USAID
Jean-François Giovannetti, Direction générale de la coopération et du développement, Ministère des Affaires Etrangères, France
Harry Palmier, IRD, France

Other Stakeholders

Carlos Garces, IPTRID, FAO, Rome Italy
Robert Herdt, ex-Rockefeller Foundation
Jack Keller, Utah State University
Mark Svendsen, Consultant, Oregon, USA
Saberwal Vasant, the Ford Foundation, India
Per Pinstrup Andersen, Chair, CGIAR Science Council
Gil Levine, Prof. Emeritus, Cornell University, Ithaca, N.Y. USA
Aasiri Gunasekera, Partner, Ernst & Young, Sri Lanka
Philip Merry, consultant, Philip Merry Consulting Group Pte Ltd, Singapore

Annex 5
List of Documents Reviewed by the Panel

1. ToR and Guidelines for External Program and Management Reviews of CGIAR Centers.
2. Report of the Second External Program and Management Review of ILRI.
3. Summary of actions taken in response to the last EPMR.
4. CGIAR research Priorities 2005-2015.
5. The latest Board-approved Strategic Plan of the Center: Strategic Plan 2004-2008.
1. Medium-Term Plans of the Center for the period of the review.
2. SC commentaries of the Center's Medium-Term Plans.
3. Center Commissioned External Review Reports:
   - CCER of IWMI Theme Agriculture Water Management - Theme 1.
   - CCER of IWMI-Tata Water Policy Research Program.
   - CCER of Human Resources (2001 and update 2004).
   - CCER of IWMI 2003 (Consolidated Report).
   - Africa Regional Office.
   - SE Asia Regional Office.
   - South Asia Regional Office and HQ.
   - CCER of Water Health and Environment.
4. List of achievements/outputs: publications (peer-review and other):
   - IWMI Performance Indicators 2003, 2004 and 2005.
   - IWMI Publications 2000 – 2006.
   - Results and synthesis of IWMI research 1996-2005.
   - Project (Theme) and Systemwide Program Syntheses (research question; project objectives, methods used, brief abstract of key results, outputs, staff).
5. A paper prepared by Center management and Board on:
   - main issues of current concern;
   - vision of clients needs in intermediate (5 years) and long (10 years) term;
   - vision on CGIAR and donor status in intermediate and long term;
   - state of the relevant science in intermediate and long term;
   - plan of action reflecting these vision statements: IWMI Vision Document (March 2006, revised May 2006).
6. Toward a New Visions and Strategy for the CGIAR.
7. New Monitoring and Evaluation System for the CGIAR Centers.
8. Recent EPMR reports of CGIAR Centers.
9. The CGIAR Charter.
10. IWMI Annual Report 2004/2005.
11. The latest annual funding request: funding request for 2006.
12. List of professional staff with short CVs including standard set of information as instructed by the SC Secretariat (publications, key memberships, invited lectures, prizes/awards; students supervised).
13. The current organization chart, with a brief description of the Center's internal management structure, including the composition and terms of reference of each major committee.
14. List of reports of major planning conferences, internal reviews, expert meetings, etc. which have had a major influence on the direction of specific Center programs:
   - Consultative Committee Meeting Minutes: South Africa (4), Iran(1), Sri Lanka (7)
   - Regional Planning Workshops (Africa, Iran, India, Sri Lanka)
   - Annual Research Meeting 2005
15. List of the agreements for cooperative activities with other Centers and institutions.
16. List of ongoing and recently completed contracted projects for Themes.
17. Most recent CGIAR financial guidelines and manual:

18. Reference Guides for CGIAR International Agricultural Research Centers and their Boards of Trustees
19. IWMI Charter and other basic documents establishing the Center:
20. Composition of the Board over the last five years
21. Board handbook:
    - The IWMI Board of Governors
    - Responsibilities of the Board of Governors
    - About IWMI
    - Documents of Governance
    - The CGIAR System
22. IWMI Board Self-Evaluation Questionnaire
23. IWMI DG's feedback instruments (e.g. results of 360 degree feedback)
24. Gender & Diversity Report to the IWMI Board of Trustees
25. Allowances, benefits, and salary ranges for each category of staff
26. Personal data on professional staff
27. Staff turnover
28. List of international staff vacancies
29. Minutes of Board and Board committee meetings since the last External Review
30. Staff Manuals (Personnel Policies for IRS and NRS):
31. Local compensation survey reports: Sri Lanka, Ghana, South Africa, Tashkent)
32. Annual Reports of external auditors for (2000-2005)
33. Most recent internal audit reports
    - CGIAR Internal Audits (2002-2005)
    - IWMI Quality Management System (2002 – 2005)
    - KPMG Ford, Rhodes, Thornton & Co (2000 – 2005)
34. Audit reports of the Challenge Program on Water and Food
35. IWMI Financial Authorization Limits
36. Staff Satisfaction Surveys (2003; 2005)
37. IWMI internal customer satisfaction surveys
38. CGIAR's SAS-HR Good Practice brochures and documents, e.g. "The One Staff Approach, IWMI's Journey"
39. SAS-HR Summary of Work Plan
40. Sri Lanka Program – Results Based Management framework July 2005)
41. International Public Goods and the CGIAR Niche
42. Key Questions for the IWMI EPMR
43. Center Response to list of strategic issues identified by the SC for 3rd IWMI EPMR
44. Key IWMI Partners (2003/2004 list; 2004/2005 list)
45. IWMI Partnership Strategy Document.

Annex 6
2nd IWMI EPMR Recommendations: IWMI's Response and Panel Comments

Recommendation 1: The Panel recommends that IWMI add crop physiology expertise to the IWR program in order to facilitate incorporating or adapting components of complex plant growth models and to communicate better with other institutes that have this expertise.

IWMI's 2000 Response: IWMI agrees with the Panel that crop physiology expertise is essential for a full understanding of crop water productivity. However, this kind of expertise is available in other CGIAR centers as well as universities and research institutes around the world including many of our NARS partners. We do have an excellent crop modeler on our staff. But IWMI has no real comparative advantage in the highly specialized area of crop physiology. Therefore IWMI will respond positively to this recommendation by strengthening our cooperation with interested CGIAR centers, specialized university departments and research institutes, and NARS having crop physiology expertise. We may also use top scientists on regularly scheduled short term assignments as Fellows. The planned workshop on crop water productivity under SWIM later in 2000 will also provide the opportunity to establish these partnerships.

IWMI's 2006 Updated Response: Implemented as foreseen in 2000. A SWIM Workshop on water productivity was held and a key reference book on water productivity was produced (Kijne et al., 2003). Crop physiology is a major component in both the Comprehensive Assessment (SWIM2) and the Challenge Program on Water and Food – through the contribution of other CGIAR centers and partners. The Challenge Program on Water and Food mobilizes the crop physiology expertise from other centers (e.g. to develop drought resistant varieties of a range of key crops such as rice, wheat, maize and barley), and IWMI collaborates where relevant.

Panel's Comments: IWMI has adequately addressed the recommendation as per their original response.

Recommendation 2 The Panel recommends that the IWR program should increase its emphasis on the groundwater depletion problem.

IWMI's 2000 Response: IWMI agrees with the recommendation to increase its emphasis on groundwater depletion issues. In fact we are pleased the Panel has highlighted this issue. In mid-1999 the Institute recruited Dr. Tushar Shah, a leading expert in groundwater, to the staff. The Institute is leading a special session on groundwater at the World Water Forum meetings in March 2000, and has during the past year been seeking additional financial support for this work. As part of the priority setting exercise to be carried out later in 2000 we anticipate that groundwater depletion will emerge as a major thrust.

IWMI's 2006 Updated Response: Implemented as foreseen in 2000. Groundwater was one of IWMI's major themes from 2000-2005 and IWMI has produced a major body of work on groundwater management. The key reason for this special attention was practical, i.e. to give special attention to groundwater. At the same time it was always felt that as surface and groundwater are inextricably linked, the appropriate approach from a research perspective is a basin-wide approach that encompasses both surface and groundwater. In the latest revision of IWMI's themes, it was felt that by now the management of groundwater had become sufficiently developed that it could be combined into the first theme, Basin Water Management for Agriculture, where all water in the hydrological cycle is included in an integrated approach.

Panel's Comments: IWMI did address this by leading a special session at the WWF in The Hague in 2000, developed a body of literature on groundwater management to raise awareness of this problem. However, the Panel does not believe that "by now the management of groundwater had become sufficient developed" such that it no longer needed special attention. The Panel agrees that groundwater is an intrinsic part of ht hydrologic cycle and needs to be addressed in the context of a basin-wide approach.

Recommendation 3 The Panel recommends that IWMI staff should examine what further role PIM should have, if any, in IMT issues, particularly how much attention should be given to new and emerging problems often associated with IMT, such as equity in access to water, capacity of the private sector to manage water resources, and evaluation of turnover programs and policies that have failed.

IWMI's 2000 Response: IWMI agrees with this recommendation. IWMI does not intend to invest further in irrigation management transfer (IMT) case studies on impacts and processes, of the kind carried out during the late 1980s and early 1990s. However, having built up a corpus of case studies, IWMI does intend to make modest investments in synthesizing the lessons through comparative analysis. Many countries are still designing new management transfer programs despite the pitfalls. IWMI believes that carefully targeted investment in examining programs with innovative approaches, such as private sector involvement in water management, may have high pay-off in terms of both impacts and new knowledge. As the Panel notes, countries which have implemented IMT policies are facing new "second generation" problems. These include inequitable access to water, management capacity and financial viability of local water users' associations, and sustainability of physical infrastructure. Further, "irrigation management transfer" is only a part of a larger package of institutional reforms. These include such questions as: 1) how to design and implement effective river basin management policies and institutions; 2) where do local water management organizations fit into these larger basin-level institutions; 3) how can countries provide a supportive environment for these new local water management institutions and specifically for locally managed irrigation by small farmers; 4) how to encourage productive use of water while also achieving equity in access to water; and 5) how to design and enforce water rights regimes. IWMI will not be able to address all of these issues itself, but will focus on those which are judged to have the highest potential impact.

IWMI's 2006 Updated Response: IWMI has developed a large body of literature, totaling over 250 publications, on Irrigation Management Transfer. The literature ranges from initial assessments of IMT as a method to improve the management of agricultural water resources, to gender analysis and the impact of IMT on poverty, to evaluations and assessments of past IMT experiences and from that related implementation and policy recommendations. IWMI has recently synthesized the impacts of IWMI's past work on IMT. In addition, IWMI maintains a limited capacity on IMT to continue to build on the lessons learned from past IWMI research on IMT, with an active IMT-related project in one sub-region, i.e. the IWRM in the Ferghana Valley project in Central Asia. In other regions IWMI primarily retains a capacity for advice and comparative research on experience with IMT in a variety of settings (through Dr Madar Samad in India and Mehmood ul-Hassan in Ghana).

Panel's Comments: Given the large public investment in irrigation infrastructure that is needed for rehabilitation in Asia and interest in Africa for expansion of irrigation, and the growing dependence on local management of irrigation, IWMI should probably revisit its work on water users associations and opportunities for local irrigation management. This would directly involve policy, institution and management related work and could focus on why some turnover policies have failed.

Recommendation 4 The Panel recommends that IWMI's work on poverty, with special emphasis on its relationship with gender, be pursued in two directions; namely (i) investigating more precisely the

relationship between poverty, gender and access to water and, (ii) incorporating more explicitly poverty and gender concerns in the design and conduct of research activities in programs other than PIM; and consider the implications of research results for the poor.

IWMI's 2000 Response: IWMI agrees with the recommendation. Indeed, the Institute has already made considerable progress in both directions identified by the Panel. For example, with regard to poverty-water linkages, IWMI has recently been exploring these linkages for both large-scale and small-scale irrigation in different agro-ecologies. Two broad patterns seem important: in regions— such as the Ganga-Jumna-Meghna-Brahmputra basin— where 500million of the world's poor live, improving poor women's and men's access to groundwater for irrigation can improve livelihoods significantly. IWMI is initiating work with India's Planning Commission on how best to do this. With regard to incorporating poverty and gender concerns more explicitly, poverty reduction has already become the central concern of research in other IWMI programs in addition to the Policies, Institutions and Management Program. For example, the Irrigation and Water Resources and PIM Programs are collaborating on three donor-supported projects in India and several African countries specifically addressing how poverty can be reduced through small-scale irrigation. A proposed new donor-funded project in 15 Asian countries on "Pro-Poor Irrigation Investments" will also entail collaboration between these two programs. The Applied Information and Modeling Systems Program is helping to developing a poverty-map of South Africa.

IWMI's 2006 Updated Response: Research on water and poverty has been a major component of IWMI's work ever since the 2000 EPMR. Much of this work was concentrated in the ADB-funded project on Pro-poor Irrigation in Asia, completed in 2005. Water and poverty related research has also been mainstreamed in many other IWMI's projects, however, and is the driving force behind Theme 2, that focuses on livelihoods. As of 2005, IWMI has initiated work in several of its benchmark basins (notably the Krishna, Karkheh and Syr Daria) on a new concept developed at IWMI, water poverty mapping. Much of IWMI's poverty research has a special emphasis on gender issues. The former small "gender program" (in essence one researcher with, at times, one or more associate experts) has been mainstreamed, in the sense that rather than doing separate gender studies, the gender researchers play a key role as social scientists with a gender-specialization in IWMI's water and poverty research. The number of social scientists with a gender specialization has increased to one Principal Researcher (Dr B van Koppen, Pretoria), one Researcher (Dr D Joshi, Hyderabad), one Post-Doc (Dr M Ebato, Addis Abbeba) and several more junior researchers and scientists with a "livelihoods" specialization (including gender issues).

Panel's Comments: IWMI has continued its work on poverty with the focus being on developing and refining the concept of water poverty mapping. The ADB Pro-Poor Intervention Strategies in Irrigated Agriculture project was completed in 2005 but several peer reviewed outputs are delayed. The gender work has not been mainstreamed adequately.

Recommendation 5. Given the limited number of professional staff and finances available for achieving the broad mission of the PIM program, the Panel recommends that careful attention be given to planning future PIM activities, based on a more formal, and more transparent, priority setting process.

IWMI's 2000 Response: IWMI is aware of the gap between the limited human and financial resources and the broad mission of the Policies, Institutions and Management (PIM) Program. The Institute agrees with the recommendation that IWMI should pay careful attention to planning future PIM activities following a more formal and transparent process. The latter will be done as part of a broader priority-setting exercise (see the response to Recommendation 9). For most developing countries, getting their policies right and designing and strengthening their institutions to formulate and

implement policy is the crux of the problem they face. The issues are enormously complex and there is an urgent need to strengthen IWMI's effort in this field. Therefore, as part of the planning and priority-setting process, IWMI will explore ways to enhance the capacity of the Institute and its partners to address these complex issues. We will continue to expand our partnerships with other institutions having specific capacities in policy and institutional research, and as part of a larger effort to strengthen IWMI's capacity building efforts, put more emphasis on supporting Ph.D. and post-doctoral research. If funding permits, IWMI in the future will also further strengthen the senior staff in this Program.

IWMI's 2006 Updated Response: Implemented as foreseen in 2000. The institute's program and capacity, as well as its capacity building, has expanded considerably and allowed increased focus on policies and institutions – as a separate theme in the period 2000-2005, and integrated in a more problem-oriented and less disciplinary approach to priority setting in the new thematic structure. The PIM activities were developed as part of a transparent priority setting process through the 2000-2005 and 2004-2008 Strategic Plan development and consultation processes, as well as the IWMI-wide CCER conducted in preparation for the 2004-208 Strategic Plan.

Panel's Comments: The Panel takes a slightly different view. It feels that priority setting is necessary but that the emphasis should be on strengthening research capacity in the policy and institutions area, and in developing strong links with centers that have strong social science staff such as IFPRI.

Recommendation 6. The Panel recommends that IWMI should retain the research component dealing with irrigation-related health issues.

IWMI's 2000 Response: IWMI agrees with this recommendation, which is an endorsement of the current irrigation related health work. The Institute is pleased that the Panel has recognized the importance of this work. IWMI will continue to address irrigation-health related issues with a small interdisciplinary team of researchers, making use of associate experts, interns and students wherever possible. An effort will be made to obtain funding for research in Africa on controlling *schistosomiasis* through water management and on health impacts of small scale irrigation projects.

IWMI's 2006 Updated Response: Implemented as foreseen in 2000. It is noted here that in 2001 IWMI, on request of CDC, convened a Systemwide Initiative on Malaria and Agriculture (SIMA). In its November 2005 meeting the IWMI Board decided to respond positively to suggestions from African national partners to pass on the responsibility for the SIMA network to one or more African national or regional partners. The CDC (now AE) responded positively to this suggestion at its meeting in Marrakech in December 2005. Discussions are ongoing with NEPAD. The year 2006 is a transition year; by the end of 2006 IWMI will have transferred SIMA and it will no longer be a CGIAR Systemwide initiative. In the reorganization of IWMI's research themes from a more disciplinary to a more problem oriented focus, IWMI no longer has "health and environment" as a research theme, but it is a cross-cutting issue wherever health is important (similar to "policies and institutions", or "poverty", or "gender", all of which have been themes or programs in the past and are now cutting across the themes – still important but not organized as free-standing programs). Health and environment research is important for all themes, but particularly for theme 3, which deals with the re-use of wastewater for agriculture.

Panel's Comments: IWMI is phasing out SIMA though an institutional home has still not been found for the program to continue. The anticipated work on *schistosomiasis* also did not materialize. IWMI under its Theme 3 on Water, Cities and Agriculture has been addressing health concerns especially as they relate to wastewater use.

Recommendation 7. The Panel recommends that IWMI should increase its capacity to develop a research effort on the effects of irrigation on downstream water resources by recruiting appropriate expertise in water quality and associated natural resource management.

IWMI's 2000 Response: IWMI agrees with this recommendation. The Institute has so far found it difficult to raise sufficient funds to expand its work on environmental issues. However, IWMI agrees that more expertise on water quality and other environmental issues is needed to be able to be more successful in fund raising activities and in the building of a significant research effort on the effects of irrigation on downstream water resources. The Institute will also develop strong partnerships with interested universities and research institutes specialized in water-related environmental issues. Recruitment of expertise and the positioning of the environment work within IWMI will be addressed as part of the priority-setting exercise (see Recommendation 9).

IWMI's 2006 Updated Response: IWMI's work on environmental issues has increased very significantly over the last five years, as IWMI has prioritized work on the overall water-food-environment nexus, specifically targeting the interfaces between the core agriculture / food-production system with the 2 key systems with which this interfaces: 1) cities, with a strong focus on water quality, pollution and health and environmental impacts of wastewater reuse; and 2) ecosystems, with a strong focus on the impact of irrigation on the environment, agriculture-wetland interactions, and environmental flows to maintain ecosystem services, i.e. balance between food and environment. IWMI has strengthened its capacity in this area both in terms of ecology and eco-hydrology, has developed key partnerships with environmental organizations (and is now the only CGIAR center that is formally a member of IUCN, the World Conservation Union). In late 2005 IWMI's contribution in this field was recognized by the Conference of the Parties of the RAMSAR Conventions (on wetlands) when it adopted a resolution to recognize IWMI as the fifth International Organization Partner of the Convention.

Panel's Comments: The Panel concurs that IWMI has addressed this recommendation, as this has been an area of significant growth over the past five years, with significant expertise added in environmental science / ecology. The approach taken by IWMI has assured that the environment will be a major consideration of any water-food program. Recognition of IWMI's contribution to wetlands at the RAMSAR conventions was testimonial to the work done on this critically important topic in the past five years. However, less significant is the capacity of IWMI to explore economic aspects.

Recommendation 8. The Panel endorses the investment in researching the use of relevant information technology, remote sensing and modeling for use in irrigation and water management and recommends that this work should continue and, with respect to various modeling systems, that IWMI should continue to follow its current position of being a user, tester and adapter of existing models rather than being a primary developer.

IWMI's 2000 Response: The Panel's endorsement of our investments in applications of information technology,
remote sensing and modeling in irrigation water resources is welcome. IWMI's objective is to continue to play a leading role in the application of appropriate techniques. IWMI will integrate new techniques into its work in collaboration with recognized leaders in the relevant disciplines.

IWMI's 2006 Updated Response: IWMI has strengthened this area of its work and believes it is now internationally recognized as a center of excellence on Remote Sensing and GIS as related to water resources management. IWMI maintains its position that it should not be a "model developer", certainly not in basic hydraulic and hydrologic or climate models (all of which require major investment and are available from various sources), although IWMI has developed a water-food-

economics model (WaterSim, with IFPRI) where it has unique strengths. The focus of the RS/GIS work is the development of water-related applications for development, generally for data-sparse tropical environments, focusing on: (a) mapping irrigated areas; (b) mapping water productivity at basin scale; (c) mapping wetlands (and wetland-agriculture interaction). IWMI has also served as the coordinator of the CGIAR's Consortium on Spatial Information – in essence a knowledge sharing network - for the past 3 years.

Panel's Comments: IWMI has addressed this recommendation fully.

Recommendation 9. The Panel recommends that IWMI adopt more formal procedures for priority-setting and impact assessment.

IWMI's 2000 Response: Recommendation 5 (above) makes a similar recommendation with respect to the Policies, Institutions and Management Program. IWMI agrees with this recommendation and will review how best to make its priority-setting more transparent and its impact assessment procedures more systematic. The Institute has struggled with these twin issues of procedures for priority-setting and for impact assessment since its inception without finding a satisfactory solution. With the arrival of a new Director General later in 2000, IWMI will be reviewing its entire program and strategy. Setting priorities in a transparent manner and assessing impact will be a central component of this review. The starting point for this exercise will be IWMI's mission statement and its underlying logic. The goals to which IWMI's work contributes are food security and poverty eradication. IWMI contributes to achieving these goals through achieving its objective of fostering sustainable increases in the productivity of water. Better management of irrigation and other water uses in river basins is the means to achieve the objective. In Recommendation 4, the Panel recommends that IWMI should investigate more precisely the relationship between poverty, gender and access to water, and incorporate poverty and gender concerns more explicitly into the design and conduct of the Institute's research. The analysis IWMI will carry out, to respond fully to this recommendation, will form a major basis for setting the Institute's priorities more transparently.

With regard to impact assessment, the complexity of water management systems and the intangible form of our primary products make most of IWMI's impacts "invisible." These impacts largely occur through the stimulus of new research-based ideas and concepts, which lead to changed behavior among policy makers, donors, other scientists, and water managers. There is generally a long time-lag, and a large number of intervening variables, between the stimulus and the outcome. IWMI seeks to achieve a reasonable balance between long-term strategic research, and applied research involving testing interventions in field situations. For the latter, impacts are more directly measurable; for strategic research the measures are indirect and imprecise; but we would argue, more substantial. The priority-setting exercise that we will undertake later in 2000 will include specific attention to how we propose to assess impact in future. IWMI is looking forward to learning new ways of doing this through its participation in the Workshop in May on "The Future of Impact Assessment in CGIAR: Needs, Constraints and Options," organized by the Standing Panel on Impact Assessment of TAC.

IWMI's 2006 Updated Response: IWMI believes it has, over the past 6 years, developed and implemented an effective approach to priority setting. The center piece of the longer term priority setting process has been the 2000-2005 and 2004-2008 Strategic Plans. These plans served to focus the institute's attention on the long term issues and have had a major impact on priority setting. For the medium term the Institute has started to use the MTPs as the primary tool for priority setting, sharpening the research agenda and helping to shape the impact pathway from output to outcome to impact. We believe the MTPs have gradually improved and taken on a more useful function within the institute's work, from a largely "external / administrative" document to a realistic tool that serves to link short term project goals to medium term institute goals. In addition, IWMI has undergone

several Center Commissioned External Reviews (CCERs) of its Themes (MTP Projects) to assist the Institute with its priority setting. These CCERs include reviews of the following MTP Projects:

- 2002: Water, Health and Environment, former MTP Project 5
- 2003: Center-wide Program review in conjunction with Strategic Planning process
- 2004: IWMI-Tata Water Policy Program, within the former Groundwater Management MTP Project 3
- 2005: Agricultural Water Management, former MTP Project 1

In terms of impact assessment, IWMI did not have an effective program of impact assessment at the time of the 2nd EPMR. Over the past five years, IWMI has tried to build up its expertise in NRM impact assessment by networking with other NRM centers and organizations, becoming involved in the recent set of SPIA sponsored NRM impact assessment case studies, undertaking a series of pilot studies on impact/outcome assessment, and directly incorporating impact assessment into the research lifecycle. More recently, in 2005 IWMI started to develop a collaborative relationship with CIFOR and WorldFish on impact assessment that aims to develop a single NRM impact assessment function shared by the three centers. IWMI is also participating in efforts to develop complementary approaches to economic cost benefit analysis as the basis for impact assessment of "upstream" policy research. It has taken an active interest in the use of alternative methodologies, particularly "Outcome Mapping" (as developed by IDRC) and methods such as Most Significant Change and Impact (or Adoption) Pathways. Several staff members have attended training courses, several projects are implementing the new approaches on a pilot basis and IWMI expects to introduce these approaches on a larger scale in coming years.

Finally, complementing the impact assessment work, IWMI has embraced the idea of "knowledge management" or "knowledge sharing" (through its Strategic Plan objective to become a world class knowledge center on water, food and environment). This is contributing to increased reflection on the ways and means through which knowledge is shared, and used, from the very start of the research project cycle. We believe that the increasing emphasis on developing a "knowledge culture" at IWMI will also contribute to improved definition of impact pathways and impact assessment. To further strengthen the synergies between impact assessment and knowledge management, IWMI is currently in the process of recruiting a post doctoral fellow who will contribute to Knowledge Sharing in Research initiative and the IWMI-WorldFish-CIFOR impact assessment alliance. While more work is clearly required, we believe that the steps taken thus far have established a stronger foundation, network and overall impact culture at IWMI, which in turn will help the Institute in its efforts to establish a robust NRM impact assessment program with CIFOR and WorldFish.

Panel's Comments: The issue of impact assessment, especially as it relates to research planning is considered in Chapters 2 and 5. The Panel concludes that IWMI's efforts to date in this area have not been sufficient given its importance to the Centers' future, and have recommended that IWMI invest in the employment of their own professional staff in this field. This would not exclude cooperation with other centers but would rather enhance IWMI's capacity to interact. The Panel also makes a recommendation regarding the use of CCERs. While IWMI is praised for commissioning CCERs, the Panel recommends regular and rigorous CCERs across all Themes.

Recommendation 10. The Panel recommends that the Board formulate and implement an ongoing Board development program aimed at ensuring the Board meets, in particular, its responsibilities for strategic planning, policy formulation and monitoring of performance.

IWMI's 2000 Response: IWMI agrees with this recommendation. As noted in the report, the Board invited the Management Advisor from the CGIAR Secretariat to attend a 1997 Board meeting to facilitate a discussion on Board roles and responsibilities and sent two members to the workshop

that followed ICW99. We discussed at the meeting just concluded plans to orient new members in a more structured way, including briefings by Program Leaders, the Board Chair, and an experienced Board member who will be asked to act as a mentor. We will continue the practice of inviting new members to attend a meeting as an observer prior to taking office. We also initiated discussion at the recent meeting of ways in which the agendas of Board and Committee meetings might be restructured to ensure better oversight of program and finance and experimented with a self-assessment methodology. In the interim before our next gathering, we will look at useful procedures developed at other Centers.

IWMI's 2006 Updated Response: Implemented as foreseen in 2000. IWMI has participated in the Center Board Chair led board induction programs and is regularly revisiting its self-assessment tools. The IWMI Board has emphasized a careful nomination process and as a result is now composed of a well-balanced group of very experienced individuals – many of whom have come from outside the CGIAR – and with ample experience in finance and governance (through their careers in senior management and other board positions, rather than their educational backgrounds). The IWMI Board shares (or has shared) a board member with four other CGIAR centers (ICARDA, Maggie Catley Carlson through May 2006; CIFOR, Sunita Narain; CIMMYT, Uraivan Tan-Kim-Yong through March 2006; and WorldFish, Asger Kej) and has agreed with the WorldFish Board to attempt to identify candidates for additional joint Board positions.

Panel's Comments: The Panel agrees with IWMI's comments on the use of a revised self-assessment tool and the quality of its nomination process and of its current Board members. However, the Panel found the participation of new Board members in the orientation process wanting. There also doesn't seem to be a Board development program.

Recommendation 11. The Panel recommends that the Board should establish an Audit Committee with responsibilities for audit matters of both a financial and operational nature.

IWMI's 2000 Response: IWMI agrees with this recommendation and took action at the meeting just concluded to establish an Audit Committee and to appoint a chair and membership. New terms of reference will be prepared, drawing from the audit functions previously included in the terms of reference of the Executive and Finance Committee. As has been our usual practice, the full Board met with the Institute's External Auditors, in the absence of management staff, to discuss the current year's audit and plans for 2000 and will continue to retain this aspect of audit responsibility.

IWMI's 2006 Updated Response: Implemented as foreseen in 2000. IWMI has joined the CGIAR's Internal Audit service and this has resulted in an active program of internal audits of both a financial and operational nature.

Panel's Comments: Implemented by IWMI as indicated.

Recommendation 12. The Panel recommends that the Board's Terms of Reference, Rules and Procedures and the terms of Reference for its Chair, standing committees and Secretary should be reviewed and revised to more clearly specify responsibilities.

IWMI's 2000 Response: IWMI agrees as well with this recommendation. In the next months, we will systematically review the full set of documents that specify the responsibilities of the Board and its Committees and, as indicated above, will reconsider meeting and other procedures. Noting a comment in the EPMR report, we also took action to appoint a Vice Chair of the Board and will retain this position in the future.

IWMI's 2006 Updated Response: The ToRs have been updated regularly. In light of recent developments and recommendations in the CGIAR on board structure and functioning (notably the recommendations of the CIMMYT EPMR and the Africa Task Force), and in light of the rapidly evolving strategic alliance with WorldFish, the IWMI Board has established a Task Force on Board Restructuring that will evaluate all elements of the Boards charter, terms of reference, structure and functioning, and report back to the Board later in 2006.

Panel's Comments: The Task Force was scheduled to present its conclusions at the October 2006 Board meeting. The Panel doesn't know the results of that work.

Recommendation 13. The Panel recommends that the Board should meet twice a year and that at each of these meetings of the Board there be meetings of its standing committees.

IWMI's 2000 Response: IWMI agrees with the importance of having two Board meetings each year. Since 1998, as a cost saving measure, the Executive and Finance Committee, rather than the full Board, met in the autumn following our Spring Annual Meeting. However, we take the point made by the Panel and agree that the expenditure involved in a full meeting is justified. We had already decided to have two Board meetings in 2000 and will continue this practice.

IWMI's 2006 Updated Response: Implemented as foreseen.

Panel's Comments: Implemented as indicated.

Annex 7
Review of the Comprehensive Assessment (CA) of Water Management in Agriculture

So far, three books and eleven research reports published by IWMI are the primary visible output of CA. The research reports cover a range of topics from virtual water trading to integrated water management and intersectoral water transfers. Some of the reports seem clearly to fill research gaps, such as Research Report 7 on the "Impacts of Irrigation on Inland Fisheries: Appraisals in Laos and Sri Lanka" by Sophia Nguyen-Khoa et al. (2005), while others seem to be designed to promote an approach, or review past research, such as "Integrated Land and Water Management for Food and Environment Security" by F. W. T. Penning de Vries et al. (2003), Research Report #1.

Penning de Vries et al. provides a good statement of the problems involved in an integrated approach to land and water management to meet our food and environmental objectives. The research issues that are selected by Penning de Vries et al. for future research first appear to be very broad but the accompanying discussion provides clearer identification of potential research topics. The discussion lists a number of interesting topics, some of which don't seem to belong under a particular heading. For example, under the poverty reduction heading you find "what are the most appropriate water-allocation procedures within river basins and within irrigation systems that encourage sustainable land and water-conservation practices?" This just illustrates the problem of grouping research issues under five very broad headings. It also tends to hide a number of important sets of issues that have not been included. One of these sets is research dealing with institutions and policies that influence water use and management. The legal framework is only one small part of this important area.

Research Report #2, "Taking into Account Environmental Water Requirements in Global-scale Water Resources Assessments," is a natural extension of the first report and focuses on environmental water requirements. It provides an overview of the general problem of how much water to reserve for the environment. The authors point out that one threshold figure is not adequate without considering frequency and assurance of water flow. One strength of the report is the list of several important research topics that were left out of the first report, such as policy and institutional constraints and challenges, and the need to coordinate institutions and water policies among countries with international rivers.

Research Report 3# by Giordano et al. (2004), "Water Management in the Yellow River Basin: Background, Current Critical Issues and Future Research Needs," provides readers with an overview of the complex issues facing the managers of the Yellow River with its wide variation in rainfall and runoff (spatially and temporally). Almost half of the paper discusses the early development of the Yellow River, highlighting why it is named the Yellow River (at times there is as much soil flowing in the river as water). The authors see the report as background information for both researchers and policy makers. They argue that past successes in managing the river have reduced flooding enough so that new issues have moved to the top of the management agenda. These new issues include water scarcity, soil conservation, water quality, and environmental damage. There also was a change in approach to water development and management, during the 1990s as the Ministry of Water Resources moved away from engineering dominant strategies to one based more on demand management and the value of water resources. Even so, basin management continues to have overlapping authority, unclear responsibilities, and competing interests. How management copes with these overlapping responsibilities is a major unanswered question, as it implements new allocation policies designed to cause the least disruption to farmers, particularly low income farmers, and agricultural output.

This is a country-specific study that may have some value to other countries as a prototype. Clearly in basin management we need the types of information discussed in the study. In addition, all basins will face the institutional gap they highlight, that "The natural unit for administration is usually...the river basin while the actual units of governance have other boundaries" (p. 35). Still their historical analysis would have been more useful if they had evaluated, in some detail, the effectiveness of past institutional arrangements in the basin.

Research Report #4, "Does International Cereal Trade Save Water? The Impact of Virtual Water Trade on Global Water Use," does a review of what impact past cereal trade has had on water use. It makes the point that there is a wide difference in the amount of water used to produce a ton of cereal. Water use can be reduced by producing more grain in areas that use less water. However, they find that water "savings" through trade is more strongly correlated with water productivity than with water scarcity. Because of data limitations, they feel this topic deserves a separate study that goes beyond the scope of the report.

Research Report #5, "Evolution of Irrigation in South and Southeast Asia" by Barker and Molle (2004), provides a long-term, broad overview of how irrigation has evolved over the past century and a half. They argue that in recent years the benefits of irrigation development have gone largely to consumers. Yet they fail to point out that there are many small farmers in south and Southeast Asia who are also consumers, as are landless agricultural labor. They also argue that the main emphasis is now on improved water management to increase water productivity and diversify production. In addition, the role of the state in planning, managing, and investing in irrigation has diminished as use of groundwater has accelerated. Yet the state may become more important as water scarcity increases and water must be reallocated among sectors and users. The strength of this report is that it provides an excellent history of irrigation development. Where it is weak, is in its suggestions for the future. They provide a long list of old reasons why economic incentives (pricing and markets) have not worked well in the past. This is nothing new but they go on to argue that since economic incentives haven't worked in the past, they will not work in the future. What they should have done is challenge the research community to determine what actions need to be taken to make economic incentives more effective in this region. As part of such research they may find that in some cases the transaction cost of making the necessary changes is too high, while in others they may be quite modest.

Research Report 6, "Macro Policies and Investment Priorities for Irrigated Agriculture in Vietnam" by Bocker et al. (2004), is a very comprehensive report on investments in Vietnam where water is only one of the investments. They argue that private sector investment in wells and pumps was the most important single factor affecting water resources in Asia during the past decade (1990s). They do an excellent job of estimating irrigation's contribution to gross agricultural output in Vietnam. Although the report is country focused, it can be a useful guide for similar case studies in other countries to help them better establish water investment and research priorities. IWMI can also use studies such as this to help them set research priorities. For example, this report clearly indicates that IWMI should consider devoting more time and money to conduct research on a range of groundwater problems.

Research Report #7 (2005), as indicated above, appears to be directed at one of the research gaps, although it is specifically focused on assessing the impact of irrigation on fisheries and income in Laos and Sri Lanka. The problem with the report is that it provides little detail about the surveys that were used to collect the data. The analysis was based on surveys and workshops but the report leaves the reader in the dark concerning the data and analysis. Given this lack of detail, the report cannot serve as a useful guide to do similar studies in other countries.

Research Report #8 by Joshi et al. (2005), "Meta-Analysis to Assess Impact of Watershed Program and People's Participation," provides an excellent overview and assessment of watershed projects in India.

They use a meta-analysis of 311 case studies of watershed programs in India to assess the benefits in terms of efficiency, sustainability, and employment. The mean benefit cost ratio was 2.14, and it was higher in low income watersheds, ones with rainfall between 700-1,000 mm and where people's participation was high. They argue that past watershed projects have tended to only involve large and influential farmers in the process of assessing stakeholders' needs. These projects also have not been sensitive to the needs of women and the landless. One of the key steps to correct these problems is to develop institutional arrangements that assure a broad-based level of participation by all stakeholders. Equally important is the need to train stakeholders and to develop mechanisms for sharing benefits in accordance with costs incurred. Although this is a country-specific study, the authors provide enough information about the methodology and data so that it can be used by other countries or regions to conduct similar studies. Hopefully, such studies will go beyond this report and identify local institutions that have facilitated participation by a wide range of stakeholders and institutional arrangements that improve the distribution of project costs and benefits.

Research Report #9 by Courcier et al., "Historical Transformations of the Lower Jordan River Basin (in Jordan): Changes in Water Use and Projections (1950-2025)," is basically a hydrology report that looks at the water balance over time. They make projections to 2025 based on projects that are started, accepted, or very likely to be accepted. They argue that you can't depend on demand management to reduce water use in agriculture; therefore, the only way to meet future water needs is by desalinizing water or importing water from other basins. The strength of the paper is its historical discussions of the changes in water use over time, which highlight the over commitment of surface water and the over drafting of groundwater. The main weakness is that the authors fail to understand how demand management can play a helping role in meeting future water demands.

Research Report #10 by Molle and Berkoff, "Cities Versus Agriculture: Revisiting Intersector Water Transfers, Potential Gains and Conflicts" (2006), provides a very good historical review of past water transfers. It seems to make a number of generalizations from only a few case studies. The paper basically is developed around the "strawman" that a large number of people think urban growth is being held back by agriculture's wasteful use of water. Consequently, these same people believe a lot of water must be taken away from agriculture. The authors also have a strong view that economic incentives will surely fail to help reduce water use. Yet, in their conclusion, they do make one good point that water shortages in urban areas are due to the lack of political will to make the necessary investments for clean water and sewage systems, and are not due to the cities' inability to get water from agriculture.

The Resource Report #11, "Prospects for Productive Use of Saline Water in West Asia and North Africa" by J. Stenhouse and J. W. Kijne, focuses on the potential for using saline water to irrigate land in Egypt, Syria, Jordan, and Tunisia. It begins by highlighting the water scarcity problem in North Africa and Asia and the extensive salinity problems in irrigated areas of the world. Approximately 20 percent of irrigated land and about 3% of the dry land agricultural areas are affected by salinity. The paper goes on to discuss the primary and secondary causes of salinization and the effects of salinity. They also include a discussion of economic incentives to help reduce salinization but rather quickly conclude that most economic mechanisms can't be used because of measurement problems. However, they fail to recognize that this situation is beginning to change in a number of developing countries as water scarcity increases and low cost measurement devices become readily available. They use four brief case studies from Egypt, Tunisia, Jordan, and Syria, given during a two-day workshop conducted at ICBA in Dubai, June 2004, to illustrate the need for saline irrigation. Yet, their idea that saline irrigation will require larger farms seems to contradict their hope that saline water use will help poor farmers.

The last major section on the rural poor draws heavily from the FAO report by Dixon et al. (2001) on Farming Systems and Poverty. They argue that West Asia and North Africa (WANA) should focus its efforts on introducing saline irrigation in areas with mixed irrigation and with mixed rainfed farming systems. This might work best in areas in the four case study countries where the demand for forage is greater than the supply at reasonable prices. Finally, the authors recommend that optimal use of saline water should be part of long-term government drought management policies. However, as pointed out in the conclusion, someone needs to do a careful economic analysis to determine what options, if any, offer reasonable economic returns without damaging the soil. Another problem, which the authors highlight, is that it is unlikely all the conditions they list as necessary for successful induction of biosaline agriculture systems can be satisfied anywhere. Still the report is a good overview of the technical feasibility of saline irrigation and it attempts to indicate how it might help reduce poverty.

The first book in the comprehensive assessment (CA) series is *Water Productivity in Agricultural: Limits and Opportunities for Improvement* edited by Kijne, Barker and Molden. The focus of the book is on what is known about increasing the productivity of water in agriculture. The book discusses concepts, constraints and methodologies concerning water productivity from different disciplinary perspectives and then uses country examples from around the world to explore water productivity in specific countries. Individual chapters consider water productivity in different settings such as rice cultivation, cropping under saline conditions, and rainfed agriculture. Several chapters look at the possibilities for plant breeding to improve water productivity under both rainfed and irrigated conditions. The last nine chapters are case studies illustrating issues discussed in the earlier chapters. Several chapters look at different strategies for improving water management to improve water productivity: one focuses on the importance of an integrated farm-resource management approach while another emphasizes the benefits of integrated watershed management to improve the use of rainwater. Others consider specific crops or tree planting including agroforestry, drought-resistant potato varieties, and wheat-rice production systems. In a chapter on Thailand the author wastes considerable space arguing against the use of economic incentives. One of the more interesting chapters in the book is the final chapter which looks at the use of deficit irrigation. This is an area that has been neglected for many years and deserves more in-depth research to determine its real potential for increasing water productivity.

Overall this book is a good addition to the literature, particularly on the physical and technical side of water productivity, including such things as plant breeding and water use under different crops, and cropping systems. If there is a gap in the book's coverage, it is on the socio-economic side. Improvements in water productivity eventually have to be done by people in the irrigated or rainfed areas. The brief discussion of socio-economic concerns in a few of the chapters focuses primarily on the appropriate measures of water productivity. The somewhat limited discussions regarding economic incentives and farmer response are based on very large Asian systems that are poorly managed and lack key infrastructure. None of the papers looks at how economic incentives have worked effectively when the appropriate institutions, including water rights, are in place. It would have been more helpful if someone had asked why economic incentives have not worked or have not been tried in the past, and what changes in institutions, infrastructure, and organization are needed to make them effective management tools in the future? With water scarcity increasing, transaction costs are not an excuse for doing nothing. When water becomes scarce, it pays to invest in new institutions and organizational arrangements to better allocate and manage water.

The second book in the CA series edited by Hoanh et al. (2006), *Environmental and Livelihoods in Tropical Coastal Zones: Managing Agriculture-Fishery-Aquaculture Conflicts*, focuses on an area that has largely been ignored by those working on irrigation and agriculture. The book is written to help planners, resource managers, and donors make better investment decisions regarding the use and

development of coastal zones, as well as taking into account how actions upstream impact coastal zones. The coastal zones contain 40% of the world's population and are an important source of the world's food production. This is also a zone of very rapid change with both development and environmental degradation. A key land-use change in the coastal zone is the rapid growth in shrimp aquaculture and the resulting clearing and converting of mangrove forests and salt marshes. This has been pushed by strong global demand and lack of government policies regarding the conversion of those lands. Yet the clearing of mangroves is also the result of their exploitation for timber, fuel-wood, and other forest products. The major problem is that the coastal zone supports three resource-dependent enterprises: agriculture, shrimp farming, and fishing. These have been very competitive enterprises with externalities from one impacting the other.

The book also explores the social and environmental impact of shrimp farming, which is a major export industry. It is not as labor intensive as rice cultivation in the local area but overall rice production (compared to shrimp production) doesn't require as much employment of ancillary activities. Problems created by pollution from shrimp production have caused conflicts in both India and Bangladesh while there seems to be somewhat less conflict in Vietnam. Still the problem is that farmers have not experienced appropriate signals regarding the external costs associated with their private investment decisions. Yet the book finds that no one approach will solve the problems caused by increased use of the coastal zone. The options considered range from government regulation of effluent levels and design standards to the promotion of best management practices and coastal zone management with its focus of improving our use of coastal zones. This book seems to fill an important gap in our knowledge about water management in Asia. As the book argues, these issues will become more important as the population grows and water is used more intensively both upstream and downstream. It is critical in the future that river basin management explicitly include the coastal zone. It has been ignored in the past, which has caused serious problems for coastal communities and fisheries all over the world.

In 2002 the book edited by Bouman et al., *Water-wise Rice Production*, was published and is listed as a CA publication, although it is based on a workshop held in IRRI in the Philippines. The objectives were to present and discuss the development, dissemination, and adoption of the latest water-saving technologies in rice production from the field to the irrigation system. Therefore, most of the chapters are country specific or even system specific. The reason they focus on rice is that more than three quarters of Asian rice production comes from 79 million ha. of irrigated land. In addition, it takes 3,000 - 5,000 liters of water to production 1 kg of rice, but this is 2 to 3 times more water than is required to produce other cereals such as wheat or maize. The hope is that the workshop and publication will help enhance a more coherent research program on water savings approaches for rice-based cropping systems in Asia. This book is a good first step in such a process although it would have been good to have a concluding chapter that highlighted some of the key findings of the workshop.

Annex 8
Acronyms

AC	Audit Committee
ACIAR	Australian Center for International Agricultural Research
ADB	Asian Development Bank
AGM	Annual General Meeting of the CGIAR
AWC	Agriculture, Water and Cities
BFP	Basin Focal Project
BWM	Basin Water Management
CA	Comprehensive Assessment of Water Management in Agriculture
CABI	CAB International
CAPRi	Collective Action and Property Rights (CGIAR Systemwide Program)
CCER	Center Commissioned External Review
CDC	Center Directors' Committee of the CGIAR
CIAT	International Center for Tropical Agriculture
CIDA	Canadian International Development Agency
CIFOR	Center for International Forestry Research
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
CInI	Central India Initiative
CoP	Community of Practice
COSI	Foundation for Technical Cooperation, Sri Lanka
CGIAR centers	CGIAR centers
CPWF	World Food Challenge Program
CSD	Convention on Sustainable Development
DANIDA	Danish International Development Agency
ECA	East Central Africa
EFC	Executive and Finance Committee
EPA	Environmental Protection Agency
EPMR	External Program and Management Review
FAO	Food and Agriculture Organization of the United Nations
IAASTD	Int'l Assessment on Agricultural Science & Technology for Development
IAHS	International Association of Hydrological Sciences
IAU	Internal Audit Unit
IBSRAM	International Board for Soil Research and Management
ICARDA	International Center for Research on Dry Areas
ICRAF	World Agroforestry Center
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and Communication Technology
IDE	International Development Enterprises
IDRC	International Development Research Center
IFPRI	International Crops Research Institute for the Semi-Arid Tropics
IIMI	International Irrigation Management Institute
IITA	International Institute for Tropical Agriculture
ILRI	International Livestock Research Institute
IMT	Irrigation management transfer
IPG	International Public Goods
IPGRI	International Plant Genetic Resource Institute
IRC	International Water and Sanitation Center
IRD	Institut de recherche pour le développement
IRRI	International Rice Research Institute

IRS	Internationally Recruited Research Scientists
IRSS	International Research Support Services
ISNAR	International Service for National Agricultural Research
ITP	IWMI-Tata Program
IUCN	The World Conservation Union
IWMA	Irrigated Water Management Agriculture
IWMI	International Water Management Institute
IWRM	Integrated Water and Resources Management
LAC	Latin-America and the Caribbean
LDP	Leadership Development Program
LWL	Land, Water and Livelihoods
MoU	Memorandum of Understanding
MSEC	Management of Soil Erosion Consortium
MTP	Medium-Term Plan
NAFRI	National Agriculture and Forestry Research Institute
NARS	National Agricultural Research Systems
NC	Nominating Committee
NEPAD	New Partnership for Africa's Development
NGOs	Non-governmental Organizations
NRM	Natural Resources Management
NRS	Nationally Recruited Scientists
PC	Program Committee
PDF	Post Doctoral Fellows
PIM	Policy, Institutions and Management
PwC	Price Waterhouse Coopers
R&D	Research and Development
RRS	Regionally Recruited Scientists
RWAF	The Resource Center on Urban Agriculture and Forestry Network
SC	Science Council
SEA	South-East Asia
SGM	Sustainable Groundwater Management
SIDA	Swedish International Development Cooperation Agency
SIMA	System-wide Initiative on Malaria & Agriculture
SPIA	Standing Panel on Impact Assessment
SSLWMS	Sustainable Smallholder Land and Water Management Systems
SWAT	Soil and Water Assessment Tool
SWIM	Systemwide Initiative on Irrigation Management
SWP	Systemwide Program
TAC	Technical Advisory Committee
UNESCO	United Nations Educational, Scientific and Cultural Organization
USAID	United States Agency for International Development
WARDA	Africa Rice Center
WASPA	Wastewater Agriculture and Sanitation for Poverty Alleviation in Asia
WHE	Water, Health and Environment
WHO	World Health Organization
WME	Water Management and Environment
WRIP	Water Resources Institutions and Policies

CGIAR

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