

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH  
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

**Report of the**  
**Second External Programme and Management Review**  
**of the**  
**International Water Management Institute**  
**(IWMI)**

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS  
October 2000

This document comprises:

- (a) Extract from *Summary of Proceedings and Decisions*, Mid-Term Meeting 2000, Dresden, Germany, 21-26 May 2000
- (b) Letter from TAC Chairman and CGIAR Executive Secretary, transmitting the Report of the Second External Programme and Management Review
- (c) TAC Commentary on the IWMI External Programme and Management Review
- (d) IWMI's Response to the Report of the Second External Programme and Management Review
- (e) Transmittal letter from Panel Chairman to TAC Chairman and CGIAR Executive Secretary
- (f) Report of the Second External Programme and Management Review of the International Water Management Institute (IWMI)



**Consultative Group on International Agricultural Research - CGIAR**

From: The Secretariat

July 2000

CGIAR Mid-Term Meeting  
May 21-26, 2000  
Dresden, Germany

**IWMI External Program and Management Review<sup>1</sup>**

At a parallel session chaired by Eduardo Moscardi, an *ad hoc* committee of interested CGIAR Members and other MTM2000 participants discussed the report of the second External Program and Management Review (EPMR) of IWMI, as well as the Center's response and the TAC commentary. The discussion of the review report followed a presentation by Michel Petit, Review Panel Chair, the Center response by Klaas Jan Beek, Board Chair, Frank Rijsberman, Director General designate, and Doug Merrey, Deputy Director General, and commentary by Elias Fereres, TAC Member.

**Highlights of the Committee Discussion**

The *ad hoc* committee:

- Concurred with the overall conclusions of the Review Panel and TAC that the review resulted in a positive overall assessment and commended IWMI for undergoing a successful transformation over the past six years to a broader, holistic, science-based and research-oriented approach to water management issues;
- Noted IWMI's commendable effort in defining its mission, setting priorities, and implementing strategy;
- Expressed satisfaction that IWMI is well positioned to exert strong leadership in developing science-based solutions to water management challenges;
- Encouraged expanded collaboration with other CGIAR Centers to strengthen expertise in crop physiology;
- Suggested that the Systemwide Initiative on Water Management be continued, with some redesign and focus;
- Suggested more emphasis on strategic alliances and partnerships to deliver research outputs;
- Called for a strengthened policy focus at macro and System levels;
- Urged rethinking of strategic planning and product delivery modes in light of the regional and ecoregional focus;
- Noted that groundwater depletion is a serious problem affected by macroeconomic policy issues as well as use of small pumps for irrigation;

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<sup>1</sup> Extract from "Summary of Proceedings and Decisions - Report from the *Ad Hoc* Evaluation Committee, Parallel Session II", CGIAR Mid-Term Meeting 2000, Dresden, Germany.

- Noted that health issues were best dealt with through strategic alliances with UNICEF, WHO, and similar organizations;
- Noted that competing claims for water result in serious scarcity issues.

### **Conclusions and Recommendations:**

The *ad hoc* committee:

- Endorsed the Panel's recommendations and positive assessment of IWMI, thanking the Panel for an excellent report and IWMI for its excellent preparations for the review;
- Praised IWMI for adopting the Panel's recommendations that the Center enhance expertise in crop physiology, address issues of groundwater depletion, water quality, and natural resource management, increase emphasis on poverty and gender issues, retain research dealing with irrigation-related human health issues, and adopt more formal procedures for priority-setting;
- Praised IWMI for adopting the Panel's recommendations that governance be enhanced by implementing a Board development program, establishing an audit committee, taking steps to clarify Board responsibilities, and implementing bi-annual Board meetings;
- Urged continued support for IWMI's work.

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Mid-Term Meeting 2000  
May 21 - 26  
Dresden, Germany

Charting the CGIAR's Future – A New Vision for 2010
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## Second External Programme and Management Review of IWMI

Attached is the Report of the Second External Programme and Management Review of IWMI, together with the transmittal letter from the Chair of TAC and the CGIAR Executive Secretary to the Chairman of the CGIAR, TAC's Commentary on the Review, and the response of IWMI's Board of Trustees and Management to the Review Report.

This Report will be discussed in parallel session. The Chair of the External Review Panel will summarize the Panel's findings and Centre representatives will respond. Members will be able to ask questions and raise concerns. The Chair of the parallel session will report the outcome of the discussions to the Group in plenary session for decision making.

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH  
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

REPORT OF THE  
SECOND EXTERNAL PROGRAMME AND MANAGEMENT  
REVIEW  
OF THE  
INTERNATIONAL WATER MANAGEMENT INSTITUTE  
(IWMI)

TAC SECRETARIAT  
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

April 2000

## Consultative Group on International Agricultural Research (CGIAR)

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### TECHNICAL ADVISORY COMMITTEE

Emil Q. Javier, Chairman

12 April 2000

Dear Mr. Serageldin,

We are pleased to submit to you the Report of the Second External Programme and Management Review of IWMI, conducted recently by a Panel chaired by Michel Petit of the Institut National Agronomique, Paris, France. The Review Report and the IWMI written response to the Report were discussed by TAC at its 78<sup>th</sup> Meeting in Paris in March 2000. The Panel Chair and IWMI representatives, Klaas Jan Beek, the Board Chair, Doug Merrey, Deputy Director General (Programmes), David Governey, the Deputy Director General (Administration) and Frank Rijsberman, the Director General-designate were present at the meeting.

The Report of the Panel is accompanied by two attachments. The first contains the TAC Commentary, which summarizes TAC's and the CGIAR Secretariat's reaction to the Panel's Report and to the Response of IWMI's Board and management. The second attachment is the Response of IWMI to the Panel Report.

IWMI has undergone a major transformation since the time of the last EPMR, not only in its name and mission statement but more importantly in its programmatic focus and strategic orientation. For a centre of its size, its research achievements are clearly impressive. The Report emphasized the high quality of science being done by IWMI and its partners and the increased recognition and acceptance by water management specialists internationally. TAC believes IWMI has indeed found a niche for itself in the global sphere of research on water management. TAC wishes to specially acknowledge and applaud the outstanding contribution of and critical role played by the outgoing Director General, David Seckler in bringing the institute to its current position.

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Mr. Ismail Serageldin  
CGIAR Chair  
World Bank  
1818 H Street, NW  
Washington, DC 20433  
USA

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Institute of Plant Breeding, UP Los Baños, College 4031 Laguna, Philippines  
■ Tel.: (63-49) 536-5285 ■ Fax: (63-49) 536-5286 ■ E-Mail: eqj@ipb.uplb.edu.ph ■

Looking to the future, we believe that issues related to the efficient and equitable distribution and management of water by multiple users in various sectors will loom even larger. IWMI has successfully demonstrated its ability to address some of these key global water issues and therefore, in our opinion, deserves the CGIAR community's strongest support. TAC believes the Group should re-confirm its commitment to this Centre.

Yours sincerely,

Alexander von der Osten  
Executive Secretary, CGIAR

Emil Q. Javier  
TAC Chair



## TAC COMMENTARY ON THE SECOND EXTERNAL PROGRAMME AND MANAGEMENT REVIEW OF IWMI

The Report of the Second External Programme and Management Review (EPMR) of IWMI was discussed at TAC 78 in the presence of the Panel Chair, Michel Petit, the Chair of IWMI's Governing Board, Klaas Jan Beek, and the two Deputy Directors of IWMI, Doug Merrey and David Governey. TAC wishes to express its appreciation to Dr. Petit and the Panel that conducted the Review.

TAC is pleased to note that the Panel's report is, overall, very positive. The Report convincingly portrays IWMI transformed over the last six years from an institute focused primarily on irrigation management with a technical assistance orientation to one which is more focused on strategic research and analysing irrigation within an integrated water resources management and river basin perspective. This change is prominently reflected in IWMI's new name, mission statement and adopted paradigm.

The Panel made 13 recommendations in the Report, four of which relate to governance, one to priority setting and impact assessment and eight covering the research programmes. The Centre is in agreement with all 13 recommendations and in their response describes the steps that are or will be taken to address these. As pointed out in the Centre's transmittal letter, four of the eight programmatic recommendations are in fact endorsements of current thrusts or activities of the Centre.

### Priorities and Strategies

TAC agrees with the Panel's assessment of the Centre's need for setting clear priorities in order to focus its research efforts on the most critical issues within a global water management research framework. This is particularly relevant given the breadth of IWMI's mission, the demands from the national programmes and the current financial resource constraints. While senior management has been instrumental in creating the new vision and purpose for IWMI and in promoting specific strategic initiatives, TAC believes the institute would greatly benefit from a clearer and more precise formulation of its strategy. The current draft Strategic Plan does not provide sufficient guidance as pointed out by the Panel. TAC notes that the Centre has agreed to revisit IWMI's strategy for the future, which will be reformulated in a new plan following the arrival of the new DG.

TAC strongly endorses the recommendation by the Panel that IWMI adopt and implement a more formal mechanism for priority setting and impact assessment and is pleased to note that the Centre intends to do so.

### Research Programmes

TAC is pleased to note the Panel's positive assessment of the science conducted at IWMI emphasizing its quality and its acceptance by water management specialists internationally. Of particular importance has been the contribution to the recent World Water Forum. TAC would like to highlight the key leadership role played by the outgoing DG in enhancing IWMI's capacity to conduct high quality, globally relevant, strategic research. Notable research achievements include the evaluation of the global water scarcity problem; the integrated, holistic approach to water management (river

basin perspective); new methodologies of water accounting; and insights on the relationships between water management and poverty, gender and health.

TAC takes note of some of the initial results and early achievements of the research within the Health and Environment Programme, for example, that related to the impact of agricultural water management on control of malaria. The Committee strongly endorses the Panel's recommendation that IWMI give high priority to work in the area of irrigation related health issues as such research is critical for the provision of safe water to the poor. However, TAC agrees with the Panel that IWMI should confine its efforts to research on the environment and health topics that are endogenous to irrigation.

TAC notes the Panel's "bold" suggestion that IWMI consider phasing out the Systemwide Initiative on Water Management (SWIM). While TAC appreciates the rationale provided by the Panel in coming to this conclusion, i.e., that SWIM activities be mainstreamed into the regular programmes of the respective centres--since most are bilateral ventures anyway and do not necessarily foster multi-centre collaboration on specific water-related issues-- the Committee also appreciates the practical dilemma the Centre faces in dealing with this issue. Recognizing the early and promising results to-date in terms of achievements in SWIM and cognizant of the Centre's disagreement with the suggestion, TAC intends to revisit the rationale for systemwide programmes and develop ground rules for the management of such programmes before recommending action.

TAC believes that inter-centre collaboration is essential in the case of IWMI, given the importance that water management has in the research programmes of many centres of the CGIAR such as IRRI, IFPRI, ICARDA, ICLARM, ICRISAT, and CIFOR. It is imperative that strategic alliances are built between IWMI and other CGIAR Centres and that new incentives for collaboration are provided in view of the competition problems cited by the Panel on page 36 of the report. Furthermore, while TAC takes note of the strength and effectiveness of many of its diverse partnerships with national programmes, in some cases it appears that collaboration with national programmes may not be satisfactory, i.e., lacks sufficient ownership, and would therefore encourage the Centre to re-assess the way in which it relates to its NARS partners.

TAC concurs with the Panel view that IWMI needs to strengthen its capacity building efforts. TAC would like to emphasize the importance of effectively disseminating IWMI's research results to increase its impact, but at the same time agrees with the judgement by the Panel that IWMI adopt a cautious approach to expanding in-house capacity for training, in view of the tight and uncertain future funding situation.

Finally, TAC notes the Panel's observation about the lack of a systematic review process at IWMI that would ensure a continuous monitoring of the quality of science at the project and programme level. IWMI does not have a systematic programme of CCERs. Only a single CCER (in 1999) was conducted since the last EPMR and this was fairly broad in coverage, i.e., the Panel was unable to use this CCER in evaluating the relevance and quality of science, and felt that its own work would have been greatly facilitated and enhanced if CCERs of the various programmes had been available. TAC encourages the Centre to initiate a series of programmatic CCERs in the next few years.

## Governance and Management

TAC notes the significant problems detected by the Panel related to Board performance, but is nevertheless conscious of the need to strike a proper balance between the oversight and monitoring functions of the Board and the executive management functions of the DG--as the Panel rightly points out. Indeed, the Panel acknowledges the tradeoff between informality which served to enhance the institutional culture at IWMI, and more discipline-- in this case, in following more rigorously generally accepted rules and procedures for conducting business. TAC considers all four of the Panel's recommendations in the area of governance and management as appropriate and is pleased that these were accepted by the Centre. It welcomes the steps already taken by the new Board Chair for the improvement in Board governance.

## Impact

TAC notes with some concern that IWMI has yet to undertake any systematic effort to measure the impact of its work. This seems somewhat surprising given the number and quality of IWMI's research achievements and given the current culture of the CGIAR with its strong emphasis on demonstrating the impact of successful research on the mission and goals of the Centres. IWMI appears to be lagging behind other Centres in this area. Notwithstanding the difficulty in trying to measure the impact of improvements in the way in which a critical input like water is managed, TAC recommends that high priority be given to impact assessment by the Centre.

## Future Directions/Other Issues

TAC is pleased to note the Panel's conclusion that IWMI is now well positioned to provide research leadership on issues related to improved management of water resources for the benefit of present and future generations. The demand for more research on water-related issues in agriculture can be expected to increase in the future. This has obvious implications for the size and structure of IWMI and consideration will have to be given for maintaining an appropriate balance between the global and national programmes and between strategic and applied research. TAC recommends that this issue be explicitly addressed in the revised Strategic Plan. Consultation with stakeholders is critical.

TAC notes that several of the Panel's recommendations appear to have implications for expansion (Recommendations No. 1, 2, 7). While the programmatic rationale for increasing emphasis in those specific areas is clear and supported by TAC, there is uncertainty as to whether such expansion is expected to be achieved via additional funding or through re-allocation of existing funds. In one case (Recommendation No. 1) the Centre intends to respond by strengthening cooperation with interested CGIAR Centres, specialized universities and research institutes and NARS partners, and perhaps with short-term Fellows, rather than with long-term appointments in-house.

TAC supports IWMI's planned expansion of effort in Southern Africa to develop a regional programme. TAC suggests that, where possible, IWMI's research in the region be in close association with other CG centres working there.

## Conclusion

TAC is pleased to note the major transformation that has occurred at IWMI and endorses the significant changes in name, mission and programmatic focus over the last several years. It believes, as the Panel does, that IWMI has indeed found a niche for itself in research on water management and food security issues in a global context. TAC applauds the Centre, and in particular, the Director General, for the significant achievements made over the last six years. The Committee recommends continued strong support from the CGIAR members for IWMI and its work on water management related issues.



INTERNATIONAL WATER MANAGEMENT INSTITUTE



Colombo, 4 March 2000

Dr. Emil Q. Javier  
Chair  
Technical Advisory Committee  
Professor  
Institute of Plant Breeding  
University of the Philippines at Los Baños  
College, Laguna  
The Philippines

Mr. Alexander von der Osten  
Executive Secretary  
Consultative Group on International Agricultural Research  
The World Bank  
1818 H Street, NW  
Washington, DC 20433,  
USA

Dear Dr. Javier and Mr. von der Osten:

Subject: Second External Programme and Management Review (EPMR)  
of the International Water Management Institute

On behalf of the IWMI Board and Management, we express our appreciation to Dr. Michel Petit and the members of the EPMR Panel for the comprehensive review and report. We are very pleased that the Report, in its overall assessment, recognizes the transformation that has occurred at IWMI over the past six years. In particular, the Panel notes that IWMI is well positioned to exert strong leadership in the provision of science-based solutions for the efficient and equitable management of water resources.

The EPMR endorsement of IWMI's research activities comes at an important time as the Institute prepares to take a key role in the 2<sup>nd</sup> World Water Forum at the Hague in March.

The Panel believes that IWMI could effectively put to good use a higher level of funding and provide good value for money. We are pleased to note that the Panel believes that the logic of preserving the clear identity of the Institute as a key resource management institute is unassailable.

The Panel made thirteen recommendations and we are pleased to state that we agree with each of the recommendations. In our responses we have explained the steps which are already being taken to implement all thirteen recommendations. It is perhaps useful to note that four of the eight recommendations on IWMI's research programs represent endorsements of the Institutes approach to complex issues e.g. Recommendation No. 6 the Panel recommends that IWMI should retain the research component dealing with irrigation related health issues.

IWMI's formal responses to the thirteen recommendations follow. In addition, the many helpful suggestions made by the Panel have been carefully considered by Board and Management, and are part of the current year's action plan.

Yours sincerely,



David Seckler  
Director General



Klaas Jan Beek  
Chairman, Board of Governors

IWMI'S BOARD AND MANAGEMENT RESPONSE TO THE RECOMMENDATIONS OF THE SECOND EXTERNAL PROGRAMME AND MANAGEMENT REVIEW OF IWMI
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## RESPONSES TO RECOMMENDATIONS

Recommendation 1: The Panel recommends that IWMI add crop physiology expertise to the IWR programme 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 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.

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

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. Tushaar 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.

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 programmes and policies that have failed.

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 programmes despite the pitfalls. IWMI believes that carefully targeted investment in examining programmes 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.

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 programmes other than PIM; and consider the implications of research results for the poor.

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-Brahmaputra 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 programmes in addition to the Policies, Institutions and Management Programme. For example, the Irrigation and Water Resources and PIM Programmes 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 programmes. The Applied Information and Modeling Systems Programme is helping to developing a poverty-map of South Africa.



Recommendation 5: Given the limited number of professional staff and finances available for achieving the broad mission of the PIM programme, 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 is aware of the gap between the limited human and financial resources and the broad mission of the Policies, Institutions and Management (PIM) Programme. 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 Programme.

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

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.

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 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).

Recommendation 8: The Panel endorses the investment in researching the use of relevant information technology, remote sensing and modelling for use in irrigation and water management and recommends that this work should continue and, with respect to various modelling 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.

The Panel's endorsement of our investments in applications of information technology, remote sensing and modelling 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.

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

Recommendation 5 (above) makes a similar recommendation with respect to the Policies, Institutions and Management Programme.

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 programme 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.

#### General Comment – Chapter 4

The Board appreciates the comments in the Panel’s report regarding the evolution of the Institute’s programme that has taken place during the tenure of the current Director General. The expansion of IWMI’s research programme to consider water management issues on a global scale and to focus on problems of regional water scarcity was an important change that will greatly enhance IWMI’s contribution to world water issues in general and to the CGIAR’s objectives in particular. However, without denying the credit due to the DG for this expanded vision and for the quality of the scientific work with which it has been pursued, the Board feels that the Panel ignored the very real role of the Board in guiding this evolution, supporting the DG’s efforts, and redirecting the Institute’s strategic direction.

The governance chapter contains a number of very useful recommendations and suggestions to which we fully subscribe as noted below. Nonetheless, we believe the report fails to recognize the role that the Board has played in promoting change, both in the Institute and in its own greatly improved operations over the last five years. In fact, there has been a steady progression in the Board’s involvement in IWMI’s strategic directions and an evolution in Board membership commitment. Even those changes made since the April 1999 meeting, which was observed by the Panel, were not sufficiently acknowledged.

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

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 Programme 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 programme 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.

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 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.

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 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.

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 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.

#### Suggestions – Chapter 4

The Panel suggests that the Board consider the inclusion of members with expertise in natural resources. However, we believe this area is adequately covered by several Board members and have chosen to seek new members in the social sciences, an area of expertise that will be diminished as two current members leave the Board at the end of 2000.

Other suggestions in the EPMR report relate to Board documents and procedures and will be carefully considered in the review referred to in our response to the recommendations above. We note especially the suggestion that the Board take steps to ensure a comprehensive policy framework for the Institute. We will review the existing policies in the course of the next few months and compile them into one document. This is another area in which materials might usefully be shared among CGIAR Centers, and we will look to the CGIAR Secretariat for assistance in identifying sources.



CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH  
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

REPORT OF THE  
SECOND EXTERNAL PROGRAMME AND MANAGEMENT REVIEW  
OF THE  
INTERNATIONAL WATER MANAGEMENT INSTITUTE  
(IWMI)

Review Panel:     Dr. Michel Petit (Chair)  
                      Dr. Walter Coward  
                      Dr. John Dillon  
                      Dr. Marvin Jensen  
                      Dr. Wayne S. Meyer  
                      Dr. K.R.S. Murthy  
                      Dr. Montague Yudelman  
  
                      Dr. Selçuk Özgediz (CGIAR Secretariat)  
                      Dr. Timothy G. Kelley (TAC Secretariat)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

February 2000



*Professeur Michel Petit  
Institut National Agronomique  
16 rue Claude Bernard  
75005 Paris  
FRANCE.*

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Colombo, 27 February 2000

Dr. Emil Q. Javier  
Chair  
Technical Advisory Committee  
Professor  
Institute of Plant Breeding  
University of the Philippines at Los Baños  
College, Laguna  
The Philippines

Mr. Alexander von der Osten  
Executive Secretary  
Consultative Group on International Agricultural Research  
The World Bank  
1818 H Street, NW  
Washington, DC 20433, USA

Dear Dr. Javier and Mr. von der Osten:

On behalf of the Panel, I am pleased to submit to you the Report of the Second External Programme and Management Review of the International Water Management Institute (IWMI).

The Panel members with whom I worked on this review brought great skill and commitment to the task. They made every effort to analyze IWMI's research programme, management and governance so as to be able to offer a considered assessment of the Institute and make constructive recommendations.

The Panel is convinced that over the last six years IWMI has transformed itself from an institution focussing on irrigation management and involved in a combination of research and technical assistance activities to a much more research-oriented institution. IWMI, led by the DG, David Seckler, ably supported by his senior management team and by IWMI staff, and with the general support of the Board, deserves much credit for this achievement.

Although we point out a few areas of weakness, these can easily be addressed. We want to make it clear that, in our view, the Institute deserves stronger financial support than it has received so far. Indeed, in our view, it is imperative to find solutions to long-term water issues covered by IWMI's mandate if the overarching goals of the CGIAR are to be achieved.



I speak for all members of the Panel in thanking you for giving us the opportunity to participate in such an absorbing and important assignment.

Yours sincerely,

Michel Petit  
Chair, IWMI EPMR Panel

# TABLE OF CONTENTS

	<b>Page</b>
<b>FOREWORD</b>	xxvii
<b>SUMMARY AND RECOMMENDATIONS</b>	xxix
<b>CHAPTER 1 - THE EVOLUTION OF THE INTERNATIONAL WATER MANAGEMENT INSTITUTE (IWMI)</b>	1
1.1 The Increasing Scarcity of Fresh Water	1
1.2 From IIMI to IWMI	2
1.3 IWMI's Modus Operandi	5
1.4 Conclusion: The Need to Establish Priorities	7
<b>CHAPTER 2 - RESEARCH PROGRAMMES</b>	9
2.1 Irrigation and Water Resources Programme (IWR)	9
2.1.1 Overview of Programme	9
2.1.2 Achievements: Outputs and Impact	11
2.1.3 Assessment	13
2.1.4 Conclusions	16
2.2 Policy, Institutions and Management Programme (PIM)	17
2.2.1 Overview of Programme	17
2.2.2 Achievements: Outputs and Impact	18
2.2.3 Assessment	20
2.2.4 Conclusions	24
2.3 Health and Environment (H&E)	24
2.3.1 Overview of Programme	24
2.3.2 Achievements: Outputs and Impact	27
2.3.3 Assessment	28
2.3.4 Conclusions	29
2.4 Applied Information and Modelling Systems (AIMS)	30
2.4.1 Overview of Programme	30
2.4.2 Achievements: Outputs and Impact	33
2.4.3 Assessment	33
2.4.4 Conclusions	36
2.5 Systemwide Initiative on Water Management (SWIM)	37
2.5.1 Overview of Programme	37

	<b>Page</b>
2.5.2 Achievements: Outputs and Impact	37
2.5.3 Assessment	37
2.5.4 Conclusions	40
<b>CHAPTER 3 - RESEARCH ORGANIZATION AND MANAGEMENT</b>	<b>41</b>
3.1 Organization Structure	41
3.1.1 Overall Structure	41
3.1.2 Research Programme Structure	44
3.1.3 National Programmes	45
3.2 Research Planning and Management	47
3.2.1 Research Planning	47
3.2.2 Project Development for Restricted Funding Support	48
3.2.3 Project Management	49
3.3 Monitoring and Evaluation	50
<b>CHAPTER 4 - LEGAL STATUS AND GOVERNANCE</b>	<b>52</b>
4.1 Legal Status	52
4.2 Board of Governors	53
4.2.1 Assessment	53
4.2.2 Improving Board Performance	54
<b>CHAPTER 5 - FINANCE AND ADMINISTRATION</b>	<b>61</b>
5.1 Financial Management	61
5.1.1 Funding	61
5.1.2 Expenditure	63
5.1.3 Financial Planning and Control	65
5.1.4 Financial Administration	67
5.2 Human Resources Management	68
5.2.1 Strategic Approach	68
5.2.2 Staff Numbers and Turnover	69
5.2.3 Staff Policies	72
5.2.4 Human Resources Administration	74
5.3 Research Support Services	74
5.4 Communications and Donor Relations	75
5.4.1 Library	75
5.4.2 Publications	76
5.4.3 Donor Relations, Fund Raising and Project Development	78

	<b>Page</b>
<b>CHAPTER 6 - OVERALL ASSESSMENT</b>	80
6.1 IWMI's Major Transformation Towards a New and Clearer Identity	80
6.2 Achievements Have Been Significant	81
6.3 Remaining Weaknesses and Future Challenges	82

## **ACKNOWLEDGEMENTS**

### **ANNEXES:**

Annex 1: Water and Agriculture

### **APPENDICES:**

Appendix I	Composition of the Panel and Biographical Information
Appendix II	Terms of Reference for External Programme and Management Reviews of CGIAR Centres
Appendix III	Recommendations of the 1994 EPMR Panel and IWMI's Response
Appendix IV	Documents Provided to the Panel
Appendix V	Itinerary of the EPMR Panel
Appendix VI	Glossary of Acronyms

## FOREWORD

This is the report of the Second External Programme and Management Review Panel appointed by the Technical Advisory Committee of the CGIAR to evaluate the research programme and management of the International Water Management Institute (IWMI). The composition of the Panel, which conducted this evaluation, is listed in Appendix I along with brief biodata of the Panel members. The Terms of Reference (TOR) that the Panel were given are provided in Appendix II.

In producing its report the Panel was guided by the two broad objectives of EPMRs: (a) providing CGIAR members with an independent and rigorous assessment of the institutional health and contribution of the Centre and (b) providing the Centre and its collaborators with assessment information that complements or validates their own evaluation efforts. The Panel has made every effort in this report to present an “accurate account of the outputs, achievements and what is known about the impact of IWMI during the review period.” For this review, the Panel took as its departure point the major recommendations from the 1994 EPMR. These recommendations and a summary of the Centre’s response to them are provided in Appendix III. The Panel believes that IWMI has responded in a satisfactory manner to all but one of the previous EPMR’s recommendations.

With respect to the conduct of its review, the Panel relied on several sources of information in reaching its conclusions and making its recommendations. These were the following:

- documentation provided by the Centre and the TAC and CGIAR Secretariats (Appendix IV);
- IWMI staff presentations given during the Initial Phase of the review (4-12 December 1999);
- follow-up discussions with programme teams and individual scientists and other staff groups at IWMI headquarters during both the Initial Phase and the Main Phase (14-29 February 2000) of the review;
- meetings and discussions with government officials, NARS scientists, university staff, NGOs and farmers associated with IWMI’s national programmes in Sri Lanka, India, Pakistan, Mexico and South Africa;
- field visits to specific project sites in Sri Lanka, Pakistan, Mexico and South Africa and follow-up discussions with IWMI staff in the field;
- review of Board agendas, minutes and other documentation and observations of the Board in action (Board Meeting, April 1999);
- informal discussions with professionals working on water issues in various institutions, e.g., FAO, CEMAGREF, Water Vision Secretariat, World Bank, ICID, universities; and,
- meetings and consultations with persons knowledgeable on health, environment, and gender-related issues, notably within The Novartis Foundation for Sustainable Development, the International Centre for Research on Women, the World Wildlife Fund and the World Resources Institute.

The Panel made every attempt to conduct the review in an objective, transparent and participatory manner with a focus to the future as well as to the past. The Centre was kept informed of the Panel’s activities and progress throughout. A list of key issues identified by

the Panel at the conclusion of the Initial Phase of the review was shared with the Centre to elicit initial reactions. Early drafts of various chapters of the report were shared with the Centre to ensure continued dialogue and to check for factual accuracy.

Because of time constraints, the Panel could not go in detail into every element of the Centre but chose to focus on what it believed were the most significant issues facing the Centre. For example, at the conclusion of the Initial Phase of the Review, based on a consistently favourable impression of staff-management relations and overall high morale observed among staff—and confirmed after some probing—the Panel chose to not conduct a formal staff survey to investigate further. However, the Panel did encourage staff to contact them (confidentially) if they had any concerns or issues to discuss. In a similar way, the Panel chose not to conduct a survey among IWMI's NARS partners, but did spend considerable time meeting various government officials and other IWMI collaborators in five countries (see Panel itinerary in Appendix V). None of the other CGIAR Centres (including those with whom IWMI has active collaboration) responded to an invitation to bring to the attention of the Panel any issues of importance.

## **SUMMARY AND RECOMMENDATIONS**

### **The Evolution of the International Water Management Institute (IWMI)**

The Institute began in 1984 as the International Irrigation Management Institute (IIMI). Its initial mandate was to improve the management of irrigation systems, especially in developing countries. Much of its 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 External Program and Management Review (EPMR, 1994) of the Institute recommended a shift to more strategic research in irrigation water management. This shift has been promulgated through the term of the current Director General (DG) who was appointed in 1995. Under his leadership, the research programme now includes consideration of water management and irrigation issues at a global scale with a central theme concerned with the emerging problem of regional water scarcity. Consistent with this theme, research attention has been focused through the notion that water management can only be sensibly considered within a river-basin context. This emphasizes that all water within a basin is inter-connected and that use or reuse of water in one part of the basin can affect water users in other parts, especially those downstream. With this direction, IWMI has, over the last five years, established itself 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.

### **Research Programmes**

IWMI has established four complementary research programmes:

- Irrigation and Water Resources
- Policy, Institutions and Management
- Health and Environment
- Applied Information and Modelling Systems.

The Irrigation and Water Resources (IWR) Programme has expertise in irrigation systems, crop water consumption, and crop production per unit of water consumption. Crop physiology expertise will be needed to identify and quantify the key determinants of productivity and the interactions with irrigation water management. The Programme has made major progress in developing a water accounting system that provides a universal basis for comparing irrigation performance and the beneficial use of irrigation water. This system is a key part of the analysis used to estimate emerging changes in water scarcity in different regions of the world. Irrigation system performance indicators developed by IWR staff are also being used to assess the effectiveness of rehabilitation and changes in supporting institutional arrangements.

The Policy, Institutions and Management (PIM) Programme has focussed on issues associated with the transfer of irrigation operation and maintenance activities from government agencies to local water user groups. It has initiated a promising programme of activities on the relationships between gender, poverty and water management. More

recently, it has launched studies of the system of institutions involved with water resource management at the basin level. The Programme will now be charged with the policy dialogue work generated by the use of the IWMI-developed model called PODIUM which was used extensively to help prepare the World Water Vision of the World Water Commission. The future emphasis of the Programme should be on defining the impediments and supports allowing successful irrigator-led water management, and on studies identifying the causes and effects of gender-related poverty. Research on the valuation of water for various uses, including the environment, will be strengthened by the recent arrival of a senior economist.

The Health and Environment (H&E) Programme conducts research to identify the impacts of irrigation on human health and to examine water management options that may lead to improved health. The underlying hypothesis is that improved management of irrigation water delivery can achieve health benefits through the improved control of water-borne (e.g., gastro-intestinal disease) or water-related diseases (e., malaria). The potential tradeoffs in water available for food production still need to be quantified. Currently, the only specifically designated environment research project concerns irrigation water management effects on downstream wetlands in southern Sri Lanka. Other irrigation related environment work, e.g., salinity and waterlogging, is integrated in projects of other Programmes. The health component of this Programme, despite its small size, has been very productive. Future work will focus on those human health aspects that are the direct result of irrigation water use. Work on the environmental effects of irrigation, particularly those of downstream water quality, is expected to increase and this is indeed desirable.

The Applied Information and Modelling Systems (AIMS) Programme is relatively new and focuses on the application of information technologies for improving water management. These include adapting and using remote sensing, geographic information systems and simulation modelling to support analyses of water use and distribution within river basins. This Programme also provides a support function to the other IWMI Programmes in applying information technologies. Over the last five years this group has produced the IWMI World Climate and Water Resources Atlas—the final release of which is expected in 2000. The substantial resources and expertise embedded in this Programme should continue to develop the use of information technologies and to support the use and adaptation of the modelling capability.

The Systemwide Initiative on Water Management (SWIM), while not a research programme in its own right, is important to IWMI as a means to enhance its partnerships with other CGIAR Centres. As part of this initiative, a set of eight “state-of-the-art” SWIM papers have been released and several projects involving other CGIAR Centres are well underway. The current review strongly suggests, however, that modifications to the SWIM arrangements are needed to enhance the original objective of encouraging CGIAR Centres to work together on shared issues.

## **Research Organization and Management**

Research organization and management at IWMI, while not changed in basic structure since 1994, now has a much better sense of purpose. Nearly all senior managers are actively involved in research. Research Programme Leaders are increasing their influence over projects to cover all of IWMI’s research interests irrespective of the geographic location of



the projects. The annual Work Plan and its associated development has become the primary mechanism for research groups to identify their projects and activities. The planning and management processes in place are well understood by staff and well supported by good team work between research groups and research support services. Integration between the three levels of planning (strategic, medium term, and annual), however, is not complete. In addition there is no systematic effort to assess the impact of IWMI's work. Thus this review has recommended that a more structured process of priority setting at all levels, should be implemented.

## **Legal Status and Governance**

IWMI is an autonomous international organization, under the control of a Board of Governors. Formalities to officially modify the name of the Institute (from International Irrigation Management Institute to International Water Management Institute) await the approval of the Government of Sri Lanka. At the time of this change, there will be an opportunity to revise and update the Institute's Charter.

The various tasks of the Board of Governors are discussed and suggestions are made to indicate how the Board can become more proactive and business like. This review has resulted in a number of recommendations aimed at making operations of the Board conform more with accepted best practice and positioning IWMI to move forward as a maturing international organization.

## **Finance and Administration**

As with all CGIAR centres, management of finances at IWMI takes place in an environment of increasing complexity and considerable uncertainty. All aspects of financial management and administration have been reviewed. IWMI has put in place a well-designed and thorough financial system that provides timely, well-documented and credible information to all levels of management. Active management of staff, both in composition and location, has accorded flexibility and the creation of a stimulating intellectual research environment. The Research Programmes are well supported by facilities such as information technology, computing and library services. The recently revamped Communications and Donor Relations unit includes a Project Development Officer who keeps researchers apprised of interests and needs of donors and assists researchers in developing new proposals. Quality assurance on IWMI outputs is generally well implemented. The review has suggested actions that the Communications and Donor Relations unit can take, which will enhance the IWMI trademark.

## **Overall Assessment**

This review found that IWMI has responded well to the advice it received in recent years. Through the efforts of its staff, it has generated a scientifically productive environment that is well supported by its organizational structures and administration. The Panel believes that thoughtful implementation of the recommendations contained in this report will strengthen the already firm foundations of IWMI, as an international organization. The Panel believes

that IWMI is in an excellent position to provide research leadership on issues related to better management of water resources and thus contribute to achieving the goals of the CGIAR.

## LIST OF RECOMMENDATIONS

### CHAPTER 2 - RESEARCH PROGRAMMES

- (1) The Panel recommends that IWMI add crop physiology expertise to the IWR Programme in order to facilitate incorporating or adapting components of complex plant growth models and to communicate better with other institutes that have this expertise.
- (2) The Panel recommends that the IWR Programme should increase its emphasis on the groundwater depletion problem.
- (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 programmes and policies that have failed.
- (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 programmes other than PIM; and consider the implications of research results for the poor.
- (5) Given the limited number of professional staff and finances available for achieving the broad mission of the PIM Programme, the Panel recommends that careful attention be given to planning future PIM activities, based on a more formal, and more transparent, priority setting process.
- (6) The Panel recommends that IWMI should retain the research component dealing with irrigation-related health issues.
- (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.
- (8) The Panel endorses the investment in researching the use of relevant information technology, remote sensing and modelling for use in irrigation and water management and recommends that this work should continue and, with respect to various modelling 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.

### **CHAPTER 3 - RESEARCH ORGANIZATION AND MANAGEMENT**

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

### **CHAPTER 4 - LEGAL STATUS AND GOVERNANCE**

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

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

(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.

(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.

# **CHAPTER 1 - THE EVOLUTION OF THE INTERNATIONAL WATER MANAGEMENT INSTITUTE (IWMI)**

## **1.1 The Increasing Scarcity of Fresh Water**

Fresh water has at least five important characteristics that will bear on the well-being of the world's population in the 21<sup>st</sup> century. These are: (a) Fresh water is the essential life blood of the biosphere and it is unlikely that there will be a substitute for fresh water in the foreseeable future; (b) The annual global supply of water (renewable and in aquifers) is finite and there appears to be no natural or man-made processes—including climate change and desalinization—that are likely to have a major impact on the supply of water in the near future; (c) The distribution of the world's water supplies is determined by environmental conditions and is uneven relative to population. Thus, while there is no absolute shortage of water vis-à-vis the world's population, the distribution is such that per capita supplies of fresh water vary greatly among nations (and, in some instance within nations); (d) The world only uses a relatively small part of the total supply of fresh water, but a high proportion of the total supply is in remote and inaccessible locations that would be very costly to develop and convey to densely populated areas. The Congo Basin in Central Africa and the Amazon Basin in Brazil have large untapped fresh water resources as do the ice caps of the Arctic and Antarctica; and (e) In a given region, the distribution of water among people depends very much on policies and institutions. As a result, access to water by the poor is less than that by the rich.

The International Water Management Institute (IWMI) has undertaken a series of analyses of the availability and use of water required to meet the global, regional and national needs and demands. The most recent of these analyses cover 45 countries representing 85% of the world's population over the period 1995-2025. This authoritative study projects that by 2025 around 33% of this population, living mostly in North Africa, the Middle East and parts of India and China, is expected to face an absolute shortage of water. This shortage will be a major constraint on domestic production in all sectors of the economy. Forty-five percent of the population will be living in countries primarily in Africa and in parts of East Asia and Latin America where there will be a need to increase water availability by an estimated 25% to satisfy projected demand (with adequate allowances for imports and exports). Developing these additional supplies could well involve costs that would strain the limited financial capacity of many of these countries. The remaining 22% of this population, mostly in North America, Europe and Japan, is expected to have water supplies that are ample enough to meet the needs of the people without too much difficulty.

These studies, along with others, make it abundantly clear that there is, and will continue to be a need to focus to a greater extent than hitherto on the wise management of water resources. This is especially relevant in the agricultural sector where irrigation accounts for around 70% of the water used in developing countries. Over the past 50 years

there has been a substantial increase in the area under irrigation, especially in the most populous regions of Asia, including India, China, Pakistan and Indonesia. A combination of adequate and timely water supplies, chemical fertilizers and high yielding varieties of seeds has led to substantial increases in the yields of the staple food crops consumed in these countries. The irrigated sector now accounts for close to 60% of the food grown in all developing countries; it is estimated that, taking into account the constraints on increasing output from rainfed agriculture, the irrigated sector will have to provide as much as 80% of the added food to meet the demands of the additional two billion people who will be living in the developing countries by 2025. IWMI's analyses make it clear that increasing the supply of food to attain these goals will require both an increase in the area under irrigation as well as a rise in the productivity of water used for food production.

Looking ahead then, there will be a need for a two-pronged approach: 1) increased investment in the expansion of irrigated agriculture at a time when costs of developing irrigation are rising, and 2) ensuring that whatever water is used for irrigation be used as productively and equitably as possible. This will include developing strategies for macro level water allocation among competing sectors at the basin level as well as strategies to improve the operation and maintenance of surface irrigation to ensure adequate, timely and equitable supplies of water for producers. In addition, there will be a need to develop strategies to increase productivity of groundwater without depleting this valuable resource.

When the Green Revolution started in the 1960s, water was not seen as a major constraint to increased productivity in potentially productive areas. Indeed the rapid expansion of irrigation was one of the "engines of growth" over the past 50 years. This situation has changed. The cost of developing water resources has risen, and the competition for water from all sources has increased; water has become relatively scarce compared with the situation that existed in the 1960s. In addition, although there has been great success in increasing food production (especially in the irrigated sector), numbers of poor, sick and undernourished human beings in the developing countries are still very high, and in many cases, there has been a worsening in the degradation of natural resources, such as irrigation-induced salinization.

Thus there will be a major intellectual challenge to formulate policies, strategies and programmes whereby irrigation can expand and increase its output to meet projected demand by 2025 and beyond. The central tenets of whatever strategy does emerge will be to raise the productivity of water in a way that permits socially equitable and environmentally sustainable development. This, of course, is the *raison d'être* of IWMI—as is discussed below.

## **1.2 From IIMI to IWMI**

The International Irrigation Management Institute (IIMI) was established in 1984 with the support of a number of donors under the leadership of the Ford Foundation. IIMI was created at a time when there were serious concerns that the poor management of the rapidly expanding public sector irrigation systems—especially in Asia—was leading to

ineffective use of water. These concerns were clearly reflected in IIMI's very ambitious Charter. The Charter states that "the specific objectives of the Institute shall be to develop methods, devices, procedures, practices, and operational approaches to: (a) optimize the effectiveness of water use for agricultural production; (b) ensure dependability and equity in the distribution of the benefits of irrigation; (c) evaluate and improve the management and performance of irrigation systems; (d) protect, maintain and improve the quality of irrigated soil and the environment in areas affected by irrigation systems, as well as the health and quality of life in rural agricultural communities, and (e) improve the reliability of water supply thus reducing the risks to investments in yield increasing inputs and to share and disseminate information thereon among potential user groups, organizations, and other bodies and persons concerned with irrigation."

Faced with this daunting array of objectives and constrained by limited resources, IIMI chose to focus a great part of its efforts on the improvement of the management of public sector irrigation systems *per se*. Thus in 1988, IIMI's Board of Trustees approved a formal mission statement that gave the Institute's purpose to be: "to strengthen national efforts to improve and sustain the performance of irrigation systems in developing countries through the development and dissemination of management innovations." These management innovations were deemed to run the gamut from the valuation of water to institutional arrangements for improving the operation and management of canals. Much of IIMI's early work was undertaken at the behest of donors and involved "action research". It also involved technical assistance intended to provide advice on improving the irrigation efficiency in specific irrigation systems; there was little research geared to developing strategies for improving the overall use of water resources. One further important facet of IIMI's early work was the initiation of case studies on the transfer of management of canal systems to water users—studies that have continued to this day and have made the Institute a leading authority on this topic.

In 1991, IIMI became a member of the CGIAR. IIMI's entrance into the CGIAR was justified in large part (by TAC) by the critical role played by irrigation in increasing food production, especially in Asia, the most heavily irrigated and populous region of the world. TAC emphasized that improving the efficient management of these water resources could contribute to raising agricultural productivity, especially in the production of rice and wheat, the major staples grown under irrigation by smallholders and consumed by the urban poor. TAC stressed the need for research on improving the operation and maintenance of existing irrigation systems, and on the strengthening of institutions concerned with the management of irrigation. It also recommended that IIMI consider research on more general topics such as the role of irrigation development in food production and how national policies governed the pace and scope of irrigation development.

Following its entry into the CGIAR, IIMI moved to bring its mission into line with the overall goals of the CGIAR and the recommendations of TAC. The most significant change was a broadening of the Institute's earlier focus from research on improving the *management of irrigation systems* to research on raising the *productivity of irrigated agriculture*. Thus, IIMI's mission was redefined "to foster the development, dissemination

and adoption of lasting improvements in the performance of irrigated agriculture in developing countries.” IIMI continued much of its research as before. Its two main thrusts were on overarching issues such as developing performance indicators to measure the success (or otherwise) of irrigation projects and on in-country analysis of the devolution of management of irrigation systems. IIMI also undertook its first analysis of the global water situation during this period.

The first EPMR in 1994 endorsed the importance of international socio-economic research on irrigated agriculture and supported IIMI’s shift away from the narrower focus on the management of irrigation. The EPMR also encouraged more interdisciplinary research and urged that IIMI should be the convening centre in the CGIAR for research on water resources (so complementing its skills with the disciplines in the other centres). The EPMR supported IIMI’s approach to research based on studies in the field with real systems and with the involvement of local organizations and farmers. The EPMR did, however, urge that the research programmes should be “demand-driven” and have a greater strategic content than the somewhat eclectic ongoing research effort. Finally, the EPMR recommended that all programmes and projects be reviewed for research opportunities related to gender and objectives be established based on these. It also suggested that IIMI explore opportunities to expand its research on the environment (including the control of disease-carrying vectors through improved water management).

A combination of the recommendations in the 1994 EPMR and broadening of the CGIAR’s objectives along with the appointment in 1995 of a new and forceful DG brought a further widening of IIMI’s mission. The CGIAR also prodded the CGIAR Centres, including IIMI, to expand their research horizons to include gender and environmental issues along the same lines suggested by the EPMR. In addition, the CGIAR endorsed the notion that IIMI should be the pivotal centre in the evolving SWIM Programme.

The appointment of the new DG in 1995 brought a further dimension to IIMI’s mandate and a reoriented research programme. He introduced a school of thought about water resources management, which has become known as “the IIMI paradigm of water use efficiency” (though, as is widely acknowledged, the central concepts of this paradigm were articulated by Jensen as early as 1977 and it was subsequently clarified and refined with the aid of many water specialists). The basic tenet of this paradigm is that the conventional approach to analyzing irrigation efficiency on a project-by-project basis, as formerly endorsed by IIMI, can be misleading. This arises because water resources systems are highly integrated and apparent gains in a project in one part of the system can be offset by real losses in other parts of the system and *vice versa*. Consequently, the paradigm holds that water resources analysis measuring the productivity of water is best carried out in the context of water balances of a whole river basin, taking account of *all* the water used within that basin.

As a reflection of a commitment to these concepts of the “IIMI paradigm,” in 1997 the Board agreed to a change in the institution’s name to the International Water Management Institute (IWMI). Such a change was widely welcomed by the Institute’s stakeholders. It was deemed to be appropriate as the proposed holistic, integrated

approach to optimizing broad-based water use was seen to extend well beyond the use of water for irrigation alone. In addition, since the integrated approach was to be centred around river basins, it was also deemed desirable that the river basin be the organizing entity in the analysis of the multiple uses of water. Thus, the most recent statement of IWMI's mission, which also reflected the CGIAR's own mission statement of 1998, is that "IWMI will 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." In line with these sentiments, the IWMI research programme was expanded to develop models that examined water allocations and water balances in a basin context. In addition, research on malaria control and several related environmental uses was strengthened.

### **1.3 IWMI's Modus Operandi**

IWMI's research or science programme has been changed over the past several years to conform with the Institute's changed mandate and in response to the criticism of the first EPMR that the programme was too site-specific and lacked strategic context. As is discussed in the chapters that follow, research falls under four global programmes: (a) irrigation and water resources, (b) policy, institutions and management, (c) health and environment, and (d) applied information and modelling systems. The global programme contains 12 funded MTP projects, including a number of activities funded through the CGIAR's systemwide initiative, the SWIM Programme. The Institute has both resident and non-resident national programmes with outposted staff manning the resident programmes, while most non-resident programmes are managed from headquarters. (The Central Asia Programme is managed from Pakistan.) Following the pointed comments of the first EPMR about the number of individual IWMI staff members resident in scattered locations and the desirability of having a critical mass of staff members in any one location, there has been a sharp cutback in resident programmes. In 1999, there were five such programmes in Pakistan, Sri Lanka, Turkey, Mexico and West Africa. The resident programme in Turkey has been terminated and that in Mexico is drawing to a close. It is probable that a new resident programme will be established in the Republic of South Africa in 2000. There are at least 15 countries in which IWMI has non-resident activities. These include India, Bangladesh, Nepal, China, Philippines, Iran, Kazakhstan, Peru, Indonesia, Kenya, Côte d'Ivoire, Mauritania, Senegal and Burkina Faso; there will also be a non-resident programme in Mexico following the termination of the resident programme. Outposted staff in some of the resident programmes also cover more than one country, e.g., the staff in Mexico also undertook research in Colombia and Peru, and the proposed resident programme in South Africa is expected to lead research programmes in other countries in parts of sub-Saharan Africa.

IWMI staff undertake policy research both at headquarters and in the field. This policy research includes global issues (policies to improve global water management) as well as narrower issues (policies on pricing of water). In addition, IWMI has undertaken work both at headquarters and in the field, in conjunction with other research institutions, on water systems modelling. Policy work is also done on issues such as policies to



encourage the devolution of management authority of irrigation systems from state to private user groups.

The largest national programme is in Pakistan where this programme has four field offices, employs more than 120 people and presently commands 13% of the Institute's budget. The second largest programme is in Sri Lanka though this programme has become smaller in recent years. The two countries have very different irrigation systems but the current research programmes in the two countries provide IWMI with opportunities to learn more about a range of technical and social issues that govern effective water use, e.g., studies in salinity in Pakistan and on tank operations in Sri Lanka. Work in these countries also serves as testing grounds for the global research programmes, for instance those that examine both health and environmental issues. The programmes in Turkey and Mexico focused, respectively, on developing and testing river basin models dealing with water allocations for agriculture and examining the transfer of management of irrigation systems from the state to local user groups. These programmes also serve to demonstrate (a) the feasibility of river basin analyses and the shortcomings that have to be overcome to improve them, and (b) the impact of transferring authority from the state to water users on a number of variables including the incomes of water users, the payment of water fees and the maintenance of canal systems.

Nearly all of IWMI's programmes include training and capacity-building. These efforts have involved formal short courses, on-the-job training for students and national researchers as well as training through joint research and development activities with NARS, universities and NGOs. IWMI's national programmes have also organized numerous workshops and seminars. These have ranged from sessions intended to bring Turkish and Iranian officials up to date on the application of satellite imagery for use in assessing the effects of water use on resource degradation to exchanges about the most effective systems for promoting local participation in water users associations. IWMI's efforts in capacity building have also included supporting students and postdoctoral researchers.

IWMI's modus operandi includes the use of the printed word and the Internet to reach and inform its audience about its work. This audience includes researchers as well as policymakers and managers who are interested in tools and concepts related to improving water management. The printed word includes IWMI's own publications such as its series of Research Reports (51 in number between 1996 and 1999) that inform readers about the results of its own research (and the research activities under the SWIM Programme). IWMI also publishes workshop proceedings, working papers and country reports. In addition to its own publication, IWMI encourages its staff to publish in refereed international and national journals. All the scientific work published by IWMI staff is subject to peer review. IWMI also uses the global Internet to disseminate its findings; a noteworthy illustration of this is the availability of IWMI's *World Water and Climate Atlas* and all its research reports on the IWMI web site. They are also available on CD. (All of IWMI's publications are available to interested parties at no cost.)

As a small centre with a large mandate, IWMI has been adept at developing partnerships in developed and developing countries, both upstream and downstream, to complement its own skills and facilitate its own research. IWMI has developed partnerships with government agencies, universities and NGOs in almost all its field operations. IWMI's success in developing partnerships is well illustrated by the collaboration in the use of information technologies to facilitate the analysis of irrigation systems, in a basin context, along with the testing of alternative interventions through computer simulation and modelling. At the global level, IWMI has collaborated with the Utah State University Climate Centre in the USA and the Climatic Research Unit of the University of East Anglia in the UK to produce its acclaimed *World Water and Climate Atlas*. At the basin and systems levels, IWMI has carried out remote sensing studies in partnership with the National Remote Sensing Agency of India. Also, IWMI, together with national partners in Sri Lanka, India, Pakistan, Turkey and Mexico and the International Institute for Aerospace Survey and Earth Sciences in the Netherlands, has applied the GIS and satellite imaging to assess the productivity of land and water and the effectiveness of water management practices in irrigation systems and river basins.

#### **1.4 Conclusions**

The Panel has taken note of IWMI's evolution and its steadily expanding mandate. In principle, the Panel endorses the holistic approach embodied in the IWMI paradigm. However, in adopting this approach, the Panel recognizes that there will be scope for a wider range of research topics than hitherto at a time when financial resources may continue to be constrained. Consequently, it will be more important than hitherto that due attention be given to establishing and articulating a clear set of priorities for allocating available financial resources and for seeking additional resources.

The Panel was disappointed that IWMI's Strategic Plan did not provide yet greater guidance in this respect. Most strategic plans are forward-looking documents that do emphasize priorities; at a minimum they spell out the major objectives to be attained over a given time period, the inputs needed to attain these objectives and the modalities whereby the plan can be implemented. In addition, where there are uncertainties about funding, the plans present different scenarios depending on both priorities and projected levels of funding.

The Strategic Plan, as presented in its successive drafts by IWMI, does not yet conform to this format. It is an elegant statement that spells out the rationale behind IWMI's existence (concern about the threat of growing water scarcity) along with a discussion of IWMI's ongoing science programme, its output and the impact of its work. The bulk of the document consists of a description of IWMI's activities and some general discussion of the anticipated benefits to society from these activities. It is only in the final section of the paper that there is any discussion about the future and this is couched in very general terms. There is a vision of the major problems that will arise in the context of the world water situation over the next 25 years and how the refocusing of the research programme has been in line with that vision. In many respects the conclusion suggests that

the reorientation of research that has taken place over the past five years has laid the groundwork for the enlarged mandate and the basin approach and that, by and large, there is no need to change the present orientation of the science programmes (though some research components in given programmes would be substituted for others, e.g., the Mexican project on the transfer of irrigation management to water users associations would be terminated at a time when a South African project in this general area would be initiated).

The main thrust of the “Future Directions of IWMI’s Programme,” in the strategy document is an argument for increasing IWMI’s budget by 50% over the next five years. The rationale behind the proposed increase is that the present budget does not do justice to the size and urgency of IWMI’s mandate (a view shared by the 1999 CCER). A 50% increase would enable IWMI to expand the current programme and to cover several gaps in its current strategy. These would include more emphasis on capacity building and strengthening its presence in a number of different locations in Africa and Asia. The document concludes with the expectation that an additional US\$5 million a year by 2005 will multiply the beneficial impact of the Institute’s work many times over without elaborating on how this will come to pass.

In spite of the limitations of the draft Strategic Plan, the Panel is impressed by the transformation that has taken place at IWMI. As is discussed in the following chapters, the Panel believes that IWMI is now a strong science based organization that is in a position to make a substantial contribution toward resolving issues of water use and agricultural development in the future.

## CHAPTER 2 – RESEARCH PROGRAMMES

Managing water resources for irrigated agriculture involves managing a primary input into a production system that not only increases crop production, but also contributes to modifying and protecting the environment. For small landholders, irrigation also generally enhances their livelihoods. If irrigation is not well managed, it can have adverse effects on the environment and human health. Good irrigation water management requires an integrated approach from the timely delivery of irrigation water to farms to the uniform distribution of water to crop root zones as needed to meet crop water requirements.

A recent paper prepared by IWMI<sup>1</sup> for the *World Water Vision* describes the world's water situation in detail. Of particular concern is the impending water crisis that now exists, or that will become more severe in some developing countries. At the same time, there is a need for a substantial increase in food production in developing countries over the next quarter century. IWMI responded to the challenge as described in its paper entitled *The New Era of Irrigation and Water Management*, which describes the water basin theory, new opportunities for progress, and the application of modern information technologies.

IWMI has four major research programmes: 1) Irrigation and Water Resources Programme, which combines the former Performance and Impacts Assessment Programme and part of the Design and Operation of Irrigation Systems Programme; 2) Policy, Institutions, and Management Programme; 3) Health and Environment Programme; and 4) Applied Information and Modelling Systems Programme. Each programme has its own separate focus, but complements the work of the others. Teams drawn from two or more programmes do most of the work. IWMI also leads the CGIAR Systemwide Initiative on Water Management (SWIM). In addition, the Institute collaborates with National Agricultural Research Systems (NARS). Many of these institutions do not have multidisciplinary programmes in irrigation or water resources management. Therefore, IWMI works with a large number of partners at the system, national, regional, and global levels. IWMI also collaborates with nongovernmental organizations (NGOs). In 1999, IWMI had resident country research programmes in Pakistan, Sri Lanka, Mexico, West Africa, and Turkey.

### 2.1 Irrigation and Water Resources Programme (IWR)

#### 2.1.1 Overview of Programme

The IWR Programme has identified two general research goals that are in line with the Institute's overall programme shift in research focus over the past five years. The two broad IWR Programme goals are: "(i) to develop and apply water accounting procedures

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<sup>1</sup> International Water Management Institute. 2000. *World Water Supply and Demand: 1995 to 2025*. Colombo, Sri Lanka. Monograph prepared as a contribution to the *World Water Vision* of the World Water Commission, The Hague, March 2000.

and performance indicators to measure the variance in performance at the farm, distribution system, and basin levels over time and across sites; and (ii) to identify ways to improve and sustain increases in productivity of irrigation water in river basins.” The second stated goal is very broad and encompasses much of the entire Institute’s programme on improving the management of irrigation systems. The Programme’s specific objectives are: to develop innovative and integrated approaches to managing water resources as they become increasingly more scarce within basins; to develop technology to better understand the status of water uses in basins and countries; to identify existing methods and develop new methodologies to improve the productivity of water in basins (water accounting); to develop better methods to assess irrigation performance and to better understand the reasons for design failures, the results of management practices and interventions (performance indicators, etc.); and, to document impacts of interventions (lessons learned).

A major problem in implementing improvement practices identified for the Institute’s new integrated river-basin approach to irrigation water management is the absence in the literature of consistent methodologies and performance indicators to account for irrigation water actually consumed in crop production. Research conducted by this Programme is attempting to solve this problem by producing a water accounting procedure that helps identify opportunities for improving water productivity in a river basin. A major goal of this Programme is to encourage the adoption of uniform water accounting procedures by all institutions conducting research on irrigation and water management. The next step is to value the water used, or more specifically consumed, for different purposes.

The fraction of irrigation water consumed by evapotranspiration (ET) relative to the amount diverted from a stream or groundwater source has been called *irrigation efficiency* by engineers who design canals, closed conduits, or field irrigation systems. To illustrate, if 100 units of water were delivered to a project and 40 units were consumed in ET, the traditional irrigation efficiency for the project is said to be 40%. The fraction not consumed, most of which remains available for use, is 60%. The irrigation efficiency term has often been misunderstood. The misunderstanding results in the assumption that by increasing irrigation efficiency, more water would become available for other uses, or used for expanding the area of land that can be irrigated with that water supply. Research conducted by the IWR Programme led the way to clarifying what happens to water components from a river-basin view in terms of the components of water consumed and the components that are not consumed. IWMI has taken the lead in clarifying this misunderstanding from a river-basin viewpoint by recognizing that a change in irrigation efficiency may or may not change the volume of water consumed within an irrigated project or hydrologic basin. Rather, the Institute considers the “effectiveness” of irrigation<sup>2</sup> from an integrated water-resources management and river-basin perspective. It has refocused its research programme on the productivity of water consumed within an irrigated perimeter or basin, recognizing that all users, farmers, households, cities, industry and the environment, share water supplies of a basin.

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<sup>2</sup> See endnote 37, of report listed in footnote 1, page 8 of this report.

IWMI also recognizes that some countries will need to import food as water supplies are diverted from irrigation to domestic, municipal and industrial uses. Importing food involves a concept that is not new, but has recently been given more attention under the concept of *virtual water*.<sup>3</sup> The concept suggests that importing a ton of grain is equivalent to importing 1,000 m<sup>3</sup> of water if the grain was produced under conditions where 1 kg of grain is produced per cubic meter of water consumed in ET. Clearly, for many countries in which water supplies are scarce, importing virtual water can help alleviate the water scarcity. Countries with ample water supplies would produce the crops that have consumed a lot of water per unit of production and export the crops produced to water-scarce countries.

The IWR Programme includes three of IWMI's 12 funded MTP projects. IWR has a number of smaller projects that have been contracted or funded by various donor groups or by different countries. The three MTP projects are:

MTP Project #1	Assessing Performance and Impacts of Irrigation.
MTP Project #3	Irrigation System Design, Modernization, Maintenance and Operation.
MTP Project #5	Improving the Productivity of Water through Field, Irrigation System and Basin Practices.

The IWR Programme expenditures for 1999 and its budget for 2000 range from 18% to 20% of the total Institute expenditure and budget. Expenditures, expressed as a percentage of the total, have varied somewhat in prior years depending on projects, activities and funding sources.

The senior staff in this Programme consists of the Research Leader and six international researchers. One researcher is located in Mexico and one is located in West Africa at WARDA. The researchers tap the skills/knowledge of others as needed through cooperative projects or through partnership arrangements.

### **2.1.2 Achievements: Outputs and Impact**

The lessons learned in developing methodologies for assessing irrigation performance confirmed that a set of consistent indicators was necessary to compare the performance among systems, and to analyse temporal and spatial variations within one system as well as among systems. Issues identified and various hypotheses that were developed led to the river-basin concept. The achievements by the IWR Programme, or its outputs, consist primarily of a series of IWMI publications and papers published in national and international peer-reviewed journals. The IWR staff has an impressive record of research publications over the past three years. Many of the publications are the result of joint activities with other Programmes or co-operators. A brief tabulation of the distribution of the publications in 1997, 1998 and 1999 by IWR and partners by general categories is presented below.

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<sup>3</sup> Allan, J.A. and J.H. Court (eds.). 1996. Water, peace and the Middle East: Negotiating resources in the Jordan basin. London and New York: Tauris Academic Studies.

Many of the recent publications summarizing IWR's research have focused on problem identification and establishing new procedures for uniformly quantifying the productivity of water. These publications represent major progress and achievements in developing a new, more realistic and rationally sound approach (water accounting) to assessing the performance of irrigated agriculture. Understanding the current status of water use for various purposes is a first step in developing innovative and integrated approaches to improving the productivity of water use in agriculture. IWR's publications on water accounting describe the major categories of water depletion (beneficial, non-beneficial, non-committed, etc.), and describe general strategies for improving productivity within these categories such as increasing productivity per unit of transpiration and reducing non-beneficial depletion.

**Table 2.1: Number of Publications by IWR and Partners between 1997 and 1999**

<b>General subject area</b>	<b>Research Reports</b>	<b>Journal Articles</b>	<b>Book chapters</b>	<b>Books authored</b>
Irrigation systems:				
Performance assessment	6	2	3	0
Design and operations	1	4	0	1
Management and maintenance	3	2	4	0
Rehabilitation and modernization	2	0	1	0
Water accounting and productivity	1	6	2	0

Publications by IWR describe water accounting as assessing the use and productivity of water, and they present options for increasing the productivity per unit of transpiration. They also present options for reducing non-beneficial depletion of water by non-beneficial evaporation and reducing flows to sinks in which water cannot be recovered for beneficial use.

Development of a set of indicators that relates outputs of irrigated agriculture, i.e., crop production, to inputs of land and water has been a major achievement of the IWR Programme. The IWMI indicators have been used for diagnosis, intervention analysis, and as a routine tool for monitoring performance at the project level and in national programmes. At the ICID Congress in September 1999, more than 100 participants from about 50 countries took part in a half-day workshop on "Performance Assessment of Irrigation Systems" that was led by the IWR Programme Research Leader. The Research Leader is a member of the ICID Working Group on Irrigation and Drainage Performance, and chairs the Working Group on Irrigation and Drainage Performance of the U.S. National Committee of ICID.

Performance assessment also involves diagnosing problems and assisting managers in routine operations. Procedures developed by IWMI in Burkina Faso were widely

disseminated to irrigation practitioners and policymakers in the country, and have been applied in at least one large-scale irrigation scheme. A publication entitled “Fostering Performance-Oriented Management in Irrigation Schemes” based on four years of field research by IWMI and national and international partners is nearing completion.

Application of water accounting procedures in Sri Lanka has shown that water provided by an irrigation system is also used for domestic purposes, home gardens, livestock, trees and other perennial vegetation. It also showed that water was being transferred out of agriculture to meet growing demands of other sectors, but often without the consent of or compensation to farmers with irrigated land and water rights. In another study, it showed that perennial vegetation consumed much more water than irrigated crops. In a study in north-west India and a sub-division of the Punjab in Pakistan, it showed that the beneficial use of water for crop production was high and there is little scope for water conservation. The efforts there should be on improving productivity of depleted water resources.

IWMI’s performance indicators are now beginning to be used in time series analyses by IWR researchers to assess the impacts of rehabilitation interventions and institutional interventions on different secondary units. A sensitivity analysis of canal structures to variations in settings of the structures and hydraulic inputs indicated the importance of understanding the interactions between design and management. A typology of irrigation systems developed by IWR to aid in irrigation systems operations combined with system modelling showed how operations could be improved in Sri Lanka and how modernization should incorporate these concepts.

A review of salinity studies and an analysis of water and salt balances in Pakistan and north-west India showed that because of resulting salinity impacts, present water management practices are not sustainable. Modelling studies showed that when using deficit irrigation along with improved on-farm water management practices, waterlogging and salinity could be managed or controlled. A study of salinity in five major arid zone river basins has been concluded with a discussion of measures to control river salinity. A publication on the results of this study, which is nearing completion, will provide technical, organizational, and institutional implications for managing salinity in river basins.

### **2.1.3 Assessment**

The water accounting publications over the last three years, such as Research Report 20, and the recent paper in the *International Journal of Water Resources Development* (Molden and Sakthivadivel, 1999)<sup>4</sup> are of excellent quality and their general and rapid acceptance by irrigation professionals indicates that results are relevant. Assessing performance using remote sensing and hydrologic models indicates that the latest technological tools are being used in IWR research (Research Report 27). Indicators for comparing performance of irrigated agricultural systems are well documented

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<sup>4</sup> Molden, D.J., and R. Sakthivadivel. 1999. Water accounting to assess use and productivity of water. *International Journal of Water Resources Development*, 15 (1/2): pp. 57-71.



(Research Report 20). Likewise, use of remote sensing combined with hydrologic models are being used to facilitate the evaluation of some environmental impacts of irrigation practices.

Research conducted by staff in this Programme was instrumental in the development of the IWMI global water supply and demand paper that will be presented at the Second World Water Forum in The Hague in March 2000. The study, which involved about 45 countries and about 85% of the world's population, identified those countries where water scarcity would become severe by the year 2025. The implication for such countries is that water will have to be diverted from agriculture to other sectors reducing the potential capacity for production and food imports will need to be increased. The study also identified in-country spatial and seasonal variability.

Extensive experience by the staff in widely varying climates and farming, an ongoing activity, has enabled IWMI staff to identify new and unique techniques used in one area that have potential application for small-scale farmers in other areas. IWMI has initiated new work on smallholder water management systems (water harvesting, low-cost application technologies, low-cost small manual and mechanical pumps) to assess which of these technologies and innovative water management approaches are applicable and relevant to poor farmers in Asia and Africa.

Publications on generic solutions to the problems, or publications that outline systematic procedures for developing countries faced with these emerging problems need to be developed in cooperation with national partners to facilitate implementation. Some solutions for several specific situations have been developed such as rehabilitation planning for small tanks in cascades (Research Report 13), and modernizing irrigation operations (Research Report 35). National irrigation agencies and private consultants need more than just research publications. They need publications that are somewhat like manuals that provide checklists or stepwise procedures to identify problems and apply solutions. The Panel suggests more effort be placed on publications that present generic stepwise solutions or procedures to identify problems and to modernize irrigation systems for general types of existing conditions that can be used directly by national agencies and consultants. Publications of this type should be the future target milestones for the IWR Programme. Such publications should include sufficient detail so that the implementation of solutions would essentially not require technical assistance except for that provided as part of a training programme, or as part of a collaborative project. Thus, the Panel is pleased that IWR has begun developing a manual on performance assessment, which is expected to be published in 2000 by the ICID Working Group on Irrigation and Drainage Performance.

The establishment of initial goals that focused on identifying the general nature and magnitudes of basin-wide and worldwide water productivity indicates thorough planning by the IWR staff. For example, in the paper to be presented at the March 2000 Global Water Vision meeting in The Hague, large differences in productivity of water (expressed as kg/ha yield, and as kg/m<sup>3</sup> of water consumed) for three different locations are presented. Future research will require identifying and quantifying the key determinants of

productivity and how better water management can enhance productivity. This understanding is needed to recommend interventions that can correct or ameliorate the crop yield-limiting effects. This understanding involves plant growth and crop yield-limiting factors. **The Panel recommends that IWMI add crop physiology expertise to the IWR Programme in order to facilitate incorporating or adapting components of complex plant growth models and to communicate better with other institutes that have this expertise.** Such expertise would also lend more credibility to models that have a crop growth component.

The emerging problem of overexploitation (overdraft) of groundwater has been identified as a major threat. Little or no research has been published on the rates of groundwater depletion in areas that are shown to be, or expected to become water scarce. Obtaining data on groundwater levels and depletion rates has been difficult, and estimates may be needed for initial evaluations. The basic principle of conservation of mass clearly shows that to balance water supply with demand, the average net withdrawal, i.e., volume pumped minus return flow, must not exceed the average annual recharge within the basin or sub-basin. This is the general solution, and general techniques for enhancing recharge, such as recharge basins, capturing excess floodwaters and diverting them to recharge areas and, in some cases, encouraging excess water applications in areas overlying groundwater aquifers whose water levels have been declining have been used in some areas for decades. How to identify potential groundwater problems at an early stage so that solutions can be implemented before the problem becomes severe is a challenge. Estimating the rate of depletion relative to the remaining magnitude of extractable groundwater could also indicate the potential severity of this problem. In some cases, modified solutions must be developed to fit local conditions and they must be evaluated under various existing policies and practices in various river basins. **The Panel recommends that the IWR Programme should increase its emphasis on the groundwater depletion problem.**

To assess whether groundwater is being mined, i.e., withdrawals are greater than average recharge, an index could be developed, such as the estimated fraction or percentage of the water pumped that is fossil water. The higher the fraction, the greater or more rapid is the move toward absolute water scarcity depending on the potential magnitude of extractable fossil water. The IWR has the expertise to develop such an index for quantifying the severity of the groundwater depletion problem as it has done for basin-wide water accounting. The results of research on these issues could lead to a much better overall understanding of the emerging problem of groundwater depletion.

An emerging river-basin problem is that as irrigation becomes more profitable, and if the area irrigated within a part of a river basin is expanded, the volume of water consumed in an upper segment of the basin may increase. The increase in water consumption would deplete more of the water supply and less would remain available for downstream users who may have been dependent on this water. This is a very broad and complex issue, especially where international rivers are involved. Suggested practices that would enhance water productivity may have future water-rights implications. Where this potential exists, the research publications should alert readers accordingly. Likewise, increased water consumption will reduce the quality of the remaining non-consumed

fraction because evaporation and transpiration remove pure water. The concentration of dissolved solids or salts originally in the irrigation water will increase in proportion to the increase in the fraction of water consumed by evaporation and transpiration. The potential impacts of increased water consumption on water quality as well as on quantity within the basin context also need to be considered.

Activities of the IWR Programme that relate to the design of irrigation facilities and systems are especially important to irrigation and hydraulic engineers. In the design of hydraulic structures, designers need to be aware of the impending changes that will require changes in flows. For example, if changes in cropping patterns are recommended, the necessary flexibility may not be built into the hydraulic structures to enable adjusting flows to meet new requirements. Adding such features at a later date can be very expensive or impractical. With some understanding of expected physical and institutional changes and improvements in management, some changes in the initial design could be made with minimal costs.

The research conducted by this Programme resulted in many publications on irrigation systems and water productivity. The immediate impact is difficult to assess. The increasing interest in IWMI publications is an indication of the impact its research is having on national agencies and governments. The importance of providing the tools and procedures for identifying and quantifying the magnitudes of various components of water consumption within basins and sub-basins provides the foundation for the policy and management changes that national agencies and countries need if they are to minimize the potential future water scarcity that they may be facing. Finally, the IWR staff should continue to review and assess new technologies that are emerging under various local conditions, as this will enhance the transfer of such technology to other small-scale irrigation systems. For example, the Programme is collaborating with NGOs and NARS to assess low-cost, drip or trickle irrigation systems, small portable fuel-powered pumps, and water harvesting systems suitable for adoption by small farmers in marginal areas.

#### **2.1.4 Conclusions**

The changes made in the IWMI strategic research programme over the past five years, and the accompanying shifts in the IWR Programme have resulted in a strong Programme with expertise in irrigation systems, and crop water consumption and crop production. The Programme staff has made major progress in developing a water accounting system that provides a universal basis for comparing irrigation performance and beneficial use of irrigation water, as well as identifying the magnitudes of non-crop production uses and non-beneficial consumption of irrigation water. This accounting system is a key part of the programme used to estimate probable changes in water scarcity. Irrigation performance indicators developed by the IWR staff have been documented and are also being used in time series analyses to assess the impacts of rehabilitation and institutional interventions on secondary units. More effort is needed on producing generic systematic solutions to problems that have been identified in cooperation with national partners for use by national agencies and consultants.

## 2.2 Policy, Institutions and Management Programme (PIM)

### 2.2.1 Overview of Programme

“The broad goal of the PIM programme is to identify the policy tools, organizational designs and institutional frameworks necessary to achieve and sustain high productivity of water and improve people’s lives” (*Draft Strategic Plan*, p.20). It does so by joining its core PIM staff with other IWMI staff and, in partnerships with social scientists and others in government agencies, universities and NGOs conducting strategic and applied research.

#### Resources

The PIM Programme has 6.5 experienced international professionals located at headquarters and three social scientists in other countries, mainly in Pakistan. The core, though small, comprises several individuals with distinguished research achievements. In the Panel’s view, PIM Programme staff at headquarters can only be an adequate nucleus if the country programmes involve well-qualified social scientists, either as direct IWMI staff or as project-funded collaborators.

In 2000, 5.8 person-years of IWMI international research staff and US\$2.2 million of programme expenditure are budgeted for PIM activities. This represents, respectively, 29% and 40% of the corresponding resources devoted by the entire Institute to the four Global Programmes. However, the latter percentage is somewhat misleading, reflecting large carryover of funds from the previous year resulting from the late start up of several projects supported with restricted funds.

This combination of staff and budget, while not oversized, does suggest an important commitment on the part of IWMI to advance understanding and practice in the policy and institutional aspects of water management.

#### Activities

The Medium Term Plan, 2000-2002 identifies three projects under PIM:

- MTP Project #7 - Projecting World Water Supply and Demand for the Twenty-First Century
- MTP Project #8 - Promoting Effective Institutions for Managing Irrigation and Basin Water resources Systems
- MTP Project #9 - Linking Gender, Poverty and Water.

The current activities of the Programme include diverse studies of the transfer of various irrigation operation and maintenance activities from government agencies to local water user groups, a major undertaking on gender and poverty issues associated with water management, and work, which has been started recently, on the complex set of institutions

involved with water resources management at the basin level. Macro-policy issues received significant attention in IWMI in recent years; they led in particular to the development and dissemination of a policy-dialogue model called PODIUM. Such activities would normally fall under the purview of the PIM Programme and can legitimately be classified as PIM activities. It is worth noting, however, that none of the current PIM staff has been associated with PODIUM. As discussed later, this raises a question on the capacity of IWMI to conduct policy research after the current DG, who has played a key personal role in this area, leaves the Institute. The Panel is, however, somewhat reassured by the fact that the new Programme Research Leader has experience in policy research.

PIM's capacity-building activities are an important by-product of its research programme. Particularly significant has been support for graduate students, both local and international, to conduct research in collaboration with IWMI staff and research partners. This has been especially important in the Mexico programme and is projected to be so in South Africa. IWMI also has hosted advanced graduate students at headquarters.

Capacity-building also occurs as IWMI staff collaborate with their partners, particularly national institutions and researchers. In some cases, of course, these national researchers are themselves well trained and highly experienced; but, in other cases, working in the context of applied problems, conducting field-based research, or executing interdisciplinary research they may individually, or together, represent new experiences and opportunities for professional growth.

### **2.2.2 Achievements: Outputs and Impact**

PIM has had significant achievements in the area of organizational design for irrigation systems. The work with irrigation management transfer (IMT) has been important in providing an ongoing assessment of this institutional innovation as it was being implemented in various national settings. Such assessments have proven very valuable to policymakers and irrigation department staff for planning and implementing new policies. Now, as noted by IWMI staff, new issues, sometimes resulting from or related to IMT are beginning to appear. Examples of these new issues include matters of equitable access to water, the real capacity of the private sector in managing water resources and the need to evaluate failures of turnover policies and programmes. Other issues identified by the Programme include, among others, the adequacy of maintenance, water rights, supporting institutional systems and policies, reforms of government bureaucracies, water pricing and the role of law.

PIM staff have also made important contributions to the analysis of gender poverty issues related to water management. It appears that the causes and effects of poverty may be different for women and men, even in similar settings. This gender-related poverty work can help direct IWMI's overall future research directions, as well as influence poverty thinking throughout the CGIAR System. The basic question behind this programme of research is: does better access to water for poor male and female smallholders increase productivity and improve poor people's incomes? It would benefit from further refinements to more precisely specify the types of poverty that increasing

access to water can help alleviate—landless poverty, ecological poverty, and the poverty of remoteness. It will also be important for PIM staff to continue probing the precise nature of the connections between access to water and poverty eradication, especially the multiple intervening factors that may influence this relationship.

The research on gender and poverty began in 1995 and appears to be a direct response to the recommendation made by the 1994 EPMP concerning the need for more attention to gender issues. IWMI is to be commended for the steps it has taken and for its important role in significantly advancing understanding of the gender dimensions of water management—especially as they relate to poverty. Indeed, an informal survey by one Panel member of the world literature on women and water indicates that most of the research that has been undertaken centres around the provision of adequate, good quality water, delivered at the right price for multipurpose household use. There is very little published research on women and irrigation and much of the little that is available comes from IWMI.<sup>5</sup> PIM's research has covered a range of issues in a variety of agricultural settings: the division of labour by gender in different irrigation systems; the constraints on women's access to water; the importance of women head-of-households in irrigation; and the role of women in water users associations. As this research advances, it will be important for senior staff to review the work and its implications for all parts of IWMI's research, communication and capacity-building activities.

Finally, the work on world water supply and demand done using the PODIUM model has received considerable and high-level attention as it has been a major contributor to the preparation of the World Water Vision of the World Water Commission. The PODIUM model itself is beginning to be widely disseminated, thanks in particular to the sponsorship of ICID.

There has not been a formal assessment of the impact of PIM's research outputs, nor are there current plans for a formal exercise in this domain. There are some informal indicators of impact that can be noted. First, with regard to the topic of IMT, as noted above, IWMI's research findings have become an important public good widely used by irrigation departments and policymakers for initial planning, implementation and assessment of their own IMT activities. Second, the research and publications by PIM staff have helped stimulate independent IMT work by other researchers in both advanced institutions and NARS. Thanks in large part to the work of IWMI staff, IMT—one of the major institutional policies in the water management sector in recent years—is well documented and analyzed and is a topic of continuing interest to researchers worldwide. Though PIM did not invent IMT, it played a large role in shaping understanding and practice through its field-based research projects. Its collaboration with FAO to produce publications that summarize past results and provide a guide for future action is likely to have impact. Also, IMT research results have had direct impact on some collaborating country programmes, e.g., the impact on policies and strategies for institutional reform in Pakistan.

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<sup>5</sup> In 1996, Margreet Zwarteveen, then an IWMI staff member, received the ICID Award for Young Professional for this work.

Finally, the Linking Gender, Poverty and Water project, while too new to show much impact at this time, is very promising on two fronts. First, it is likely to help inform the CGIAR System, Centres and donors alike, regarding the nature of poverty and the ways in which CGIAR-supported research can be better directed toward poverty alleviation. Second, this research project promises to have important implications for IWMI's overall poverty eradication strategy.

One measure of the productivity of this Programme is its good publication record. Numbers of publications between 1995 and 1999 listed by various categories are shown in the table below. In the Panel's view, the quality of these publications, for the most part, is satisfactory to high.

**Table 2.2: Publications of PIM Programme Staff, 1995-1999**

	<b>PIM STAFF*</b>	<b>OTHER IWMI STAFF</b>	<b>CONSULTANTS</b>
Books	3	7	1
IWMI Research Report	9	13	2
Journal Articles	7	13	2
Book Chapters	12	11	1
Others	2	61	7

\* Listed according to Lead Author's Programme.

### **2.2.3 Assessment**

The above achievements are indeed very significant and IWMI is justly proud of having accomplished them. However, the limited number of professional staff and the finances available for the broad mission of the PIM Programme necessitate careful attention in planning future activities. More formal, or at least more transparent, priority-setting procedures will, in the Panel's view, be required.

First, there is a need to be clear about the policy responsibilities of PIM. It is not the only programme in IWMI that deals with policy matters; clearly the Health and Environment Programme is concerned with the policy dimensions of its work, for example. It would appear that PIM's primary policy responsibilities lie with policies for supporting appropriate organizational designs and institutional frameworks to increase water productivity and poverty eradication. In addition, the very limited attention given in recent years to economic policy instruments, such as those associated with water pricing, may have been insufficient.

From its inception, IWMI has undertaken a range of studies that focus on valuing water in irrigated agriculture. These studies drew attention to the need to distinguish whether water is a private good that can reasonably be left to free market forces or a public good that requires some amount of extra-market management to effectively and efficiently serve social objectives. This distinction is important but has not been fully appreciated by policymakers in many countries.

In the case of irrigation, IWMI's studies have drawn attention to the "necessary and sufficient set of preconditions that must be in place for the beneficial introduction of market mechanisms to allocate water." These conditions, which range all the way from defining entitlements of all users under all levels of water availability up to policy and legal provisions that obligate users to pay water fees, are a useful reminder about the requirements for effective implementation of schemes that value water, especially as part of any programme of irrigation management transfer.

IWMI has also contributed to the debate on cost sharing for water services in irrigated agriculture through a series of studies undertaken in Egypt in 1995. These studies, using IFPRI's model of the Egyptian agricultural sector, examined alternative approaches to cost recovery. The results of these studies showed the economic advantages of having crop-based charges both from a farmer and national perspective (by reducing demand for water while increasing returns to water). The analysis also revealed that volumetric charges, as widely advocated by some donor agencies, are an unrealistic means of encouraging significant reductions in demand because of the very high charges needed to have a significant impact. Furthermore, these studies indicated, for Egypt, that the benefits from the required investment in infrastructure to allow the measurement of individual supplies and differentiation of activities between farms, are small in relation to the likely financial costs of infrastructure. The studies conclude that the present distribution and cost-sharing system provides farmers with the water they need—unmeasured and undifferentiated at the farm level.

These IWMI studies were important contributions to the continuing debate about valuing water and how best to implement any schemes for the pricing of irrigation water so as to save water and increase output per unit of water. There has been a hiatus in IWMI's work in this area. However, with the recent arrival of a senior agricultural economist, it is to be hoped that IWMI will continue to undertake research in this very important facet of water management, including the valuation of water markets for environmental purposes. IWMI is in a good position to use its access to field data to help clarify the importance or otherwise of just getting prices right on water use and the options open to those policymakers who have the will to have water users pay for the volume of water that they consume.

It also appears that PIM may be the home in IWMI where the responsibility lies to produce, in collaboration with others, notably IFPRI, macro-data sets concerning water resources and water scarcity for use in policy dialogues. To the extent that PIM staff are expert in designing policy development strategies, they also may assist IWMI staff in other programme areas to advance their policy agendas.



**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 programmes and policies that have failed.** It may be that there now is a consequential group of other researchers able and interested to take up this next phase of the work. This decision is important, in part, because IWMI is properly assigning significant staff and financial resources for research on appropriate institutional frameworks and organizational designs for river-basin governance. This work, which partly responds to a recommendation made by the 1994 EPMR, will build on the important research that IWMI has conducted on the design of local organization for irrigation management, as in Pakistan, and will be an important complement to the focus on river basins informing the other components of IWMI's research programme. But it also needs to be recognized that this analysis of basin-level institutions is relatively uncharted territory, and unlike the previous work with IMT, builds on less elaborated bodies of knowledge. Activities are underway to conduct a series of basin studies across several countries.

Work on gender and poverty should obviously be continued in PIM. Poverty concerns should also be further integrated and mainstreamed into the other programmes. On the former it will be important to: (i) more precisely specify the types of poverty that access to water can help alleviate—landless poverty, ecological poverty, the poverty of remoteness; (ii) continue probing the precise nature of the connections between access to water and poverty eradication, especially the multiple intervening factors that may influence this relationship; and, (iii) in the context of (i) and (ii), specify the intermediate and long-term expected outputs from this project and the milestones for measuring progress.

**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 programmes other than PIM; and consider the implications of research results for the poor.**

Another topic meriting some attention relates to corruption, or extra-legal practices (or "blackwater"). It is perfectly clear that in many irrigation systems extra-legal practices do occur, e.g., systematic and extra-legal diversions, and that they influence real water-management practices. The analyst ignores them at the risk of providing a faulty understanding of what is happening and why. At the same time, reporting such practices may be unacceptable to IWMI's partners. In any case, approaches as objective as possible will be required in this politically sensitive domain. Explicit reference to the so-called new institutional economics and new political economy can be helpful in providing inspiration to build appropriate analytical frameworks and, also, to give legitimacy to such research. The Panel suggests that IWMI should develop a clear policy concerning its research and reporting on extra-legal practices that may be revealed in the process of field work in live irrigation systems and river basins.

In terms of joint efforts with other CGIAR Centres, PIM's most important collaboration has been with IFPRI. A senior researcher at IFPRI, paid for in part with IWMI unrestricted funds, has been an "IWMI Fellow" for the past 4 to 5 years. The collaboration has been effective in providing critical inputs into the World Water Vision exercise. It has also involved integrating updated results from IFPRI's IMPACT model into PODIUM, and vice versa. Beginning in 2000, IWMI and IFPRI have agreed to cooperate in research on river-basin management issues in Indonesia and Vietnam, and are discussing collaborative work under the second phase of SWIM on irrigation and poverty eradication in India. In sum, the collaboration between IWMI and IFPRI is a productive one that IWMI anticipates will continue and get even stronger in future. The Panel shares this hope.

Regarding other partnerships and capacity-building, the PIM group has a good record of working closely with research partners both from the countries in which they are operating, as well as elsewhere. This should be further developed because in many places, one can find a few social scientists and economists who are interested, and perhaps experienced, in conducting research on some dimension of water. Thus, broadly speaking, PIM staff will have a number of potential partners in the countries in which IWMI operates. These include university-based researchers, policy institutes and selected NGOs. Similar partners are available at various advanced research and policy institutes in developed countries. Another set of potential partners needs to be explored, those working in the private sector whose activity in the water field is relatively new but expanding rapidly. In recent years, there has been a general shift towards the privatisation of state-controlled enterprises including those managing urban water supplies. A number of large corporations are taking advantage of the opportunities to invest in this area. Thus far they have not invested in rural water supplies or in national irrigation systems, but there are evident signs of growing interest for which IWMI could begin to explore areas of potential collaboration.

Given the staff and funding resources available to PIM, the Programme's approach to capacity-building appears to be appropriate and manageable. As the PIM group carries out its research mandate it also contributes to the training and development of individual researchers in many locations. It would, in the Panel's opinion, be useful for PIM staff to pause at this point and take stock of their experiences to date, with a view to identifying what is working well and what could be improved. The Panel, therefore, suggests that PIM should undertake an assessment of its experiences to date with respect to capacity-building, and thereby seek to identify the best opportunities currently available for collaboration not only with individual researchers but also with existing, or incipient, centres of excellence in natural resources research in the developing countries to further strengthen them.

#### 2.2.4. Conclusions

Although PIM is IWMI's largest research programme, with activities ranging from irrigation management transfer studies to gender and poverty analysis, from macro-policy analysis (PODIUM) to water pricing-policy studies, and now, more recently, the analysis of basin-level institutions, the Panel believes the Programme needs to more carefully consider its priorities for the future. This is particularly so because of an interesting and expanded research agenda in PIM, most of which appears perfectly justifiable in the eyes of the Panel, assuming there were no resource constraints. **Given the limited number of professional staff and finances available for achieving the broad mission of the PIM Programme, the Panel recommends that careful attention should be given to planning future PIM activities, based on a more formal, and more transparent, priority-setting process.**

### 2.3 Health and Environment (H&E)

#### 2.3.1 Overview of Programme

In 1985, a year after IWMI (IIMI in those days) was established, a workshop was organized at headquarters in collaboration with the WHO/FAO/UNEP Panel of Experts on Environmental Management for Vector Control (PEEM). The follow-up to that workshop took six years to materialise and consisted of a joint IIMI/PEEM mission to some south Asian countries in 1991. A shortage of funding put a proposed programme on hold.

The 1994 EPMR recommended that the Institute should pay more attention to environmental and human health issues related to irrigation. Specifically, vector-borne diseases, agrochemical use in irrigated areas, and downstream environmental impacts of irrigation were mentioned. It was suggested that these be taken up as part of the proposed Systemwide Initiative on Water Management (SWIM).

In 1994, an associate expert from the Danish Aid Agency, DANIDA was posted to IWMI. He initiated research on health and irrigation with a study on the transmission of malaria and its control through water management in a traditional tank-based irrigation ecosystem in the dry zone of Sri Lanka. At the end of 1996, a formal Health and Environment (H&E) Programme was established with a mandate for global research on environmental health issues in relation to irrigated agriculture.

IWMI's Strategic Plan discusses the Programme as one that examines how irrigation systems can be managed to optimize the health benefits of water and minimize the negative effects of irrigated agriculture on human health and the environment. The objectives are (i) to improve the understanding of the linkages between irrigated agriculture, the environment, and human health, and (ii) to identify potential health hazards and assess water management options for mitigating or eliminating these. Of particular concern is the use of irrigation water for non-agricultural purposes, how this contributes to

human health and welfare and to environmental sustainability, and ways to reduce diseases like malaria through water management interventions.

The Programme has two distinct activities—a health component and an environmental component. The health component is the larger of the two components. It has more than 80% of the Programme's proposed operational budget for 2000 and consists of three major initiatives. The environmental component consists of one free-standing project.

The main thrust of the health component is to identify impacts of irrigation on human health and to examine water management options to achieve improved health. The research that IWMI has undertaken and is undertaking with its collaborators is to test whether the operation of irrigation systems can be changed so as to achieve health benefits without negative impacts on agricultural performance. To this end IWMI has focused on "irrigation and malaria" with activities in Sri Lanka (mapping the risk of malaria and examining water management options to control malaria in tank cascade systems through flushing and flooding), and in Pakistan and India (through water management options to control malaria in canal irrigation systems and through improved drainage). In addition, there is a research component that examines water management options to control malaria and Japanese encephalitis in irrigated rice ecosystems through alternate wet and dry periods. This research includes activities in Sri Lanka, India, China and Kenya.

The health component includes a further activity that examines the non-agricultural benefits of water use in irrigation systems (especially among the poor) and seeks to identify ways to improve the availability and quality of water for basic human needs in irrigated areas. The field research in this first phase of the project is being undertaken in Pakistan.

The environmental component contains one free-standing activity that was identified as an important issue during earlier case studies in Sri Lanka on the multiple uses of water. This ongoing activity examines irrigation water management and its effects on downstream wetlands. The research is concerned with the effect of the Kirindi Oya irrigation scheme in southern Sri Lanka on internationally protected (RAMSAR) wetlands in the Bundala National Park.

The planning and proposal development process occurs in a similar way to other Programmes (see Chapter 3). Detailed documentation of research activities and planned outputs was readily available and is presented very systematically. During 1999, 14 special project proposals were submitted of which 3 were accepted, 5 were rejected, 4 are still under consideration, 1 is in revision upon request of the donor and 1 is in abeyance. Of the 3 projects approved, 2 are in the health area and 1 is on the multiple uses of water.

The Programme has 26 people associated with it, 15 in Sri Lanka, 9 in Pakistan and 2 in Europe. In Sri Lanka, in addition to the Research Leader, there are 2 international seconded researchers, and 5 consultants, 4 of whom are part-time. A further 7 people, either students or research assistants are based at field stations in Sri Lanka. In Pakistan, 3

consultant junior researchers are located in Lahore while another 6 people, field researchers and students, operate from the Haroonabad field station. (One of the interesting features of this programme is that a number of staff are provided by donor governments who pay their salaries; another interesting feature is the use of PhD candidates to work on field research).

**Table 2.3: Aggregated budget information from the IWMI Draft Medium Term Plan 2001 – 2003**

<b>Actual and proposed salary and operating expenditure(in US\$ million)</b>		
<b>MTP Project</b>	<b>1999 (actual)</b>	<b>2000</b>
10. Identifying Impacts of Irrigation on Human Health and Water Management Options in Achieving Improved Health	0.44	0.82
11. Exploring the Issues and Options in the Multiple Uses of Water and Allocation among Competing Uses	0.62	0.21
13. Developing Water Management Options to Protect Aquatic Ecosystems	0.44	0.52
<b>Total</b>	<b>1.50</b>	<b>1.55</b>

Operating expenditure within the Programme was US\$0.525 million in 1999 with a budgeted amount of US\$0.725 million in 2000. In terms of financial resources, this Programme is the smallest of the four Programmes; in 2000, it will account for around 10% of IWMI's Programme expenditure (8% for health and 2% for environment).

The Programme has relied very heavily on collaboration with other scientific institutions in its work on malaria. A partial list of collaborators shows the wide range of its cooperative efforts at both the international and national levels. International partners include: WHO, UNEP, IRRI and ICIPE as well as the London and Liverpool Schools of Tropical Medicine. In Sri Lanka, there has been close cooperation with the University of Peradeniya and the National Anti-Malaria Campaign with IWMI helping to select and set up field sites and to implement screening procedures. Partners in India include the Tamil Nadu Agricultural University, the Centre for Research in Medical Entomology at Madurai and the Desert Medical Research Institute at Jodhpur. Those in Pakistan include the National Malaria Research and Training Institute at Lahore. In general, the partners in India, Kenya and China implement the research programme that IWMI has helped to design; in addition IWMI provides quality control and analyses the data that are generated by the field research programmes.

### 2.3.2 Achievements: Outputs and Impact

By and large it is too soon to evaluate the impacts of the H&E Programme on the well-being and health of those its research is expected to benefit. Nonetheless there are some early achievements that warrant mention. These include:

a) IWMI and its collaborators helped establish and design programmes for community-based diagnosis and treatment of malaria in Sri Lanka. These led to the development of village treatment centres. This concept has been used as a model in a World Bank supported malaria project and the WHO “Roll Back Malaria” programme.

b) IWMI’s studies of comparative costs of different malaria control measures have strengthened the economic arguments in favour of managing water levels in streams through the periodic release of water from upstream water reservoirs as an important means of malaria control. Research has shown that this approach may be cheaper than other preventive measures but further work is needed to determine the extent to which the practice may compromise the availability of water for irrigation. Further contributions have provided guidance to Ministries of Health on the lowest cost combinations of preventive and curative methods of limiting the incidence of malaria.

c) Studies in Sri Lanka and Pakistan in 1997 and 1998 showed that an exclusive focus on water efficiency in agriculture could actually reduce the availability of domestic water in irrigated areas. These studies indicated the need for further research into determining which options were most appropriate for supply of good quality water for domestic purposes in areas where irrigation water is only supplied seasonally.

The work in Sri Lanka has been particularly productive with more than 10 papers in internationally recognized scientific journals. In addition, the Programme has contributed to capacity building through cooperation with a number of institutions, most notably with the University of Peradeniya in Sri Lanka and through support of individual researchers.

**Table 2.4: H&E Programme’s Publication Record for 1995-1999**

Refereed journal articles	Book chapters	Research reports	Conference papers	Submitted papers
<b>21</b>	<b>2 + 1 book</b>	<b>6</b>	<b>23</b>	<b>7</b>

### 2.3.3 Assessment

This Programme has all the hallmarks of a well-organized and run research group. Despite its small size it has been very productive. The group has well-established quality assurance protocols and they pay due recognition to the need for team building and internal capacity building. This is particularly important because of the number of junior and limited experienced staff. This healthy state of affairs is in no small measure due to quality leadership.

As it currently stands, the Programme consists of two “unequal” parts. A major reason for the unevenness is that IWMI has found it difficult to attract additional funds for specific research on irrigation related environment issues. The health component has evolved and become focused. It is well articulated with a clear strategy and priorities. The Programme has been designed by health specialists at IWMI in conjunction with staff in other Programmes so making it a multidisciplinary effort. In this respect the location of a health programme in a water management institute appears to have overcome the constraints arising from the more usual compartmentalization of effort by water specialists and health specialists.

Giving priority to doing research on options for managing irrigation systems that can limit the incidence of malaria makes a great deal of sense. Malaria is one of the two major diseases in developing countries and it debilitates millions of people every year—especially children in Africa. Furthermore, despite massive international programmes to “roll back malaria,” there has been little progress (as yet) in producing vaccines so that it is appropriate that the international community should scrutinise other options for dealing with this scourge. IWMI is one of the very few institutes that is pursuing this line of research that can improve the livelihoods of millions of rural dwellers. It is to be applauded for doing so.

The Programme’s other health activities are still at early stages. Like the malaria activities, though, these activities deal with how water management can assist the poor live healthier and more productive lives without impinging on raising the productivity of water used for irrigation.

Should additional resources be available, it is to be hoped that IWMI would undertake research on ways to improve water management to reduce schistosomiasis, especially in Africa. Such research should focus on environmentally friendly, non-toxic methods of snail control that are beginning to show some signs of promise. Additionally, if resources were available, IWMI could well turn its attention to analysing the extent to which the large number of small scale irrigation projects in tropical Africa provide breeding grounds for diseases and what might be done to limit the incidence of these diseases.

The environmental component within this Programme has been marginalized but it should remain part of the H&E Programme for the foreseeable future. The Panel recognises that projects within other Programmes have activities that are concerned with

environmental issues. The Panel suggests that IWMI will need to give more consideration to the rapidly developing concerns about the effects that irrigation has on the environment and, that in reviewing its strategy, it examines whether it has enough research in this area. In due course IWMI may have to expand its environment related work in line with the need to know more about managing the competition for water between the environment and other sectors. When this happens, it would be appropriate to consider the positioning of the environment related projects in the programme structure.

During the next few years, IWMI should confine itself to playing a catalytic role, e.g., it could well take the lead in bringing together interested parties such as IUCN, WWF and others to consider how best to develop more meaningful estimates of the water requirements of the environmental sector. In addition, as has been suggested elsewhere, IWMI should strengthen research on the important topic of valuing water used for environmental purposes or assigning environmental standards to protect sensitive ecosystems affected by irrigation.

### **2.3.4 Conclusions**

Overall, the research on the health component in this Programme is of a high standard. The Programme Leader has done an excellent job of developing quality research on irrigation related health issues. The small IWMI group has served a catalytic role in bringing a range of donor-sponsored and within-country expertise together. The IWMI investment is therefore getting good leverage and return.

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

However, given the constraints on the budget and the overwhelming importance of increasing the productivity of water, every effort should be made to promote joint financing of projects by collaborators and to continue the successful policy of using the services of associate experts and interns wherever possible. The focus of the research should always clearly be on issues where there is a clear connection between the supply and management of irrigation water and human health.

The environment component of this Programme is poorly developed. The Panel recognises that there are other projects (such as the salinity management work in Pakistan), which could be classified as environment projects. However, increasing world scrutiny of the effects of irrigation on the environment indicates that this component needs to be strengthened. Therefore:

**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 resources.**



The process of positioning this environment work should occur during the course of the strategy refinement and priority setting process. Like much of IWMI's work there are many related issues on which useful research could be done. However, the Panel urges that IWMI should confine its efforts to research on the environment (and health) topics that are endogenous to irrigation, i.e., caused by water use. This is in contradistinction to research topics that are exogenous to irrigation, i.e., activities that occur outside of the water regime but which impinge on water use such as deforestation on mountain slopes leading to silting of canals or excessive use of pesticides polluting water. Research on deforestation and integrated pest management is best left to others.

## **2.4 Applied Information and Modelling Systems (AIMS)**

### **2.4.1 Overview of Programme**

This Programme came into existence following the April 1999 Board meeting when it was decided to reorganise the MTP projects and give a greater emphasis to the important areas of remote sensing, geographic information systems and modelling. The new Programme, "Applied Information and Modelling Systems" (AIMS) took over MTP projects #2 and 6. These projects have been consistently listed in succeeding Medium Term Plans (MTPs) since 1998 as:

MTP Project #2 - Applying advanced information systems in performance and impact assessment.

MTP Project #6 - Framework and methodologies for management of irrigation and water resources systems.

"The *Applied Information and Modelling Programme* conducts research on the application of a wide range of *information technologies* for improving water management. The focus is on adapting and using technologies such as remote sensing, simulation modelling, and IWMI's *World Water and Climate Atlas*, to support analyses conducted on river basins or over wider geographic areas. The Programme also supports the work of other Programmes in applying these new techniques." (IWMI's Strategic Plan Final Draft January 2000, p.20). The primary focus of the Programme is research in the application of information technologies; however, the added support role of this Programme makes management more complex than for the other Programmes.

The intermediate goal for Project 2 is stated as, "Adapt emerging information technologies and sources to provide enhanced data for improved management of irrigation and other uses in river basins." For Project 6 the intermediate goal is "Demonstrate application of appropriate management and decision support tools to enhance performance of irrigation and to better manage the interaction with other users in river basins" (*IWMI Draft Medium Term Plan 2001–2003*, p.vii and p.xv).

AIMS currently focuses on three broad areas of activity:

- development and application of advanced information technologies and remote sensing,
- modelling systems, and
- statistical techniques and data management.

The development of the “IWMI Atlas” has been ongoing since 1996. The intention is to give much easier access to world climate data, particularly that associated with water resources and water availability. This has required the assembly of large data sets, development of interpolative procedures and development of an appropriate user interface—the “IWMI Synthesiser.” A major portion of this work has been contracted out. The major outputs from this project are expected during this coming year (2000).

One of the main activities associated with satellite derived data is the estimation of evapotranspiration (ET) from particular areas. This activity has mainly focused on areas in Turkey and Pakistan and now Sri Lanka, and involves collaboration with the International Institute for Aerospace Survey and Earth Sciences (ITC), and the Sri Lankan Meteorological Department, Irrigation Department and the Mahaweli Authority. The Meteorological Department is expected to adopt the routines as a regular service. Field estimates of ET are being gathered as part of the ground truthing that must be done to give confidence in the accuracy of derived ET information. It is expected that the ET data will be used to make first approximation estimates of productivity and yield and also improve estimation of regional water balances to approximate runoff yield.

Analysis of remotely sensed images is able to accurately indicate the location of irrigation structures, water distribution and cropping patterns. Having this capability and data available is particularly valuable to other research projects in the Institute.

Modelling activities at the point scale have largely concentrated on adaptation and application of existing models with the recognition that a range of models will be needed for different purposes. The large scale “SLURP” hydrological model, used for evaluating flows and productive potential of major rivers, is currently being applied to the Mekong basin in conjunction with ICLARM to examine the effects on aquatic resources. Institute resources are being devoted to improving the inputs and the user interface of the SLURP model. Hydrological modelling of cascade irrigation systems is being combined with different crop productivity estimates in an optimisation process to provide information on more productive use of water resources. An IWMI Research Report is being prepared on the possible effects of global climate change on the water resources of the Indus Basin.

In November, a draft work plan is prepared for discussion at the Programme Planning Meeting (PPM) and most Programme plans and associated budgets are finalized at this time. The approved annual work plan is published in January and this provides details of the projects expected within the MTP projects. Projects are assessed against the Institute’s general criteria (see Chapter 3). Additional project possibilities arising through the year are developed through a process of discussion with the Research Leader,

submission of a concept note for embellishment and conformity to the proposal proforma and assessment by the Research Leader and the senior management committee. During 1999, the Programme submitted seven proposals from HQ and two from Pakistan. Of these, four were approved for funding, one rejected, and the remaining four are still in review.

Staff arrangements (*IWMI Work Plans for 2000*) show, in addition to the Research Leader, a complement of five researchers, one research associate, one senior research officer, one research officer/GIS analyst and one junior clerk. There are two consultants engaged in Colombo—a full time statistician and a part time (60 days per year) international consultant in remote sensing who divides his time between Colombo and Pakistan. The Pakistan Programme lists their staff under the AIMS Programme in subject or activity areas. There are three staff members working on MTP Project #2 activities and six working on activities under MTP Project #6. The Pakistan Programme Director allocates about 25% of his time to AIMS related research.

Aggregated budget information for AIMS from the *IWMI Draft Medium Term Plan 2001–2003* (Table 2.5) is given in the table below:

**Table 2.5: Budget Information for AIMS from the *IWMI Draft Medium-Term Plan (2001-2003)***

<b>Actual and proposed salary and operating expenditure(in US\$ million)</b>		
<b>MTP Project</b>	<b>1999 (actual)</b>	<b>2000</b>
2. Applying Advanced Information Systems in Performance and Impact Assessment	1.05	1.23
6. Framework and Methodologies for Management of Irrigation and Water Resources	0.62	0.62
<b>Total</b>	<b>1.67</b>	<b>1.85</b>

Operating expenditure within the Programme was US\$1.182 million in 1999 with a budgeted amount of US\$1.307 million in 2000.

Accounting and financial management services are provided by the central administration group. The Research Leader receives monthly reports down to project level and reacts to any obvious anomalies. Although Project Leaders receive relevant monthly reports they take only a cursory interest in them. Financial delegations to the Research Leader and Project Leaders are set out in the Administrative Procedures Manuals.

Programme staff estimated that they spent about 25% of their time on various forms of capacity building although they did not have a shared understanding on what guidelines applied across the Institute. The specific activities they had in mind related to

occasional student involvement, involvement with national institute staff to develop shared understanding and proficiency in common software, and internal information and skill development.

#### 2.4.2 Achievements: Outputs and Impact

In reviewing this Programme, the Panel has borne in mind that this is a newly formed group and that it has a specific service role to the other Programmes. The researchers now making up the group have published widely and the published work includes reports on previous work in Turkey and the development work on energy balance derivations of evaporation coming from remotely sensed data. The forthcoming special edition of the *Journal of Hydrology*, with AIMS staff as guest editors, includes world class papers from IWMI researchers that compare various methods of estimating evaporation at different scales. A number of publications are the result of joint activities with other Programmes and co-operators. A brief tabulation of published and written output since 1995 is presented in Table 2.6.

**Table 2.6: Published and Written Output of AIMS, 1995-1999**

<b>Journal articles</b>	<b>Book chapters</b>	<b>Research reports</b>	<b>Conference papers</b>	<b>Submitted papers</b>
18	7	10	23	10

It is clear that the main publication effort has been carried by a few of the researchers although there are quite a few papers of journal article level that are either submitted or are well advanced from other researchers. The imminent conclusion of the IWMI World Water and Climate Atlas through the release of the upgraded Synthesiser interface and the availability of Internet and CD access will be a major output from the group. This project represents an investment of more than US\$1.1 million over 4 years with at least 1.7 person-years of IWMI researcher time. The Panel formed the opinion that a number of lessons about managing software development and associated contracts had been learned from this project. These lessons will help IWMI manage such projects more expeditiously in future.

The intra-IWMI service role performed by this group brings a level of complexity to its management that is not associated with the other research Programmes. Currently the interaction is well managed but as acknowledged by the Research Leader this dual role brings tensions between the need to service and the need for the research group to get on with their own research projects.

#### 2.4.3 Assessment

It is clear to the Panel that recent developments in this Programme represent a significant and sustained investment by the Institute in computing hardware, software and

bringing together of appropriate expertise. Indeed without such a commitment the overall research effort at the Institute would not have been able to keep pace with the rapid development in the application of information technology to this field.

The necessity for an international institute like IWMI to bring together an interactive inventory like *The Atlas* is acknowledged. The potential usefulness of this product has been well argued. However, it is too early to assess what impact the availability of *The Atlas* will have. It is the use to which this vast information source is put that will decide whether it has been a good investment. The Panel urges that further investment in maintenance and additional development of *The Atlas* occur only after careful review of the demand and impact following this latest release. IWMI should avoid the large and ongoing costs of updating a large world inventory without a clear justification.

The work on estimating evaporation from remotely sensed data is of high quality as indicated by the good acceptance of published journal articles. The continued need for ground truth to corroborate remote estimates must be emphasised. In this respect it is imperative that the IWMI researchers remain strongly networked into similar work in the rest of the world and that an effort to increase collaboration with other groups be made.

The service role of the Programme in providing satellite imagery and its interpretation for use in irrigation system performance analysis has developed well. It should be borne in mind though that similar capabilities are rapidly developing in other places (e.g., Indian National Remote Sensing Agency) and IWMI will therefore have no particular comparative advantage. The capability to obtain, manipulate and analyse appropriate images must be maintained at a level that services IWMI's research needs.

The range of hydraulic simulation, surface hydrology, soil water distribution and crop models that the group has used are appropriate and well balanced. The apparent policy to have researchers, in the main, take existing models and adapt them, rather than develop new ones is supported. The ongoing resource needs associated with extensive model development of all kinds would be a major drain on the small IWMI group. Obtaining the latest models and associated experience through collaborative donor projects will be a better way to proceed. In this respect the resources being devoted to upgrade the SLURP interface need to be managed as a rigorous software development project.

**The Panel endorses the investment in researching the use of relevant information technology, remote sensing and modelling for use in irrigation and water management and recommends that this work should continue and, with respect to various modelling 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.**

In general terms the project planning process seems quite adequate and well understood by staff. However, since the Strategic Plan for the Institute is still in the draft stage, the connection between chosen research activities and the general direction of the

Institute has likely been fairly ad hoc. The need for a well-developed and agreed Strategic Plan is clear. There is also a need for a more formal appraisal mechanism to help decide suitability of projects and activities.

Members of this Programme had differing understanding of the paper and report review protocols necessary for quality assurance. This partly manifested itself in the supplied listing of publications from the Programme that indicated an incomplete holding and classification of reports, conference proceedings and papers from existing and former staff. This is a more general issue, not confined to this Programme.

While two projects in the Pakistan Programme are listed as being part of the AIMS Research Programme the connection between the Research Leader, the staff and the activities is not clear (pp. 21 – 24, Pakistan Programme Research Reporting Day, November 11, 1999). The modus operandi seems to be that the Research Leader provides a source of technical reference, technical advice and quality assurance. It is not clear how this last, very important role is fulfilled since the success of the arrangement at present is highly dependent on the personal interactions between the Pakistan Programme Director and the Research Leaders. More clarity of roles and responsibilities is needed so that changes in personnel do not lead to a loss of the interaction.

Programme research staff are well qualified. Although they have limited specialist qualifications in systems modelling, information science and GIS, they have built their capability through experience. They are ably supported by a database manager, statistical consultant and GIS technical specialist.

The AIMS Programme group in Colombo does not meet on a regular basis. The staff agreed that this needed to happen. There was a mixed response to the idea of more structured team building with the junior and national staff indicating that this would be helpful to develop a shared sense of purpose.

At face value there seems to be adequate operating and support funds per researcher. The Panel questions the reason for the separation of the salary budget from the operations budget. This means that Research Leaders have to aggregate different information sources to get a clear idea of the total costs at project and activity levels. Knowing the total cost of doing research is fundamental to the education of both the research staff and the donors.

Anecdotal evidence indicates that research staff think administration is working well. Staff records, financial management, contractual arrangements and reporting requirements seem clear and well managed.

If all of the collaborators listed in the MTPs represent significant interactions then the projects are well supported. The collaborators appear to have changed very little over the 3-year period. This may be the case and therefore indicates stability. However, if the reporting is to be of much value then it needs to be more than a cursory exercise. Some indication of the value (or at least its significance) of each collaboration would be helpful

for review purposes, while development of new collaboration would be a healthy sign of researchers interacting widely and could therefore be regarded as a performance indicator. More considered reporting of current and anticipated collaboration efforts in the annual Work Plan would serve the need here.

There is general uncertainty and confusion about IWMI's attitude towards capacity building. The clearest articulation was provided by the Pakistan Programme Director who indicated that:

- formal, en mass training was not done,
- providing occasional lectures was acceptable,
- selected seconded staff who complemented agreed work programmes was encouraged,
- some students were encouraged particularly at PhD level, and
- internal capacity building needed to be factored in.

If this statement generally applies then the Panel suggests that it needs to be more widely shared by all staff.

A communication strategy and action plan is needed for the Programme. While the research group has a good grasp of their work and where it fits, this is not accompanied, yet, by a consistent set of materials, which describes what they are doing for different audiences.

#### **2.4.4 Conclusions**

This Programme is in its early stages. The group has brought together some talented researchers supported by some good technical and physical resources. The challenge is to develop a synergistic team and in this endeavour some deliberate team building would help. In fact, the whole of IWMI's activities, particularly in Colombo and among the various Programme and Research Leaders, could be enhanced with some additional attention to structured and systematic team building.

It will be hard for this Programme to maintain focus. While the notion of an Applied Information and Modelling Systems Programme may seem a sensible way to bring a group together, it will not be long before the tension between its service role to the other Programmes and its own research activities will become significant. The Research Leader already sees this as an issue. This will need to be kept under review and at an appropriate time the separation of the service and research roles may be needed.

In general, the Panel believes all the Programmes will and should have modelling and GIS capability. The researchers should drive these tools. There is a temptation that the fascination with the tools can become an end in itself and the service role of making the tools address research questions can be subjugated. A watching brief by senior management will be needed to see that this does not happen.

## 2.5 Systemwide Initiative on Water Management (SWIM)

### 2.5.1 Overview of Programme

As the lead centre in water management, IWMI was designated by TAC as the convening centre for the Systemwide Initiative on Water Management (SWIM). Activities began in 1996. It is reviewed here as one component of IWMI's research activities although SWIM activities are being conducted by CGIAR Centres other than IWMI, and most of IWMI's contributions are or could be incorporated in one or more of the Institute's global research programmes, discussed above. The main reason for a separate discussion here is that SWIM has received special attention by TAC and by the Group, including significant special financial support. It is also an important instrument used by IWMI to enhance its partnerships with other CGIAR Centres and these partnerships deserve to be reviewed.

The objective of SWIM, as officially stated is "to enhance the productivity of water in an environment of growing scarcity and competition." This is very broad, and really not distinguishable from that of IWMI. As shown below, this identity of objectives is deliberate. It puts SWIM at the heart of IWMI's core agenda. But this raises immediately the question whether or not, as a systemwide initiative, it should be more focussed. Much of the following discussion revolves around this question.

### 2.5.2 Achievements: Outputs and Impact

First, a set of eight 'state-of-the-art' papers (see Table 2.7) were commissioned, written, and published in a special SWIM series. Two more will eventually find their place in this series. These papers cover a gamut of topics, some squarely at the core of IWMI's work, as for instance SWIM Paper #1 on *Accounting for Water Use and Productivity*, while others deal with issues requiring inter-centre collaboration, e.g., SWIM Paper #5 entitled *Producing More Rice with Less Water from Irrigated Systems*, done in collaboration with IRRI. These papers are receiving good attention, as illustrated by the number of hits on the web. They represent useful syntheses on specific topics and have been useful in the identification of research projects, which was indeed their first *raison d'être*. In addition, a few research projects thus identified have subsequently been started under the SWIM umbrella and are linked directly to one of the four programme areas (See Table 2.8). These activities involve collaborations directly with other CGIAR Centres or indirectly with other Systemwide/Ecoregional programmes.

The Panel's review of these SWIM Research Reports indicates that they represent significant achievements, and build a solid foundation for future useful collaborative work.

### 2.5.3 Assessment

SWIM has become IWMI's main tool for collaboration with other CGIAR Centres. That collaboration is mainly of a bilateral nature. Indeed, it must be stressed that the SWIM programme is not a joint response of several CGIAR Centres to a common



challenge, which could have been the focus of a truly systemwide undertaking. This is reflected by the breadth of the official objective specified for SWIM (to enhance the productivity of water). Whereas such an objective is central to IWMI's mission, it is only peripheral to most sister Centres. In the case of ICARDA, for which water is very important and which devotes significant resources to water issues in dryland agriculture, only a small fraction of the corresponding activities are incorporated into SWIM. As a result, SWIM appears really as the tool of IWMI.<sup>6</sup> Within that framework, the tool seems to have been used effectively to prepare the ground for future collaborations. But one must wonder whether it really qualifies as a systemwide initiative, with a clear objective shared by several partners, well-defined priorities and a well-articulated set of activities in pursuit of a common objective.

This raises a major question for the CGIAR, since systemwide initiatives and programmes were invented to tackle important problems beyond the capacity and the mandate of a single Centre. In the case of SWIM, the Initiative started in 1995 with seed money allocated from the World Bank contribution to the CGIAR. At first, a Steering Committee of 16 members, with representatives from each of the ten collaborating or interested Centres, was established. The transaction costs were, however, seen as very high by IWMI and, as governance structure, the Committee was perceived as unwieldy. As a result the Steering Committee was left dormant by IWMI and subsequently, *de facto*, disbanded. In a May 1999 "Report to Donors" (of SWIM), prepared by the SWIM Coordinator, a senior IWMI staff member, this position is clearly expressed: "In contrast with most other systemwide programmes, the objectives of both SWIM (increasing the productivity of water in an environment of growing scarcity and competition) and the convening centre IWMI are essentially the same. IWMI sees the continuation and strengthening of collaborative links with other CGIAR Centres in water management as essential if the CGIAR goals of maintaining food security and eradicating poverty are to be achieved. In short, the catalytic role and coordination function of SWIM will now be assumed by IWMI." The Panel considers that the logic of such a position is perfectly defensible from the point of view of IWMI. One must however wonder what could then be the justification for special funding, in addition to the normal allocation to IWMI, under this perspective.

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<sup>6</sup> Note that this tool does not seem indispensable to IWMI for undertaking collaborative work with another Center. Thus a promising collaboration with ICLARM on the Mekong basin was initially proposed without SWIM support.

**Table 2.7: List of SWIM Papers**

<b>Number of paper</b>	<b>Title of paper</b>	<b>Authorship</b>
SWIM Paper 1	Accounting for Water Use and Productivity	David Molden, IWMI
SWIM Paper 2	How to Manage Salinity in Irrigated Lands: A Selective Review on Particular Reference to Irrigation in Developing Countries	Jacob Kijne, IWMI
SWIM Paper 3	Water-Resource and Land-Use Issues	I.R. Calder, University of Newcastle
SWIM Paper 4	Improving Water Utilization from a Catchment Perspective	Charles Batchelor, Jeremy Cain, Fran Farquharson, and John Roberts, Institute of Hydrology, Wallingford
SWIM Paper 5	Producing More Rice with Less Water from Irrigated Systems	L.C. Guerra, College of Engineering and Agro-Industrial Technology, S.I. Bhuiyan, IRRI Representative for Bangladesh, T.P. Tuong, IRRI, R. Barker, IWMI
SWIM Paper 6	Modelling Water Resources Management at the Basin Levels: Review and Future Directions	Daene C. McKinney and Ximing Cai, University of Texas, Mark Rosegrant, IFPRI/IWMI, Claudia Ringler, IFPRI/Center for Development Research, Bonn, and Christopher Scott, IWMI
SWIM Paper 7	Water Harvesting and Supplementary Irrigation for Improved Water Use Efficiency in Dry Areas	Theib Y. Oweis, ICARDA, Ahmed Hachum, Musol University, Iraq, and Jacob Kijne, IWMI
SWIM Paper 8	Multiple Uses of Water in Irrigated Areas: A Case Study from Sri Lanka	Margaretha Bakker, IWMI, Randolph Barker, IWMI, Ruth Meinzen-Dick, IFPRI, and Flemming Konradsen, IWMI
SWIM Paper 9*	Synthesis of Watershed Research in CGIAR Centers: Lessons and Opportunities	Chin Ong, ICRAF, John Kerr, IFPRI, Nicholas Van-de-Giesen, WARDA, and Tammo Steenhuis, Cornell University.
SWIM Paper 10*	The Evolution, Present Status and Issues of Small Tank Systems in Sri Lanka	Chris Panabokke, IWMI, R. Sakthivadivel, IWMI, and Asoka Weerasinghe, IWMI

\*Forthcoming

**Table 2.8: List of SWIM Activities for 2000**

Activities	Collaborators
1. Water Saving Irrigation in Rice Production	IWMI, IRRI, ICIPE
2. Increasing Water Productivity in Agriculture	IWMI, commodity centres
3. Water Allocation among Sectors	IWMI, IFPRI
4. Groundwater Depletion and Recharge	IWMI, Rice-Wheat consortium
5. Modelling Flows in the Mekong Basin	IWMI, ICLARM
6. Peri-Urban Agricultural Initiative	IWMI, CIP-proposed

As already indicated, the Panel's judgement is that IWMI has coped well with the existing situation, characterized by intense competition among CGIAR Centres, making genuine collaboration the exception rather than the rule. But in operating SWIM on a bilateral basis and keeping the objective very broad, IWMI has placed itself in a vulnerable financial situation.

#### **2.5.4 Conclusions**

**The Panel strongly suggests that TAC, IWMI and the other CGIAR Centres that contribute to SWIM consider phasing it out as a systemwide initiative, and, instead, mainstream the activities into the regular programmes of the respective centres, reinforced with ad hoc bilateral or multilateral partnerships arrangements; while the Panel urges donors to continue, indeed increase, their support to such activities.** An alternative would be to initiate a set of multi-centre activities focussing on a specific aspect of irrigated agriculture, as for example, along the lines of the proposed activity *Increasing Water Productivity in Agriculture* (Activity # 2 in Table 2.8) with IWMI working with other CGIAR commodity centres. In the Panel's view, this would be consistent with the recommendation made in Section 2.1.3.

## **CHAPTER 3 - RESEARCH ORGANIZATION AND MANAGEMENT**

As outlined in Chapter 1, the mission of IWMI has changed rapidly and, in some ways fundamentally, in the short span of its 15-year history. The research organization and management at IWMI has responded well to the changing demands made on it. The Panel is impressed with the way in which it has done so in the last five years. This ability to cope is derived from the flexibility that is built into its organization and management, most significantly in its human resources and research programme management practices. The current leadership has been able to put this flexibility to good use and prepare the Institute for more strategic research, as was recommended by the first EPMR.

### **3.1 Organization Structure**

#### **3.1.1 Overall Structure**

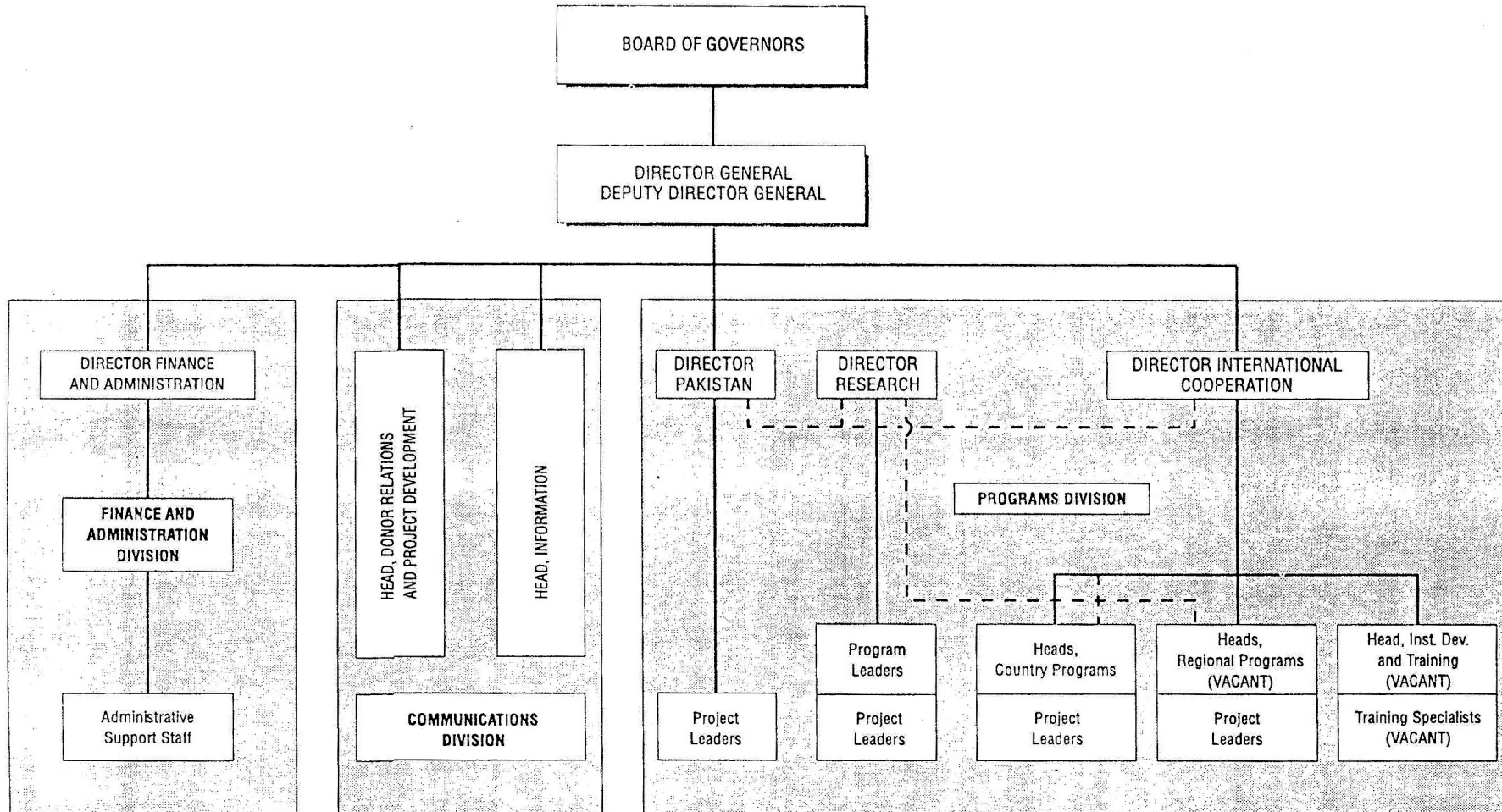
The current DG, who took charge in 1995, has provided strong leadership to strategic research at IWMI. The DG has been ably supported by the DDG (Programmes) and DDG (Operations), together with the Director of IWMI Pakistan, the two (part-time) Senior Advisors to the DG, and the four Research Programme Leaders.

Of this senior management, all except the DDG (Operations) and one senior advisor are actively involved in research, in addition to their management and administrative duties. Thus, the DG leads by example. With good team work at the top and the active involvement of the DG in shaping the content and methodology of research from the very early stages of many projects, the research organization and management have been effective in engendering enthusiasm and dedication among research and support staff. It has enhanced the reputation of IWMI among its stakeholders and others.

The first EPMR (1994) had observed that the organization structure of IWMI then (as shown in Figure 3.1), although outwardly “reasonably traditional within the CGIAR System,” was not “functioning as effectively as it should.” The current organization and programme structure (Figure 3.2) is broadly similar to the earlier one. As before, each of the four programmes has two to four MTP projects. However, in contrast to the 1994 EPMR, the Panel found that the organization is functioning effectively and has been meeting both the demands placed on it and the changes in its environment.

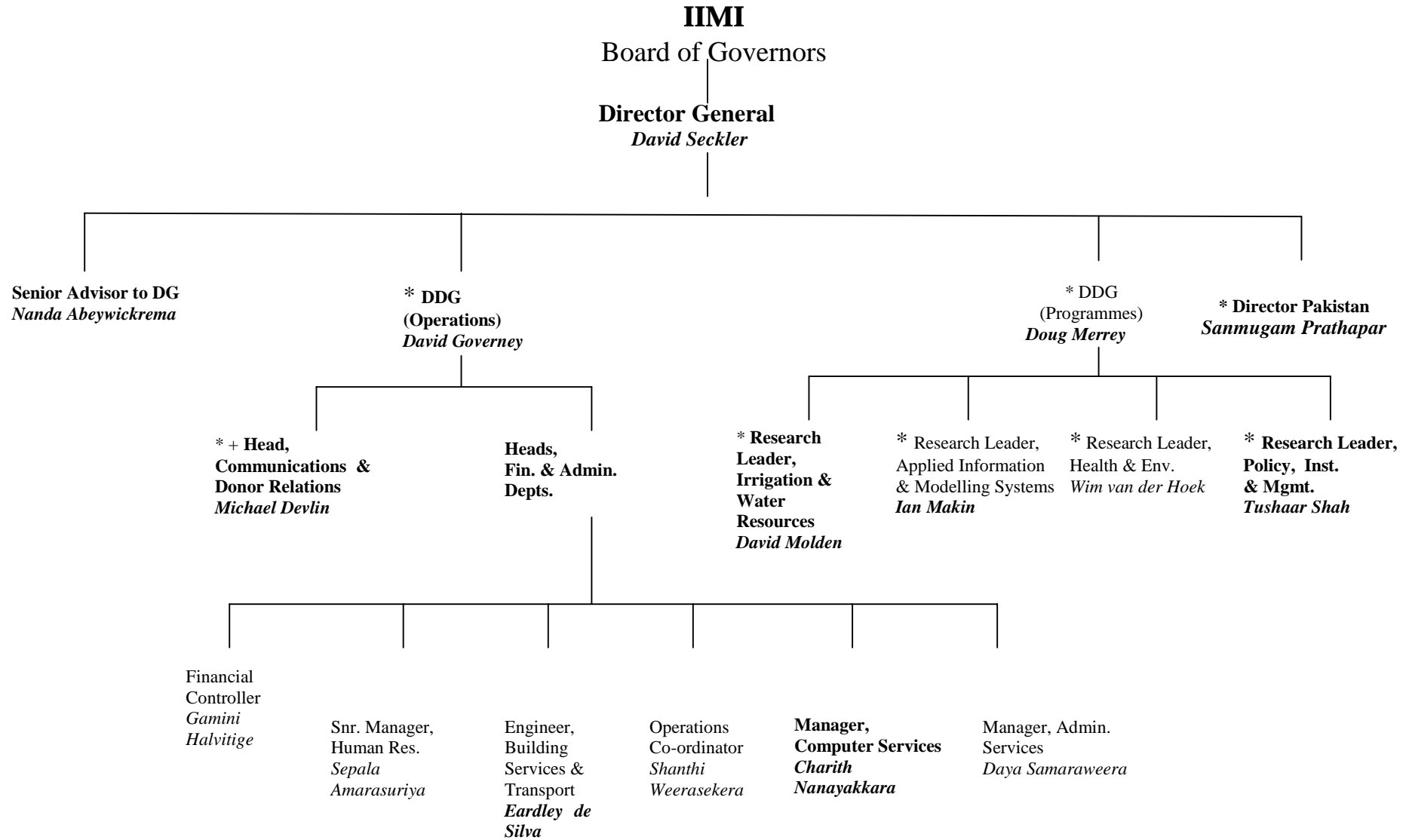
The 1994 EPMR reported that the organization was top heavy at the director level. In December 1993, there were 6 director-level staff members [Director General, Deputy Director General, Director (Research), Director (International Cooperation), Director (Pakistan) and the Director (Finance and Administration)]. The activity level at that time is indicated by an expenditure of US\$9.1 million and a staff of 379, including 38 international and associate-expert staff members.

Figure 3.1 IIMI Organizational Chart—December 1993



Source: First EPMP Report (1994), page 14.

Figure 3.2: IWMI Organization Chart—February 2000



1. \* Denotes International Staff.
2. + Operationally reports to DDG (Operations) but on donor relations, proposal preparation, etc. reports to DDG (Programmes).

The Institute now also has six director-level staff members—Director General, two Deputy Directors General and Director, IWMI Pakistan and the two part-time senior director-level advisors (one of whom is not shown on the organogram of Figure 3.2)—for a total expenditure level of US\$9.8 million and a staff of 245 members, including 33 international staff members. Some of the directors are also involved in research. If the research part of their work is excluded, the number of director person-years spent on management is four.

The Panel does not consider the current organization as top heavy at the director level. It recognizes the important role the current DG, ably supported by the DDG (Programmes), has played in the substantive redirection of IWMI's mission. However, given that a new DG is shortly taking charge, the Panel suggests that he or she reviews the roles and responsibilities of not only the director-level staff, but also all staff at senior levels, including the programme leaders. In doing so, the Panel hopes that the distinctive features of IWMI's organization—a high status for research, the personal involvement of senior management in shaping the research culture, and team work—will be maintained, if not enhanced.

### **3.1.2 Research Programme Structure**

Each global research Programme is managed by a Research Programme Leader, who is responsible for the allocation and administration of budget and staff to a number of activities or projects. Research Leaders have detailed position descriptions. Basically, they are responsible for the proper utilization of the researchers' time and for ensuring that their publications and other outputs serve IWMI's mission. They are expected to guide the researchers, initiate and develop proposals, do policy planning, develop budgets and work plans, monitor the projects in their Programme, keep track of expenditures vis-à-vis budgets, maintain donor relations, negotiate contracted research and provide quality assurance on Programme outputs. The Programme Leaders are responsible for the coordination of their Programme activities not only at headquarters but also in the various countries where IWMI works.

The Research Leaders and the portfolio of projects they are pursuing at any given time constitute the current research direction of the Institute. The 40 or so projects or activities turn over with a median duration of about 2.5 years. As the MTP for 1998-2000 puts it, the Programmes provide "the continuity and framework for IWMI's research over time, while IWMI 'projects' are completed, evolve or are replaced by new projects" (p. 9).

With the selection of a new project or the completion of an existing project, the research direction of the Institute undergoes a change, howsoever marginally. The programme-based structure itself is an umbrella for the research activities of the Institute. Senior Management can reallocate the activities among the Programmes and give greater focus to a chosen area or type of activity. It is possible to move incrementally at the project level for several years, and learn about IWMI's potential for impact, before

deciding on raising the status of the area in the programme structure. That is what the Institute has been doing.

For example in 1999, when the Institute changed the names of two of its Programmes and rearranged the affiliations of their research people, projects and budgets, it was only recognizing and raising the status of research in the applied information and modelling systems area to the Programme framework and clarifying the shift in the organizing principle from irrigation to river basin for the Irrigation and Water Resources Programme. In both programmes, the Institute had traversed quite a distance at the project level before refocusing and rearranging the programme structure.

The Panel understands the need for this approach to research organization and management. Given the changes and uncertainties faced by the Institute, the approach provides considerable flexibility for management.

### **3.1.3 National Programmes**

The National Programme Offices currently report to different people in Senior Management—Pakistan and Turkey to Director General, Mexico to a Senior Advisor, and Africa to DDG (Programmes).

IWMI has budgeted funds in 2000 for four residential National Programmes and two non-residential National Programmes. The four residential National Programmes – Sri Lanka, Pakistan, Mexico, and West Africa – were provided a total of US\$2 million out of the total Institute’s 2000 research budget of US\$7.3 million, or 27 %. The Institute plans to close down its Mexico National Programme this year. The total number of “outreach nationally recruited field staff” declined from 213 on April 1, 1995 to 123 on April 1, 1999, in spite of more than a doubling of such staff strength in Pakistan over this period. The closure of the SCOR project in Sri Lanka in late 1998 and the consequent reduction in the strength of the field staff in that country contributed significantly to this reduction.

The residential national programme activity of IWMI has been reduced considerably in recent years. International staff outside Sri Lanka have declined from a peak of 18 members in 1996 to 6 currently. With the exception of Pakistan, research in different countries is essentially led now by the Research Leaders in headquarters.

The Pakistan programme continues to be different from the other residential national programmes. While the other residential national programmes are project-based, IWMI Pakistan is led by a Director who reports directly to the DG. "IWMI Pakistan's goal is to implement IWMI's mission in Pakistan" according to the work plan for 2000. The institutional reform work in Pakistan is not directed by the PIM programme leader at headquarters. In its field work, Pakistan reflects, in addition to the institutional research themes, a continued strong field-assistance component.



In the selection of which countries to work in and how much effort to apply in those countries, IWMI's margin of manoeuvrability is limited both by virtue of its own history and by fund raising constraints. The limited unrestricted funds have to be devoted to meeting overhead costs and financing small strategic research projects, to ensure that IWMI staff can indeed investigate issues that are at the core of IWMI's agenda. Thus national programmes are critically dependent on the availability of restricted funds. The most common restrictions are those that specify in which country the work has to be done. In some instances, donors can be convinced on the basis of their interest in the topic on which IWMI wishes to work. In such cases, IWMI has a somewhat greater latitude to suggest where the work should be done. All in all, however, IWMI's choices are limited.

The Institute has made significant efforts to define the criteria for selection of its national programmes. In its 1998-2000 MTP, it described several characteristics that a resident country programme should satisfy. These included: likelihood of continued operation of between five to 10 years, a specific definable river basin, an ability to support a minimum of two internationally recruited staff equivalents, and an institutional research agenda involving at least two of its global programmes and the budgeting of funds and staff time from global programmes.

The Panel has not been apprised of IWMI's experience in implementing these principles. This is understandable given the small number of decisions taken. The significant points that the Panel has noted are: (i) the shrinkage of the Sri Lanka programme, (ii) the presence of all the four global programmes in Pakistan, as well as the varying levels of its research linkages between professional staff there and headquarters, (iii) headquarters budgetary support from unrestricted sources to national programmes, (iv) the opening and closing of the Turkey Residential Programme, (v) the closing of the Mexico Residential Programme this year, and (vi) the possibility of a residential programme in South Africa soon.

The Panel also notes that the national programmes and the headquarters research are more interdependent now than at the time of the 1994 EPMR, not only in administrative and financial terms, but also in terms of substantive research. The non-resident national programmes, such as the ones in India and Iran, reflect the global research thrusts of IWMI and are undertaken in association with national research institutions.

For the future, in its current draft Strategic Plan, IWMI has provided a revised set of general guidelines for the choice of national programmes and the themes to be pursued. These are couched in fairly general terms but perhaps this is sufficient, given the degree of opportunistic behaviour in this domain imposed on IWMI by its funding constraints.

## 3.2 Research Planning and Management

The question considered in this section is whether or not IWMI has an adequate and continuous management process that relates the Institute's long-term mission to well-articulated plans, policies and priorities at various levels.

### 3.2.1 Research Planning

Planning at IWMI, as in other CGIAR Institutes, takes place at three levels—the strategic, medium term, and annual. As already indicated, IWMI has recently developed a strategic plan. A “Final Draft” was produced in January 2000. This plan was developed at the suggestion of the 1999 CCER. As noted earlier, in the view of the Panel, the document does not provide clear enough directions for the Institute’s long-term planning, especially if account is taken of constraints in funding.

IWMI has had longer experience in medium term planning than at the strategic level. In its rolling three-year plan, IWMI proposes MTP projects that are approved for funding by the CGIAR, in line with system priorities and objectives. In the absence of an IWMI strategic plan that sets the context for its priorities in the CGIAR System, the Panel is not surprised that IWMI finds it difficult to sharpen its medium term priorities.

The third level is the annual planning cycle consisting of Programme Planning Meetings and Work Plans. At this level, the sequence of events is well described in IWMI’s draft Strategic Plan document:

“The planning process begins around mid-year when guidelines are sent to all staff, and they are encouraged to develop short proposals. These are sent to the research group leaders, who work with others in their group and with other group leaders to evaluate and revise proposals and ensure they are within budget guidelines. In November a draft work plan is prepared for discussion at the Programme Planning Meeting (PPM). All senior staff and many junior and national researchers participate in the PPM. Most of the plans and associated budgets are finalized at this time, though changes are made during the year as new opportunities arise. The PPM is also an important opportunity for sharing ideas, upgrading skills in new analytical tools and methodologies, and for team building. The annual approved work plan is published in January.”

This process presents the advantage of permitting IWMI to allocate discretionary funding to support research on new creative ideas proposed by the researchers at a time when information is available on all commitments: those resulting from restricted project funding, with corresponding work to be done for these projects, as well as obligations to meet such expenses as salaries of staff who are under contract and indirect costs. As expressed in the same strategy document:

“Given the available funding and human resources, IWMI’s choice of projects is governed by three criteria: (i) Is the problem a sufficiently important one for which we have interesting hypotheses on how it can be solved? (ii) Does the proposed project contribute to IWMI's overall goals and to the specific objectives in the Medium Term Plan? and (iii) Does IWMI have a comparative advantage in doing the project? Related to the second criterion, it has been said that IWMI's research strategy is reflected in what it chooses not to do.” (*Draft Strategic Plan*, 15.1.2000 p 21)

In 1999, the Institute was able to fund almost all the seed-money projects proposed by staff out of its discretionary funding.

### **3.2.2 Project Development for Restricted Funding Support**

Proposals are sent to donors throughout the year. The Institute has a Project Development Officer to assist researchers in the preparation of proposals and to pursue them with donors. This Officer scans the websites of donors, keeps in personal touch with donor offices and CGIAR representatives of donor countries. He feeds relevant interests, requests for proposals and other ideas to the researchers. The researchers prepare concept notes, not only based on these leads but also from those they get during their interactions with user and donor representatives whom they meet occasionally. The Project Development Officer converts them into project proposals meeting the particular format, style and deadlines set by the donors. Before submission, each proposal is reviewed internally (for its relevance to the Institute's mission, objectives, hypotheses, methodology and deliverables) and by the collaborators, and previewed by donors.

The DDG (Programmes) coordinates across programmes, supervises work plan preparation and proposal writing, and oversees donor relations. Every proposal has to be approved by the DDG (Programmes) and the DG before it becomes an IWMI project.

The status of various concept notes and proposals is discussed in monthly meetings with researchers and the Financial Controller’s Office. The Project Development Officer maintains a logbook and follows up with the donors each month on pending proposals. The Executive and Finance Committee of the Board is apprised of the proposals in the pipeline and the Institute's assessment of the status of each proposal; there were 46 proposals in the pipeline at the time of its meeting at the end of October 1999.

In the past two years, the Institute has submitted 50 proposals, 14 of which have been accepted and 25 are still under consideration. This gives the Institute a hit rate of 28 %, not taking account of the 25 still under consideration. The Project Development Officer finds the market tough—with declining funding, high expectations for rapid and measurable impact, a geographic or thematic focus of donors, and stiff competition from many institutions, including the nimble-footed small local non-government organizations, which are swift and personal in contacting the donor agencies with proposals.

The matching of the Institute's priorities with those of the external sources of support requires careful attention. In this respect, the Panel did not detect any serious mismatch and was pleased to note that IWMI has had the courage to discontinue at least one technical assistance type project and to decline another opportunity to launch a new one, which would have been large and thus would have contributed unrestricted funding through the overhead charge.

However, in examining the plans made at all the three levels defined above (strategic, medium term, and annual), the Panel found that formal and explicit priority setting is weak, confirming the 1999 CCER's observation. The Panel believes that planning with better defined priorities would enhance the ability of IWMI to keep a sharper focus on the core of its mission. This would have the added advantage of permitting IWMI to formulate its priorities and strategies in explicit reference to those of the CGIAR as a whole.<sup>1</sup>

### **3.2.3 Project Management**

Projects, or activities as described above, are at the heart of IWMI's research organization and management. The Research Programme and the project leaders are responsible for the management and deliverables. The Research Leader allocates the time of the research staff and the budget available across various activities. To assist in this effort, the Financial Controller's Office provides the Research Leader a Life of Project report. This report compares the project budget with expenditure and commitments, as at the end of each month by each expense category. The report also gives the total expenses and commitments as a percentage of the total project budget, and indicates the balance of funds that are available for completion of the project. For projects supported by restricted funding, the milestones and schedules are spelled out, as required by the donor. The Research Leader maintains these and follows up with the project leaders. The Financial Controller's Office is also able to flag on deliverables, a month ahead of the date when cash receipts are due. The Research Leaders and the Publications Committee check when the reports are overdue.

These arrangements seem to be working. However, based on the experience of several of its members who are currently, or have been, involved in research management, the Panel noted that a complete connection (including salary and all operating costs) between Programme, MTP project and research project budgeting is not available. Making such a connection requires bringing together information from various

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<sup>1</sup> At the CGIAR Ministerial-Level meeting in Lucerne, Switzerland in 1995, Ministers, Heads of Agencies and Delegates representing membership in the CGIAR, urged the CGIAR to, among other things, address more forcefully the international issues of water scarcity. TAC as well, in the Priorities and Strategies for Soil and Water Aspects of Natural Resources Management Research in the CGIAR (TAC 1997) document, identified water as an area of focus requiring much greater emphasis in the CGIAR, as water-related issues, including waterborne diseases, are expected to become increasingly important in agriculture, forestry, and fisheries in the future. TAC concluded that "water-related research is a priority area for which the System's scope and intensity of work should be significantly expanded, particularly related to water scarcity and competition, and water quality."

sources. The Panel believes that Programme management could be assisted by bringing together at the operating-project level all of the relevant information. This would require the addition of budgeted total costs (including salaries) into project descriptions, so that Research Leaders are more fully aware of total costs while submitting project proposals and negotiating contracts. This change would complement the very good work that has already been done to bring the annual work plans together in a document, which is published in January each year. Indeed, these plans form the real operating level of the research groups and, therefore, maximum use should be made of them in planning, monitoring and reviewing ongoing research of the Institute.

### **3.3 Monitoring and Evaluation**

Project monitoring, as already discussed in the preceding section, is done at a number of levels—Project Leader, Research Leader, and the DDG (Programmes). This monitoring is administrative in nature on matters such as research staff work loads, gaps between supply and demand for research time, hiring of consultants, preparation of work plans, budgets and costs, travel, and deliverables such as project reports, monographs, and journal articles.

Assuredly, there is some substantive monitoring of research at the project level. However, there does not seem to be any systematic review of research beyond what exists for publications. The Panel feels that an effective review system would greatly help priority setting and planning, given that the Institute is balancing a variety of factors such as fund raising, global CGIAR concerns, donor project specifications, and the interests of individual researchers.

The Panel suggests that IWMI Senior Management consider the need for organizing within the Institute a review process that ensures a continuing focus on the quality of science at the project and programme levels, with suitable documentation, depth, duration and frequency. The Panel noted that IWMI does not have a systematic programme of CCERs. The work of the Panel itself in reviewing the quality of the science would have been greatly facilitated and enhanced if CCERs of the various Programmes had been available. The Panel is convinced that, in addition, such reviews would help IWMI more easily manage its own business and increase the Institute's credibility in the eyes of its stakeholders, notably those who provide, or could provide, it with (more) financial support.

Similarly, regarding impact assessment, the Panel recognizes that the achievements of IWMI in recent years are drawing favourable attention from relevant international and national communities. IWMI has also endeavoured to document the various types of impact it has had. However, the Institute has not undertaken any systematic evaluation of the impact of its research under various programmes.

Impact usually refers to the broad, long-term economic, social and environmental effects resulting from research. Such effects may be anticipated or unanticipated,

positive or negative, and could be assessed at the level of the individual, household, village, district, state or nation or region. To date, IWMI has yet to undertake a systematic effort to measure the impact of its work in relation to the mission and goals of either its own or those of the CGIAR. Impact assessment at IWMI has remained largely anecdotal.<sup>2</sup>

The Panel recognizes that impact assessment is not easy, particularly for a research centre like IWMI, which, unlike most other CGIAR centres, focuses its research on improving the way in which a critical input—water—is managed in the pursuit of food security and poverty alleviation goals. Nevertheless, given the current culture of the CGIAR with its strong emphasis on demonstrating the linkage between research and successful development efforts, the Panel believes that IWMI should design and implement a more formal mechanism, either in-house or via outside sources, for assessing the extent to which its research has had an impact on the food security and poverty alleviation goals of the System. They would help the Institute convince its stakeholders of the value of its work and, in an iterative process, help it sharpen the priorities for its future activities.

**The Panel recommends that IWMI should adopt more formal procedures for priority setting and impact assessment.** It also suggests improvements in the research management information system, the details of which are spelled out in the text of this chapter. These changes would not entail significant extra costs and would facilitate the tasks of the Institute’s research managers.

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<sup>2</sup> IWMI does keep an “impact file” of stories/events, reflecting for the most part, indirect or potential impact of IWMI’s research on policies and strategies for irrigation management in national programmes. At best, these could be described as quasi- or potential impact examples, and are of varying quality.

## CHAPTER 4 – LEGAL STATUS AND GOVERNANCE

### 4.1 Legal Status

The legal status of IIMI as an “autonomous organization, international in character” under the control of a Board of Governors is satisfactorily ensured by the Sri Lankan Government's *Act No. 6 of 1985*, which recognizes the *Charter of IIMI* and its ratification by the Government of Sri Lanka. This *Charter* may be amended by the Institute's Board. However, amendments to its fundamental provisions "such as IIMI's status, country of location, Board composition and dissolution of the Institute" are also subject to prior consultation with the Government of Sri Lanka and the CGIAR Chairman. The *Charter* has been revised by the IWMI Board on several occasions, the most significant of these being to accommodate IIMI's joining the CGIAR System on January 1, 1991.

Currently, at the request of the Board, formal approval is awaited from the Government of Sri Lanka for the Institute's legal name to be changed from IIMI (International Irrigation Management Institute) to IWMI (International Water Management Institute). Approval is expected shortly, certainly in 2000. Meanwhile, the Institute is using the name IWMI for work purposes. While the change in name to IWMI is not in conflict with the Institute's objectives and activities as posited in the current *Charter*, once the change is formally approved, revision of the *Charter* will be necessary to introduce the new name. This will provide the opportunity to review the *Charter* and revise it so as to more directly reflect the Institute's orientation to water and bring the *Charter* up to date in terms of such matters as provisions for Board tenure, gender-neutral language, etc.

There is no doubt that the Institute is meeting the major provisions of its *Charter* that it be “organized and operated as a non-profit organization, the objectives and activities of which shall be confined exclusively to research, education, training and information.”

IIMI's working relationships with its partners (governments, NARS, IARCs, ARIs, donors, etc.) are formalized through memoranda or letters of agreement or understanding, or contracts. Of particular significance is the *Memorandum of Agreement between IIMI and the President of the Islamic Republic of Pakistan for the Establishment of a Pakistan Unit of IIMI*. Signed in 1986, this *Agreement* ensued from negotiations for the establishment of IIMI's headquarters in Sri Lanka. It specifies that a major unit of IIMI, to be known as IIMI Pakistan, be located in Pakistan with “international and national legal personality [and] have the character of an autonomous, international, non-profit, research, educational, and training organization”; that it “shall be operated under the Governance of the IIMI Governing Board”; and that “the Director, IIMI Pakistan shall be appointed in consultation with the Government of Pakistan.” While there is no doubt that this *Agreement* has given IWMI excellent facilities in Pakistan (including the splendid headquarters building of IWMI Pakistan in Lahore) and has facilitated its work there, it nonetheless to some degree constrains IWMI's freedom of action (the direct cost of IWMI Pakistan involves 13.1% of IWMI's total budget and 29.5% of the total unrestricted

research funding for 2000) and engenders some difficulties and inefficiencies in IWMI's work in the context of relationships between India and Pakistan.

## **4.2 Board of Governors**

### **4.2.1 Assessment**

The most important task of a Board is to ensure that it has a good Chief Executive Officer. In this, the IWMI Board was eminently successful with its appointment of a new DG in 1995 who, with his dedication and enthusiasm for research, has transformed the Institute. It is now firmly on track as an international research centre with, as wished for by the 1994 EPMR, an intellectual climate that stimulates creativity and collegiality. Staff are competent and dedicated. They are clearly enthusiastic, not least because they know the DG is genuinely interested in what they are doing. However, in their desire to transform the Institute, the DG and the Board agreed to set the balance of responsibility between the Board and Management more to the side of Management than, in the Panel's view, is desirable in the longer term.

The Board has not been as active as it might have been in ensuring effective strategic planning, policy formulation and monitoring of performance. To some degree wisely but not totally so, in accommodating the DG the Board has generally been permissive rather than proactive. In part, this reflects the Board's decision when it appointed the current DG in 1995 to give him somewhat of a free hand. It is also reflected by the Board's decision of April 1996 that "Recognizing the strain on staff time in preparing various reporting documents, the Board agrees that many reports to the Board can be verbal." The Board, of course, could still request documentation it believed necessary. Nonetheless, in the view of the Panel, this decision downplayed the Board's opportunity to more carefully examine important issues. Likewise, in agreeing in 1997 with the DG's request to reduce its meetings from two to one per year, the Board accepted his assessment of it as an expense that could be profitably reduced. Thus, currently there is the paradox of a much improved institute (thanks to the DG) with a Board whose performance in recent years can only be described as weak relative to CGIAR norms and expectations. With a new DG to be appointed in 2000, the long-term welfare of IWMI demands that the Board play a more active role in meeting its responsibility for oversight of the Institute.

As well as the activist role played by the DG, there have been at least four other contributing factors to the less-than-strong performance of IWMI's Board. First, in recent years, the Board, qua Board, has suffered from a lack of active leadership. This was particularly so in 1999 when, due to his heavy work commitments as a senior government official, the Board Chair was not able to attend a number of Board-related meetings including those of the Executive and Finance Committee of the Board and the CBC. Second, the Board has been casual relative to formal requirements. For example, in 1997, the Board Chair's term of office was extended for a further two years without input from the Nominations Committee. In being a two-year rather than a one-year extension and not involving any process of evaluation or Nominating Committee recommendation, the appointment clearly violated the Board's own Rules and Procedures. Likewise, despite its duty of care, the Board has not responded as seriously as it might have to the one recommendation and four of the five suggestions pertaining to governance of the last



(1994) EPMR. The recommendation was that the Nominating Committee "develop a mechanism to assess regularly the composition of the Board and the contributions of individual Board members and officers." The five suggestions related to the need for (1) clearer appraisal of the DG, (2) Board self-evaluation at the end of each meeting, (3) member participation in agenda development, (4) periodic review of the quality of Board decisions, and (5) achieving closure on important issues. Of this listing, in the Panel's view, only Board composition and member participation in agenda development have received adequate attention (though some attention has been given to annual appraisal of the DG and, intermittently and inadequately, to Board self-evaluation).

A third reason for the Board's less-than-strong performance is that it appears to have been unaware of what currently constitutes best practice in CGIAR Boards. That is perhaps surprising given that the Board has generally had at least two members with prior CGIAR Board experience and a majority of members who clearly have the capacity to be very competent. (Board membership since the 1994 EPMR is detailed in Table 4.1.) In large part, the explanation for the Board's poor awareness undoubtedly lies in a lack of active leadership and the failure to provide adequate induction and training for members together with the lack of any systematic monitoring and evaluation of its own performance.

Fourth, as elaborated below, the institutional parameters under which the Board operates are not conducive to good performance. They need thorough overhaul to bring them up to best-practice standard.

#### **4.2.2 Improving Board Performance**

##### **Leadership**

The Board has a new Chair as from January 1, 2000. Given his interest and with appropriate support from the Board, the new Chair has the capacity to transform the Board. Part of this will involve ensuring good leadership of the Board's standing committees. This implies more purposeful work by the Nominating Committee in recommending chairs for the other standing committees and that the chair of the Nominating Committee be appointed on the recommendation not of the Nominating Committee itself but of the Board Chair.

##### **Overcoming Tradition and Improving Culture**

Making the Board more proactive and business-like is a task to be accomplished over a couple of years. It necessitates the Board's leadership (i.e., its officers but especially the Chair) guiding the Board, both by example and by directives, to adhere to and work within an improved set of institutional parameters defining not just the scope of the Board's business but also the setting and the way in which business is conducted. As discussed below, these parameters encompass such elements as Board size, committee structure, terms of reference, rules, procedures, and the frequency, format and documentation of meetings. However, it must be recognized that better setting of the Board's institutional parameters is only a necessary, not a sufficient, condition for the Board's effectiveness. It must be complemented by ensuring that the Board always has a competent dedicated membership willing to gain the knowledge and do the work necessary to ensure its good performance.

TABLE 4.1: MEMBERS OF THE IIMI BOARD OF GOVERNORS, 1995-2000<sup>a</sup>

Name and First Year	Nationality	Expertise	Gender	Type of Member	'95	'96	'97	'98	'99	'00 <sup>b</sup>
Ms N. Al-Shayji '90	Kuwait	Admin/Environment	F	CGIAR Nominee	x					
Mr R. Rangeley '90	U.K.	Engineering	M	At large	x					
Dr H. Tsutsui '90	Japan	Engineering	M	At large	x					
Dr T. Hullar '91	U.S.A.	Agriculture	M	At large	x	x				
Dr. L. Swindale '91	New Zealand	Agriculture	M	At large	C	C				
Dr. Z. Altaf '92	Pakistan (HC)	Economics	M	HC Nominee	x	x	C	C	C C-EFC	
Dr. E. Alves '92	Brazil	Economics	M	CGIAR Nominee	x	x	x			
Mr. J. Medagama '95	Sri Lanka (HC)	Rural Development	M	HC Nominee	x	x	x	x	x EFC	x EFC
Dr. R. Barker '95	U.S.A.	Agricultural Economics	M	<i>Ex officio</i> (DG)	x					
Dr. M. Buvinic '95	Chile	Women in Development	F	At large	x	x	x	x	x EFC, NC	x PC
Dr. D. Hopper '95	U.S.A.	Global Public Policy	M	At large	x	x	x	x	x C-PC, EFC	x PC
Dr. D. Seckler '95	U.S.A.	Economics	M	<i>Ex officio</i> (DG)	x	x	x	x	x DG, EFC, PC	x PC, EFC
Dr. T. Mase '96	Japan	Irrigation Engineering	M	At large		x	x	x	x PC, NC	x PC, NC
Dr. B. Lesaffre '96	France	Water Supplies	M	CGIAR Nominee		x	x	x	x PC, EFC	x PC, EFC
Dr. M. El-Kady '97	Egypt	Civil Engineering	F	CGIAR Nominee			x	x	x PC, EFC, C-NC	x PC, C-NC, EFC
Prof. K.J. Beek '97	Netherlands	Soil Science	M	At large			x	x	x NC	C C-EFC
Ir. S. bin Abdullah '97	Malaysia	Civil Engineering	M	At large			x	x	x PC	x PC.
Mr. A. Kej '97	Denmark	Hydraulics & Env. Eng.	M	At large			x	x	x PC	x C-PC, EFC
Dr. E. Terry '97	Sierra Leone	Plant Pathology	M	CGIAR Nominee			x	x	x PC, NC	x PC, NC
Dr. C. Lancaster '98	U.S.A.	Economics	F	At large				x	x Resigned April	
Dr. R. Gautschi '99	Switzerland	Civil Engineering	M	At large					X	x NC, EFC
Dr. W. Huppert '99	Germany	Engineering	M	At large					X	x PC
Ms. J. Joshi '00	U.S.A.	Finance/Administration	F	At large <sup>c</sup>						x
Vacancy vice Altaf '00	Pakistan	?	?	HC Nominee						x

<sup>a</sup> Membership of the Board from 1983 to 1994 is detailed in *Report of the First EPMR of IIMI* (TAC Secretariat, 1994, p. 51).

<sup>b</sup> As approved by the Board at its April 1999 meeting.

<sup>c</sup> Proposed to become CGIAR Nominee

C - Chair  
EFC - Executive and Finance Committee  
PC - Programme Committee  
NC - Nominating Committee  
HC - Host Country

## Training to Meet Responsibility

As yet, the Board has no formal systematic induction programme for new members. Nor, except for part of a presentation by the CGIAR Secretariat's Management Advisor in 1997 and the attendance of two members at part of the post-ICW'99 CGIAR Board Training Workshop, has the Board had any briefing or training on either its role and responsibilities or on best practice in CGIAR Boards. **The Panel recommends that the Board should formulate and implement an ongoing Board development programme aimed at ensuring that the Board meets, in particular, its responsibilities for strategic planning, policy formulation and monitoring of performance.** This should include a one-day induction programme for new members involving discussions with the Board Chair and Secretary, Senior Management and Programme Leaders; focus should be on the member's responsibility in the CGIAR context and an overview of the Institute and its Board from a strategic perspective. Other elements of the development programme might include periodic in-house workshops based on the *Reference Guidelines for CGIAR Boards*, regular self-evaluation, periodic SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis, review of policies and Board meeting documentation and Handbooks from other CGIAR centres, and—as feasible—participation of some members in Systemwide Board training activities and at ICW. The current practice of inviting new members to attend a Board meeting as observers immediately before joining the Board is commendable.

## Setting the Institutional Parameters Better

### (1) Board size and composition

Since 1994, the size of the Board has varied between 10 and 15. Currently the Board has 15 members including only four women. It meets constitutional requirements on composition and exhibits a good balance in terms of developed and developing countries, CGIAR experience, new and old blood, age and the private sector. In terms of expertise, the Board's composition is good except for somewhat of a surfeit in engineering and a deficit in natural resources. The Panel suggests that the Board review its membership relative to the possibility of including more expertise in natural resources.

Under the IIMI *Charter*, allowable size of the Board is from 12 to 20. To avoid the temptation to add members without real need, it would seem wise for the Board to fix on a particular size. For reasons of cost, the appropriate size should be the smallest possible to meet constitutional requirements and do the Board's business effectively. This would imply a membership of 12 or at most 13.

### (2) Board year

Currently the Board usually meets only in April each year and the Board year runs from January 1 to December 31. In consequence, the annual changeover in Board officers and committee memberships, as well as the entry and retirement of members, occurs in a vacuum between meetings and there is a lag of eight months (April to January) between

appointment and taking up duty. The Panel suggests that consideration be given to having the Board year run from the end of one Annual General Meeting (AGM) to the end of the following AGM. Appointments would then commence immediately at the end of the AGM.

(3) Committee structure

The Board has three standing committees. These are the Programme, Nominating, and Executive and Finance Committees. All include the Board Chair *ex officio*.

The elected membership of the Programme Committee has varied over time, e.g., it was seven in 1999 and is nine in 2000. Meetings of the Committee are open to and generally attended by all the Board members. This has the significant advantage of enabling all Board members to be informed of programme matters and should continue. A smaller elected membership of six would better facilitate members of the Committee being given specific Programme-liaison and reporting tasks by the Committee chair if he or she wished.

The Nominating Committee with five elected members in 1999 and four in 2000 is larger than necessary. Three senior (i.e., second-term) members (with at least one from a developing country and one from a developed country) would suffice to do the Committee's work. Such a size would better ensure confidentiality and also reduce the communication load necessary between meetings if the Committee is to do its work properly; seniority would not only bring Board experience and knowledge but also make it easier (i.e., less embarrassing) for the Committee to responsibly monitor and review Board members' performance as—to repeat the recommendation of the 1994 EPMPR—should be done by the Committee in the future. Currently the DG serves as a Resource Person to the Nominating Committee and participates very actively in its meetings. Given that the DG works under the authority of the Board, this is a questionable procedure as it may lead to untoward bias in the Board's membership. There is no doubt, however, that the Chair of the Committee should liaise with the DG about the Committee's likely recommendations for Board membership.

The Executive and Finance Committee has seven members—the Board Chair, chairs of the Programme and Nominating Committees, the DG, the HQ host-country nominee to the Board and two at-large members. The Committee's specified responsibilities include audit matters which, however, are in practice handled by the full Board. Because audit matters (which by definition relate to the integrity of past performance) are important and quite distinct from finance and budget matters (which relate to the present and future), **the Panel recommends that the Board should establish an Audit Committee with responsibility for audit matters of both a financial and operational nature.** A three-person membership with at least one person having expertise in finance and administration would suffice. The DG should not be a member. The chair of the Audit Committee might well replace one of the at-large members on the Executive and Finance Committee.

If the committee structure of the Board were as proposed above, it could be accommodated by a Board of 12 members with some members serving on both the Programme Committee and the Nominating or Audit Committee.

(4) Board officers

The Board's officers do not include a Vice-Chair. To meet the exigencies of the previous Chair's absences, the Board has had a (designated but never Board-approved) Co-Chair and, more recently, a Chair-Designate. It would seem appropriate for the Board to have an office of Vice-Chair filled on an annual basis by an appropriate member.

To avoid possible conflict of interest, it would be best if the Board's rules did not allow a host-country nominee or an *ex officio* member to be Board Chair; likewise for the position of Vice-Chair if introduced.

The DDG (Operations) serves as Secretary to the Board. Currently he does not attend the Board's closed sessions. It would seem appropriate that, except for items of a personal nature, he attend closed sessions and maintain confidential minutes in his office.

(5) Terms of reference, rules and procedures

**The Panel recommends that the Board's Terms of Reference, Rules and Procedures and the Terms of Reference of its Chair, standing committees and Secretary should be reviewed and revised to more clearly specify responsibilities.** While there are many matters of detail needing attention, major matters to be encompassed in revision of the various Terms of Reference are: explicitly including strategy and planning in the Board's responsibilities; shifting the responsibility for audit matters from the Executive and Finance Committee to an Audit Committee; adding policy formulation and review in the areas of research, training and technology transfer to the responsibilities of the Programme Committee; making the Nominating Committee responsible for the monitoring and improvement of the performance of the Board and its members; and giving the Board Chair responsibility for approving and monitoring an Annual Performance Agreement for the DG. Likewise, the Board's Rules and Procedures need revision to accord with current best practice in CGIAR Centres.

(6) Frequency of meetings

Since 1997, acceding to the DG's request, the Board has operated on the basis of one meeting per year of the Board and its standing committees, held in April, supplemented by a one-day post-ICW meeting of its Executive and Finance Committee in Washington, D.C. Such infrequency of meeting has reinforced the low profile of the Board. To meet the volume of business that it now needs to handle, **the Panel recommends that the Board should meet twice per year and that at each of these meetings of the Board there be meetings of its standing committees.** This would also enhance members' knowledge of the Institute and enable the Board to better meet its responsibilities for policy and oversight. It would also provide more opportunity for interaction with both national and international staff, many of whom feel they do not know the Board.

## (7) Format of meetings

Judging from its April 1999 meeting, which was attended by two Panel Members, the format of the Board's meetings could be much improved. Indeed, change will be necessary if the Board is to adequately cover its responsibilities. For example, the Board might allow a first day for the Programme Committee, a second day with the Audit and Nominating committees meeting concurrently in the morning and the Executive and Finance Committee in the afternoon, followed by two days for the Board meeting. Those members not belonging to the committees meeting on the second day would have a useful opportunity to liaise with staff.

## (8) Board code of conduct and mission statements

The Panel suggests that the Board develop statements specifying its Code of Conduct and its Mission. These should regularly appear at the front of the Board's meeting documentation and could be referred to in the Chair's opening remarks. The Code of Conduct should be broader than and replace the current rule on conflict of interest.

## (9) Board action plan

The Panel suggests that, with the Institute having a new Board Chair and DG this year, as well as having undergone this EPMP, it would be opportune for the Board to develop an ongoing Action Plan listing the actions that it needs to take in order to ensure it meets best-practice standard. These actions would include such things as, e.g., ensuring adequate response to this EPMP Report, revising the Board's structure and terms of reference, reviewing the IIMI *Charter*, developing a Board Code of Conduct, establishing a comprehensive Register of Board Decisions etc., etc. The Action Plan should be an agenda item at each Board meeting.

## (10) Board agendas and documentation

The agendas for meetings of the Board and its standing committees should better reflect their terms of reference. It would seem useful for each to have a basic agenda-template to which matters of a periodic or *ad hoc* nature (such as policy items, the Strategic Plan, the MTP, EPMP follow-up, etc.) could be added as need be. Items not included in recent Board agendas, which it would seem appropriate to include as standard items, are Apologies, Ratification of Out-of-Session Actions, Report on the CGIAR and CBC, CCER Schedule, Risk Appraisal (of significant uncertainties that may affect the Institute), Statements by Observers, DG Evaluation, Exit Statements, Board Action Plan and Board Self-evaluation.

To be businesslike and better able to do its homework, the Board should rescind its April 1996 decision that "many reports to the Board can be verbal." This gives Management too ready an excuse for not providing adequate and timely documentation. Indeed, as the Board further recognizes its responsibility for strategic planning, policy

formulation and review, and monitoring of performance, it will need substantially more documentation. The Board cannot prepare this documentation itself. It has to decide what it needs (e.g., a schedule of future CCERs or a policy statement on training and capacity-building or whatever) and instruct Management to prepare a draft for Board discussion and approval. That way the Board would better meet its responsibilities while giving Management the up-front opportunity to present its views.

(11) Board-approved policies

Review of the Institute's policy framework indicates there are a number of gaps, particularly in relation to governance and Board-approved policies, in the areas of research, training and external relations. The Panel suggests that the Board take steps to ensure a comprehensive Board-approved policy framework for the Institute.

### **Cost Implications**

Some of the above recommendations have cost implications in terms of IWMI's limited unrestricted funds. The Panel is conscious of this and recognizes the importance of such funds being spent wisely. Most significant is the recommendation for a second meeting of the Board and its standing committees each year in lieu of a meeting only of the Executive and Finance Committee. Assuming a Board membership of 12, this would increase the annual Board cost by some US\$27,000 or 17%. This is seen by the Panel as a necessary expense if the Board is to properly meet its responsibilities. Other costs relating to the induction of new members and better documentation of Board agendas would be much more marginal but would also provide benefits to IWMI as a whole.

## CHAPTER 5 – FINANCE AND ADMINISTRATION

### 5.1 Financial Management

#### 5.1.1 Funding

IWMI's unrestricted,<sup>1</sup> restricted and total funding over the six years 1995 to 2000 in nominal US dollars is shown in Table 5.1. Total funding is also shown for these years in constant year-2000 US dollars and indicates a decline in IWMI's funding in real terms of 15%. However, compared to 1999, there is a degree of projected recovery in 2000 due in large part to the (unexpected) grant of US\$0.905 million in restricted funds (largely from the World Bank) for SWIM (as alluded to in Section 2.5.), but also reflecting an increase of US\$0.768 million from other donor sources. Too, funding in 1999 was lower than expected because of two accidents in the CGIAR System (which illustrated the Institute's vulnerability to the vagaries of funding sources).

As Table 5.1 indicates, unrestricted funding as a percentage of total funding has varied between 36 and 44% over the years 1995 to 1999. It was 44% in 1999. It is budgeted at 38% in 2000, which is in the low range across the CGIAR System.

Over the period 1995 to 1999, IWMI received funds from 36 donors. Most of these provided only small and/or intermittent funding. Only 13 donors provided continuous funding over the period. These 13 were the ADB, AFDB, Australia, Canada, DANIDA,

**Table 5.1: Unrestricted, Restricted and Total Funding, 1995 to 2000**  
(US\$ million)

Year	Nominal US dollars			Constant 2000 US dollars <sup>1</sup>
	Unrestricted	Restricted	Total	Total
1995	4.114 (41%)	6.027 (59%)	10.141	11.428
1996	3.867 (39%)	5.956 (61%)	9.823	10.768
1997	3.455 (36%)	6.192 (64%)	9.647	10.237
1998	3.878 (41%)	5.534 (59%)	9.412	9.821
1999 <sup>2</sup>	3.624 (44%)	4.624 (56%)	8.248	8.471
2000 <sup>3</sup>	3.568 (38%)	6.153 (62%)	9.721	9.921

<sup>1</sup>Conversion from nominal dollars based on the Consumer Price Index of *The Economist*.

<sup>2</sup>Latest actual (February 2000)

<sup>3</sup>Budget estimate (February 2000)

Ford Foundation, France, Germany, India, Japan, The Netherlands, USAID and the World Bank. They contributed some 84% of IWMI's total funding over the five-year period and, in 1999, 77% of unrestricted and 78% of restricted funds. These percentages would have

<sup>1</sup>Note that IWMI's classification of restricted and unrestricted funding follows the auditors' requirement to refer to the contractual arrangements for its source of funding. This practice tends to underestimate the proportion of funding with no or very limited restrictions, such as that which the CGIAR classifies under "attributed funding." This explains the difference between the percentages indicated in this report and those which can be found in the CGIAR Financial Reports.



been even higher if the EU, a significant donor from 1995 to 1998, had provided the funds expected in 1999.

During the review period, the most significant variation in funding has related to the World Bank's unrestricted contribution, which in 1995 and 1996 was US\$1.5 million. During 1997 the Bank changed the formula for the allocation of its contribution. Since then it has used a matching-fund concept and provides 11% of grants received from other donors. In consequence, the Bank's contribution fell in 1998 to US\$0.914 million and in 1999 to US\$0.818 million; in 2000 it will be US 0.947 million. Also significant was the Ford Foundation's decision in 1998 to cease providing unrestricted funding to the four CGIAR Centres which it had traditionally supported. IWMI was one of the affected Centres. The Foundation had provided IWMI with US\$0.350 million every year from 1993 to 1998, the last year of contribution. The future of EU funding is of great concern to the Institute given the strong support, particularly in terms of restricted funding, received over the years up to 1998.

More positively, IWMI has had significant success in attracting new unrestricted donors as indicated in Table 5.2. This represents major progress in the quality of IWMI's funding as a research organization. Being unrestricted, these funds from new donors, in the view of the Panel, are not only far more valuable dollar for dollar to IWMI than restricted funding, but are also a sign of recognition of the importance of IWMI's mission, capability and work. Also notable has been Germany's continued support with unrestricted funding of US\$0.219 million in 1999, at a time when this donor drastically reduced its funding to the CGIAR. Noteworthy also is South Africa's 1999 contribution of US\$80,000 towards IWMI's work there.

**Table 5.2: Contributions by New Unrestricted Donors, 1998 and 1999  
(US\$ million)**

<b>New unrestricted donors</b>	<b>1998</b>	<b>1999</b>
Sweden	0.319	0.359
Switzerland	0.296	0.249
Norway	-	0.127
Belgium	-	0.118
<b>Total</b>	<b>0.615</b>	<b>0.853</b>

Overall, IWMI's funding situation continues to be fragile. It has not been able to raise the US\$11 million corresponding to the share (3.2%) of total CGIAR funding seen as desirable by TAC and approved by the Group.

However, the increase in the number of donors providing unrestricted funding and in the amount they contribute is certainly very encouraging. Given the tough competition among CGIAR Centres and with others vying for the same funds, the performance of IWMI in this area is very commendable. The Panel sympathizes with the views expressed by the DG in his report for the February 2000 meeting of IWMI's Board, viz.:

“For nearly five years now, our funding efforts have been a process of one step forward and then one step backward: as we get new donors and additional funding in one step, we lose funding in another.... But every year, it seems ODA funding becomes smaller and more restricted. Thus, notwithstanding the increasing awareness of the importance of water in the world and the importance of IWMI in the field of water, we have not yet achieved the funding we need to do our important work.”

It is both noteworthy and praiseworthy that IWMI has in recent years resisted the temptation to increase its funding by undertaking or seeking some major projects that were more in the nature of technical assistance than research. The IWMI budget is today driven by the Institute's agenda rather than vice-versa as was the case before 1995.

IWMI has not had cash-flow problems in its funding except for the systemwide problem of delay (and, in 1999, cancellation) of EU funding. Such delays highlight the need for the holding of operating reserves to withstand such financial shocks and the need for ongoing risk appraisal of funding possibilities given the uncertainty endemic to the CGIAR System. IWMI's performance in this regard has been excellent. The Institute's operating reserve as at December 1999 was US\$2.3 million, equivalent to 83 days of operation. This is budgeted to reduce to US\$1.9 million, equivalent to 71 days of operation, in 2000. The Board's policy is to have a reserve equivalent to at least 70 days of operation.

### 5.1.2 Expenditure

As shown in Table 5.3, IWMI's total expenditure in 1999 was US\$8.807 million; **operating** expenditure was US\$8.685 million and **capital** expenditure amounted to US\$0.122 million.

**Table 5.3: Expenditure, 1998–2000<sup>1</sup> (US\$ 000)**

<b>OPERATING</b>	<b>1998</b>	<b>1999</b>	<b>Budget 2000</b>
<b>Programme</b>			
IWR	959	1,216	1,337
AIMS	1,990	1,182	1,307
PIM	1,457	1,519	2,213
H&E	1,414	525	725
SWIM	204	532	903
Allocated to National Programmes etc.	852	1,020	816
Sub Total	6,876	5,994	7,301
<b>Non-Programme</b>			
Communications Office	522	497	600
Governing Board	173	171	184
Office of DG	350	444	446
Fin & Admin. Div.	692	646	700
General Operations	354	312	275
Depreciation	394	361	400
Exchange Loss	6	107	25
Severance/Redundancy	34	-	-
EPMR & DG Search	-	153	300
Sub Total	2,525	2,691	2,930
<b>TOTAL OPERATING</b>	<b>9,401</b>	<b>8,685</b>	<b>10,231</b>
<b>CAPITAL</b>	<b>51</b>	<b>122</b>	<b>39</b>
<b>GRAND TOTAL</b>	<b>9,452</b>	<b>8,807</b>	<b>10,270</b>

<sup>1</sup> Due to changes in the Programmes, data for 1995 to 1997 are not comparable to that for 1998 to 2000 and are, therefore, not presented.

Of the 1999 operating expenditure of US\$8.685 million, US\$5.994 million (69%) went directly to research, which is called **Programme** expenditure, and US\$2.691 million (31%) was used for support services and governance (overheads), which is called **Non-Programme** expenditure.

The 1999 **Programme** expenditure of US\$5.994 million was divided among the global research programmes as shown in Table 5.4 and across Programme locations as detailed in Table 5.5.

**Table 5.4: Division of Programme Expenditure among the Global Research Programmes (US\$ 000)**

<b>Programme Expenditure</b>	<b>US\$ 000</b>	<b>%</b>
IWR	1,216	20.3
AIMS	1,182	19.7
PIM	1,519	25.3
H&E	525	8.8
SWIM	532	8.9
Direction (Coordination)	192	3.2
Unrestricted funds for National Programmes	828	13.8
<b>Total</b>	<b>5,994</b>	<b>100.0</b>

**Table 5.5: Programme Expenditure by Programme Location**

<b>Programme Location</b>	<b>Expenditure (US\$ 000)</b>			
	Unrestricted	Restricted	Total	%
Global (Colombo)	1,056	2,119	3,176	53.0
<b>National*</b>	<b>915</b>	<b>1,712</b>	<b>2,627</b>	<b>43.8</b>
Coordination	138	54	191	3.2
<b>Total Programme</b>	<b>2,109</b>	<b>3,885</b>	<b>5,994</b>	<b>100.0</b>
* Pakistan	640	727	1,367	52.0
Mexico	59	351	410	15.6
Turkey	131	208	339	12.9
Sri Lanka	47	70	117	4.5
Iran	-	89	89	3.4
Nepal	1	60	61	2.3
Africa	19	207	226	8.6
Coordination	18	-	18	0.7
<b>Total National</b>	<b>915</b>	<b>1,712</b>	<b>2,627</b>	<b>100.0</b>

The 1999 **Non-Programme** expenditure of US\$2.691 million (overheads) was spent on various support services as shown in Table 5.6.

**Table 5.6: Breakdown of Non-Programme Expenditure  
(US\$ 000)**

<b>Non-Programme Expenditure</b>	<b>US\$ 000</b>	<b>%</b>
Governing Board	171	6.4
Finance and Administration	646	24.0
Office of DG	597	22.2
Communications & DR Office	497	18.5
General operations	312	11.5
Depreciation	361	13.4
Exchange loss	107	4.0
<b>Total</b>	<b>2,691</b>	<b>100.0</b>

The Panel noted that cutting down the Non-Programme expenditure and increasing the allocation to research Programme expenditure, without compromising on the quality of research support services, has received adequate attention. The Panel recognizes that IWMI has to incur a somewhat higher proportion as Non-Programme expenditure because of its small size and in order to meet the high standards of accountability expected of a CGIAR Centre by donor countries and other stakeholders. In the Panel's view, the current level of Non-Programme expenditure and the management efforts to continuously keep it under check are reasonable.

The 1999 pattern of operating expenditure (Programme and Non-Programme) of US\$8.685 million was as shown in Table 5.7.

The Panel noted that there were no cash-flow or liquidity problems. Current assets covered current liabilities adequately.

The Institute had an accumulated surplus (Operating and Capital Funds) of US\$3.925 million as of December 31, 1999. It is considering redesignating a part of its Capital Fund of US\$1.597 million for Training and Capacity Building activities, as the current level of its Capital Fund is more than is judged necessary for its designated purpose, namely, additions to and replacement of fixed assets. In the Panel's assessment, IWMI is financially healthy.

### **5.1.3 Financial Planning and Control**

Financial planning at IWMI, as at other CGIAR Centres, is carried out in an environment of increasing complexity and continuing uncertainty. Complexity comes from the many and varied funding sources with a range of expenditure windows and reporting requirements, while uncertainty about continuance of income is constantly present.

**Table 5.7: Pattern of Operating Expenditure in 1999, Programme and Non-Programme (US\$ 000)**

Category	US\$ 000	%
Internationally Recruited Staff	3,172	37.0
Consultants	783	9.1
Contract Research	490	5.7
Associate Experts	77	0.9
National Staff	1,360	15.9
Office & Research Supplies	1,318	14.0
International Travel	619	7.2
National Travel	159	1.9
Depreciation	366	4.3
Publication & Dissemination	140	1.6
Fellowships	125	1.5
Workshops	76	0.9
<b>Total</b>	<b>8,685</b>	<b>100.0</b>

IWMI budget projections are required at all levels and the process is initiated by the DDG (Operations). In an example supplied to the Panel, the DDG (Operations), in preparation for an October 1999 meeting of the IWMI Executive and Finance Committee, called for updated projections on expenditure in 1999 from the Research Programme Leaders. This call, made in early September, contained information on the expenditure to date in the current year (1999) and included estimates of expenditure for the remaining months of the year based on previous spending trends. In addition, guesstimates for year-2000 expenditures and income were provided. These income projections are made from an aggregation of the reasonably well-known unrestricted funds and the more uncertain restricted funding. The latter is made up of known, already in progress projects some of which will continue for up to three years. Out-year projections on income extend to five years and expenditure to at least three years.

It is clear that the prime responsibility for the Institute's financial planning and control rests with the DDG (Operations). In turn, he is dependent on the DDG (Programmes), the Director Pakistan and Research Programme Leaders to provide their best estimates of likely income and expenditure during the coming year. To provide guidance to these people, the expected Institute-level of income in the coming year and current-year budget expenditure on a Programme basis is provided.

Final formulation of annual detailed budgets comes in discussions between the DG, Directors and Programme Leaders with the DG being the final arbiter. The proposed forward budget is presented to the Board's Executive and Finance Committee who have a chance to scrutinize and question, and then ratify. Ongoing, daily control of finances rests primarily with the DDG (Operations).

The material provided to the Panel indicated that a high level of fiscal responsibility was exercised in both financial planning and overall control. There was evidence of a thorough appreciation of budget management and of identifying that which

is known and that which is uncertain. Working within budgets and managing the reserve account consistent with CGIAR requirements was also evident.

Clearly, the success (or lack of it) of IWMI's project proposals to donors can have a dramatic effect on financial resources and, in turn, on the capacity of the researchers to deliver outputs and outcomes. There is therefore a continuing imperative to keep bringing project money in even though it constitutes restricted funding. The Panel recognizes the fine balancing act that this requires. Projects must be consistent with IWMI's mission and priorities, the proposed project must be attractive to the donor, the proposed research needs to be feasible, the Programme research staff must be capable and available when the project funding becomes available and the necessary infrastructure to support the people and work must be available and accessible. To achieve reasonable consistency in this source of income requires a clear mission and goals, good intelligence on likely funding opportunities, good understanding of the Institute's capabilities, very good financial planning and, above all, great team work.

The perceived imperative for continued restricted income could easily lead to compromising the mission and goals of the Institute in the pursuit of opportunistic sources of funds. The Panel is pleased to report that there is no substantive evidence that this has or is the case and, in fact, there is evidence that sizeable grants have been turned down because the work did not fit the IWMI research direction. Financial planning and control is servicing the research agenda. It is clear that financial planning and control at IWMI is orderly, timely and comprehensive.

#### **5.1.4 Financial Administration**

Financial services are administered at headquarters by an 11-person unit (including two accountants) supervised by a Financial Controller who reports to the DDG (Operations). In Pakistan there is a smaller unit which reports via a Manager, Finance and Administration to the Director, Pakistan. Both units are composed of national staff.

There appears to be a good understanding between the research and finance groups of each other's problems and needs. Research Programme Leaders expressed satisfaction with the financial services provided, as did the responses of internal customers at headquarters to a recent feedback survey by the Financial Controller.

Overarching responsibility for IWMI's financial administration lies with the headquarters unit under the DDG (Operations). This responsibility includes the development and monitoring of accounting and control systems and procedures, cash-flow management, preparation and maintenance of accounts including IWMI's annual financial statement, coordination of internal and external audits, monitoring the purchase, movement and disposal of assets, coordinating and preparing IWMI's annual budget, assisting Research Programme Leaders develop detailed budgets, review of proposal budgets prior to submission to donors, and monitoring of project expenditures against budget allocations. In the view of the Panel, these responsibilities are very well met and reflect credit on the Financial Controller, his staff and the DDG (Operations). Credit must also be accorded to the financial accounting software developed in-house at a saving of at least US\$100,000.

The headquarters financial unit produces 13 monthly financial reports of a significant nature for use by relevant managers. These reports are produced in timely fashion and are appreciated by IWMI's managers. They provide excellent ongoing monitoring and oversight of IWMI's financial situation from the level of sub-projects to that of the Institute as a whole. Overall, the view of the Panel is that the Institute's financial management, controls and procedures are first-rate. This is supported by the reports of the internal and external auditors and by the Panel's discussions with them.

Internal and external audit services to IWMI are provided by two well-known reputable firms of accountants. They indicated that IWMI has appropriate controls and procedures in place; CGIAR accounting standards are met; prompt attention is paid to their management reports and letters; appropriate audit plans are specified by the Institute; they regard their interaction with the Board as satisfactory; there are no legal issues facing IWMI; and that some inconsistencies in financial reporting from IWMI Pakistan to headquarters, that arose a few years ago due to differences in accounting practice, had been overcome.

The internal auditors noted that they are able to oversee only the expenditure side of projects vis-à-vis budgets. They find it difficult to oversee project deliverables (i.e., outputs) vis-à-vis project milestones. While this is an understandable difficulty in a research institution, the Panel feels that, as noted in Section 3.3, project management and monitoring might be facilitated if there were better-specified milestones against which research outputs could be monitored.

## **5.2 Human Resources Management**

### **5.2.1 Strategic Approach**

The selection, management and turnover of staff, especially researchers, has been a very significant factor in IWMI's transformation to a vibrant research institution since the DG took up his appointment in 1995. As a young visiting scholar said to the DG on her departure, "IWMI really rocks!"

The strategic approach to recruitment followed by the DG has been to select the best possible match of researchers and projects and, in his role as Director of Research, to interact regularly with staff on an individual basis, without losing sight of the Institute's goals. This approach is understandable given that, unlike in a manufacturing firm where the tasks are repetitive, a research organization—particularly one as small as IWMI—has to team researchers of widely different expertise to meet unique project research objectives and field situations. As IWMI and its Senior Management have demonstrated, the Institute's need for a highly formal bureaucratic framework has been less important than the ability to manage staff flexibly and be firm on the research goals set while inculcating a stimulating intellectual environment with a culture of collegiality.

The key to the flexibility in IWMI's management of its staffing needs lies in its personnel policies. These enabled the bringing in of a whole new set of internationally recruited scientists suited to the changed institutional needs. Significant too was the personal involvement of the DG in setting clear research objectives and expectations on the methodologies and outputs of each Programme, if not most of the important projects.

There was purposeful matching of individual research capabilities and institutional needs, better setting of project objectives, greater autonomy and support for the project leaders, and closer interaction among researchers in different Programme areas in a fluid matrix structure. IWMI has thus been successful in changing its portfolio of researchers and projects fairly fast since 1995 while producing some influential products and publications.

However, the danger in the repetitive use of such flexibility to adapt to changing institutional needs is the loss of organizational memory and learning, especially in the areas of management of research and of relationship with partner institutions. These are not embedded in the products or written in the project reports or publications of the Institute. Institutional memory in these areas of management becomes critical if IWMI wants to work with partners in spelling out its science or products on the ground or have them implemented in the field for demonstration and emulation. Only eight of IWMI's 26 internationally recruited staff members in 2000 were also there in 1996. The Panel suggests that IWMI needs to endeavour to ensure that its organizational memory is sustained. As well, recognizing the present DG's personal approach (as Director of Research) of an open, highly interactive and bureaucratically free style of research direction and management, care will need to be taken to ensure smooth transition as control moves to a new DG, as will soon occur.

The purposeful use of carefully selected consultant expertise (budgeted at US\$0.604 million for 2000) and the contracting out of specific research and other tasks (US\$0.970 million) have been a second important strategic element in IWMI's human resources management. While the use of consultants is not new to IWMI, their use has increased in recent years. In 1999 IWMI had 110 consultancy contracts, 46 of which were with international consultants and 64 with local consultants. The shortest was for three days. Only four exceeded 12 months. Most were in the range of 10 days to three months. Virtually all related to research.

A third element in the Institute's strategic approach to management of human resources has been the DG's desire to create a stimulating intellectual environment fostering good science in a collegial atmosphere. In this, he has been successful, in large part as a result of his frequent unscheduled discussions with staff about their research on a one-to-one basis. These visits are much appreciated by the scientists who find them stimulating and a tangible expression of interest in their work.

### **5.2.2 Staff Numbers and Turnover**

IWMI's staffing as at December 1999 is summarized by location, category and gender in Table 5.8. These data indicate: (1) that in terms of the number of people employed, though not of international scientists, IWMI Pakistan is similar to headquarters; (2) that national research staff constitute the major category of staff at IWMI Pakistan; (3) that the ratio of IWMI's international staff (including associate, seconded and postdoc staff) to its nationally recruited staff is 33:230 or 1 to 7; and (4) that the Institute's gender balance could be much improved. Gender balance as a goal, which was suggested by the 1994 EPMR, remains unfulfilled

IWMI is very conscious of its less than desirable gender balance and has made serious attempts to improve the situation. It has an affirmative action policy. A major difficulty is that few women are available as yet in many of the required areas of scientific



expertise. As well, there is difficulty in recruiting women (and also international staff generally) for IWMI Pakistan (whose gender balance, even so, is much better than is typical in comparable national institutions there).

Of IWMI's 33 international staff members (including six associates or secondees and one postdoc), nine come from The Netherlands, five from the USA, 13 from six other developed countries and only six from developing countries (India two, Sri Lanka two, Colombia one and Pakistan one), i.e., 27 from developed countries and only six from developing countries. Some stakeholders indicated to the Panel that they hoped this imbalance could be reduced.

Staff movements and turnover rates for the years 1995 to 1999 are shown in Table 5.9. Average turnover rates for IWMI as a whole over this five-year period for both international staff (22%) and national staff (20% at headquarters and 12% at IWMI Pakistan, 18 % in total) far exceed the respective rates of five per cent and eight per cent reported by the 1994 EPMR.

For national staff at headquarters, the increased turnover rate arose from the availability of a Voluntary Separation Scheme in 1997 and the closing down of a large project whose extension was not sought as it did not fit well with IWMI's new direction. At IWMI Pakistan, the fluctuation in national staff turnover rate (and arrivals) over the five-year period reflect the cessation (and start-up) of projects. The data of Table 5.9 thus reflect the fact that IWMI has a high degree of flexibility relative to its use of national research, management and support staff. They are appointed, depending on the Institute's needs, either on a regular (i.e., permanent) basis or on a contract (usually two years, renewable) basis. As at December 1999, of IWMI's 100 national staff members at headquarters, 22 were on contract; of the 124 national staff members in Pakistan, 92 were on contract (reflecting project-funding arrangements).

Table 5.8: IWMI's Staffing as at December 1999

Location	Category	Male	Female	Total
<b>Sri Lanka (HQ)</b>	Internationally Recruited Staff	20	2	22
	Associate Experts/Seconded Int. Staff	2	2	4
	Postdoc Scientists	0	0	0
	Nationally Recruited Staff - Research	12	2	14
	- Management	5	1	6
	- Support	50	30	80
	<b>Sub-Total</b>	<b>89</b>	<b>37</b>	<b>126</b>
<b>Pakistan</b>	Internationally Recruited Staff	1	0	1
	Associate Experts/Seconded Int. Staff	1	0	1
	Postdoc Scientists	1	0	1
	Nationally Recruited Staff - Research	61	9	70
	- Management	3	0	3
	- Support	46	2	48
	<b>Sub-Total</b>	<b>113</b>	<b>11</b>	<b>124</b>
<b>Mexico</b>	Internationally Recruited Staff	2	0	2
	Associate Experts/Seconded Int. Staff	1	0	1
	Postdoc Scientists	0	0	0
	Nationally Recruited Staff - Research	2	4	6
	- Management	0	0	0
	- Support	1	2	3
	<b>Sub-Total</b>	<b>6</b>	<b>6</b>	<b>12</b>
<b>West Africa</b>	International Staff	1	0	1
	<b>Sub-Total</b>	<b>1</b>	<b>0</b>	<b>1</b>
	<b>TOTAL</b>	<b>209</b>	<b>54</b>	<b>263</b>

Most of the increase in turnover of international staff relative to the pre-1995 period was purposeful. It reflects the change in IWMI's focus (with greater emphasis on research) and alignment of senior staff expertise with institutional needs. This was facilitated by IWMI's policy of appointing internationally recruited staff for two-year terms, with extension beyond a continuous term of 10 years subject to Board approval. The Institute was thus able to practically change its international staff almost entirely over the four years 1995 to 1998 with 24 leaving and 21 arriving. The turnover fell to 12% in 1999, which IWMI and the Panel hope is indicative of turnover rates in the future.

### **5.2.3 Staff Policies**

IWMI, in the Panel's judgement, has in place an appropriate set of comprehensive and well-articulated staff policies. These policies were revised in 1996 for international staff, in 1997 for national staff in Sri Lanka and in 1999 for national staff in Pakistan.

Salary-wise, IWMI's policy is to remain competitive so as to be able to attract and retain high-quality staff. To this end, periodic compensation surveys are conducted by independent agencies of the relevant markets for national and international staff. The salary and benefits package for international staff includes a housing and utilities allowance, health insurance, pension contribution, reimbursement of educational expenses of children up to 12<sup>th</sup> grade, a car for official and personal use, annual home-leave travel for self and family, annual medical exam expenses for self and family, and repatriation expenses on contract completion. For national staff, the benefits include superannuation contribution, medical care allowance for self and family, free transport-to-work facility or transport allowance, vehicle allowance for some professional and management staff, and personal accident insurance.

The 1994 EPMR was concerned that IWMI's overall compensation cost structure was high and its practices above the market at that time. The Panel does not consider that to be the case now. Based on its review of the current salary and benefit packages of staff and the recent compensation surveys of relevant comparators, the Panel agrees that IWMI should maintain its current policy of being competitive at the desired level in the various markets in which it needs to seek staff.

The Institute has a well-designed annual performance appraisal system for all staff and links salary increases to performance. Supervisors' appraisals of national staff, however, appear to be weak in discriminating between performance levels. The Panel suggests that an effort be made to ensure greater discrimination in the categorization of staff across the performance levels currently used in staff appraisal.

IWMI's training needs for its national staff, both scientific and support, are identified and both in-house and external training programmes are used to train staff.

**Table 5.9: Staff Movements and Turnover Rates, 1995-1999**

<b>Year</b>	<b>Departures during year</b>	<b>Total staff as at Jan. 1</b>	<b>Turnover %</b>	<b>Arrivals during year</b>	<b>Total staff as at Dec. 31</b>
<b>INTERNATIONALLY RECRUITED STAFF</b>					
<b>1995</b>	<b>7</b>	<b>25</b>	<b>28</b>	<b>3</b>	<b>21</b>
<b>1996</b>	<b>5</b>	<b>21</b>	<b>24</b>	<b>9</b>	<b>25</b>
<b>1997</b>	<b>6</b>	<b>26</b>	<b>23</b>	<b>4</b>	<b>24</b>
<b>1998</b>	<b>6</b>	<b>25</b>	<b>24</b>	<b>5</b>	<b>24</b>
<b>1999</b>	<b>3</b>	<b>25</b>	<b>12</b>	<b>4</b>	<b>26</b>
<b>NATIONAL STAFF AT HEADQUARTERS</b>					
<b>1995</b>	<b>35</b>	<b>209</b>	<b>17</b>	<b>22</b>	<b>196</b>
<b>1996</b>	<b>23</b>	<b>185</b>	<b>12</b>	<b>23</b>	<b>185</b>
<b>1997</b>	<b>60</b>	<b>190</b>	<b>32</b>	<b>11</b>	<b>141</b>
<b>1998</b>	<b>49</b>	<b>139</b>	<b>35</b>	<b>6</b>	<b>96</b>
<b>1999</b>	<b>3</b>	<b>100</b>	<b>3</b>	<b>3</b>	<b>100</b>
<b>NATIONAL STAFF AT IWMI PAKISTAN</b>					
<b>1995</b>	<b>0</b>	<b>42</b>	<b>0</b>	<b>45</b>	<b>97</b>
<b>1996</b>	<b>0</b>	<b>97</b>	<b>0</b>	<b>44</b>	<b>141</b>
<b>1997</b>	<b>0</b>	<b>141</b>	<b>0</b>	<b>1</b>	<b>142</b>
<b>1998</b>	<b>38</b>	<b>142</b>	<b>27</b>	<b>0</b>	<b>104</b>
<b>1999</b>	<b>33</b>	<b>104</b>	<b>32</b>	<b>40</b>	<b>111</b>

Both at IWMI's headquarters and at IWMI Pakistan, formal liaison between national staff and Senior Management is ensured by way of a committee. Headquarters has a National Staff Consultative Committee with 12 representatives from across the Institute. It is chaired by the DDG (Operations) and meets quarterly. In Pakistan, liaison

is through the Management Committee which is chaired by the Director, Pakistan and meets monthly. Its membership consists of six managers *ex officio* plus two junior staff representatives (one from research staff, one from support staff). The committees appear to serve satisfactorily as fora for information exchange, consultation and feedback on matters affecting national staff and the Institute. National staff representatives with whom the Panel met appeared satisfied with the Institute's policies and practices. The Panel felt that its interaction with the national staff representatives, both at headquarters and Pakistan, reflected cordial relationships with management and a good organizational climate.

Overall, the Panel found staff morale to be good and the Institute to be a happy place. In particular, there were no signs of any ongoing tension between research and administration. This speaks well for the staff (and other administrative) policies in place and for the fair and transparent way in which policies and procedures have been applied by Senior Management.

#### **5.2.4 Human Resources Administration**

Both at IWMI headquarters and IWMI Pakistan, there is a small nationally staffed administrative unit that handles staff matters. These units are responsible for the mechanics of recruitment, the implementation of personnel policies and procedures, the organization of staff performance appraisals, the maintenance of staff records, the induction of new staff, and the ensurance of liaison between Senior Management and staff, particularly national staff. The units play a lead role in the Institute's ongoing development of instruments (policies, appraisal procedures, etc.) pertinent to its human resources. The Panel found appropriate and well-articulated manuals and procedures to be in place. In the view of the Panel, IWMI is being served well by its human resources administrative units.

### **5.3 Research Support Services**

As well as administrative services in the areas of financial and human resources management as outlined above, IWMI provides operational services for research support at headquarters in the areas of:

- Computer services (acquiring hardware and software, maintaining the system and databases, and supporting the use of IT).
- Building and transport (housekeeping, maintenance of buildings and equipment, air-conditioners, generators, telecom, vehicles and drivers).
- Administration (purchasing, housing for international staff, and the contracting out of the cafeteria and security services).

A national staff member is in charge of each of these services and reports to the DDG (Operations). Job descriptions are clear and adequate controls are in place. The Panel's discussion with the officers in charge of these support services indicated good

appreciation of their roles. Discussions with research staff indicated general satisfaction with the services provided.

Support analogous to that listed above is also provided at IWMI Pakistan. There, too, researchers expressed satisfaction with the services provided.

In discussion at headquarters with staff members of one of the research Programmes, it emerged (to the surprise of management) that some national scientific staff felt that national administrative staff gave preferential attention to international staff. The Panel suggests that IWMI endeavour to ensure that national scientific staff do not perceive that international staff receive preferential attention in administrative matters.

Both at headquarters and at IWMI Pakistan, IWMI's level of Information Technology (IT) and its use appear to compare well with those in other CGIAR Centres. The Computer Services teams—four professionals at headquarters and three at IWMI Pakistan—are up to date. At headquarters, an IT Committee, consisting of the Manager, Computer Services, two researchers and the DDG (Operations) meets three times a year to assess needs. Most hardware requirements are met from unrestricted funds while specialized software requirements, such as for GIS, are met from project budgets. The IT services provided include local-area networking, E-mail, Internet services, a help desk, software library, and, as required, staff training. Similar services are provided at IWMI Pakistan with users in Lahore, Bahawalnager, Haroonabad, Quetta, Hyderabad and Sindh. IWMI decided to stay out of the CGNET arrangements for IVDN (Integrated Voice and Data Networking) because it considered the annual increase in costs of US\$100,000 outweighed the potential benefits.

## **5.4 Communications and Donor Relations**

The Head of Communications and Donor Relations is an internationally recruited staff member who joined IWMI only in October 1999. He reports to the DDG (Operations) and the DDG (Programmes) and is responsible for supervision of the library, the documentation centre, the publications unit and the project development service.

### **5.4.1 Library**

The 1994 EPMR commended the staff of the library for the services they provided for the scientific staff and other users interested in the topics covered under what was then IIMI's mandate. Since that time the library has expanded and now is considered to be one of the better libraries in the world that focuses exclusively on scientific research related to water management. It has also become recognized for its extensive collection of grey literature on water management and irrigation-related topics such as unpublished scientific and technical papers, as well as unpublished proceedings of technical conferences.

In the Panel's judgement, the library performs the functions expected of a modern research library and uses modern information technology for information development and delivery. In short, the library is performing effectively and provides the services that are generally expected of a library in the CGIAR System.

#### 5.4.2 Publications

The 1994 EPMR was critical of the Institute's publication programme. The main criticisms included the slow pace of reporting scientific output, the inadequate quality control of scientific publications and the somewhat confusing array of publications. The Review recommended that the Institute appoint an Editorial Committee and a Publications Review Subcommittee to manage IIMI's publications and ensure quality. (The EPMR also pointed out that clear information should be given to all professional staff that periodic publication in the monograph series, in addition to refereed journal articles, is a fundamental requirement in a CGIAR Centre.)

IWMI has undertaken vigorous steps to correct the deficiencies noted by the 1994 EPMR. These include the establishment of a Research Publications Committee chaired by the DG to oversee the publication programme. Senior management staff are members of the committee. The Institute's most important publication is IWMI's research report series published as monographs that are intended to keep the scientific community informed about the results of IWMI's research. The rate of publication of these monographs has risen from an average of less than one a year during 1984-93 to an average of more than 12 a year during 1995-99 (Between 1996 and 1999, the annual rate of these publications was 1996:9, 1997:9, 1998:17 and 1999:16, a total of 51 such publications). IWMI has also published eight SWIM papers. In addition, as is shown in Table 5.10, IWMI has published country and regional papers (124 during 1995-9) and a host of workshop proceedings, and working papers. The staff of IWMI have also published 91 articles in refereed international journals during 1995-99 and 33 articles in national journals and as chapters in books. IWMI's work has also been the subject of special issues of several scientific journals, notably a special double issue of the *International Journal of Water Resources Development* in March 1999 (that was coordinated by IWMI). The journal *Agriculture and Human Values* devoted a special issue to gender and irrigation in December 1998. This contained eight papers written for the Workshop on Women and Water that IWMI hosted in 1997. Also in press is a special issue of the *Journal of Hydrology* on evapotranspiration experimental work in Turkey.

The Panel notes a significant change in the mix of publications. The Research Publications Committee introduced a new quarterly newsletter targeted at a more popular readership that contains shortened versions of IWMI's research articles and achievements in applied research and institution-building. There are also other publications intended to keep policymakers, managers and the water community, in general, abreast of developments at IWMI and about the state of the art in water management. In addition, IWMI now publishes a series of its publications in Spanish (primarily for Latin America). All of the publications are free and are available via the Internet.

There is one general comment on the quality of IWMI's publications that may warrant consideration. There may be some advantage for IWMI in developing formats that have a consistent look and feel that immediately identifies them as IWMI's products. In this regard, IWMI could learn from the successful experiences of a very similar sized organization, CSIRO (Land & Water) in Australia.

IWMI now has a policy that calls for rigorous quality control of its scientific publications and has circulated a clear set of review procedures for research reports. The review process includes both internal and external professional review.

**Table 5.10: Number of IWMI Publications by Type of Publication and Staff Publications outside IWMI**

<b>Type of publication</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999*</b>	<b>Total, 1995-1999</b>
<i>IWMI</i>						
Research Reports	NA	9	9	17	16	51
SWIM Reports			1	4	3	8
Books	0	0	3	9	0	12
Workshop proceedings, and working papers	12	15	7	4	0	38
Country and regional papers	8	21	40	38	17	124
<i>Outside IWMI</i>						
Articles in refereed/international journals	10	6	26	26	23	91
Articles in other national journals; chapters in books	12	16	31	20	14	33
Books	2	6	4	1	2	15

\*To November 1999.

The staff has been encouraged to publish their findings in refereed international journals and national journals as well as chapters in books. However, in order to avoid any semblance of censorship, articles for publication in refereed journals are not reviewed in-house nor are they cleared by the Publications Committee. IWMI may wish to reconsider this approach as some external reviewers take a negative view of submissions that have not been peer reviewed by the host institution.

The Panel is impressed by the number and general quality of IWMI's scientific publications and commends IWMI for its vigorous implementation of the recommendations on publication of the 1994 EPMR.



### **5.4.3 Donor Relations, Fund Raising and Project Development**

An important change in the role of the communications unit since the 1994 EPMR is the added responsibility for donor relations and fund raising. This added responsibility has come about not only because of the slow increase in funds available for the CGIAR System as a whole and the increased competition for these funds among the Centres, but also because IWMI perceived that it was desirable and would be efficacious to take a more focused approach to stakeholder (particularly donor) relations than hitherto. Such an approach also recognizes the fact that IWMI has been encouraged to be more vigorous in its efforts to raise research funds.

One of the innovations introduced was to employ an internationally recruited Project Development Officer. This was deemed to be necessary to free senior staff from the time-consuming task of preparing proposals for funding. As discussed in Section 3.2.2, this arrangement has worked well from this standpoint with the researchers reporting that they are able to devote more time to their principal activities. The Project Development Officer is also assigned the valuable task of keeping researchers informed about the interests and needs of donors and the opportunities that are available for funding. The Panel welcomes this effort and suggests that the Institute should closely monitor its effectiveness.

The Head of Communications and Donor Relations, though in office as yet for a short period, is developing a strategy for establishing appropriate relations with potential donors, inside and outside the CGIAR System and both in the public and private sectors. The Panel notes three points that may be relevant to this task.

A first point is that there is a great deal of experience available about fund-raising that can be tapped to the advantage of IWMI. In this regard, the Head of Communications and Donor Relations is a member of the CGIAR Resource Mobilization Network where he shares information regularly with colleagues in other Centres about topics of mutual interest. This information is also shared with Future Harvest, an organization set up by the Centre Directors of the CGIAR System to raise awareness among the international community at large, including donors, about the significance of international agricultural research in meeting global food needs. This networking is to be encouraged. However, there are literally thousands of NGOs of all kinds and sizes outside of the CGIAR System who are attempting to raise funds to support worthwhile causes in their home countries and abroad. It is to be hoped that IWMI will take the opportunity to capitalize on the expertise of some of these fund-raisers with their extensive experience. This might be done through the good offices of Future Harvest or through direct contacts with these organizations.

A second point is that fund-raising is time consuming and requires the involvement of the DG and/or senior staff. There seems to be an impression that appointing a fund-raiser relieves the senior staff of their involvement in what many consider to be a somewhat distasteful activity. Experience elsewhere contradicts this; like it or not, the DG has to be heavily involved as many donors prefer to deal with the

DG directly rather than other staff members. This point has been recognized in the job description for the incoming DG and he or she needs to take it into account when defining his or her own role.

The third point is that success in selling your message necessitates having a clear message and having a defined target. Each of these elements needs to be well specified for communication to be successful. In particular, having a clear message implies ongoing awareness by the communications unit of the passing of research milestones and of successful research outputs and impacts.

## CHAPTER 6 - OVERALL ASSESSMENT

### 6.1 IWMI's Major Transformation Towards a New and Clearer Identity

Since the last External Review in 1994, IWMI has undergone a profound transformation. This was done in response to the Review's recommendations and suggestions, but also in response to a better understanding of the challenges posed by increasing water scarcity. IWMI's own work has made a significant contribution to that understanding. Consequently, the most recent statement of IWMI's mission is that "IWMI will 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." In line with this broadening, IWMI expanded the scope of its research and initiated a major shift in its focus. The Institute adopted a new global approach, the so-called "IWMI paradigm," and a new name intended to reflect the new focus of analyzing irrigation within an integrated water resources management and river basin perspective.

IWMI's overarching goal is now articulated more explicitly than before, namely, finding ways to have a sustained increase in the productivity of agricultural water, i.e., "more crop per drop." Indeed, IWMI holds that raising the productivity of water is a necessary precondition for meeting the increasing demands for water while maintaining food security, reducing poverty and conserving natural resources. Taken together, these important changes in mission, name, paradigm and goal focus have set the stage for changes in IWMI's research portfolio and staff profile.

There is no doubt that over the last six years IWMI has transformed itself from an institution focussing on irrigation management and involved in a combination of research and technical assistance activities to a much more research-oriented institution. For instance, work on improving irrigation management has decreased; the focus has shifted from developing irrigation performance indicators *per se* to water productivity as a major indicator of performance within the context of a river basin approach. A completely new programme on health and the environment has been established, providing IWMI an opportunity to examine multiple water use issues in a river basin context and to assess potential trade-offs between agricultural productivity, human health and the environment. A purposeful and significant turnover of scientific staff during the same period has made these rapid changes possible.

The transformation that has taken place is reflected in the change in the quantity and quality of IWMI's research publications. The most important of these publications are IWMI's own series of monographs intended to inform the scientific community about the results of its research. The scope of these reports has broadened and their quality has improved with the introduction of a rigorous system of internal and external peer review. In addition, the flow of reports has risen from an average of one per year between 1984 and 1993 to an average of 12 per year over the past four years. The number of other peer-reviewed publications has also increased several fold.

As a result of these changes, IWMI's own identity is now well established. It has found a niche for itself, focussing its research on the link between water management and food security and becoming a strong voice on the urgency of these issues. That voice is heard

in the international community dealing with global water issues and in many governments including those of several large countries faced with serious water management problems.

The Panel has taken note of IWMI's growth and its steadily expanding mandate. In principle the Panel endorses the holistic nature of IWMI's new approach. However, in adopting this approach, the Panel recognizes that IWMI will face a wider range of possible research topics than hitherto at a time when financial resources will continue to be constrained. Consequently, it will be important that due attention be given to establishing and articulating a clear set of priorities for allocating available financial resources and for seeking additional resources.

## **6.2 Achievements Have Been Significant**

The Panel was pleased with the very significant achievements of IWMI since the last EPMR. As discussed in detail in chapter 2, significant research results include a better evaluation of the dimensions of the global water scarcity problem; a new "paradigm" on an integrated, holistic approach to water management; new methodologies of water accounting, promising new insights on the relationships between water management and poverty, gender and health; as well as more informed views of the preconditions for successful institutional reform in the irrigation sector and for the use of market mechanisms as a tool to ensure better water resources management.

This increased productivity of the Institute as a research organization could not have been achieved without a profound change in the institutional culture. Thanks in large measure to the dynamic leadership of the Director General, ably assisted by his senior management team, and his personal involvement in all key aspects of the life of the institution, the status of science within the organization has been greatly enhanced and research support services are indeed exactly what they are called: they very effectively support research and are provided as services. Considerable teamwork is evident in many parts of the organization, particularly among the headquarters staff. Morale is high in all categories of staff interviewed by the Panel.

Multiple partnerships have been developed by the Institute. Practically all activities, be they research, policy dialogue, dissemination, training or capacity building, involve several diverse partners. On the whole, the Panel was pleased to note, these partners spoke highly of IWMI for the quality and the spirit of these partnerships, immune from any sign of arrogant or condescending attitude. The Panel noted, however, that in several instances national officials did not feel a strong sense of ownership of the, supposedly joint, activities undertaken by IWMI, even in collaboration with national partners, in their country. In several cases, a national Steering Committee, or the equivalent, is supposed to ensure that such activities are truly joint. Obviously, this role has not been satisfactorily fulfilled. The Panel advises IWMI to look into this matter, recognizing that this needs to be done on a case-by-case basis and that the Panel was not in a position to analyze each case thoroughly enough to make a more precise recommendation.

On partnerships within the CGIARIAR, the Panel did not identify any glaring difficulty but was dismayed to hear, from several and diverse sources at IWMI and from other Centres, enough anecdotal evidence to suggest that the competition among Centres is a major impediment to collaboration. The Panel wants to emphasize on this point that IWMI

should not be particularly blamed for this undesirable state of affairs. The issue is a systemic one for the CGIAR as a whole.

On capacity-building, the Panel essentially shares the views expressed in a recent report prepared by a consultant commissioned by IWMI<sup>1</sup>, i.e., that IWMI has done a great deal in training and capacity building but that it should formalise some of its policies (e.g., for supporting students) and that it should develop long-term relationships with some universities. The report also recommended a cautious approach to expanding in-house capacity for training, such as creating a special training unit, until such time as the demand warrants it and funding is secure.

### **6.3 Remaining Weaknesses and Future Challenges**

Given the importance and the breadth of IWMI's mission and the existence of severe resource constraints (which will remain so even under the most optimistic scenario), setting clear priorities in order to sharply focus research on the most critical issues within a global framework is essential. In this regard, the Panel believes that the Institute would benefit from a clearer and more precise formulation of its strategy than that expressed in the January 2000 "final draft" of its Strategic Plan. IWMI would benefit from a clearly articulated strategy developed in conjunction with its stakeholders of what it wants to do. Such a strategy could then be truly shared within the Institute, and guide everybody's action, as well as with IWMI's partners and stakeholders who would have more precise perceptions of what they can expect from the Institute. Similarly, the Panel has recommended that IWMI adopt more formal procedures for priority setting and for impact assessment. The Panel recognizes that impact assessment is not easy, particularly for a research centre like IWMI, which conducts research on resource management issues. Nevertheless, given the current culture of the CGIAR with its strong emphasis on demonstrating the linkage between research and successful development efforts, systematic impact assessment has become a must.

Finally, the Panel has suggested possible improvements in the research management information system, recognizing the individual project level, not the MTP aggregates, as the key unit of management. In passing that judgement, the Panel is keenly aware of the existence of important trade-offs between the flexibility and nimbleness permitted by the existing, often informal, arrangements and the advantages of more formal and transparent procedures. Introducing too much rigidity and bureaucratic constraints would be bad as it could destroy the very qualities for which the Panel has commended IWMI. Resolving that typical contradiction is a matter of judgement, since obviously there is always a fine line between too much informality and too much bureaucracy.

In the same spirit, the Panel believes that the Board would greatly benefit from more rigorously following generally accepted rules and procedures to conduct its business. Here again there are trade-offs between informality, which has probably enhanced the positive values of the institutional culture alluded to above, and a greater degree of discipline. It is the Panel's judgement, however, that time has come to run a "tighter ship," with clearer delineation of responsibilities between Board and Management. The essential role of the Board as trustees to exercise due diligence is essential to sustain the confidence of the stakeholders of the Institute, particularly those who provide it with financial support.

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<sup>1</sup>Burton, M. A. *IWMI's Strategy for Training and Capacity Building*, February 2000.

A continuing challenge for the Research Programme will be the full integration of research activities conducted in “national programmes” into IWMI’s “global research programmes.” Much progress has been accomplished on this front since the 1994 EPMR. But the integration, particularly in the case of the Pakistan Programme, is not complete. This raises the question of the future of that national programme. The Panel is conscious of the special agreement with the Government of Pakistan, which has existed since the Institute was established. The Panel also recognizes the importance of irrigation, and more broadly water management, in that country. IWMI can both contribute to and learn from the Pakistan National Programme, as it has done from the very beginning. But the Panel would be remiss if it did not call the attention of all the parties and stakeholders to the fact that this national programme consumes a significant share of the untied resources of IWMI and that, in due time, that share may have to be reduced. To facilitate such a change, if and when it would appear to be desirable, IWMI might consider making a clearer distinction in its activities, and in the way they are managed and funded, between those which are justified on global research grounds and those which serve a national purpose.

For the future, it is important that IWMI keeps its identity as an excellent science-based organization, focussed on the complex interrelationships among the technical, social, institutional and policy dimensions of the constraints hindering better water resources management. IWMI must continue to focus on the critical issues involved, and these must be sharply defined and specified, bearing in mind that this identification of the critical issues must be periodically reviewed. In doing so, IWMI will be well served by its holistic, comprehensive approach to water resources management. In that approach, the Panel believes, poverty concerns, particularly those regarding food security, gender and access to water, should and will continue to occupy centre stage. Inevitably, systematic attention will need to be given to environmental problems and the urgency of groundwater depletion and degradation.

Given the essential role that irrigation is expected to play in future food production, water resources management in and for agriculture will and should continue to receive the bulk of the attention of the Institute. As a result, the Health and Environment Programme should not utilise a greater share of IWMI’s resources than it does at present. Yet, the Panel believes that such a Programme is fully justified. This apparent contradiction reflects both the urgency of the issues resulting from growing water scarcity and the limitations of the traditional sectoral approaches to water issues.

In this context, the Panel is surprised that donors have not been more forthcoming and that IWMI has not been able to raise the US\$11 million per year *de facto* recommended by TAC. The Panel believes that IWMI could effectively put to good use a higher level of funding and provide good value for money. This being said, the Panel has not been convinced that the current draft of the Strategy document provides sufficient justification for a US\$5 million increase in IWMI’s annual budget in the near term.

In addition to funding uncertainties, the Institute must also monitor closely the institutional risks associated with a likely reform of the CGIAR in the years to come. On this point, the Panel believes that the logic of preserving the clear identity of the Institute as a key resource management research institution is unassailable. Much of the progress of the last six years could be lost otherwise.

In summary, the Panel believes that the importance of water for ensuring the increase in food production required by a growing population, with rising income, is self-evident. In addition, the equitable distribution of the benefits of that growth will depend on the conditions under which the poor will have access to water. Also, given the increasing relative scarcity of water, the world community will focus increasing attention on what people and nations do with their water. In this context, the Panel is pleased to report that IWMI is now well positioned to exert strong leadership in the provision of science-based solutions for the efficient and equitable management of water resources for the benefit of present and future generations.

## ACKNOWLEDGEMENTS

The EPMR Panel expresses its sincere appreciation to the Board, Senior Management and all staff of IWMI for their support and assistance during this review. In particular, the Panel wishes to thank David Seckler, Director General, David Governey, Deputy Director General (Operations), Doug Merrey, Deputy Director General (Programmes), Sanmugam Prathapar, Director of IWMI Pakistan and other members of the management staff, all of whom cooperated fully with the Panel in the organization and implementation of this EPMR. They deserve our special thanks for ensuring that the Panel was provided with a good working environment, effective secretarial and technical support, and wonderful hospitality. The Panel is also grateful to the Chair and members of the Board of Governors for their help and support.

The Panel was fortunate to visit several of IWMI's country programmes—in Sri Lanka, Pakistan, India, Mexico and South Africa—and wishes to express its gratitude for all the support, information and hospitality provided by IWMI's outreach staff and the Institutes' collaborators in the respective government agencies, universities and NARS. Special thanks go to Sanmugam Prathapar, Ramasamy Sakthivadivel, Chris Scott, and Marna de Lange for their help in organizing and hosting Panel visits to those countries.

There are a number of other IWMI staff who either directly or indirectly helped the Panel by providing the necessary logistical, computing, printing, and other support. They are many indeed; but we especially want to mention the tremendous help the Panel received from David Governey's efficient and well-managed team, in particular, Shanti Weerasesera, Operations Coordinator and Asst. Secretary to the Board, David van Eyck, Travel/Conferences Administrative Officer, Erhard Haniffa, Systems Administrator, A.D. Ranjit, Data Assistant/Office Aide, and Mahinda Karandawatte, and Y.K.G. Costa, IWMI Drivers.

The Panel was fortunate to have Ann Drummond of the TAC Secretariat assisting in the word-processing and preparation of this Report, in addition to handling a number of other report-related tasks. She was ably assisted by Veronica Lumanauw, IWMI Secretary. Both worked extremely hard and put in many long hours to help the Panel complete its report, for which they are sincerely grateful. Their calm and pleasant manner were both a boon and a great example to the Panel

It is the Panel's pleasure to also thank the TAC Secretariat (particularly Tim Kelley who accompanied the Panel throughout) and the CGIAR Secretariat (particularly Selçuk Özgediz who joined the review team for five days) for the coordination and management of this review and for guidance throughout. In particular, the Panel thanks Irmi Braun-Castaldi from the TAC Secretariat for making travel and administrative arrangements during the Initial and Main Phases of the review.



## WATER AND AGRICULTURE<sup>1</sup>

### I. The Supply of Water

1. Water, the lifeblood of the biosphere, is essential for all forms of life. The greatest quantity of this resource (97%) exists in the oceans; the second largest amount (around 2%) exists as ice and snow in the Polar Regions and only around 1% of the total water supply is fresh water. This supply of water consists of relatively small amounts of non-renewable water in deep aquifers along with supplies that are continuously replenished by natural processes.

2. **Water is a renewable resource.** Each year the sun's energy evaporates some 500,000 cubic kilometres of water, mostly from the oceans, that enter into the atmosphere and then fall back on the globe as rain, sleet or snow. This process transfers an estimated 40,000 cubic kilometres a year of water from the oceans to land. After falling to the earth, this water is recycled. Most of it returns to the atmosphere as it evaporates from moist surfaces and water bodies, or it returns to the atmosphere through the process of evapotranspiration (i.e., the loss of water from the soil both by evaporation and by transpiration from the plant life growing thereon). The remaining water seeps into the soil and replenishes subsurface aquifers with much of it eventually finding its way into the rivers, lakes and to the sea and so back into the hydrological cycle. Part of this process may be rapid or slow and involves both intra- and inter-seasonal variations in rainfall. In addition, activities such as large-scale deforestation can have some effect on the rate of evapotranspiration and so a marginal impact on the hydrological cycle. Nonetheless, it is generally accepted that the annual average supply of fresh water does not vary much over a decade or more.

3. **The supply of water is finite.** Most climatologists and hydrologists agree that there is no natural process, short of climate change, that can increase the world's fresh water supply. If global temperatures were to rise sufficiently on a sustained basis, then, all other things being equal, there could be an increase in the evaporation of water from both land and water surfaces. The greater the warming, the larger the expected increase in precipitation. One simple level of analysis suggests that a global warming of about 3.0 degrees Celsius would well lead to an increase in evaporation of about 10% and to an increase in average global precipitation of around 10%. The timing, duration and distribution of rainfall, though, would probably be unevenly distributed with the biggest increases being at high latitudes and lower increases being closer to the equator.

4. There is a great deal of uncertainty about whether global warming and the build-up of carbon dioxide in the atmosphere is *accelerating*, and about the complex interactions between rising temperature, changes in climate and changes in rainfall. However, all the available evidence points to a slow increase in global temperature (1°C over the past 50 years). With such a slow rate of increase it seems highly improbable that there will be any

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<sup>1</sup> This annex was drafted by M. Yudelman to provide background for the Panel, who endorsed the general thrust of its contents.

significant changes in the total supply of fresh water through global warming within the next several decades.

5. There are manmade processes for increasing the supply of fresh water. These include the conversion of saline, ocean water into fresh water through desalination. Thus far, however, the processes available for this purpose are costly; the plants presently in operation are mostly in the “oil-rich, water poor” nations of the Persian Gulf. In the early 1990s, there were an estimated 7,500 desalting plants operating worldwide, but together they only produced one-tenth of one percent (0.11%) of the world’s usable supply of fresh water (with most of this being to provide potable water). Without substantial progress in lowering costs, which are currently estimated to be 10 to 20 times the amount that farmers are paying for irrigation water, salinization will have little effect on increasing the total supply of fresh water in the world.

6. The supply of fresh water is adequate to provide an average of more than 6,000 cubic metres per capita for the six billion people on the earth. This is well in excess of the per capita requirement of 2,000 cubic metres per annum that is widely used as a crude yardstick of a supply that can meet a population’s needs for all purposes. Clearly, too, there is water enough to meet the needs of a doubling of the world’s population—an event which is most unlikely to occur in the first half of this century. The average per capita supply of water, though, is predicated on an even spread of both water and population. Unfortunately, this is not the case.

7. **The global supply of water is unevenly distributed relative to the world’s population.** Natural environmental conditions determine the amount of renewable fresh water that passes through the aquifers and rivers of different regions and countries (though national supplies may be augmented by exogenous supplies carried into a region by transnational rivers and aquifers). The world’s population, though, is unevenly distributed relative to the water supply; as a result per capita supplies vary greatly among nations and regions.

There are already a number of nations primarily in West Asia and North Africa that suffer from “water scarcity” or “water stress.” With increasing populations and a finite supply of renewable water it is projected that by 2025 all of North Africa and western Asia (except for Turkey) will experience the “highest levels of water scarcity.” In addition, many countries in sub-Saharan Africa and parts of South Asia with their rapidly increasing populations are also expected to become “water stressed” by 2025.

8. Only part of the total renewable supply of fresh water, estimated to be anywhere between one-third and one-half, is used or is deemed to be potentially usable under current economic conditions. Most of the remaining water is inaccessible or too costly to develop and runs into the ocean or into sinks. In many areas, future requirements for water will necessitate large investments to make additional supplies of water available for use in all sectors of the global economy, but more particularly for irrigation.

9. The International Water Management Institute (IWMI) has undertaken a series of analyses of the availability and utilization of water required to meet the needs and demands of a number of nations. The most recent of these analyses cover 45 countries, representing 85% of the world’s population and covers the period 1995-2025. The analysis, which utilizes the Institute’s own PODIUM model and IFPRI’s IMPACT model,

attempts to assess water needs in relation to food supply and projected demand by 2025. This study which represents the state of the art in studies of this kind acknowledges some serious data problems and makes some very large assumptions (including assumptions about future patterns of consumption and yields). This study breaks the 45 countries into three basic categories of water scarcity: In IWMI's own words:

**Group I** consists of countries that face *physical water scarcity* in 2025. This means that, even with highest feasible efficiency and productivity of water use, these countries do *not have sufficient water resources* to meet their agricultural, domestic, industrial and environmental needs in 2025. Indeed, many of these countries cannot even meet their present needs. The only options available for these countries is to invest in expensive desalinization plants and/or reduce the amount of water used in agriculture, transfer it to the other sectors, and import more food. The 11 countries in this group are primarily in West Asia and North Africa.

**Group II** represents countries that do have sufficient water resources to meet 2025 needs but which will have to increase water supplies through additional storage, conveyance and regulation systems by an estimated 25% or more over 1995 levels to meet their 2025 needs. Many of these countries face severe *financial and development capacity* problems in meeting their water needs. The 14 countries in this group include Brazil, Mexico, Philippines, Thailand, Nigeria, Bangladesh, Sudan, and Vietnam.

**Group III** consists of countries that will need to develop less than 25% more water supplies to meet their 2025 needs. In most cases, this will not pose a substantial problem for them. In fact, several countries in this group could actually decrease their 2025 water supplies from 1995 levels because of increased water productivity. The 18 countries in this group are mostly in Europe and North America, though they include Japan and Indonesia.

The PODIUM model operates at the country level. Therefore, it generally ignores the substantial differences in water scarcity within countries, at the levels of regions or river basins. For example, about one-half of the population of China lives in the wet region of southern China, mainly in the Yangtse basin, while the other one-half of the population is in the arid north-west and south-east. Much the same is true of many other countries.

Including one-half of the population of India and China in each of Group I or II, it is estimated that by 2025:

- (a) 33% of the population of the 45 countries will be in Group I with physical water scarcity.
- (b) 45% of the population will live in countries with substantially underdeveloped water resources, requiring 25% or more development of additional water supplies.
- (c) 22% of the population will live in countries, mainly developed countries, with little or no water scarcity.

10. The Institute's current and ongoing research and analysis is more than adequate to emphasize the point that the world is entering the 21<sup>st</sup> century at a time when water scarcity, relative to need, is already a major constraint in large parts of the world and will

become even more of a constraint over the next several decades. In this context, it is widely recognized, as IWMI emphasizes, that the irrigated sector is the largest user of water (70%), especially in developing countries, and that, in the process of development, the irrigated sector will have to give up some water for non-agricultural uses. At the same time, though, the irrigated sector will be expected to be the main source of future increases in supply of food and agricultural products for an increasing population (with rising per capita incomes). Indeed, IWMI's analysis estimates that the *gross irrigated* area should be increased by 31% from 1995 to 2025 to meet future demand; half of the increase can be achieved by raising the productivity of water on existing irrigated area with the remaining half coming from the development of new areas. Thus, in the years ahead, *the* major challenge will be to develop additional water resources (as yet untapped) for use by the agricultural sector and, most importantly, to utilize available resources more productively than in the past so as to “get more crop per drop” than hitherto.

## II. The Role of Irrigation in Agricultural Development

12. During the second half of the 20<sup>th</sup> century, irrigation has been a major factor in increasing the food and fibre supply for a global population that more than doubled, rising from 2.5 billion people to over 6 billion people. The increased food supply exceeded population growth throughout the period with the exception of several years in the 1960s when cutbacks in production in the West coincided with massive crop failures in South Asia. Apart from this brief interregnum, the overall increase in per capita output of food has led to a steady downward trend in international prices of grains, most notably rice and wheat. This downward trend in the price of these basic food staples has contributed substantially to raising the real incomes of billions of low-income consumers in developing countries, many of whom are urban dwellers. (It should be noted, though, that it is possible that some of the increased production has been at the cost of depleting natural resources and that the total cost, including the replacement of natural resource assets is not factored into the cost/price nexus of the commodity.)

Despite the great success in increasing the global supply of food stuffs, especially food grains, there are still large areas of the world where per capita output is lagging. The most significant of these lagging regions is sub-Saharan Africa and parts of western Asia. In sub-Saharan Africa, population growth rates are declining but are still higher than in most regions in the world. Agricultural production, though, is increasing at a slow rate, if at all, and food imports are growing as are the numbers of undernourished. According to FAO, there are still more than 800 million people—or 20% of the population of the developing countries—who lack adequate access to food. Sixty percent of this undernourished population lives in Asia; however, while the proportion of undernourished in Asia is declining, this is not the case in sub-Saharan Africa where both the number and proportion of the population that is undernourished are on an upward trend. In general, hunger and malnutrition persist not necessarily because of inadequate food availability, but mostly because poor people cannot afford to buy all the food they need and in the rural areas they do not have the means to produce it for themselves.

13. The increase in per capita output that has taken place came about from a combination of a significant drop in population growth rates and a steady increase in food production. Global population growth rates declined from a peak of 2.6% per annum in the early 1970s to around 1.4% at the end of the century (and from close to 3% in

developing countries as a whole to around 1.7% in the same period). Population growth rates have fallen for many reasons, not the least important being changes in socioeconomic conditions that have increased educational and employment opportunities for women, with a resulting fall in fertility levels and the average size of families. During the same period, agricultural output in developing countries—most notably in Asia and Latin—rose by an annual average of more than 2.5% per year.

14. The increase in food supplies was made possible by a qualitative shift in the sources of growth of output. Prior to the 1960s, almost all of the increases in food production in developing countries came from expanding the area under production. The main inputs were land and labour; since the 1960s, though, most of the increases in output have come from increased yields per unit of land, e.g., in India during 1961-63 grain yields averaged 0.95 tons per hectare, some 30 years later during 1991-93 average yields were 1.98 tons per hectare. This doubling of yields represented an average growth rate of 2.1 percent a year and was achieved on around 100 million hectares of land, about half of which came under irrigation in this period. Without the yield increases, 200 million additional hectares of land would have been required to produce the same amount of grain.

15. All in all, it has been estimated by the World Bank that more than 80% of the increase in food supplies in developing countries over the past 50 years has come from increasing yields per unit of land. These increases were made possible by the introduction and spread of new, high-yielding varieties of grain—primarily rice and wheat—which gave much higher yields than traditional varieties when used with adequate supplies of water and plant nutrients. Water and plant nutrients were symbiotic components or joint inputs in production that gave higher yields and became the basis of the ‘Green Revolution’.

16. The prospect of high returns led to a substantial increase in the inputs needed to raise yields. The most important of these inputs were irrigation and non-organic (largely chemical) fertilizers. There was a massive increase in investment by both the public and private sectors in irrigation. Institutions such as the World Bank increased their loans for irrigation as did many bilateral aid programs. Public sector investments in expanding surface irrigation rose as governments made expanding irrigation an important tenet of their strategies for agricultural development. Private investments in pumps and shallow wells ballooned as part of a “pump revolution” that tapped available groundwater to expand and increase both areas under cultivation and yields. Irrigated land area in the developing countries as a whole rose by as much as 4% a year in the 1960s and 70s before slowing down to 2% a year in the 80s and 90s. Between 1960 and the early 1990s, the area under irrigation in developing countries rose from 80 million hectares to 180 million hectares. Most of the increase was in Asia, especially in China and India, the two most populous countries in the world. By the early 1990s, 90 million hectares, comprising almost half of the arable land in these two countries, was irrigated. There was also a large expansion in irrigated area in Indonesia, Pakistan, and Bangladesh where, as in India, the rapid spread of private sector investments in shallow tube wells led to a sharp increase in food production in the “dry season” before the onset of the monsoon rains. The slowest expansion in irrigation was in sub-Saharan Africa where, in contrast to India and China, less than 10% of the arable land is irrigated, mostly in the Sudan and Madagascar. This low level of irrigation in sub-Saharan Africa helps explain why sub-Saharan African agriculture has lagged behind the growth in the other developing parts of the world.

17. There was also a rapid increase in the use of non-organic fertilizer on irrigated land to provide the major plant nutrients—nitrogen, potash, and phosphates—required to enable crops to flourish. Historically, organic supplies of these nutrients were adequate to sustain a low level of agricultural output without serious soil depletion and mining of soils. The introduction and spread of high-yielding varieties in irrigated areas, however, required more nutrients than could be provided organically; mineral fertilizers were introduced to supplement organic nutrients. Between 1950 and 1960, prior to the Green Revolution, the developing countries as a whole used less than three million tons of fertilizer nutrients—most of it on export crops. Between 1960 and 1997, the spread of high-yielding varieties of grains and the expansion of irrigation accelerated the rate of fertilizer use in developing countries by as much as 10.5% a year; the developing countries' share of the total global market for fertilizer rose from 10% in 1959/60 to more than 60% of a much larger market in 1996/97. East Asia with its large irrigated land area devoted to food crops accounted for more than 55% of the fertilizer used in developing countries while sub-Saharan Africa with its small-irrigated land area (despite appreciable annual growth) accounted for less than 1% of the global fertilizer use.

18. The irrigated sector now performs an essential task in meeting the basic food needs of billions of people in the developing countries. It provides the water for more than half of the output of the two most important basic staples and for close to a third of all food crops produced in the tropics. On a regional basis, it is estimated that around 60% of the value of crop production in Asia is grown on irrigated land. This includes around 80% of Pakistan's food, 70% of China's and more than 50% of India's and Indonesia's food. In West Asia and North Africa, more than one-third of the region's crop production, by value, is irrigated, including almost all the food grown in Egypt and more than half of that grown in Iraq and Iran. A relatively small proportion of agricultural production in Latin America, around 10%, is grown under irrigation, but more than half of all the production of crops grown for export in Chile and Peru are irrigated. Sub-Saharan Africa, with the smallest regional area under irrigation, produces an estimated 9% of its total food production on irrigated land.

19. The substantial investments, estimated to be anywhere from US\$300 to US\$400 billion, made in expanding irrigation in developing countries over the past half century has been very significant in increasing food supplies through the use of available water. Much of the food consumed by the more than two billion or more people added to the populations of developing countries during this period has been grown on these irrigated lands. However, the past rapid increases in expanding irrigated agriculture have also brought problems in their wake that have contributed to a substantial slowing down in the rate of expansion of irrigation, especially from large scale public sector works.

20. The slowing down in investment in large-scale public sector surface irrigation is due *inter alia* to the disappointment from the returns on many earlier investments and the poor record of their performance. In a number of instances, poor project preparation based on inadequate data about available water supplies led to expectations that could not be met. Problems of implementation of many investments included poor management of systems, including a neglect of maintenance, wasteful use of water that is grossly under-priced, increases in irrigation-induced resource degradation including the loss of land from salinization and waterlogging and the depletion of underground water resources. In addition, there were concerns about safeguarding the rights of those displaced by reservoirs and the equity of water distribution from new schemes.

21. Changing economic conditions have also discouraged public sector investment in expanding irrigation. Many of the low-cost opportunities for constructing reservoirs and conveyances have been exploited and the costs of developing new sites and of transporting water have risen. At the same time, commodity prices have continued their long and steady decline. Rising costs and low prices have made new investment unattractive. As a result of the problems of poor implementation and potentially low returns from new investments, the current investment strategy as advocated by institutions such as the World Bank is not so much to expand irrigation through new works but to improve the operation and maintenance of existing works so as to be able to get greater returns from past investments.

### III. Looking Ahead

22. A number of recent studies confirm that there will be a need for a substantial increase in food production in the developing countries over the next 20 to 25 years to meet the food security needs for the increased populations of Asia, Africa, and Latin America (where population is expected to rise from 4 to 6 billion between 2000 and 2025). The circumstances governing food production and prospects for increasing production in these regions vary greatly. In the main, though, as is emphasized by all these studies, most of the increased food supply will have to continue to come from a further intensification of production. This applies with special force to Asia and to a somewhat lesser extent to parts of Africa and Latin America. In all these regions, there are still opportunities to expand the areas under crop production. However, the growth of urbanization and non-agricultural development is taking land out of agricultural production and the prospects for bringing new land areas under production in many parts of the tropics are constrained. There are concerns that unrestrained expansion could push the frontiers of crop production into ecologically fragile areas, including biodiverse forest area, with a high risk of long-term damage to the natural resource base of the environment. The average yields of rice, still by far the most widely grown and consumed product in all developing countries (and also the most intensive water-using crop) will have to rise by around one-third to satisfy the demands of populations growing by 1% a year. The magnitude of this task can be highlighted by recognizing that average yields of rice in the developing countries would then be approaching those in modern-day Japan, where rice is grown under intensive management and where there is an agricultural support system that is unmatched in any developing country.

23. There are prospects for new technologies, such as genetically engineered transgenic plants, being introduced in the tropics in the not too distant future. These plants may well have superior attributes such as high resistance to pests or greater salt-tolerance enabling them to grow using previously unusable brackish water. However, there are still many questions about whether these new technologies will be a *major* factor in increasing agricultural output in most developing countries. Strategies for increasing yields will have to continue to rely, in good measure, on enhancing and improving the technologies that have been so successful in the past several decades—improved varieties of plants, increased and improved plant nutrients and adequate supplies of water coupled with skilled and informed management.

23a. The increasing competition for water will make it important that more emphasis be given to raising the productivity of water used in irrigated agriculture. This will require action on many fronts, including water management and agronomic practices. Improving water management could well involve a range of actions from better operations and management of systems to ensure reliable and timely supplies of water to adopting irrigation strategies that utilize deficit, supplemental and precision irrigation. These improvements can help raise the productivity per unit of water consumed by reducing plant stress during critical crop growth and by reducing the non-beneficial evaporation of moisture. Other means for raising water productivity are (a) the reallocation of water from lower unit value to higher unit value crops and from more to less water consuming crops; (b) by plant breeding that yields more mass per unit transpiration by reducing crop growth periods while keeping the same yields; and (c) by the promotion of better farm practices, including improved soil management and on-farm water use.

24. Raising the productivity of water has merit. But as IWMI's studies have shown, along with those by others, even if the productivity of water is raised to the maximum, this will not free water enough to meet anywhere near the amounts needed to meet the projected demands of the agricultural sector in the years ahead. The greater part of these demands can only be met by tapping unused water supplies and making them available for economic use. This may well involve very large (and possibly subsidized) investments in schemes for moving water from surplus areas to potentially productive but water-short areas. In times to come, these schemes could well require movement of water over long distances such as from the water "rich" areas of South China to North China or from the Amazon and Congo Basins to water-scarce but potentially productive areas in Latin America and Central Africa respectively. Given the fact that it often takes as long as 20 years for major irrigation projects to come to fruition, there is an urgency for institutions involved in planning and financing irrigation to review their policies.

25. There are other possible scenarios whereby nations could meet their food needs. The increased water requirements for agriculture may well lead to changes in trade patterns. At present, 90% of the food (especially grain) consumed in the developing countries is grown in these countries. This may well change as water surplus areas—mostly in Latin America—become large exporters to water deficit areas.

26. Whatever the pattern of international trade, irrigated agriculture, which has been so important for the increases in food production over the past 50 years, will continue to be a major factor in meeting food needs in the developing countries in the years ahead. It will affect some countries and some regions more than others. In many parts of the world where water scarcity already afflicts over one billion people and where agriculture uses around 70% of the available water, there is already an overall requirement that, at a minimum, water in agriculture be used sparingly and productively. This requirement will become increasingly important for more and more countries in the years ahead as the competition grows for relatively scarce supplies of water.



COMPOSITION OF THE PANEL AND BIOGRAPHICAL INFORMATION

**CHAIR:**

**Dr. Michel Petit**

Le Prieuré  
34190 Gornies  
France.

Tel.: (33-4) 67731667  
Fax: (33-4) 67731667  
e-mail: [mpetit@worldbank.org](mailto:mpetit@worldbank.org)  
[michel.petit@inapg.inra.fr](mailto:michel.petit@inapg.inra.fr)

**MEMBERS:**

**Dr. Walter Coward<sup>1</sup>**

4050 Jordan Lake Drive  
Marietta  
Georgia 30062  
USA.

Tel.: (1-770) 9773732  
e-mail: [EWCOWARD@aol.com](mailto:EWCOWARD@aol.com)

**Dr. John Dillon**

School of Economic Studies  
University of New England  
Armidale  
NSW 2351  
AUSTRALIA.

Tel.: (61-2) 6773 2373  
Fax: (61-2) 6773 3281  
e-mail: [jdillon@metz.une.edu.au](mailto:jdillon@metz.une.edu.au)

**Dr. Marvin Jensen**

1207 Springwood Drive  
Fort Collins  
CO 80525  
USA.

Tel.: (1-970) 226 5402  
Fax: (1-970) 226 5402  
e-mail: [MJensen419@aol.com](mailto:MJensen419@aol.com)

**Dr. Wayne S. Meyer**

Program Leader, Sustainable Agriculture  
CSIRO Land and Water  
PMB No 2  
Glen Osmond SA  
AUSTRALIA 5064

Tel.: (61-8) 8303 8683  
Fax: (61-8) 8303 8509  
e-mail: [Wayne.Meyer@adl.clw.csiro.au](mailto:Wayne.Meyer@adl.clw.csiro.au)

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<sup>1</sup> Was not in Colombo during the Main Phase of the Review, but remained in touch with the rest of the Panel via e-mail.

**Dr. K.R.S. Murthy**

355, 1 E Cross,  
6th Block, 2nd Phase,  
BSK 3rd Stage,  
Bangalore 560 085  
INDIA.

Tel.: 91 80 672 0135  
fax: 91 80 672 0135  
e-mail: [nirmala.murthy@gems.vsnl.net.in](mailto:nirmala.murthy@gems.vsnl.net.in)

**Dr. Montague Yudelman**

3108 Garfield Street NW  
Washington, DC 20008-3537  
USA.

Tel.: (1-202) 965-4642  
Fax: (1-202) 965-4642  
e-mail: [ZINTALMY@AOL.COM](mailto:ZINTALMY@AOL.COM)

**Panel Secretary: Dr. Timothy Kelley**

Senior Agricultural Research Officer, TAC  
SDRC – C632  
FAO  
Viale delle Terme di Caracalla  
00100 Rome, Italy

Tel.: (39-06) 57054210  
Fax: (39-06) 57053298  
e-mail: [Timothy.Kelley@fao.org](mailto:Timothy.Kelley@fao.org)

**CGIAR SECRETARIAT:**

**Resource Person: Selcuk Ozgediz**

Management Adviser  
CGIAR Secretariat  
World Bank  
1818 H Street, NW  
Washington DC 20433, USA.

Tel.: (1-202) 473-8937  
Fax: (1-202) 473-8110  
e-mail: [s.ozgediz@cgiar.org](mailto:s.ozgediz@cgiar.org)

**Name: PETIT, Michel (France)****Position:** Professor, Institut National Agronomique, (INA), Paris-Grignon.**Expertise:** Agricultural economics.**Education:** Diploma, Ingénieur Agronome, Institut National Agronomique, Paris (1958); Diploma: Certificat d'Aptitude Institut de Statistique de l'Université de Paris (1959); Doctorate Level, Ph.D., Agricultural Economics - Michigan State University (completed - 1964).**Experience:** 1962-1967: Researcher, Institut National de la Recherche Agronomique, Paris a) 1962-64: Assistant and b) 1964-67: Chargé de Recherches; 1968-1988: Professor, Ecole Nationale Supérieure des Sciences Agronomiques Appliquées (ENSSAA), Dijon-France; 1975 – 1977: Program Adviser for Agriculture and Rural Development in India, Nepal and Sri Lanka, Ford Foundation, Delhi-India; 1983-1984: Visiting Fellow, International Food Policy Research Institute, (IFPRI), Washington, DC; 1988-1994: Director, Agriculture & Rural Development Department, and 1994-1998: Director, Agricultural Research & Extension Group, at World Bank; Since January 1999: Present position. A number of his professional accomplishments and awards, which may be cited are: Co-founder and co-editor of the European Review of Agricultural Economics, 1978-1981: President of the European Association of Agricultural Economics. 1985-1988: President of the International Association of Agricultural Economics. Has chaired a number of external reviews, some examples of which are: Chaired the external review of CIRES (Cote d'Ivoire) 1987 and of the SAD Department of INRA, 1998. Member of the Board of Trustees of CIAT (1986-89). Elected to the Académie d' Agriculture (France) in 1999. Elected Life Member of the International Association of Agricultural Economics.**Name: COWARD, E. Walter (USA)****Position:** Visiting Professor at Cornell University.**Expertise:** Sociology.**Education:** B.S. (Major: Agronomy), Delaware Valley College (1958); M.S. (Major: Sociology), Iowa State University (1966); Ph.D. (Major: Sociology), Iowa State University (1969).**Experience:** 1958-60: Team member with International Voluntary Services (IVS) in Laos. Worked in the Plain of Jars area with Village development Efforts among various Lao and tribal (Hmong) groups; 1961-62: Team leader with IVS in Laos. Worked with refugee program in Xieng Khouang and established team in Savaboury; 1963-65: Country Director for IVS Rural Development Program in Laos; 1965-68: Research Assistant in Department of Sociology and Anthropology, Iowa State University; 1968-69: Research Associate in Department of Sociology and Anthropology, Iowa State University; 1969-72: Assistant Professor of Rural Sociology, Department of Agriculture Economics and Rural Sociology, Pennsylvania State University; 1971-73: Director of Research, International Institute of Rural Reconstruction, Philippines; 1973-75: Assistant Professor of Rural Sociology and Graduate Faculty Representative, Dept. of Rural Sociology, Cornell University; 1975-76: Assistant Professor of Rural Sociology and Graduate Faculty Representative, Dept. of Rural Sociology, Cornell; and Associate Director, Northeast Regional Center for Rural Development; 1976-79: Associate Professor of Rural Sociology and Asian Studies and Chairman, Department of Rural Sociology, Cornell University; 1979-80: Sabbatical leave; served as Program Officer for Agricultural Resource Management, Office of Asia and the Pacific, The Ford Foundation, New York; 1980-81: Program Officer for Agricultural Resource Management, Indonesia Office, The Ford Foundation, Jakarta (concurrently

Associate Professor of Rural Sociology and Asian Studies, Cornell University); 1981-83: Associate Professor of Rural Sociology and Asian Studies, Cornell University; 1983-91: Professor of Rural Sociology, International Agriculture and Asian Studies, Cornell University; 1987-89: Director, International Agriculture Program, Cornell University; 1989-91: Program Officer, Rural Poverty and Resources Program, The Ford Foundation; 1991-96: Director, Rural Poverty and Resources Program, The Ford Foundation; 1996-99: Senior Director, Asset Building and Community Development Program, The Ford Foundation; Since September 1999: Present position.

**Name: DILLON, John L. (Australia)**

**Position:** Emeritus Professor, School of Economic Studies, University of New England, Australia.

**Expertise:** Agricultural Economics.

**Education:** B.Sc.Agr., University of Sydney, (1952); Ph.D., Iowa State University, (1959).

**Experience:** 1952-53: Dairy Sharefarmer; 1953-56: Economics Research Officer, N.S.W. Department of Agriculture, Sydney, Australia; 1956-59: Research Associate, Department of Economics, Iowa State University, Ames, U.S.A.; 1959-60: Research Liaison Officer, Commonwealth Scientific and Industrial Research Organisation, Melbourne and Canberra, Australia; 1961-64: Reader in Agricultural Economics, Department of Economics, University of Adelaide, Australia.; 1965-94: Foundation Professor of Farm Management, University of New England, Armidale, Australia; Since 1994: Present position. Officer of the Order of Australia. Elected Fellow of the Academy of the Social Sciences in Australia, the American Agricultural Economics Association and the Australian Institute of Agricultural Science and Technology. Elected Life Member of the International Association of Agricultural Economists and Distinguished Alumni Award of Iowa State University. Honorary degrees: Dr.Sc.Agr. (Kiel), D.Agr.Ec. (Sydney), D.Ec. (New England). Involved with CGIAR since 1976 as a member of various review panels (CIMMYT, ICARDA, IITA and farming systems research) and as a Board Member (CIAT, ICLARM, ICRISAT, ILCA and ISNAR).

**Name: JENSEN, Marvin (USA)**

**Position:** Retired, Colorado State University; 1993-present : Consultant,. Wyoming Attorney General, and 1995-present: Consultant, U.S. Bureau of Reclamation. Updating the Lower Colorado River Water Accounting System.

**Expertise:** Crop water requirements, crop yield response to water stress, micro-meteorology of water and natural land surfaces, irrigation water management, and evapotranspiration.

**Education:** B.S., Agriculture, North Dakota State University (1951); M.S., Agricultural Engineering, North Dakota State University (1952); Ph.D., Civil Engineering, Colorado State University (1965).

**Experience:** 1959-1961: Head, Irrigation, Drainage and Water Storage Facilities Section, Western Branch (17 western states), Soil and Water Conservation Research Division, ARS-USDA, Fort Collins, Colorado. Responsible for establishing, directing and maintaining high quality research in irrigation, drainage and water storage; 1961-1968: Investigations Leader, Water Management, Northwest Branch, ARS-USDA, Kimberly, Idaho; 1969-1978: Director, Snake River Conservation Research Center, ARS-USDA, Kimberly, Idaho. Responsible for the research program at the Center and served as research leader for the Water Management Research Unit; 1979-1987: National Program Leader for Water Management Research, National Program Staff, ARS-USDA, Beltsville, Maryland and Fort Collins, Colorado; 1987-1992: Director, Colorado Institute for Irrigation Management, CSU,

Fort Collins, Colorado. Served as CSU's project director for a technical assistance project in Sri Lanka, 1988-1992, and a Romanian Irrigation Equipment Study, 1992-1993; 1990-95: USAID Scientific Liaison Officer, Int'l. Irrigation Management Institute, Sri Lanka; 1991-92: Member, Council on Agricultural Science and Technology Committee on Climate Change. Has carried out a number of other consultancies, examples of which are:- 1992-1993: Team Member, Colorado State University Integrated Decision Support Group, 1992-1994: Consultant, Florida Atlantic University, Boca Raton, Florida. South Florida evapotranspiration study and database development, and 1993-94: Consultant, Imperial Irrigation District, Imperial, California. Water Use Assessment Study, Imperial Irrigation District and Coachella Valley Water District.

**Name: MEYER, Wayne S. (Australia)**

**Position:** Program Leader of Sustainable Agriculture, CSIRO Land and Water

**Expertise:** Irrigated crop water use, soil root interactions, crop physiology, research management.

**Education:** Bachelor of Agricultural Science (BAGSc), University of Adelaide (1973); PhD (Agronomy) Degree, University of Adelaide (1977).

**Experience:** Born and educated in country South Australia, Wayne Meyer completed graduate and doctorate degrees with scholarship assistance at the University of Adelaide. His thesis was on water uptake by wheat root systems. 1976-77: Visiting Assistant Professor, Texas A & M Univ., Texas, USA, stationed at Blackland Conservation Research Centre, Temple, Texas; 1977-1980: Senior Plant Physiologist, Water Research Commission, Pretoria, Republic of South Africa, and seconded to Soil and Irrigation Research Institute, Pretoria. Research in South Africa quantified water use by irrigated crops of wheat, soybeans and citrus; 1980: Research Scientist, CSIRO Irrigation Research, Griffith, NSW Australia; 1982: CSIRO Senior Research Scientist by double promotion increment. Leader, "Soil Root Zone Biology" Sub-Program. Research focused on irrigated crop growth, water use and yield during both waterlogged and drying periods; 1986: Awarded a 3-year Research Scientist position to support work of "Demonstrable Scientific Excellence" from CSIRO; 1988: Visiting Scholar, Michigan State University, Crop and Soil Science Dept; 1988-89: Graduate, Project Leadership, Univ. NSW Business Administration School; 1989- 1991: Assistant Chief, CSIRO Water Resources, Griffith Lab; 1991-95: Program Leader "Management of water and salinity in irrigated areas"; 1994: Urrbrae Medal for Agricultural Research; 1994: CSIRO Medal for research leadership and research in irrigated crop and soil management; 1994-95 Graduate, CSIRO Leadership Development Program; 1995-97: Joint position, CSIRO Project Leader and Charles Sturt Univ., Foundation Professor of Irrigation; Since Sept. 1997: Present position.

**Name: MURTHY, K.R.S. (India)**

**Position:** Former Director, Indian Institute of Management, Bangalore and currently Vice Chairman, All India Council for Technical Education, New Delhi.

**Expertise:** Business administration, management.

**Education:** Doctorate in Business Administration, Harvard Business School (1974); Master of Science in Management, Sloan School of Management, M.I.T., U.S.A., (1970); Bachelor of Science (Honours) in Statistics, (1957) and Master of Science in Statistics, (1958), Maharaja's College, University of Mysore, India.

**Experience:** July 1959 - April 1961: Research Assistant, The Forum of Free Enterprise, Bombay; April 1961 - December 1963: Research Assistant in Research Bureau and Reporter, The Economic Times, Bombay; Dec.1963 - July 1966: Statistician and Marketing Research

Executive, Tata Oil Mills Company Limited, Bombay; July 1966 – July 1968: Senior Systems Analyst, Tata Consultancy Services, Bombay; April 1974 - Aug. 1978: Professor, Indian Institute of Management, Ahmedabad; Sept. 1978 - Aug. 1980: Associate Professor, Boston University, Economics Department.; Aug. 1980 - Aug. 1981: First full-time Director, Institute of Rural Management, Anand; Dec. 1981 - Feb. 1991: Professor in Business Policy Area, Indian Institute of Management, Ahmedabad.; Feb. 1991 - Feb 1997: Director and Professor, March 1997- May 1998: Professor, Corporate Strategy and Policy Area, and June 1997 - May 1998: BOC Chair Professor in Business Policy, Indian Institute of Management, Bangalore; Since January 2000: Present position. Also, he has undertaken several consultancies, including for several Indian public and private sector enterprises, World Bank and Ford Foundation. Director of a number of boards, examples of which are Electronics Corporation of India Ltd., Hyderabad, 1995-1997, Life Insurance Corporation of India, Mumbai, 1996-1998, Oil and Natural Gas Corporation, New Delhi, 1999 -.

**Name: YUDELMAN, Montague (USA)**

**Position:** Fellow at the World Wildlife Fund for Nature (Washington).

**Expertise:** Agriculture, agricultural economics and natural resource development.

**Education:** University of Witwatersrand, South Africa (1950); DFC: B.Sc., M.Sc., and Ph.D. in Agricultural economics, University of California, Berkeley (1956).

**Experience:** 1958-1960: Agricultural Division, FAO; 1960-1964: Assistant Director for Social Sciences at the Rockefeller Foundation; 1946-66: Lecturer, Harvard University; 1966-70: Professor at the University of Michigan; 1970-1974: Vice President and Acting President of the OECD Development Centre in Paris – a major task was directing research on the economics of sustaining the natural resource base in the face of the demographic explosion in the tropics; 1974-84: Director of Agriculture and Rural Development, World Bank. During his tenure, he had the responsibility for reorienting and expanding the Bank's lending for agriculture toward raising the productivity of small farmers. Furthermore, during this period, he helped create the Consultative Group for International Agricultural Research (CGIAR) and its international network of research centres; 1984-87: Distinguished Fellow at the World Resources Institute, a non-profit organization concentrating on environmental policy issues. Since 1987: Present position. He has undertaken many missions and consultancies, including economic evaluations of projects in different parts of the world. Some examples of these are advising the government of Cyprus, and the President of the Inter-American Development Bank on agricultural policy. Also, he has headed a mission evaluating the work of the International Service for National Agricultural Research (ISNAR) and was a member of a mission evaluating the International Rice Research Institute (IRRI). He serves as Chairman of the Board of Directors of the Population Reference Bureau, as well as on the boards of a number of other NGOs. He has numerous publications, one of which is *The Role of Irrigation in Feeding the World* published by IWMI.

**TERMS OF REFERENCE  
FOR EXTERNAL PROGRAMME AND MANAGEMENT REVIEWS  
OF CGIAR CENTRES**

**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 centres in agriculture, forestry and fisheries. The CGIAR aims, through its support to the Centres, to contribute to promoting sustainable agriculture for food security in developing countries. Because the Centres constitute the core of the CGIAR, the effectiveness of each Centre is crucial to the continued success of the CGIAR (as a System).

Each Centre 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 Centre. To ensure accountability in an essentially decentralized system, each Centre is expected to be responsive to the CGIAR, which provides financial support for its work.

The CGIAR has established a tradition of External Programme 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 TAC and the CGIAR Secretariat, and are conducted for each Centre approximately every five years. As each Centre 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 Centre**

Besides the EPMRs, Centre Commissioned External Reviews (CCERs) are undertaken at each Centre. These CCERs are commissioned by the Centre Boards to periodically assess the quality and effectiveness of particular aspects of a Centre's work. The terms of reference (ToRs) for each CCER are determined by the Centre, based on broad principles endorsed by the CGIAR at ICW95 (ref. document entitled *Improving the Quality and Consistency of CGIAR's External Centre Reviews*, dated October 24, 1995).

EPMRs complement the CCERs by providing a CGIAR-commissioned and comprehensive external assessment of the Centre'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 Centre is doing its work effectively and efficiently. EPMRs are both retrospective and prospective; and help ensure the Centres' 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 Centre they are supporting; and b) to provide the Centre 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:

- a) The Centre 's mission, strategy and priorities in the context of the CGIAR's priorities and strategies;
- b) The quality and relevance of the science undertaken, including the effectiveness and potential impact of the Centre's completed and ongoing research;
- c) The effectiveness and efficiency of management, including the mechanisms and processes for ensuring quality; and
- d) The accomplishments and impact of the Centre'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 Centre's mission in light of important changes in the Centre and its external environment since the previous external review.
- The policies, strategies, and priorities of the Centre, 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 Centre's strategy and priorities, considering alternative sources of supply and the benefits of partnerships with others.

#### B. Quality and Relevance

- The quality and relevance of the science practised at the Centre.



- The effectiveness of the Centre'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 Centre's Board in governing the Centre, the effectiveness of leadership throughout the Centre, and the suitability of the organization's culture to its mission.
- The adequacy of the Centre'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 Centre's relationships with relevant research partners and other stakeholders of the CGIAR System.

**D. Accomplishments and Impact**

- Recent achievements of the Centre in research and other areas.
- The effectiveness of the Centre's programs in terms of their impact and contribution to the achievement of the mission and goals of the CGIAR.

**RECOMMENDATIONS OF THE 1994 EPMR PANEL AND IWMI'S RESPONSE**

In October 1995, IIMI advised the CGIAR Secretariat of the actions taken in response to the recommendations of the 1994 EPMP. These are listed by recommendation with the prefix (A). In cases where significant progress has taken place subsequently, these are listed with the prefix (B).

**1. Gender Issues (Section 3.3.6.1):**

*All programs and projects be reviewed for research opportunities related to gender, and objectives be established based on these.*

**1995 Response**

- A) Two positive steps have been taken with respect to gender issues. First, the gender program has expanded. There are currently four associate experts seconded to IIMI from Dutch and Danish governments. Second, Mayra Buvinic, Director of the International Center for Research on Women, was appointed to the Board of Governors in April 1995. While these are significant steps, we have still to complete the review of all programs and projects for research opportunities related to gender. In fact, as the review team suggests, IIMI's goal should be to incorporate gender issues as an integral part of each of our research programs. We will be seeking the advice of Buvinic and others as to how best to achieve this transition. An important step in this direction was taken at the recent workshop convened by IIMI on the inter-center Initiative on Water Management (ICIWM) where we introduced gender issues explicitly into the research proposal to be submitted to TAC.

**Update, 1999**

- B) In 1997 IWMI hosted an international workshop on *Women and Water* in which leading scientists on gender and land and water resources pooled available knowledge and assessed the state of the art in this young academic field (Merrey and Baviskar, ed. 1998). In 1998 Dr. Barbara van Koppen was recruited to coordinate the program on Gender, Water, and Poverty. In 1999 the Board endorsed the strategy for this program. Much of the research on gender is being implemented as an integral part of a multi-country river basin institutions project. IWMI has also initiated research on gender and poverty issues in Pakistan.

**2. Environmental Issues (Section 3.4.2.1)**

*IIMI explore opportunities to expand its research on the environment, particularly in relation to the Systemwide initiative on water management.*

**1995 Response**

- A) Environmental issues were previously treated in IIMI's overall research program as a crosscutting theme. Under the reorganization, we have eliminated crosscutting themes and established four Global Research Programs: (i) Performance Assessment, (ii) Design and Management of Irrigation Systems, (iii) Sector, Policy and Institutional Analysis, and (iv) Social and Environmental Analysis. Major issues for research and development in this latter program are: water quality and public health, watershed management, gender issues and rehabilitation and compensation of people adversely affected by water development projects. The best known of our current

works in this area is the Shared Control of Natural Resources (SCOR) project which focuses on watershed management.

As stated above, IIMI convened a planning workshop for the Inter-Center Initiative on Water Management from 29 September-4 October 1995. Participants agreed on several research themes and projects for implementation within the Initiative to be included in a proposal to TAC which is currently being finalized by IIMI. Under the Initiative, partner centers and national organizations will implement several projects with a significant environmental dimension. These include studies on: the impact of water policy on water demands and allocations in various user sectors and water quality; watershed interventions and the interactions between health and water -- water as a vector for disease, and poor sanitation as a pollution source for water.

#### **Update, 1999**

- B) Four of the eight Systemwide Initiative in Water Management (SWIM) papers published over the past two years deal with issues related to the environment. A paper summarizing the CGIAR experience in watershed management is forthcoming. SWIM paper 3 challenging some of the conventional wisdom and beliefs regarding the impact of forest soils on water conservation has had the largest number of downloads on the web among all IWMI publications.

Stemming from the initial work on water quality in Kirindi Oya (SWIM 8) a project was developed in 1997 in collaboration with the Republic of China entitled *Multiple Uses and Water Quality*. Under this project water quality issues have been studied in Sri Lanka, Pakistan, and Mexico. A study has also been undertaken in collaboration with the Sri Lankan Department of Wildlife where fresh water draining from the irrigation system is reducing salt water concentrations in the brackish lagoons destroying the grounds for the raising of prawns and as a habitat for birds, particularly flamingoes. Finally, a project has been initiated in collaboration with ICLARM to study the impact of hydrological changes in the Mekong River on fisheries potential in the Mekong River.

The SWIM Final Report for Start Up Phase was issued to the donors in May 1999 and \$1 million was received from TAC/CGIAR set aside funds as partial support for some of the continuing SWIM activities in 1999-2000.

### **3. Integration Between Research and Institutional Strengthening (Section 3.4.2.2):**

*Each country research activity and most institutional strengthening activities be associated with a research programme, with the Director of Research and the Deputy Director General coordinating this integration.*

#### **1995 Response**

- A) Before entering the CGIAR system, IIMI lacked a strategic research agenda. The emphasis was on applied research and institutional strengthening. Under the new management, much greater emphasis is being given to strategic research output. A new medium term plan will be prepared for the Institute in 1996. Wherever possible, IIMI will limit projects and activities that involve only technical assistance without a significant research component. The management has established stringent criteria

for the acceptance of new project proposals. The most important question to be answered is: How does the proposal relate to IIMI's strategic research agenda? IIMI also believes, however, that the emphasis on strategic research notwithstanding, most of the Institute's research will continue to have an applied research and institutional strengthening component in contrast to the crop centers. IIMI's "laboratory" is typically the irrigation system or the watershed, and our research must often be described as "action oriented."

**Update, 1999**

- B) The growing scarcity and competition for water is bringing about pressure for institutional reforms. IWMI is currently involved with two major action research projects on institutional strengthening implemented in 10 countries. The objective of these projects is to identify critical priorities and processes for institutional strengthening in water-scarce river basins. Workshops bringing together researchers and irrigation systems managers from each site allow the sharing of experiences in institutional development across sites.

**4. Country Programmes (Section 4.3):**

- (a) IIMI plan its country programmes to make maximum impact in the near term; and  
(b) critical mass to implement country programmes be located in very few countries, while work in most other countries be carried out without resident staff it is part of a project based in Headquarters or country centres with critical mass.*

**1995 Response**

- A) IIMI is rapidly implementing the recommendation of the External Review to eliminate one-person country programs and maintain a critical mass of scientists in fewer countries. By the end of this year, we will have closed offices in Nigeria, Sudan, Nepal, Bangladesh, and the Philippines. Offices in Burkina Faso and Niger will be closed next year. We currently have three major national programs in place in Sri Lanka, Pakistan and Mexico with a fourth contemplated in Egypt. IIMI's objective is to maintain a critical mass of at least three international scientists in each location. Scientists from headquarters and the national programs will serve a wider range of countries, including those where IIMI formerly had a single resident staff member. In terms of additional national programs, IIMI's highest priority will be China and selected countries in Southeast Asia. We are planning a modest effort in Sub-Saharan Africa.

**Update, 1999**

- B) IWMI has conducted its research in Turkey and Mexico by strictly adhering to this concept of critical mass. In the case of Turkey the collaborative agreement with the General Directorate of Rural Services (GDRS) Government of Turkey specifically ensured that Turkish counterparts were fully responsible for providing building office facilities and the necessary support. This arrangement ensured that when the project ended in July 1999 IWMI's three international staff were able to withdraw from Turkey and relocate in Sri Lanka with minimum disruption to staff and to research.

In West Africa, IWMI has closed its one-person country programs. In their place, IWMI has posted a senior researcher to WARDA. The combination of expertise

achieves critical mass, while the complementary enhances the quality of both Institutes' research. In South Africa, IWMI began with non-residential activities, but as our relationships grew stronger, we have begun increasing our presence. The presence of strong national partners enables a critical mass to be achieved without having a large international staff. On the other hand, the distance from Colombo limits our ability to work effectively in Africa. Transport links to the rest of Africa and logistical as well as intellectual support are excellent in South Africa. If support can be found, IWMI is considering establishment of a regional office in South Africa, which would have sufficient critical mass to be effective.

**5. Integration between Headquarters and Country Programmes (Section 4.3):**

*IIMI define which Headquarters and country activities are properly part of its core programme, and support parts of the country core programmes with core funds.*

**1995 Response**

- A) As noted by the External Review, in the past IIMI's headquarters and country activities tended to be totally separate. Indeed it has been said that IIMI was composed of a series of independent franchises. To address this concern, IIMI's newly constituted Global and National programs are viewed as a matrix (not unlike the CGIAR matrix) with the four Global Programs along one axis and the four National Programs along the other. The task of the Global Program leaders is to ensure that their activities are substantively linked with the National Programs and vice versa. Core research funds for strategic research activities will be allocated across all programs regardless of where they are located.

**Update, 1999**

- B) At the annual program planning meeting (PPM) country program leaders come with project proposals that they would like to see implemented. Funds are set aside, and through discussions between the country and Sri Lankan-based program leaders, decisions are made on the allocation of these funds and on formation of teams including both headquarters and country-based staff. This process has worked well and has led to a closer working relationship between scientists at headquarters and those in the field.

**6. The Board (Section 5.1.2):**

*The Nominating Committee should develop a mechanism to assess regularly the composition of the Board, and the contributions of individual Board members and officers.*

**1995 Response**

- A) The Nominating Committee is carefully assessing the composition of the Board with respect to geographic distribution, gender, and subject matter specialty. The assessment of the performance of Board members is now a regular item on the agenda of the Nominating Committee. IIMI's Management intends to keep the Board more fully informed of Institute-wide activities by issuing monthly briefing notes.

**Update, 1999**

- B) The Nominating Committee meeting documentation contains a table showing the current composition of the Board which includes gender, nationality, discipline, terms of office and the individual members' roles on the Board. It also gives the regional and gender composition of the Board. When considering the nomination of new Board members, the Nominating Committee reviews the current composition and a database consisting of nominations of potential candidates received over a five-year period. At each meeting, this database is reviewed and new names are added. When nominating candidates for Board appointment, the Nominating Committee considers regional and donor representation, gender balance and the required fields of expertise which may change from time to time. The current Board composition displays an acceptable regional and donor representation and has 3 female members. It also displays diversity in nationality and disciplines. Please refer attachment (Annex 1) for details.

Commencing from December 1994, the agenda item "Board evaluation of board and committee proceedings" was included in the agenda of the annual Board meetings. This agenda item is considered under closed session at which time the Board members assess their own performance.

At the December 1996 Board meeting, the Board discussed the Board Self-Assessment forms distributed by the Board Chair. It agreed that the members will fill-in the forms and forward to the Board Chair. The Board also discussed the desirability to obtain the services of a facilitator to assist the Board in this area and agreed to invite Dr. Selçuk Özgediz as a facilitator to the next meeting of the Board. Accordingly, Dr. Selçuk Özgediz attended the Board meeting in November 1997. He made a special presentation to the Board outlining the objectives of the CGIAR and how these had evolved over time. His presentation covered Board governance and management at center level and also the role of the various standing committees established by the CGIAR. Mr. Özgediz explained the background to and development of a series of seven guidelines for Board governance. The guidelines include a template for self-analysis by Board members. Mr. Özgediz's presentation included a series of overheads which covered the range of topics which should be dealt with by Board members.

**7. Program Support (Section 5.2.1):**

*A Programme Support Unit be created that includes project development, training, information, and computer services.*

**1995 Response**

- A) A new Information and Communications Division has been created which combines the Information Office and Donor Relations and Project Development Office. A Coordinator has been recently appointed to oversee the two offices which have been reconstituted as follows:

The Management Information Systems Unit provides the following services: production and distribution of publications; computer services; training in use of computers; library and documentation; and database management.

The Communications Unit provides the following services: proposal development; public relations work; linkages to current and new donors; and editorial and writing services.

**Update, 1999**

- B) In September 1998 a new position of Proposal Writer was filled. The Proposal Writer works closely with researchers in developing concepts and proposal documentation for submission to donors. In September 1999, a new Head of Communications with a strong background in use of the internet, websites and public relations was appointed. The Institute's Computer Services/Information Technology unit was strengthened in 1997 by the recruitment of a systems analyst and a systems administrator.

**8. Oversight of Programs (Section 5.2.3):**

*The programme review, forward planning, and monitoring processes be based on pre-established objectives for each project, and be fully and consistently implemented.*

**Response, 1995**

- A) Under the new management, there is now a clear line of responsibility for projects and programs. Program leaders (both global and national) are responsible for oversight of projects under their programs. Program leaders report directly to the Office of the Director General which has overall supervisory responsibility for Global and National Programs. Projects will be rigorously monitored to ensure achievement of research and financial targets.

**Update, 1999**

- B) The Project Development Office and Deputy Director General (Operations) call regular meetings of Project Development Office and Finance and Research staff to discuss progress with project proposals and targeted donors. The proposal "pipeline" is carefully monitored. Each project proposal is assigned an identifying number and is tracked via a control register. The Deputy Director General (Programs) works to coordinate the preparation of proposals, and the program and project planning and implementation process.

**9. Program Management (Section 5.3.4):**

*The Programme and Project Subcommittee be chaired by the Director of Research and charged with oversight over research and ensuring an adequate level of publication.*

**1995 Response**

- A) As discussed above, IIMI has simplified its organizational structure with four Global (or thematic) Programs and four National Programs, with a critical mass of scientific staff in each program. There is no longer a Director of Research. The primary responsibility for oversight of research and publications is with the Office of the Director General. The goal is to provide emphasis on research output and to stimulate communication among scientists. IIMI has also appointed a number of internationally renowned scientists as Senior Associates to contribute state-of-the-art knowledge to IIMI's global and national programs. The new management believes that,



organizationally and otherwise, great strides have been made toward stimulating scientific excellence. We expect this be reflected in the research output for the year ahead.

**Update, 1999**

- B) No further comment required.

**10. Stabilization and Management (Section 6.1.1):**

*IIMI stabilize its organizational structure, decentralize responsibility as advised in the Report, and concentrate upon improving management for maximum effectiveness and establishing an organizational climate to stimulate excellence.*

**Response, 1995**

- A) The new management is making every effort to establish and maintain open lines of communication with all its staff based at headquarters and in the various national programs and field sties. The recent changes in IIMI's program and management as outlined in the Vision statement were developed in close consultation with the staff. Decisions by the management group are communicated as broadly as possible with the overall management structure being kept flexible and with fewer layers of authority. Staff are encouraged to participate in decision-making equitably and to interact more directly with IIMI's Board than in the past.

**Update, 1999**

- B) In 1995 IIMI substantially changed direction and management. Increasing the productivity of irrigated agriculture remains the focus of IIMI's work but the objective is now approached in the context of water basins and the analysis of water resource systems as a whole. Both the mission and the Institute's name have changed to reflect this change in research focus. The mission of the IWMI is to contribute to food security and poverty eradication by fostering sustainable increases in the productivity of water through better management of irrigation and other water uses in river basins.

In keeping with the new research agenda and focus, the Institute has also put in place an organization structure, which will enable it to meet its research objectives. The Director General as the Director of Research actively guides the research program and works closely with the staff whilst the Deputy Director General (Programs) is the overall Research Coordinator. The Deputy Director General (Operations) heads up the operations areas comprising of Finance, Human Resources, Administrative Services, Facilities and Computer Services and provides the necessary support to the research operations. IWMI has organized its research under four global programs.

- Applied Information and Modeling Systems
- Irrigation & Water Resources
- Policy, Institutions & Management
- Health & Environment

The four global programs together constitute an integrated research program. Each program is managed by a Senior Research Leader and each program makes up a

number of projects. The programs provide the continuity and framework for IWMI research over time whilst the projects are completed or replaced by new projects. The above organizational structure enables IWMI to have both a clear program focus and continuity in scientific leadership.

Researchers generally contribute to more than one of the global programs. A major strength of the global program strategy is that a departmentalized single disciplinary approach is discouraged; a broad perspective on problems and their solutions is encouraged and synergy is achieved. Each group has a separate focus but compliments the work of the other three and most of the research carried out by the Institute involves multi disciplinary teams drawn from two or more groups. There is a lot of interaction and teamwork amongst the research groups as a result of this approach. The organization of the research structure has also enabled IIMI to decentralize responsibility and move away from a narrow single disciplinary approach to a broader multidisciplinary approach.

Management combines both formal and informal procedures and processes. There is a lot of interaction and discussion on research as well as other important issues. The day to day process is largely informal; the DG chairs weekly meetings with the research group leaders to discuss both research and management issues. The management and group leaders continuously monitor research outputs providing additional support where necessary to ensure the quality of the work. The constant informal interactions and discussions amongst staff on program issues and in the implementation of research are an important factor underlying IWMI's success. There is also formal annual cycle culminating in a program planning meeting (PPM) and the production of a written work plan. All senior staff and many junior national researchers participate in the PPM held at the end of the year. The PPM is an important opportunity for sharing new ideas, upgrading skills and team building.

In addition to regular interaction and dialogue within and between research programs there is also information sharing across the institute. Professional and Management meetings are held for professional staff (both national and international research and non research staff) where they are briefed on the key issues affecting the institute as well as information on current research activities and donor funding.

A representative national staff committee was set up in early 1996 comprising of staff at all levels to have a dialogue with management on issues affecting national staff. The national staff committee is consulted on all important issues and a good rapport has been established. Regular meetings are held at which human resource issues as well as general issues are discussed with the staff committee and their input has been very useful. Currently a good climate for staff dialogue exists within the institute. A positive work environment has been created for staff consultation and involvement. The supportive management style has strengthened communication within programs/units of the organization and across the different levels of the organization. The organization structure itself supports better team work amongst a multi disciplinary and a multi cultural workforce comprising both national and international staff.

A strong organization structure, a clear program focus and a good organizational climate has enabled staff to work with commitment and cohesion to achieve the research objectives of the institute.

**11. Refereeing and Publishing (Section 6.3.2.1):**

*An Editorial Committee, with a Publications Review Subcommittee, be appointed to manage IIMI's publications and ensure quality.*

**Response, 1995**

- A) As noted above, the responsibility for supervising the research and publication effort lies with the Office of the Director General. In order to ensure an adequate level and quality of research publication outputs, a Research Publications Committee has been established chaired by the Director General as Chair. Senior management staff and all Global and National Program Leaders are members of the committee. A new IIMI research publication series is being established with high quality publications. Approximately 80 percent of IIMI's research findings will be published initially in this form. IIMI staff and Senior Research Associates will serve as reviewers. Many, if not most, of these articles will be submitted subsequently to refereed journals. A new quarterly newsletter will replace the Institute's current bi-annual newsletter, the IIMI Review. This will be targeted at a more popular readership and will contain shortened versions of IIMI research articles, and achievements in applied research and institutional strengthening.

**Update, 1999**

- B) In August 1996, following several meetings, the Research Publications Committee circulated to all research staff the standards for IIMI research papers (Annex 2). In June 1997, a revised set of review procedures for research reports was established in order to expedite the review process (Annex 3).

The establishment of the Research Publications Committee and a clear set of review procedures have contributed towards a set of quality research reports documenting IWMI research. The review process includes both internal and external professional reviews.

**DOCUMENTS PROVIDED TO THE REVIEW PANEL**

**A. Documents Provided by the TAC and CGIAR Secretariats**

*To All Panel Members:*

1. Review Processes in the CGIAR, 1988.
2. CGIAR Priorities and Strategies for Resource Allocation During 1998-2000.
3. Report of the First External Programme and Management Review of the International Irrigation Management Institute.
4. Report of the First External Programme and Management Review of the International Livestock Research Institute (one of the most recent EPMR reports).
5. Documents regarding the most recent TAC strategic studies involving the Centre:
  - (a) Priorities and Strategies for Soil and Water Aspects of Natural Resources Management Research in the CGIAR;
  - (b) Policy and Management and Institution Strengthening Research and Service in the CGIAR;
7. The TAC Commentaries on IIMI's 1998-2000, 1999-2001 and 2000-2002 MTPs.
8. Dr. Monty Yudelman's report from his having attended the most recent BoT meeting.
9. Dr. John Dillon's report on Board Issues.
10. A list of centre-specific issues drafted by the Centre for incorporation into the standard TOR of the review;
11. 'Update on the use of CCERs' (memo from TAC Chair).
12. Guidelines and TOR for EPMRs.
13. Medium-Term Resource Allocation 1998-2000: Centre Proposals and TAC Recommendations.
14. Lucerne Declaration and Action Program (pp. 7-12)
15. Most recent CGIAR Annual Report
16. Most recent CGIAR Brochure and Directory
17. Financial Requirements of the 1999 CGIAR Research Agenda (latest MTM99 doc).

18. Terms of Reference for External Programme and Management Reviews of CGIAR Centers
19. Organization and Management of the CGIAR System: A Review, 1993. (S. Özgediz, Public Administration and Development, Vol. 13, 217-231 (1993); copyright 1993 by John Wiley & sons, Ltd.)
20. Reference Guides for CGIAR International Agricultural Research Centers and their Boards of Trustees, August 1997.
21. CGIAR ICW99 End of Meeting Report and MTM99 Summary of Proceedings.
22. Evaluating Research Institutions: Lessons from the CGIAR. (S. Özgediz, *Knowledge, Technology, and Policy*, Winter 1999, Vol. 11, No. 4, pp. 97-113.

***To Relevant Panel Members:***

23. Governance and Management of the CGIAR Centers, 1991 (S. Ozgediz, Study Paper No. 27, copyright 1991, first printing October 1991)
24. Most recent volume of the CGIAR Board of Trustees Directory (October 1999)
25. CGIAR 1997 Financial Report (August 1998)
26. Committees and Units of the CGIAR: Roles, Responsibilities, and Procedures
27. Most recent CGIAR financial guidelines and manuals relating to:
  - (a) Financial Management Guidelines, Series No. 1 (January 1988)
  - (b) Accounting Policies and Reporting Practices Manual (October 1993)
  - (c) Financial Guidelines - Audit Manual (July 7, 1995)

**B. Documents Provided by IWMI**

28.
  - (a) Annual Report 1997
  - (b) Comparable research reports of the programs - Abstracts of Research Reports issued in 1998 and 1999 (18 research reports). If you require copies of the individual research reports, we will be pleased to send to you. As the individual reports run to 30-35 pages or more, we have omitted them from this package.
  - (c) International Journal of Water Resources Development. Special double issue: Research from IWMI. Volume 15, Numbers 1&2, March/June 1999.
  - (d) Expanding the Frontiers of Irrigation Management Research. Results of research and development at IIMI 1984 to 1995 by D.J. Merrey
29. IWMI's Strategic Plan for 2000 and Beyond (draft for review and discussion)– the draft has been circulated among a wide audience of donors, partners, Board members, etc., for

comments. It will also be reviewed and discussed at the Executive and Finance Committee of IWMI's Board on 30 October.

30. (a) Medium Term Plan 1998-2000
- (b) Medium Term Plan 1999-2001
- (c) Medium Term Plan 2000-2002

Panel members will be aware that the current plan of Medium Term Plans began with the 1998/2000 version. The MTP is for a three year cycle and is updated annually. Thus the narrative of the MTP for 1999-2001 and 2000-2002 are brief and confined to major programmatic changes.

31. The latest Annual Funding request to the CGIAR – dated 3 September 1999
32. IWMI's Research Achievements, 1995 to 1999
33. A brief paper summarizing the major issues confronting the center – submission to TAC dated 3 August 1999
34. (a) Current Organization Chart – The overall organization chart and detailed charts for Research Program, Finance and Administration, Communications & Donor Relations, IIMI-Pakistan and IIMI-Mexico, are included.
- (b) Brief description of the Centre's internal management structure, including the composition and terms of reference of each major committee – Please refer "Item 2: Organization" section of the General Administrative and Financial Procedures (GAFP) manual. This section gives a brief description of IWMI's internal management structure and the major committees. Items 3 to 10 describe the management and operation of the service units within the Finance and Administration division.
35. List of senior staff with brief summary of qualifications:
  - (a) Qualification Summary of International Staff
  - (b) Qualification Summary of National Staff
  - (c) Senior Staff of IIMI Pakistan
  - (d) International Staff Profiles, September 1999
  - (e) Brief Bio-Data of Research Staff
36. Report of the Center Commissioned External Review, Jan/Feb 1999
37. List of reports of major planning conferences, internal review, expert meetings, etc., which have had a major influence on the direction of specific Centre programs.
38. Self studies conducted by the centre:
  - (a) Comments by Vernon Ruttan, Regents Professor, University of Minnesota on the proposed Medium Term Plan, 1998-2000. (September '96)
  - (b) "Random Observations" - Report from Vernon Ruttan (September '96).

- (c) Review of the Grant Component of the Shared Control of Natural Resources (SCOR) Project – Carried out by Ernst & Young. (March 1996).
  - (d) Audit of the Fund Accountability Statements for the Shared Control of Natural Resources (SCOR) Project and the Actual Indirect Cost Recovery Rates incurred by IIMI – Carried out by KPMG Ford, Rhodes, Thornton & Co. (February 1999)
  - (e) The Finance and Administration Division carries out periodic reviews of services which include the following:
    - (i) Visitors to the institute are provided with a copy of the attached “help us to help you” questionnaire for completion and return prior to their departure.
    - (ii) Efficacy of the Controller’s Office (July 1999) – An internal Survey
    - (iii) Outsourcing the Functions of the Accounts Department – Preliminary findings of a survey carried out by Coopers & Lybrand, Colombo. (July 1997)
39. Summary of actions taken in response to the last EPMR:
40. A list of staff publications 1995-1999. (The publications are listed by year, by author on alphabetical sequence.)
- (a) Research Reports
  - (b) Journal Articles (in internationally refereed journals)
  - (c) Articles contributed to published books (includes published seminar/conference proceedings)
  - (d) Books authored/co-authored by IWMI staff
  - (e) IWMI Pakistan Reports
41. List of the agreements for cooperative activities with other centres and institutions
42. List of ongoing and recently completed contracted projects:
- (a) List of ongoing projects – 1999
  - (b) List of completed projects – 1998 & 1999
43. Charter and Founding Documents
44. Table showing composition of the Board 1995-1999 and the term of office of current members and their roles on the Board
45. Governing Board Manual

46. Table showing allowances, benefits, and salary ranges for each category of staff:
  - (a) IIMI International Staff salary ranges, allowances and benefits
  - (b) IIMI National Staff salary ranges, allowances and benefits
47. Table showing personal data on internationally recruited staff by program, including each job title, incumbent's location, period of tenure, gender, nationality, age, salary over the last three years, funding source (excluding names).
48. Table summarizing turnover of staff over the last five years by staff category:
  - (a) Staff Turnover – Internationally Recruited Staff 1995-1999
  - (b) International Staff Movements
  - (c) Staff Turnover – Nationally Recruited Staff, 1995-1999
  - (d) National Staff Movements
49. International staff vacancies filled in 1998/99 and period vacant.
50. Brief description of the Centre's information management systems and procedures:
51. Please refer "Item 10: Computer Services" section in the General Administrative and Financial Procedures (GAFF) manual which describes the institute's computer and information technology systems and procedures.
52. IWMI Library and documentation centre.
53. Board and Board Committee meeting minutes from 1995 to 1999
54.
  - (a) International Staff Terms and Conditions of Employment
  - (b) Policies for Nationally Recruited Staff at IIMI headquarters
  - (c) Policies and Terms & Conditions of Employment for Nationally Recruited Staff at IIMI Pakistan
55. Local compensation surveys used by the Centre:
  - (a) Compensation & Benefits Survey for IIMI-Pakistan – December 1998
  - (b) Report on Survey of Compensation Package (IIMI headquarters) – September 1997
  - (c) Report on Survey of Compensation Package for the Research Staff – September 1997
  - (d) Final Report on the Survey of Compensation Package (IIMI headquarters) – September 1996
  - (e) Final Report on the Survey of Compensation Package for Research Staff Category – September 1996
56. Reports of external auditors, including management letters, and financial officer's reports to the Board since the last External Review:



- (a) Audited accounts and management letters from 1995 to 1998
- (b) Financial officer's reports to the Board from 1995 to 1999
  
- 57. Internal Audit Reports for 1998 and 1999
  
- 58. Salary pool for internationally recruited research staff
  
- 59. Financial Accounting Manual
  
- 60. Shared Control of Natural Resources (SCOR) Project – Project Completion Report
  
- 61. Director General's Reports to the Board during 1998 and 1999
  
- 62. Board and Board Committee documentation during 1998 and 1999
  
- 63. Publications Catalog 1995-1999, IWMI Pakistan

### ITINERARY OF THE EPMR PANEL

Two Panel members attended IWMI's Board meetings held at Headquarters in Colombo from 27-29 April 1999. Assessment of the Board was made using a comprehensive checklist.

The whole Panel visited IWMI headquarters from 4 to 12 December 1999 for the Initial Phase of the Review. Senior research and management staff made presentations to the Panel to familiarize them with the Centre, its mission, goals and specific project activities, as well as to provide information on the current organization, operational functioning and support services of the Centre. During the Initial Phase the Centre arranged closed-door meetings between the Panel and some of IWMI's key partners in Sri Lanka, specifically senior officials in the Irrigation Department, the Ministry of Irrigation and Power, the Ministry of Mahaweli Development and the Ministry of Agriculture and Lands. On 10-11 December 1999 the Panel were taken on a field trip to Kirindi Oya in southeast Sri Lanka to observe one of IWMI's Health and Environment programme activities on a site where IWMI has had a long presence and studied many aspects of irrigation management.

On 12 December 1999 the Panel split up into two groups, one going to India and the other to Pakistan. The three members of the Panel who visited India spent two days in Delhi and met senior officials in the Ministry of Water Resources, CWC, WAPCOS, CADA, ICID, and ICAR and the Ford Foundation, as well as collaborators on several of IWMI projects in India (e.g., with IIMA in Ahmedabad, the Irrigation Department of Harayana, NRSA in Hyderabad, GIDR in Ahmedabad), a senior agricultural policy economist, and IWMI's representative in Nepal. Upon completion of these meetings, this sub-Panel joined the other group in Pakistan. The Pakistan sub-Panel met with a range of senior officials from the Ministries of Irrigation and the Ministry of Food and Agriculture (national and provincial), the Chairman of PARC, senior officials of the World Bank in Lahore, and staff at the University Law College in Lahore during the period 12-15 December 1999. The group also visited an IWMI Pakistan irrigation research project.

Two Panel members visited the IWMI's Mexico country programme from 18 to 20 January 2000 and two Panel members visited the IWMI South Africa country programme from 31 January to 3 February 2000. In both cases Panel members met with senior officials in various relevant government offices, IWMI field staff and relevant Water Users Associations and NGOs and, in addition, had an opportunity to observe field research at each site.

On 14 February 2000 the Panel reassembled in Colombo, Sri Lanka for the Main Phase of the review. Again, Panel members interacted with the Board, management and scientific and support staff, individually and in programme groups.

Panel draft chapters of the report were shared with the Director General in a progressive fashion. On 29 February 2000, the Panel Chair presented the Report of the Panel to the Board and senior management, and subsequently to the staff.

## GLOSSARY OF ACRONYMS

ADB	Asian Development Bank
AfDB	African Development Bank
AGM	Annual General Meeting
AIMS	Applied Information and Modelling Systems
ARI	Agricultural Research Institute
CABI	CAB International
CADA	Command Area Development Authority
CBC	Committee of Board Chairs
CCER	Centre-Commissioned External Review
CD	Compact Disk
CGIAR	Consultative Group on International Agricultural Research
CIP	Centro Internacional de la Papa
CWC	Central Water Commission
DANIDA	Danish International Development Association
DDG	Deputy Director General
DG	Director General
EPMR	External Programme and Management Review
ET	Evapotranspiration
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GIDR	Gujarat Institute of Development Research
GIS	Geographical Information System
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
H&E	Health and Environment
HQ	Headquarter
IARCs	International Agricultural Research Centres
ICAR	Indian Council of Agricultural Research
ICARDA	International Centre for Agricultural Research in the Dry Areas
ICID	International Commission on Irrigation and Drainage
ICIPE	International Centre of Insect Physiology and Ecology
ICLARM	International Centre for Living Aquatic Resources Management
ICRAF	International Centre for Research in Agroforestry
ICW	Inter-Centres' Week
IFPRI	International Food Policy Research Institute
IIMA	Indian Institute of Management
IIMI	International Irrigation Management Institute
IMT	Irrigation Management Transfer
INRA	Institut National des Recherches Agronomiques
IRRI	International Rice Research Institute
IT	Information Technology
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
IWR	Irrigation and Water Resources

MTP	Medium Term Plan
NARS	National Agricultural Research Systems
NGOs	Non-Governmental Organizations
PC	Programme Committee
PEEM	Panel of Experts on Environmental Management for Vector Control
PIM	Policy, Institutions and Management Programme
PPM	Programme Planning Meeting
SCOR	Shared Control of Natural Resources
SSA	Sub-Saharan Africa
SWIM	Systemwide Initiative on Water Management
SWOT	Strengths, Weaknesses, Opportunities and Threats
TAC	Technical Advisory Committee to the Consultative Group on International Agricultural Research
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	US Agency for International Development
WARDA	West Africa Rice Development Association
WHO	World Health Organization
WWF	World Wildlife Fund