IWMI
International
Water Management
Institute

Annual Report 2002–2003

Challenging people to think differently about water

Research Summaries & Policy Recommendations

Contents

Strategic Plan 2000-2005 largely implemented

In November 2000, the IWMI Board adopted a new Strategic Plan that set out the strategy along a number of clear ideas: growth leading to a doubling in size, financially, to achieve a sustainable scale; a new matrix-management structure with regional offices and global themes cutting across regions; rapid decentralization of the Institute's research capacity from HQ to regional offices; strong growth priorities in Africa, India and thereafter in China; establishment of benchmark basins around which long-term research programs are developed; increased emphasis on capacity building; increased emphasis on partnership; and gradual but very significant changes in the Institute's internal processes.

In late 2000, we felt that the objectives in our Strategic Plan were very ambitious. But we thought they were necessary to achieve our mission: the improved management of water and land resources to achieve increased food security, improved rural livelihoods and a sustainable environment.

IWMI has since experienced a period of vigorous growth. The budget of the institute has more than doubled (from US$8.9 million in 2000 to US$21 million in 2003), as has the research capacity. We have moved more than half the research staff from HQ to regional offices. The share of "HQ overhead" as a percentage of the total budget has dropped from 29 percent in 2000 to 16 percent in 2002. A strong capacity building program has enabled some 30 PhD students to do their graduate research as part of the IWMI research program in sandwich constructions with more than 10 universities and to the appointment of some 25 PostDocs and Associate Experts. On top of that we have considerably changed the "position" of the institute from a small Institute at the margins of the CGIAR, to one that plays a fairly central role in the CGIAR and has high visibility in the international water world. We have also made steps towards the development of key roles, complementary to knowledge generation, that help us become "knowledge brokers:" in knowledge dissemination and application.

Key events in 2002

In 2002, for example, IWMI played a key role in a number of high-profile events that jointly had a significant impact on the water-policy arena.

1. IWMI strongly supported the establishment of the Africa Water Task Force (AWTF) and its meetings, including a major stakeholder conference in Accra.
2. IWMI was responsible for the organization and facilitation, with the Thai government, ESCAP and ADB, of an Asian ministerial roundtable on water resources management in Bangkok in May.
3. IWMI was responsible for the organization of the WaterDome, with the AWTF, a massive event at the UN-World Summit on Sustainable Development; a project with a budget of over US$4 million, opened by Mr. Nelson Mandela.

4. IWMI also organized the First International Water Conference in Hanoi, in close collaboration with the Government of Vietnam—and with a focus on the Dialogue on Water, Food and Environment in October.
5. IWMI was the lead partner in the development of the CGIAR Challenge Program on Water and Food, ending with its approval at the CGIAR Annual General Meeting.

And these are just the "special events." At the same time, we have made steady progress with the development of our regional offices, a number of key new areas within the themes, and implementation of new partnerships and initiatives that range from the Global Water Partnership Resource Center in Colombo, the Systemwide Initiative on Malaria and Agriculture (SIMA), the IWMI-TATA Water Policy Program in India, to the Comprehensive Assessment of Water for Agriculture.

Change management processes

While the development of our offices, themes, partnerships and new initiatives is the most visible for the outside world, the changes that have the most immediate impact on our staff and probably more impact on our outputs and impacts in the field in the long run—be it much more indirectly—are the ongoing change-management processes. The combined impact of the organizational changes implemented in early 2001, the strong growth and the interlinked set of change management projects are indeed fundamentally transforming the organization. Our quality management system, new accounting system, better project management and recording of time spent on each activity are making IWMI more accountable to its donors and partners. The reorganization of our Human Resources function and all related systems is having a far-reaching impact on all staff, increases diversity for the organization and improves career opportunities for all staff. While these changes are not all "bedded down"—I do see major progress towards our ultimate goal of developing a truly performance- and impact-based culture at IWMI.

Outstanding Scientist of the year 2002: Dr. Tushaar Shah

A nice symbol of IWMI's new standing in the CG-community was the award to Dr. Tushaar Shah, IWMI's Theme Leader of the Sustainable Groundwater Management Theme, of the CGIAR Outstanding Scientist of the Year Award in November 2002. This was the first major CGIAR honor awarded to an IWMI scientist. It is a high honor for Dr. Shah and recognition for IWMI's work as well that we deeply appreciate.

All in all, as we evaluate where we stand in mid-2003, compared to the moment when we adopted the 2000-2005 Plan, we conclude that the large majority of the ideas tabled then have indeed been implemented. It is therefore appropriate that we assess the impact these changes have had, and update our strategies—a process that is ongoing in 2003.

Remo Gautschi
Chairman of the Board of Governors

Consolidation and reflection

Shortly after the CGIAR approved the Challenge Program on Water and Food, an IWMI staff member asked me anxiously, what new initiatives I would be cooking up next. The staff of IWMI have risen to the challenge on numerous occasions in the last few years—organizing the WaterDome, for instance, where we did wonder occasionally whether we had bitten off more than we could chew. The question reveals, however, that some feel they have been stretched and stretched to the limit. New directions, new offices, new colleagues, new ways of working. There is usually a nice buzz at IWMI—'we are on the move' as our chair wrote 2 years ago—but we recognize that enough change can be enough as well.

That is why, in 2003, we have a year of relative calm and "reflection" on where we stand. Certainly, we are in the midst of the development of the Challenge Program on Water and Food, and that is not a small undertaking. We are also still in the middle of consolidating the changes initiated earlier. So life at IWMI is not stagnant.

The key questions for our process of reflection are:

- Does our work have a positive impact in terms of our mission and how should we define and measure this?
- Are our perceptions of the research priorities in line with those of our stakeholders?
- How do our stakeholders appreciate the changes we have initiated over the last 2-3 years?
- What is the view of the stakeholders on the areas where IWMI can add value, particularly the key roles of IWMI in terms of knowledge generation and knowledge dissemination?
- What strategies can we formulate to direct our development in the coming years?

External evaluation and strategic plan update

In order to answer these questions we have started several processes: a) an analysis of types of impact and an attempt to evaluate impact ex-post for specific pilot projects; b) a center-commissioned external evaluation of IWMI as an organization; and c) a stakeholder-driven update of our strategic plan.

For the 2004-2008 update of the IWMI Strategic Plan, the process starts with a consultation of the external stakeholders, through a series of regional workshops, in-depth interviews, questionnaires, as well as the external review. The intent is also to formulate the strategies and targets in terms of outputs and impacts, rather than in terms of inputs.

Performance and impact culture

Through several of the change management projects, as well as the impact, evaluation and strategic plan exercises described above, the performance and impact culture at IWMI will be strengthened. While most of this culture will remain intangible, it is also our intention to develop as-quantitative-as-possible indicators of performance and impact from the level of the individual and the project all the way up to the institute as a whole.

How the Challenge Program is changing the way we do business

At IWMI we clearly see the urgent need to change the way the CGIAR does business: particularly to open it up to a wealth of truly level-playing-field partnerships. The Challenge Programs were not simply intended as a vehicle for bringing in additional funding but as a key plank of the CGIAR restructuring program. The CGIAR Challenge Program on Water and Food, implemented by a joint-venture (consortium) of 18 partners, led by IWMI, has a dual objective. It aims to have a major impact on how water is used in agriculture—and increase water productivity in the broadest sense in key river basins. It also aims to impact the way we do business in the CGIAR. Both of these are ambitious goals. Lack of progress towards these goals at short notice, however, will have serious consequences for the confidence that the CGIAR members place in the system. If we cannot demonstrate a serious commitment to meaningful change, then the writing is on the wall.

The Challenge Program on Water and Food is only in its initial development stages, but it has successfully completed the first round of the first call for proposals for competitive research grants. Over 340 valid concept notes were submitted by a wide variety of partners inside and outside the CGIAR and evaluated by a panel of about 30 independent, external reviewers. Some 100 will now be developed into full proposals to be submitted in September and evaluated again. By the end of the year, that should give the program a portfolio of research projects with participation of between 50 and a 100 research organizations.

A challenging step on what we hope will be a long and successful road towards a major program that shapes international research on water and food in developing countries. To date all early indications are that the Challenge Program will, if nothing else, change the way we do business at IWMI.

Baseline Conference, November 2-6, Nairobi

We will present the progress on this Challenge Program to the CGIAR-family at the first major 'outing' of the program—the Baseline Conference that will be held from 2 to 6 November in Nairobi, immediately following the AGM. This will be a good opportunity for all to test their assumptions on the potential of challenge programs for the CGIAR through close scrutiny of this first 'pilot.' We welcome your participation and feedback!

Frank Rijsberman
Director General

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THE WATERDOME:

Putting Water on the Global Development Agenda

The WaterDome, a parallel event to the World Summit on Sustainable Development, focused international attention on the water and development link. Organized by IWMI on behalf of the Africa Water Task Force, the Dome attracted some 15,000 visitors, including over 100 ministers of water, agriculture, environment and development, as well as many heads of state and international development agencies. It was made possible through primary funding from the Government of the Netherlands with additional support from over 50 governments, international development organizations, water programs, NGOs and private organizations.

Speaking to those gathered for the opening of the event, Nelson Mandela said, "The WaterDome itself is a symbol for cooperation in the water sector. Over 70 organizations from the public as well as the private sector are present to demonstrate the way we are working together to make access to water a basic right for all human beings."

Some developments that emerged from the Dome include: the ratification of the African Ministers' Council on Water and the African Water Facility, two trans-boundary integrated water resources agreements in Africa—the IncoMaputo (Swaziland, Mozambique, South Africa) and Lake Malawi/ Niassa/Nyasa (Malawi, Mozambique, Tanzania), and the launch of a significant number of new initiatives—including the CGIAR Challenge Program on Water and Food—with initial pledges of over $200 million.

The Dome's Water and Food Security Day, organized by IWMI, and the pavilion sponsored by the Comprehensive Assessment of Water Management in Agriculture (SWIM 2) enabled the CGIAR to bring the message to the world that agriculture is the place where most of the developing world's water supplies are used (up to 90% in some countries) and where better management of water has the most potential to alleviate growing scarcity and competition for water.

"We called for action—for urgent attention to tackle the world water crisis—but also celebrated the fact that so many people could come together under one roof. We celebrated our diversity of backgrounds with the conviction that all—from all water subsectors, from all parts of the world, from governments, NGOs and the private sector—have a role to play in achieving water security," said IWMI Director General, Frank Rijsberman.

The Dome ensured that, with the exception of sustainable development itself, the international media covered water more than any other issue at the Summit. Professor Albert Wright, Chair of the Africa Water Task Force, commented on the outcome of the Dome, "The attention by the media on the water issues and the world water crisis has been intense—public awareness has increased tremendously. With the help of many truly committed water persons, from President Mandela to the hundreds of people in the stands, we have had an enormous impact on this Summit, a very effective water lobby in the most positive sense of the word."

Agnes van Ardenne, Minister of Development Cooperation for the Netherlands, announces a pledge of 25 million Euro to the CGIAR Challenge Program on Water and Food.

David Molden, IWMI Principal Researcher and leader of the CGIAR's Comprehensive Assessment of Water Management in Agriculture, with Ian Johnson, CGIAR Chair, and James Wolfensohn, World Bank President, explains the CG's water research to the Netherlands' Crown Prince and Princess.

Nelson Mandela, a self-declared "water person", opens the WaterDome with a speech on the importance of ensuring water for Africa 's poor.

IWMI's Partnership with the Africa Water Task Force

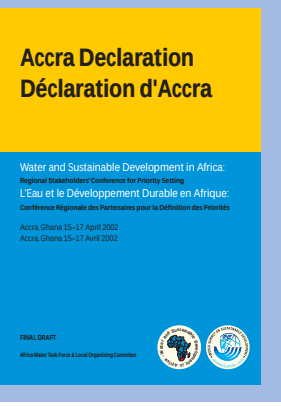
The Africa Water Task Force was originally established to help define and synthesize African priorities for the World Summit on Sustainable Development and the 3rd World Water Forum. Based on its success, the Task Force's mandate has been extended. It continues to help define an African agenda for action on water, promote sustainable water use in Africa as a key item on the international development agenda and foster collaboration on water issues.

IWMI is an active supporter of the Task Force—contributing research knowledge and providing secretariat services. In this capacity, IWMI organized the WaterDome (see article, facing page)—to fulfill the Task Force's aim of ensuring Africa's water needs, which received attention at the World Summit.

Says Chair of the Task Force, Professor Albert Wright, "Our quick, successful start was only made possible through the continuous strong support from the International Water Management Institute. Putting your money where your mouth is, taking a risk with partners you trust, is a sign of the true partnership we have enjoyed with IWMI."

As a lead-up to the Summit, IWMI also participated in the stakeholders' conference held in Accra, Ghana in April 2002. Sponsored by the Government of the Netherlands and organized by the African Development Bank, the conference brought together more than 200 participants from 42 countries, including 6 African Ministers responsible for water, senior government officials, and representatives from NGOs, universities, river-basin organizations and international research organizations active in the region.

The primary outcome of the Conference was the Accra Declaration on Water and Sustainable Development. The Declaration sets out recommendations of areas for action and next steps for meeting Africa's water challenges. The conference also endorsed the African Position Paper on Water and Sustainable Development developed by the Task Force. Both documents were published by IWMI and are available on the Institute's website: *www.iwmi.cgiar.org/accra2002/index.htm*



Recognition for IWMI Researchers in 2002

Felix Amerasinghe: Had his name and profile included in the first edition of '2000 **Outstanding Scientists of the 21st Century,'** published by the International Biographical Centre, Cambridge, UK.

Marna De Lange: Received the **Dr. Hassan Ismail Memorial International Award,** 2002, for her work in the management of water in agriculture and was also recognized by the South African government with the **Women in Water Award.**

Eline Boelee: Received the **ICID Award for Excellence** in Organizing a Special Session on Malaria and Agriculture.

Nitish Jha: Received the **Harold K. Schnieder Prize** from the Society for Economic Anthropology for his dissertation: "Research on Gender and Decision-Making in Balinese Agriculture."

Tushaar Shah: Honored with the **CGIAR Outstanding Scientist of the Year Award** for his work in improving water policies—particularly in the sustainable management and use of groundwater resources.

Abdul B. Kamara: Given the **Josef G. Knoll Science Award** for his dissertation: "Property Rights, Risk and Livestock Development in Southern Ethiopia."

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Ministerial Roundtable on Water Sector Challenges, Policies and Sustainable Development in Asia

A roundtable discussion organized by IWMI, the Economic and Social Commission for Asia Pacific of the United Nations (ESCAP) and the Office of National Water Resources Committee of the Royal Thai Government brought together Ministers of ten Asian countries to discuss and address the challenges for water and sustainable development in Asia. The meeting resulted in a joint statement on shared priorities and points for action. The ten countries represented were Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam. The Asian Development Bank (ADB) sponsored the event, which took place in Bangkok from 22nd to 23rd May 2002.

One of the factors with a direct bearing on the issues under discussion was the acute shortage of funds for water-infrastructure development and management. The ministers also acknowledged the need to enhance the socioeconomic value of water and to realize its potential for food production, employment generation and poverty reduction.

In the course of discussion, areas for regional cooperation were also identified. These were knowledge-sharing opportunities, scope for comparative research, workshops and seminars, training and capacity building. The discussion concluded with a list of water priorities to be addressed in Asia, such as:

- The need for more investment in the development of infrastructure to improve irrigation, drainage, hydropower, water supply and sanitation.
- Reduction of water pollution.
- Protecting and sustaining catchment areas and fragile ecosystems, including wetlands.
- Funding for water-resources development and management from local communities and governments.
- Minimizing the harm caused by floods, droughts, pollution and diseases.
- Institutional development and capacity building for administration of water rights, decentralization and irrigation-sector reform.
- Maximizing the productivity and social and economic benefits from water resources.

Read the complete Ministerial Statement at *www/iwmi.cgiar.org/wate-in-asia/joint_statement.htm*

Water Policy Briefing Series

IWMI has launched a new series, *Water Policy Briefing*, to translate peer-reviewed research into useful information for policymakers and planners. The series was originally developed for India, with support from the Sir Ratan Tata Trust. Based on the positive response it has received from Indian policymakers, it has recently been expanded to encompass research from other regions.

The series synthesizes policy implications and recommendations from IWMI research and those of partners, such as the Comprehensive Assessment of Water Management in Agriculture (SWIM-2). The goal is to introduce research thinking into the policy-planning process. Some topics covered by the series include pro-poor irrigation management transfer, the challenges of integrated river-basin management, and innovations in groundwater recharge.

The Briefings can be downloaded at *www.iwmi.org/waterpolicybriefing*

Defining the Water-Energy Nexus

The overexploitation of groundwater resources in many parts of India has resulted in more than just declining water tables; it has also proved a drain on the country's power supply. As water tables decline, more and more energy is needed to pump water from greater depths. Electricity pricing has contributed to the situation of uncontrolled pumping—giving farmers no incentive to start using the resource more sustainably.

Bridging the gap between the water and power sectors needs to be an important consideration in any attempt to contain India's growing water crisis. The USAID-funded Water Energy Nexus Activity (WENEXA) attempts to do just this: observing the problems associated with the interactions between the two sectors, and aiming to address these problems through reform. It looks at policy dialogue, enhanced commercial management, watershed management and customer service.

As a WENEXA partner, IWMI is contributing research thinking to the problem. In the past year, the Institute has participated in a number of dialogues at the national, local and state level—with policymakers and with farmers.

Information on the Water-Energy Nexus Farmers' Meeting in Maheshwaram Watershed is available at *www.iwmi.cgiar.org/india/maheshwaram.htm*

Evaluating the Success of Merger with IBSRAM

The International Board for Soil Research and Management (IBSRAM) became part of IWMI in April 2001. Amado Maglinao, formerly of IBSRAM, now a researcher with IWMI's Southeast Asia office, discusses the transition and the impacts of the merger.

One of the main reasons IBSRAM decided to become part of IWMI was because it had not previously been part of the CGIAR system. It was only a small research center and we found it difficult to attract investment and continue our activities.

Working with IWMI has meant that we have been able to implement a more integrated land- and water-resources strategy. And I think, in Southeast Asia particularly, IWMI's emphasis on land-resources management has been a direct offshoot of the merger.

The Management of Soil Erosion Consortium (MSEC) and the Asialand network—programs initiated by IBSRAM—have been successfully continued under IWMI. These initiatives are addressing soil erosion and sustainable soil and water management in upland areas. Their associated research networks, which between them cover nine Asian countries, have been valuable additions to IWMI.

While most of our work is currently in Southeast Asia, IWMI plans to expand its land management projects into Africa. Work has already been initiated, and plans to set up a network similar to that in Asia are currently underway.

For more information on IWMI's land management research, see *www.iwmi.cgiar.org/livelihoods/landdegrad.htm*

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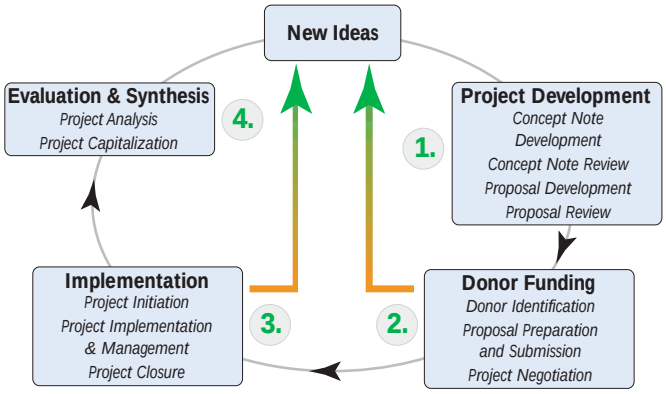
Quality Management at IWMI

IWMI's Quality Management System (QMS) Program is one of four Change Projects outlined in IWMI's Strategic Plan 2000–2005. The result of this reform will be ISO9000 certification in 2004 and a more efficient, smoothly running Institute. Project Leader, Upeka Kariyawasam, describes the goals of the QMS and IWMI's progress.

The QMS project began with the formation of a Quality Team in 2001, comprising staff from Headquarters and each of IWMI's regional offices. With assistance from the Quality Team and the Management Team, IWMI staff have formulated the procedures for their respective departments through brainstorming and discussion. The next steps are internal audits to ensure that procedures are working and determine if they need to be modified, and a pre-assessment in preparation for the ISO evaluation.

One of the first 'products' to emerge from QMS was the Research Project Cycle—a module that clearly defines the stages a research project goes through, from concept to completion. This Life Cycle, along with relevant procedures, requirements and worksheets is now available on the IWMI-intranet—as an active resource for both researchers and support staff.



IWMI Research Project Cycle

The benefit of a QMS is not only a more productive organization but also a better integrated one. After going through the process of developing a QMS, staff understand better how their colleagues in other departments work. In many cases, this results in increased respect and more active collaboration between departments. It is really very challenging but rewarding to see how people define each stage of their work and create a process, and finally how people and processes fit together.

Water Uses and Local Institutions—Lessons from Nepal

IWMI Nepal Briefs provide examples and practical summaries of research for policymakers and water managers. The two most recent additions to the series focus on research in the Indrawati river basin. Several new water-development projects are planned for the basin, including the Indrawati Hydropower Project and the interbasin Melamchi Water Diversion Project, which proposes to divert water from one of the Indrawati tributaries to the Katmandu valley to meet growing urban demand.

Nepal Brief 8 analyzes existing processes of inclusion and exclusion of stakeholders in water-resources management and development and how the interests of potentially disadvantaged groups can be better protected. Number 9 explores existing institutional arrangements (both formal and informal) for water allocation, negotiating between different water uses, water rights arrangements and conflict resolution.

The Briefs are available at www.iwmi.org/pubs.

The Hyderabad Declaration on Wastewater Use in Agriculture

Current estimates suggest 20 million hectares worldwide are irrigated using partially diluted or undiluted wastewater. The practice supports livelihoods and generates considerable value in urban and peri-urban agriculture, but it also poses significant health and environmental risks (see article, page 28).

In November 2002, IWMI, with support from Canada's International Development Research Centre (IDRC), convened an international conference to bring together thinking on wastewater use and lobby for practical approaches to limiting risks. The result is the Hyderabad Declaration on Wastewater Use in Agriculture, a set of recommendations drawn up by 40 researchers from 18 countries and 27 international and national organizations, including the World Health Organization (WHO).

Recognizing the value of wastewater to farmers in low-income countries, the declaration recommends improving the practice of wastewater irrigation viewing this as a resource, over an outright ban. The Declaration stresses the importance of undertaking cost-effective and appropriate treatment, and where this is not possible recommends measures to help provide adequate protection for farmers and consumers.

These include developing and applying guidelines for untreated wastewater use that safeguards livelihoods, public health and the environment; applying appropriate irrigation and agricultural practices that limit health risks; and developing education and awareness programs for all stakeholders to disseminate the proposed measures.

A joint statement from participants at the meeting urges policymakers, governments, donors and the private sector to "safeguard and strengthen livelihoods and food security, mitigate health and environmental risks and conserve water resources by confronting the realities of wastewater use in agriculture through the adoption of appropriate policies and the commitment of financial resources for policy implementation."

IWMI "PostDoc" Program: A View from the Inside - Regassa Namara

I wanted to join IWMI since, from my earlier field experience, I came to understand that sub-Saharan Africa failed to experience a green revolution of the type seen in Asia because of inadequate investments in water management initiatives and a lack of technical knowledge. In Ethiopia, where I come from, people are exposed to famine and hunger not because of the absolute scarcity of water, but due to a lack of appropriate management practices.

My current research work focuses on the *assessment of innovative water-management approaches,* such as the System of Rice Intensification (SRI)—low cost micro-irrigation systems in Sri Lanka and India. The SRI practice uses organic fertilizers, less water, manual weeding devices and different planting configurations, to produce higher paddy yields. The practice is especially relevant for those who have little cash and are reliant on rice for household food security. It may be *labor-intensive,* but it is advantageous from a resource conservation point of view.

I like the informal working environment, and the human-centered management style of IWMI, but I would like to see more research of micro-level activities, since I believe the success of interventions largely hinge on micro-level behaviors and responses. Work with farmers and other stakeholders in watersheds and river basins should be strengthened, as this is where research results are put to the test.

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Expanding Research and Building Capacity in West Africa

Supported by an office in Accra, Ghana, IWMI's research in West Africa has expanded over the past 3 years to encompass more work on urban and peri-urban agriculture—determining its impacts on food supply, income, health and the environment and identifying opportunities to improve the productivity of this activity. Rainfed agriculture is another growing area of research in West Africa. This work will provide smallholders and West African governments with strategies for sustainable intensification.

Does urban agriculture increase malaria risk?

Increasing urban agriculture can improve household food security, but it can introduce breeding sites for malaria vectors within a city, allowing the disease to spread into areas previously considered malaria-free. IWMI research looks at the evidence—the economic implications of this possible risk and how it could be reduced, for example through improved irrigation methods. In 2002, researchers completed a pilot study in Kumasi, Ghana and are now exploring options to work in Burkina Faso, Benin, Senegal and Togo.

How can co-composting waste be a win-win option for desperate cities?

Waste management is one of the more serious environmental problems confronting urban governments in West Africa. Co-composting for many of these cities may be a win-win situation—safely disposing of waste while improving soil organic matter and nutrients for agriculture. IWMI research in this area is working to identify and promote safe and viable composting options for municipal authorities and farmers.

How can wastewater irrigation help urban farmers without compromising health?

IWMI's research on wastewater irrigation in West Africa is generating safer options for urban and peri-urban farmers and consumers in the region as well as contributing to IWMI's worldwide research program on this issue. The research focuses on the use of wastewater to irrigate high-value vegetables—an increasingly common practice in and around West African cities, where wastewater is often the only available water resource for poor farmers.

In all these projects on urban and peri-urban agriculture IWMI collaborates with several local and foreign universities. In total, more than 100 students have done their thesis-research through IWMI projects.

IWMI hosts the regional GLOWA-Volta project office—GLOWA is an initiative of ZEF (Center for Development Research, Germany) to improve integrated sustainable use of water in the Volta basin. The IWMI West Africa Office is also hosting the Volta Benchmark Basin Coordinator for the Challenge Program on Water and Food. For more information on IWMI research in West Africa, see *www.iwmi.org/africa/index.asp*

Re-Defining IWMI as a Knowledge Organization

IWMI embarked on a knowledge-sharing initiative in January 2001, which led to the creation of the institute's Information and Knowledge Group in 2002. The group brings together the institute's communications, scientific publishing, e-library and resource center and information and communication technologies professionals into one team, at the service of the Institute's researchers. Michael Devlin, IWMI's Chief Knowledge Officer, explains how IWMI is integrating these activities.

IWMI is working to redefine itself as a knowledge organization. This buzzword is now used by many organizations. For IWMI, it means a number of specific things that will drive the way we do business over the coming 5 years.

Internally, IWMI is working to build a culture of knowledge sharing, which will improve the effectiveness of our research. To do this we are putting in place a number of practices, information tools and platforms. The goal is that staff in all IWMI offices—from Ghana to Laos—have rapid access to information and to the experiences of others. Simple web work spaces and databases can be put in place rapidly for researchers to work together—whether it's to develop a proposal, manage a project or interact with partners. A part of this is 'learning before, during and after,' simple techniques we can use to learn from others' experiences.

High-performance information platforms are a major investment. The best way to develop platforms needed to share our knowledge is to work with interested CGIAR centers to develop common tools—to the benefit of all players and to our NARS partners, with whom we can share them.

Another aspect of IWMI as a knowledge organization is services this group provides to give our research a maximum impact. Recommendations derived from our peer-reviewed research feed into the Water Policy Briefing series and to planned face-to-face interactions with potential beneficiaries to help them think differently about how they can solve their water problems. Strong links with partners (NGOs and others) to reach the educational communities and the field level will help extend the impact of our research.

An emerging activity for IWMI is the role of 'knowledge broker.' As a key partner in programs such as the Challenge Program on Water and Food, the Comprehensive Assessment of Water Management in Agriculture (SWIM 2) and the CGIAR's SIMA Malaria and Agriculture initiative, IWMI and other international centers are well placed to encourage the exchange of experience and solutions between researchers and development professionals in developing countries worldwide.

Four priorities for knowledge-sharing at IWMI

- Embed a learning culture in the Institute, learning from experiences, successes and failures.
- Be more effective in transferring research results to users and partners, and to make IMWI a more relevant force to all those we work with.
- Build strong partnerships to deliver research results and impacts more effectively.
- Make the research process more effective within IWMI and integrate more with the CGIAR system—adding value to the work of other centers and reducing duplication.

Connecting the "Bright Spots" to Reverse Land and Water Degradation

Degradation and loss of land and water for agricultural use pose an increasing threat to national and individual food security in many parts of the developing world. Agro-ecological systems and societies are resilient up to a point, but subject to collapse when degraded beyond that threshold.

Although the aggregate picture is quite worrying, there are also many 'bright spots' where either local adaptation or external intervention has stopped or even reversed degradation. Learning from these successes has, and continues to be, an important part of IWMI's research into smallholder land and water management.

This research has produced a global survey of locations where degradation of land and water resources interacts with household food security. Several field studies are already underway to look more closely at specific promising bright spots. One study, conducted through the Institute's Southeast Asia Regional Office, is looking at the use of clay-based technologies to improve the intrinsic soil chemical and water retention characteristics of degraded marginal soils.

The next step in this approach is to understand the link between degradation and poverty and the potential impact bright spots can have on poverty. The result of this research will be a global survey of areas where land and water degradation is being successfully reversed and guidelines for assessment and analyses to help bright spots spread.

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Making Wetlands-Based Agriculture Sustainable

In Southern and Eastern Africa, more and more people rely on water in *dambos,* which are small inland wetlands, usually less than 20 hectares, to grow vegetables and other crops vital to household nutrition and incomes. Without this natural resource, farmers would be limited to rainfed agriculture—a losing proposition for the poor who are left to depend on the less-favorable conditions of rainfed lands.

But wetlands are sensitive environments. Modifications in soil moisture, groundwater and surface water levels, and the introduction of fertilizers and pesticides can have grave consequences for native plants and wildlife and can endanger the natural hydrological functions of these lands. Research by IWMI and partners, looks at ways of ensuring the poverty-fighting potential of wetlands-based agriculture is harnessed sustainably. This requires the right combination of policies, public awareness, and appropriate farming methods. The project addresses the issue of sustainable use at both field and policy levels—giving farmers and policymakers the scientific knowledge they need to make the right decisions about crop production in dambos.

The program is currently operating in eight countries in Southern Africa (Lesotho, Malawi, Mozambique, South Africa, Swaziland, Tanzania, Zambia, and Zimbabwe).

For more information on this project see *www.iwmi.org/environment*

Better Data Management

The Database Management System Project addresses one of the key needs identified during the strategic planning process in 2000—a better way to manage and make available data across research projects and regions. Wolfgang Flügel, who is leading the project, explains IWMI's approach.

Our aim is to develop and implement a standard geo-relational database management system (GRDBMS) that can be used by all IWMI regional offices. Researchers should be able to easily contribute project data and model simulations as well as extract data by spatial search engines. This database project will be completed by December 2003.

The project's final product will be the geo-spatial 'Integrated Data Information System' (IDIS), which is jointly developed by IWMI-Colombo and IWMI-Lahore—working in close cooperation. The River Basin Information System (IDIS-RBIS) is developed in cooperation with the University of Jena, in Germany. The system's structure is flexible and will take care of research subjects and themes represented in IWMI within a multinational and multidisciplinary environment.

The IDIS database at present reflects the degree of detail and information revealed from IWMI researchers so far, but its flexible object-relational design permits consistent future extension. Use of IDIS will improve the integration of common data sources established by IWMI research activities and will benefit future research work. It will provide an innovative and future-oriented solution to shared information strategies between IWMI regional offices and their international research projects.

Outputs

- IDIS: A Geo-Relational Database Management System as a standard IWMI data model.
- A web-based toolbox for data input, retrieval and presentation by means of a spatial search engine.
- Object-oriented spatial data model for dissemination and decision support.
- Capacity building through continuous involvement of staff from regional offices.

Progress of Theme 2: Sustainable Smallholder Water- and Land-Management Systems

As a result of priorities identified in the strategic planning exercise carried out in 2000, IWMI created a research theme to focus on the needs of smallholders. This theme combines IWMI's experience in low-cost water-management technologies with the land-management expertise brought by the International Board of Soil Research and Management, which officially merged with IWMI in 2001. Frits Penning de Vries, the leader of the theme, speaks of its accomplishments and the challenges ahead.

The major highlights this year in the Smallholder Theme have been the completion of phase 4 of the Asialand project, during which we helped establish conservation villages—rural villages where farmers and official leaders have become convinced of the need to conserve water and land resources, and where conservation strategies have been documented in mayoral declarations. This project mostly took place in Southeast Asia—in Indonesia, the Philippines, Thailand and Vietnam.

We have also completed a report on global land and water degradation, which has given us the opportunity to draw up policy recommendations for governments (see article, page 21), and we further developed the concept of 'bright spots,' (see "Land Degradation," page 13) places where land and water degradation have been reversed.

In Africa, IWMI has been undertaking significant research into rain-fed agriculture, analyzing successes and attempting to propagate these successes on a larger scale. Much of this will be targeted towards improving food security in former homeland areas around Pretoria. We hope, by collaborating with various NGOs, to be able to influence national policy in South Africa.

Over the coming year, IWMI will develop a comprehensive program that helps smallholders manage land and water better—again mostly in Southeast Asia—and work towards propagating research findings on a wider scale.

For more information, see *www. iwmi.org/livelihoods*

Creating a Dynamic Profile of River Basins

Benchmark Basins represent a long-term partnership between IWMI and local research institutions, government agencies and NGOs. In these locations, IWMI has made a commitment to conduct research and gather data over an extended period. The Rechna Doab in Pakistan is one of IWMI's three initial Benchmark Basins. Dr. Asad Qureshi, Acting Director of IWMI Pakistan, talks about what this new approach has meant for IWMI's work and for its partners in the Rechna Doab.

In the Rechna Doab, a subbasin of the Indus, IWMI works with national partners to study the hydrology of the basin, its institutional arrangements for managing water and land, socio-economic conditions, and health and environmental factors. Developing strong partnerships is a key element of the Benchmark Basin approach. Currently eight national partners work with IWMI to collect data, build capacity and integrate findings into basin planning and management.

On the request of partners, IWMI took a lead to develop a database for Rechna Doab. The database established by IWMI provides a platform for synthesizing knowledge, performing an in-depth analysis and comparison of historical development and understanding of current basin realities. Access to this information helps IWMI and partners to better understand basin processes and interactions as well as identify trade-offs. Partners can also use this information to determine alternative scenarios for future sustainable management of water resources in the basin.

The Rechna Doab has been a research laboratory of IWMI for more than a decade. Therefore, when considered with other benchmark basins, the data and research from the Rechna Doab basin provide a more comprehensive view of how basins are developed and how they change in response to human interventions.

For more information on the Rechna Doab, and IWMI's other benchmark basins—the Olifants in South Africa and the Ruhuna in Sri Lanka—see www.iwmi.org/benchmark.

For more information on IWMI's regional office and activities in Pakistan see: *www.iwmi.org/pakistan.*

The year in review:

outputs, impacts and new initiatives

Learning from the Innovations of Local Communities

People in rural communities across South Asia are finding practical ways to manage water, which improve their food security. In a recently completed research project, IWMI worked with a number of NGOs to identify and evaluate six smallholder water management innovations that have had a significant impact on improving people's lives.

The solutions developed range from simple rainwater harvesting and groundwater-recharge systems, to low-cost drip irrigation, practices for land preparation, rehabilitation of irrigation tanks and using wastewater as a source of valuable farm nutrients.

With its partners—PRADAN, International Development Enterprises, RITI, Seva Mandir, and DHAN Foundation, Osmania University, Self-Help Groups and Water User Associations—IWMI evaluated the positive impact of these approaches on people's livelihoods. A key part of the study was to assess the potential and the right conditions for 'scaling-up' these approaches for use by large groups of communities.

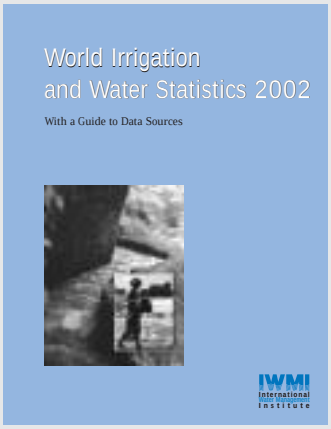
Hindi poster on wastewater reuse.

The partners are now taking the recommendations of the research forward, by launching information campaigns in the project areas in Bengali, Hindi, Telugu, Tamil and Nepali to explain these practices to a wider group of grassroots NGOs. On its side IWMI has started an initiative to bring these benefits to interested development specialists across South Asia. A further research focus that IWMI is pursuing through its Smallholder Water and Land Management and Groundwater research themes, is to study how these innovations can be transferred to improve food security for poor farmers in rural Africa.

For more information and contacts with others active in promoting innovative smallholder water management solutions, see *www.iwmi.org/smallholdersolutions*

This research was funded by DFID, UK.

New Resource for Irrigation and Water Statistics



World Irrigation and Water Statistics provides researchers, planners and other water stakeholders with rapid and easy access to a worldwide set of data on irrigation and related statistics on water resources and use. The book features an overview of the global status of irrigation and water resources, national-level data for 89 countries and data by province/state for China, India and Pakistan on key irrigation and water variables.

IWMI intends to publish the report periodically so that it becomes a dynamic, 'living' resource, which responds to the needs of the international community of irrigation and water-resources professionals.

See *www.iwmi.org/pubs*

The Emerging Water-Food-Environment Agenda

A global water-food-environment agenda is taking shape. It has grown out of a number of international initiatives and activities, including the targets set during the World Summit on Sustainable Development and the World Water Forum. The water-food-environment nexus is being increasingly recognized as inseparable from key development targets in the areas of poverty eradication, food security, and human health.

IWMI is actively contributing to this agenda through its research program and in partnerships with the CGIAR Challenge Program on Water and Food, the Comprehensive Assessment of Water Management in Agriculture (SWIM2), and the Dialogue on Water, Food and Environment.

Over the coming 5 years, these initiatives will produce a significant amount of new data, research findings and recommendations for ways to improve water management for food and environmental security. The common goal of these activities is that they produce public goods—freely available tools and information—aimed at improving livelihoods and reducing poverty.

To ensure the maximum impact from their complementary research outputs, these programs are in the process of developing a coherent strategy for an effective two-way knowledge transfer between research and its intended beneficiaries. This strategy is based on the creation of partnerships, establishment of durable communication channels, and identification of effective tools for dialogue and knowledge delivery, including shared electronic platforms.

To follow the progress of these initiatives and track the publications and recommendations as they emerge, point your browser to *www.waterfoodenvironment.org*

Integrated Water Management in a Shared Basin, Central Asia

Since the breakup of the USSR in 1992, Central Asian countries have been struggling to manage the massive irrigation infrastructure put into place during the Soviet era. Largely irrelevant due to the disintegration of large collective farms, the breakdown in maintaining and managing this infrastructure has contributed to a loss of productivity, an unreliable supply of water, and increasing poverty. In addition to this, as a result of new international borders being drawn up, irrigation and drainage systems have experienced widespread disruption. Tackling these problems has been the responsibility of the Interstate Coordination Water Commission (ICWC), formed after independence to negotiate water allocation between the Republics.

In its capacity as a knowledge broker, IWMI has been working closely with ICWC and the Swiss Agency for Development and Cooperation (SDC) in the Ferghana Valley—shared between Uzbekistan, Tajikistan, and the Kyrgyz Republic—to develop an integrated water-management strategy.

The Institute's role has involved sharing best practices for implementing water resources management along a river basin concept and participatory irrigation and drainage management, training local and regional water stakeholders in designing and establishing hydro-boundary-based institutions for water management. This makes the region's water resources management more transparent, equitable, reliable and responsive to users' needs. Through a canal-based management information system, IWMI is also helping to apply canal-performance indicators.

Stakeholder participation has been encouraged—Water User Associations (WUAs) and canal-level management organizations are being set up, and a series of regional and project training and demonstration workshops have been organized to help these groups discuss problems and resolve conflicts. A number of overseas visits for key stakeholders have been organized to expose land-locked Central Asian countries to the rest of the world and new knowledge in water management.

Mehmood Ul Hassan of IWMI's Uzbekistan Office gave some indication of the benefits IWMI and its partners were bringing to the region: 'If you look at a policy-level impact, for example, the Government of Uzbekistan has recently issued a decree to move from administrative to hydrological boundary management, partly because of principles and examples that IWMI and our partners set down in the Ferghana Valley.'

The year in review:

outputs, impacts and new initiatives

Strategic Planning at IWMI—Assessing Progress, Refining Goals

In 2000, IWMI mapped out a 5-year strategic plan with input from some 70 IWMI staff, donors and partners worldwide. The plan called for a number of substantial changes in IWMI's approach. It demanded a move from an exclusive focus on water to an approach that integrates water and land management. It created two research themes to focus more attention on IWMI's expanding groundwater and smallholder water and land management research, and called for further development of the environmental component of IWMI's health and environment research.

This plan maps out a new way of conducting field research, by transferring more staff to regional offices and making a long-term commitment to working in specific benchmark basins. It envisioned a stronger resource base, both human and financial, to support the Institute's expanded research agenda. And it defined a number of organizational change projects—timewriting, intranet, database and quality management—to increase its efficiency.

IWMI has made rapid progress in achieving the goals set out in the 2000–2005 Plan; many were met by 2003. To capitalize on its growth and consolidate changes, IWMI is updating the plan to take the Institute to 2008. In refining the vision of IWMI's future, the customers for IWMI's knowledge are driving the changes. As a basis for the 2004-2008 Strategy, the Institute is soliciting input from stakeholders through a series of surveys, regional consultations and in-depth interviews. The Strategy will also be informed by the input of the external review commissioned by IWMI in the Spring of 2003.

The objectives of the reformulation process include:

Clarifying Core Competencies

IWMI's expanded mission and research agenda have enabled the Institute to take a more integrated and holistic approach to the water-management challenges of developing countries. The revision process will identify areas within this expanded agenda where IWMI is best placed to make a significant contribution and determine how these key strengths complement those of partners and the most effective balance between scientific output and on-the-ground impact.

Integrating Research Themes

The 2000 Strategy defined five research themes; the 2004 Strategy will focus on achieving better integration between the themes and ensuring the synthesis of research results—across projects, themes and regions.

Collaborating with Other Future Harvest/CGIAR Centers

Over the past 3 years, IWMI has increased its cooperation with other Centers through joint staff appointments with IRRI, IFPRI, and ICARDA and through international initiatives, such as Comprehensive Assessment of Water Management in Agriculture (SWIM2), the Challenge Program on Water and Food, and 'SIMA' the Systemwide Initiative on Malaria in Agriculture. In the next 3 years, the Institute will work with other Centers to identify complementarities and ensure that research topics relevant to multiple Centers are tackled through joint programs.

Improving the Planning Processes

The new Strategy will more clearly define mechanisms to ensure a coherent research agenda that includes a mix of projects to address current needs and 'proactive' research on

emerging issues. These include linking the Institute's project planning cycle more closely with regional/national research prioritization processes, and the continued support of long-term research through strategic use of unrestricted funds.

Tapping Financial Resources

The Institute has shifted its approach to resource mobilization—from seeking funding for a range of individual projects to a more focused effort on larger programs built on strong partnerships and "umbrella" programs, which consolidate a number of smaller projects. IWMI will continue to pursue this strategy, while seeking more funding to synthesize research results across projects, broadly disseminate them, and look for local funding to support activities in the benchmark basins.

Risk Assessment

A key component of the strategic planning process is identifying and addressing risks that could inhibit the Institute's ability to achieve its objectives and incorporating risk-assessment mechanisms into IWMI's operations. These include business risks (inability to anticipate and react to changes in external conditions), financial risks (ability to manage finances and the safeguard assets), internal risks (lack of proper management-reporting structures, weak implementation, ineffective monitoring, poor internal information), and reputational risks (risk of an incident negatively affecting the image of the Institute, and diminishing its ability to raise funds).

As a first phase, IWMI has joined the CGIAR Regional Internal Audit Team, which brings together IRRI, IPGRI and World Fish Center. The team's primary emphasis is on identifying risks and ensuring that adequate controls are in place to minimize them. IWMI has already incorporated a number of controls into its Quality Management System. Other phase 1 activities include an audit of IWMI's computer services, completed in 2002.

IWMI Achievements Documented by External Review—Based on the 2000-2005 Strategic Plan

- Shift of focus from primarily knowledge generation through high-quality scientific research to knowledge generation and its application on the ground.
- Expansion of the scope of its work to integrated land and water management for achieving efficient, equitable and sustainable use of these resources.
- The importance given to 'benchmark basins' and rightly so, as the locus of site-specific research relevant to integrated management and demonstrating its application.
- Emphasis on working in collaboration with, and as partners of, other CGIAR institutions, international organization, NARES and local research institutions; and NGOs and ARIs.
- Substantial expansion of programs for training of researchers (post-docs and associated experts), and capacity building activities in substantive water, land, and environment.
- A certain amount of consultation at national levels, with the view of matching research priorities with recognized local needs.
- Conscious efforts to publish research findings in refereed journals (as a means of ensuring its international recognition as a leading research institute).
- Internationally recognized leadership role in the major multi-stakeholder programs: *System-wide Initiatives:* Challenge Program for Water and Food, The Comprehensive Assessment, and System-wide Initiative on Malaria and Agriculture. *Hosted programs:* The Dialogue on Water, Food, and Environment and Resource Centre for Global Water Partnership.

How Do We Get More Crop from Every Drop?

By improving the productivity of water used for agriculture, it is possible to reduce the amount of additional freshwater withdrawals needed to feed the world's growing population to zero. But this requires a commitment to institutional and management reforms and substantial investment in crop research, technology, and infrastructure.

There are a variety of interconnected paths that can improve the productivity of water. No single path holds the answer. To be successful, we must develop integrated strategies tailored to the needs of specific regions and river basins.

Crop breeding can help achieve higher yields per unit of water and produce more drought-tolerant crops and others that thrive on low-quality saline/alkaline water.

Technologies and practices that give farmers more reliable access to water (treadle pumps and water harvesting), conserve water (zero tillage, land leveling and deficit irrigation) and prevent land and water degradation (erosion control technologies) all contribute to increased water productivity.

Improving irrigation-management practices to ensure a reliable water supply that reduces yield reduction due to water stress, and encourages investment in productivity-enhancing inputs.

Integrating water recycling and reuse into basin and irrigation management helps get the most from this common practice, while reducing harmful impacts on water quality, human health and the environment.

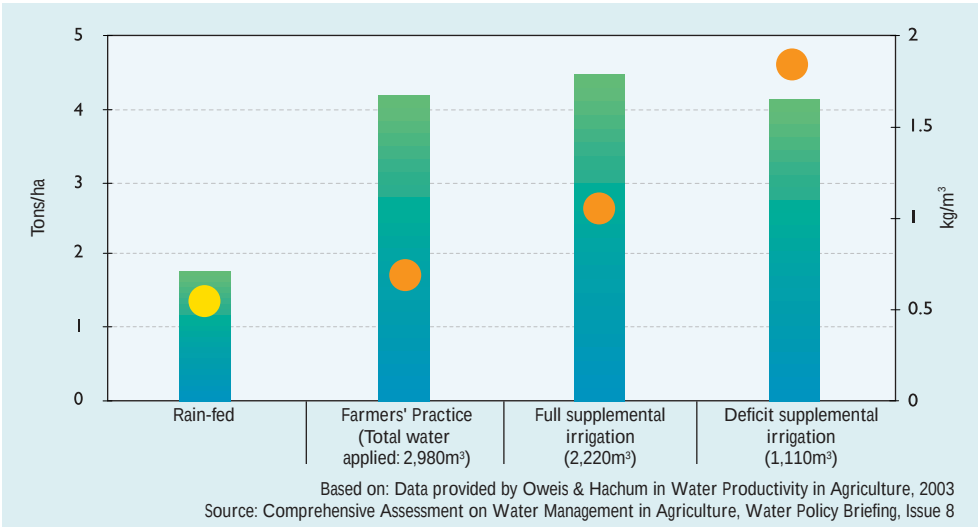
Research Program:
Comprehensive Assessment of Water Management in Agriculture (SWIM2)

This summary is based on the Water Policy Briefing *Improving Water Productivity: How Do We Get More Crop from Every Drop?*

Research source:
Kijne, W.J.; Barker, R.; and Molden, D. 2003. *Water productivity in agriculture: Limits and opportunities for improvement* (Comprehensive Assessment of Water Management in Agriculture, No. 1). Wallingford, U.K.: CABI Publishing.

The complete Policy Briefing is available on the Annual Report CD-ROM and at www.iwmi.org/waterpolicybriefing

Comparison of yields and productivity for rainfed, full irrigation and supplemental irrigation



Based on: Data provided by Oweis & Hachum in Water Productivity in Agriculture, 2003
Source: Comprehensive Assessment on Water Management in Agriculture, Water Policy Briefing, Issue 8

Supplemental irrigation in rainfed areas improves water productivity by preventing yield reduction due to water stress and reducing vulnerability to drought. **Deficit irrigation** maximizes water productivity by allowing crops to sustain some degree of water deficit and holds promise for severely water-short areas.

Integrating natural-resources management within basins—for example, considering aquaculture or agroforestry along with irrigation—can mean more food and nutrition per unit of water.

For any of these strategies to work there must be the right kind of incentives and institutional supports for all the actors involved. Existing water-management institutions need incentives to be more efficient and offer services that will encourage improvements in water productivity. Farmers need incentives to adopt technologies and practices to make the most of the water that they use. □

Recommendations for policymakers

- **Look at options for improving productivity** before investing in expanding irrigated area.
- **Take a basin perspective on water savings** and understand how changes in water management or allocation in one area affect users in another.
- **Integrate management of 'blue' water—from rivers and reservoirs—with 'green' water—**rainfall stored in the soil profile or in aquifers.
- **Invest in efforts to provide reliable irrigation to farmers in existing schemes.**
- **Create policies and incentives to support the uptake of technologies and practices** that will improve water productivity and reduce degradation of agro-ecosystems.
- **Ensure that the poor benefit from investments in improving water productivity** by ensuring access to water for income-generation, developing and promoting affordable water-productivity-enhancing technologies, and giving the poor a voice in water decisions.

Global Water Outlook to 2025: Averting an Impending Crisis

For some time, experts have argued about the earth's capacity to support ever-larger human populations. Can the earth produce enough food to feed 8 billion people? 10 billion? To answer this question properly we must first understand the relationship between water availability and food production. Only then will decision makers be able to look at the consequences of the choices they make to balance water supply and demand among all users.

To outline these consequences, IWMI and the International Food Policy Research Institute (IFPRI) have developed a global model of water and food supply and demand, which seeks to answer the following questions: How are water availability and water demand likely to evolve by the year 2025? What impact will various water policies and investments have on water availability for the environment, domestic and industrial uses, and irrigation? What steps can policymakers take to ensure a sustainable use of water that meets the world's food needs?

The research assumes that the future of water and food is directly influenced by the choices made collectively by the world's people—and in particular those choices affecting income and population growth, investments in water infrastructure, allocation of water to various uses, reforms in water management, and technological changes in agriculture. To highlight the various outcomes that policy choices produce, the model presents three alternative futures for global water and food—a business as usual scenario, a water crisis scenario, and a sustainable water scenario—followed by an assessment of specific policy options.

From these scenarios researchers have developed a set of recommendations to help ensure that the world's growing water crisis is contained, and that sustainable patterns of water use are put in place. The model highlights the need for policy changes in three key areas—water pricing, shifting to sustainable groundwater use, and exploiting the potential of rainfed agriculture. It also spells out explicitly the consequences of failing to implement these changes, and argues that water scarcity will get much worse if policy and investment commitments from national governments and international donors weaken further. Consequences mentioned include the breakdown in domestic water services for hundreds of millions of people, the devastating loss of wetlands, serious reductions in food production, and skyrocketing food prices.

However, the analysis also reveals cause for hope. The scenarios presented point to three broad strategies that can address the challenge posed by water scarcity for food production—investing in

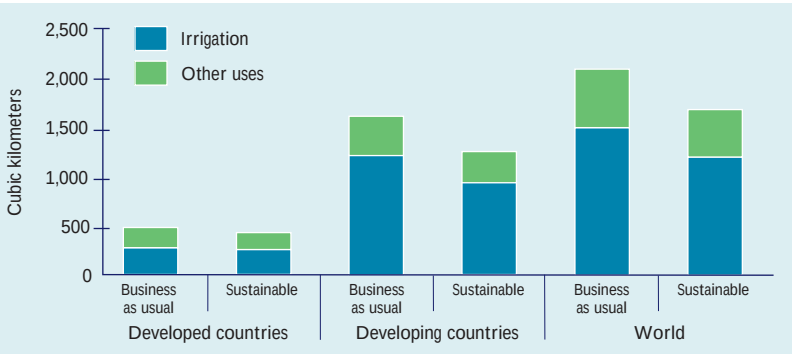
Research Theme:
Integrated Water Management for Agriculture

This summary is based on the Food Policy Report *Global water outlook to 2025: Averting an impending crisis* by Mark W. Rosegrant, Ximing Cai and Sarah A. Cline, a joint publication of IWMI and IFPRI.

Research source:
Rosegrant, M. W.; Cai, X.; Cline, S. A. 2002. *World water and food to 2025: Dealing with scarcity.* Washington, D.C., USA: IFPRI. xxiv, 322p.

The complete Policy Report and supporting research are available at www.ifpri.org

Total irrigation water consumption, by region, business as usual and sustainable scenarios, 2025



Based on: Author's estimates and IMPACT-WATER projections, June 2002
Source: Global water outlook 2025: Averting an impending crisis

infrastructure, conserving water and improving the efficiency of water use, and improving crop productivity per unit of water and land. If these are incorporated into water-saving strategies, the research argues, governments will be in a much better position to avert the growing water crisis. □

Recommendations for policymakers

- **Improve crop productivity per unit of water and land:** This is achieved through integrated water management and agricultural research and policy efforts.
- **Shift to sustainable groundwater use:** A number of basins and countries are pumping groundwater in excess of natural recharge rates.
- **Exploit the potential of rainfed agriculture:** There is significant potential here for increasing rainfed production to compensate for lower investment in irrigation.
- **Invest in infrastructure:** This will increase the supply of water for irrigation, domestic, and industrial purposes.
- **Conserve water:** Try to improve the efficiency of water use in existing systems through reforms in water management and policy.
- **Raise water prices:** Encourages users to use water more efficiently, and generate funds to maintain existing water infrastructure and build new infrastructure.

Integrated Land and Water Management for Food and Environmental Security

In many parts of the developing world, one of the main threats to household food security is the degradation and loss of land and water for agricultural use. Land and water degradation may negatively impact food security in a region by reducing one or more of the following: household consumption, national food supplies, economic growth and natural capital. Major concerns related to degradation include the displacement of soils and depletion of the plant nutrients they contain, the salinization of soils, groundwater depletion, and saltwater intrusion into freshwater aquifers.

Fortunately, there are 'bright spots' where degradation has been reversed and food and environmental security restored. We need to learn from these successes and develop practical recommendations for replicating them.

Previous research on water and land degradation has tended to emphasize the biophysical processes and impacts of food security, without taking into account socioeconomic considerations—thus limiting its use in building intervention strategies. What is needed are holistic, people-centered approaches that treat land, water and food as components of the same system. This type of approach focuses on the people who manage land and water and who suffer from food insecurity, thus highlighting the real contraints they experience and providing more realistic targets for action.

To support more effective intevention strategies and national, local and farm-level decision-making, more research is needed to: evaluate the resilience of agro-ecological systems and their inhabitants to resource degradation, and quantify the associated critical thresholds; develop management technologies to improve land and water productivity in marginal agricultural lands, at farm and landscape levels; develop systems for the large-scale recycling of nutrients in food and waste transported from rural areas to cities and rivers; and develop

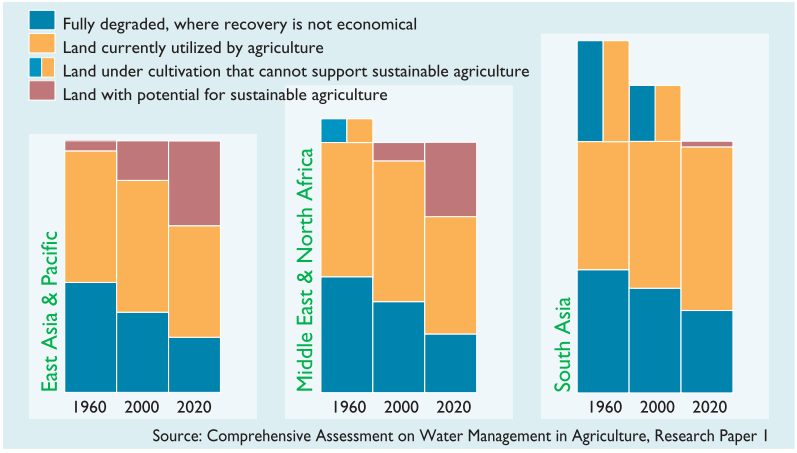
Research Theme:
Smallholder Land & Water Management

This summary is based on the policy document *Implications of Land and Water Degradation on Food Security.*

Research source:
Penning de Vries, F. W. T.; Acquay, H.; Molden, D.; Scherr, S. J.; Valentin, C.; Cofie, O. 2002. *Integrated land and water management for food and environmental security.* Colombo, Sri Lanka: Comprehensive Assessment Secretariat. 70p. (Comprehensive Assessment research paper 1).

The complete policy document and supporting research are available on the Annual Report CD-ROM and at www.iwmi.org/assessment.

Declining Land Resources



Source: Comprehensive Assessment on Water Management in Agriculture, Research Paper 1

mechanisms to internalize the off-site effects of degradation and transfer financial resources from city dwellers and industrial users to upland farmers and water managers who provide water catchment services. By considering and addressing the perspectives and needs of farmers, policymakers, and development organizations, research can serve as a solid foundation on which to build toward the resolution of local land- and water-degradation problems. □

Pathways to food and environmental security

- **Apply lessons from places where people have halted or reversed degradation.**
- **Set well-informed priorities through an integrated analysis of problems and solutions:** This approach would include assessing the extent of land and water degradation and food insecurity, with an emphasis on 'hot spots' at a subnational scale.
- **Produce a comprehensive assessment of the costs and benefits of irrigation in order to clarify the future directions for irrigated agriculture.**
- **Target appropriate technology development and dissemination for the food insecure:** Developments here could include technological innovations to allow groundwater irrigation, and prevent seawater intrusion in coastal areas. Education and training should be provided for designers and implementers of projects that influence land and water degradation.
- **Develop a policy and institutional environment that enables appropriate use of land and water:** This could include the development of institutions that enable local people to participate in landscape and watershed-scale planning processes, provision of strong and equitable public governance that secures the resource rights of food-insecure people, and the creation of incentives for investment in land and water resources.
- **Encourage more holistic approaches:** Pay more attention to the sustainability features of proposed technologies, to broader aspects of natural-resources management at the watershed and landscape level and poverty issues.

The Socio-Ecology of Groundwater Irrigation in India

Recent research shows that groundwater irrigation has surpassed surface irrigation as the primary source of food production and income generation in many rural areas. The key question is how to tap this resource without exhausting and/or degrading the supply. Indian policymakers and natural-resources planners need to make a transition from a resource-development to a resource-management mind-set.

Many people still believe that India's irrigation water mainly comes from public canal irrigation systems. While this may have been true in the past, recent research shows that groundwater now sustains almost 60 percent of the country's irrigated area. Even more importantly, groundwater now contributes more to agricultural wealth creation than any other irrigation source (see figure below). Yet state irrigation departments currently focus most of their manpower and budgetary resources on centrally created and managed large canal-irrigation systems, allocating only a fraction of these resources to groundwater resources.

Groundwater use has increased largely because it is available 'on demand' to any farmer who has access to a pump. It is a myth that groundwater use is high only where resource availability is high. IWMI research shows that the high intensity of groundwater use is associated with high population density. Areas with low supplies of renewable groundwater, compared to alarmingly high groundwater use include Tamil Nadu, Gujarat, Maharashtra, Andhra Pradesh, Karnataka, Punjab and Haryana.

Research has developed a four-stage model of the socio-ecology of India's groundwater use that can help policymakers identify appropriate policy intervention points. It describes the 'boom' and 'bust' progression of groundwater development typical of India and South Asia. Tube-well numbers increase (stage 1) and groundwater-based agriculture 'booms' (stage 2). The first signs of groundwater overuse appear (stage 3) and the 'boom' turns to 'bust' (stage 4) as entire areas are plunged into a crisis. Government policies often encourage

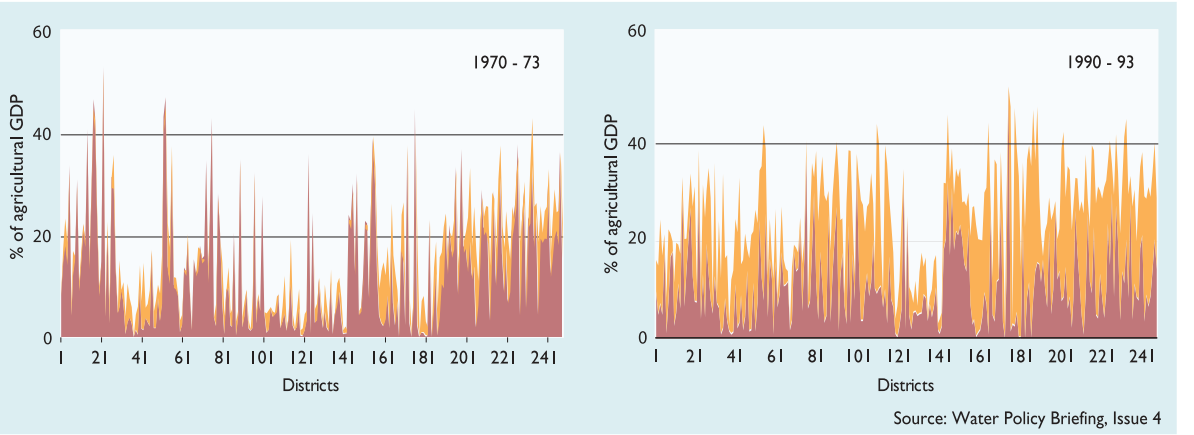
Research Theme:
Sustainable Groundwater Management

This summary is based on the Water Policy Briefing *The Socio-Ecology of Groundwater in India*.

Research source:
Deb Roy, A.; Shat T. 2002. Socio-ecology of groundwater irrigation in India. In *Intensive use of groundwater,* ed. R. Llamos and E. Custodio. Balkema. pp.307-335.

The complete Policy Briefing and supporting research are available on the Annual Report CD-ROM and at www.iwmi.org/waterpolicybriefing

Change in the contribution of groundwater and surface-water irrigation to agricultural GDP in India



Source: Water Policy Briefing, Issue 4

The four stages of groundwater socio-ecology

	Stage 1	Stage 2	Stage 3	Stage 4
Stages	**Rise in the Use of Tube-Well Technologies**	**Groundwater-Based Agrarian Boom**	**Early Symptoms of Groundwater Overexploitation**	**Agricultural Decline and Crisis**
Examples	North Bengal, North Bihar, Nepal Terai, Orissa	Eastern Uttar Pradesh, Western Godavari, Central and South Gujarat	Haryana, Punjab, Western Uttar Pradesh, Central Tamil Nadu	North Gujarat, Tamil Nadu, Saurashtra, Southern Rajasthan
Characteristics	Subsistence agriculture; protective irrigation; traditional crops; rural poverty; traditional water-lifting devices	Tube-well ownership skewed; pump irrigation prized; rise of primitive pump irrigation 'exchange' institutions; decline of traditional water-lifting technologies; rapid growth in agrarian income and employment	Crop diversification; steady decline in water tables; groundwater-based 'bubble economy' booms; economy/ ecology tensions surface; pumping costs soar; oppressive water market; private and social costs of groundwater use diverge	Groundwater-based 'bubble' bursts; agricultural growth declines; poor become poorer; depopulation of entire clusters of villages; water-quality problems become serious; the 'smart' move out before crisis deepens; poor are hit hardest
Interventions	Targeted subsidies for pump capital; public tube-well programs; electricity subsidies and flat tariffs	Subsidies continue; institutional credit for wells and pumps; donors augment resources for pump capital; NGOs promote small farmer irrigation for livelihoods	Subsidies, credit, and donor-support continue; licensing, citing norms and zoning system created, but weakly enforced; groundwater irrigators emerge as huge, powerful vote-bank that political leaders cannot ignore	Subsidies, credit and donor-support end; NGOs/donors assume conservationist stance; zoning restrictions enforced, with frequent preelection relaxations; water imports begin for domestic needs; public and NGO-sponsored actions attempt to ameliorate problems

Source: Water Policy Briefing, Issue 4

transition from 'boom' to 'bust' because policymakers fail to anticipate the impending crisis and continue policies that actively encourage and subsidize private groundwater development when their aim should be to put an effective regulatory framework in place.

The frontline challenge is to introduce mechanisms to ensure sustainable development at stages 1 and 2 and, for areas already heading toward a crisis, to take appropriate corrective action while it is still feasible. Some areas for action identified by researchers include:

Information Systems and Resource Planning: Functional information systems to provide much-needed information about groundwater availability, quality and withdrawal, etc., for use by planners and for the purposes of monitoring and further research.

Demand-Side Management: Systems for regulating groundwater withdrawals at sustainable levels. Such mechanisms would include licenses, laws, pricing systems, use of complementary water sources and water-saving crop-production technologies.

Supply-Side Management: Augmenting groundwater recharge through mass rainwater harvesting and recharge activities, the maximization of surface-water use for recharge and the introduction of incentives for water conservation and artificial recharge.

Groundwater Management in a River-Basin Context: In order to maximize efficiency, the focus of interventions could be expanded (from a very 'local' level to the level of entire river basins). □

The Challenges of Integrated River-Basin Management in Developing Countries

Issues in transferring successful river-basin management models to the developing world

Integrated River-Basin Management (IRBM) models that have been successful in the USA, Europe and Australia are increasingly being imposed on river basins in Africa and Asia by well-intentioned governments and donors. But the experiences of many countries suggest that this reform has failed to bring basins any closer to achieving IRBM.

A recent IWMI report highlights the bad fit between the IRBM models promoted and the realities and priorities of developing-country river basins as a root cause of this failure. These models are not adapted to the very different hydrologic, demographic, socioeconomic and organizational conditions that prevail in the developing world.

Research identifies a narrow focus on the formation of basin-level organizations as another factor in the failure of IRBM reform—particularly when this means simply changing the mandate of existing irrigation agencies.

The lesson: Creating institutions for river-basin management does not guarantee IRBM. For example, China's Basin Management Committees were established in the 1950s with the aim of generating hydropower, mitigating flood damage and providing facilities for navigation. But in the end they have focused only on irrigation.

This does not mean that basin-level institutions have no role to play in the developing world. Indeed, loose basin-level coordinating mechanisms such as in the Mekong or in India's Cauvery basin can serve effectively to promote dialogue between contesting states/nations sharing a basin. But river-basin organizations by themselves cannot be expected to address the more fundamental issues that water sectors in developing countries must contend with.

Addressing developing-country priorities

The big success stories of IRBM, such as the USA's Tennessee Valley Authority and Australia's Murray-Darling basin, have focused on rivers, lakes, and reservoirs ("blue" water) and on improving the productivity of large publicly managed systems. This means they have not had to address many of the challenges central to the sustainable and productive use of water in many developing countries. These include:

Challenge 1. Regulating the Informal Water Sector. How to regulate vast numbers of small-scale users who are not linked to public institutions? One possibility is to find ways of underpinning macro-level institutions with nested organizations of users at the grass roots.

Challenge 2. Improving the Productivity of "Green Water." For countries such as India and China, where the population density is high, both upstream and downstream, increasing the productivity of water diverted from rivers is less important than being able to capture rainfall and store water effectively in the soil profile ("green water").

Research Theme:
Water Resources Institutions & Policy

This summary is based on the Water Policy Briefing *The Challenges of Integrated River Basin Management in India.*

Research source:
Shah, T.; Makin, I.; Sakthivadivel, R. 2001. Limits to leapfrogging: Issues in transposing successful river basin management institutions in the developing world. In *Intersectoral management of river basins: Proceedings of an international workshop on "Integrated Water Management in Water-Stressed River Basins in Developing Countries: Strategies for Poverty Alleviation and Agricultural Growth," Loskop Dam, South Africa, 16-21 October 2000, ed. C.L. Abernethy,* Colombo, Sri Lanka: IWMI; DSE. pp.89-114.

The complete Policy Briefing and supporting research are available on the Annual Report CD-ROM and at www.iwmi.org/waterpolicybriefing

Challenge 3. Managing Groundwater. In South Asia, Southeast Asia and Northern China, protecting groundwater from overexploitation by millions of small unlicensed pumpers is an increasingly pressing issue. Community initiatives for groundwater recharge may offer the most immediate hope for reversing damage in areas where water tables are dropping by as much as a meter per year.

Challenge 4. Water Scarcity. The heart of the problem in most water-scarce countries is too many people living off a limited natural resource base. Getting more crop, cash and jobs per drop is part of the answer; the other is generating off-farm livelihoods in rural areas.

The research suggests that the answers to the developing world's most pressing water issues—lack of access to water, vulnerability to drought, shrinking aquifers—may fall largely outside of what are traditionally defined as 'institutions.' Communities tend to find their own solutions and will have to play a large role in any successful IRBM strategy. □

A comparison of basin realities

Dominant characteristics of developed country river basins	Dominant characteristics of developing country river basins
Temperate climates, humid, higher river-stream density	Low rainfall, extreme climate, higher mean temperatures, lower stream density, water scarcity an emerging constraint
Population concentrated in the valleys, downstream	Densely populated in both valleys and catchment areas; population high both upstream and downstream of dams
Water rights based on riparian doctrine and prior appropriation	Water rights to groundwater resources or rainfall, stem from land ownership; people's notions of ownership relate more easily to rain than to large-scale public diversions
Focus on blue surface water: water found in rivers, and lakes	Focus on green water: water stored in the soil profile or blue water stored in aquifers
Most water users get water from 'service providers;' most water provision is in the formal sector—making water-resources governance feasible	Most water users get their water directly from rain and from private or community storage without any significant mediation from public agencies or organized service providers. Because the bulk of water provision takes place in the informal sector, it is difficult to pass enforceable water legislation
Small numbers of large-scale stakeholders	Vast numbers of small-scale stakeholders
Low transaction costs for monitoring water use and collecting water charges	High transaction costs for monitoring water use and collecting water charges

Source: Water Policy Briefing, Issue 3

Confronting the Realities of Wastewater Use in Agriculture

The dominant thinking on wastewater use for agriculture is that the water should receive some degree of treatment first and that strict regulations should be imposed on its use. But these solutions are not always feasible in developing countries, which need realistic options that will optimize the benefits of this widespread practice while reducing the risks.

In rural and peri-urban zones in developing countries, poor farmers commonly use nutrient-rich sewage and wastewater to irrigate high-value crops. In many places, this untreated wastewater is their only source of irrigation water—their livelihoods depend on it. But, as well as bringing benefits, the unregulated use of wastewater also poses risks to human health and the environment.

Because of these risks the prevailing 'scientific' approach to wastewater irrigation advocates treatment before use. But many developing countries lack the resources to build and maintain treatment facilities. And strict regulations—another widely promoted solution—are often not enforceable. This is especially true where freshwater is scarce; farmers consider untreated wastewater a valuable resource and wastewater irrigation is an individual or community activity, with few or no linkages to governance structures.

Policymakers who prepare guidelines for wastewater use should take these realities into account, while carefully weighing up the short- and long-term risks and benefits of wastewater use, as these affect the whole community.

Banning wastewater irrigation or investing in treatment facilities, which would remove most of the valuable nutrients, should be carefully viewed in light of costs and benefits, as the first would hit the poor hardest. Many of the farmers who utilize wastewater irrigation are landless—the poorest of the poor. Only the high returns they obtain from irrigated crops enable them to rent land and make a living from agriculture. Policymakers considering this ban would need to make provision for the people who lose their livelihoods.

Health risks to farming communities and consumers of wastewater-irrigated produce—such as exposure to parasitic worms, contamination of groundwater with nitrates, and chemical pollutants and buildup of heavy metals in the soil and crops—need to be evaluated. But so should the health impacts on downstream users if the alternative to using the wastewater for irrigation is to release it into surface-water bodies—negatively impacting on the health of downstream water users. In fact, wastewater use in agriculture within a controlled area may be regarded as a form of "land treatment and disposal"—provided risks to producers and consumers can be minimized.

Preliminary research findings from Mexico and Pakistan suggest that, with the introduction of impact-monitoring programs and realistic measures to reduce health risks, wastewater irrigation can, in many situations, continue to be a productive input for farmers. IWMI research will continue to study fundamental issues in this regard as well as suitable amelioration techniques. □

Research Theme:
Water, Health & Environment

This summary is based on the Water Policy Briefing *Confronting the Realities of Wastewater Use in Agriculture* (forthcoming).

Research sources:

van der Hoek, W.; Ul Hassan, M.; Ensink, J. H. J.; Feenstra, S.; Raschid-Sally, L.; Munir, S.; Aslam, R.; Ali, N.; Hussain, R.; Matsuno, Y. 2002. *Urban wastewater: A valuable resource for agriculture—A case study from Haroonabad, Pakistan.* Colombo, Sri Lanka: IWMI. v, 20p. (IWMI research report 63)

Ensink, J. H. J.; van der Hoek, W.; Matsuno, Y.; Munir, S.; Aslam, M. R. 2002. *Use of untreated wastewater in peri-urban agriculture in Pakistan: Risks and opportunities.* Colombo, Sri Lanka: IWMI. v, 22p. (IWMI research report 64)

Scott, C.; Zarazua, J. A.; Levine, G. 2000. *Urban-wastewater reuse for crop production in the water-short Guanajuato river basin, Mexico.* Colombo, Sri Lanka: IWMI. v, 22p. (IWMI research report 41).

The supporting Research Reports are available on the Annual Report CD-ROM and at www.iwmi.org/pubs

Comparison of wastewater and canal-water-irrigated farms, Haroonabad, Pakistan

Description of variable (unit)	Canal-water farms	Wastewater farms
Crops grown	Wheat	Vegetables
Annual cost of irrigation water (Rs/ha)	1,141[a]	200
Cost of chemical fertilizers (Rs/ha)	5,484	2,621
Land productivity: Gross value of product (Rs/ha)	57,183	68,118
Gross margin (Rs/ha)	34,429	47,217

[a]Average cost of pumped groundwater used to supplement canal water

Source: IWMI Research Report 63

Suggested wastewater policy options for maximizing benefits and minimizing risks

- **Crop selection and irrigation practices:** Selecting crops that are less likely to transmit infection to consumers and using irrigation techniques that mininimize contact between wastewater and crops (such as bed and furrow)
- **Human exposure control:** Use of protective measures
- **Preventive medical care programs**: Use of preventive therapy like anti-helminthic drugs
- **Post-harvest handling**: Washing of vegetables, improved storage
- **Upstream wastewater management** and appropriate low-cost treatment
- **Educating farmers and awareness-building** among consumers and authorities

Donors - 2002

During 2002, IWMI's funding support was provided by the following governments, development banks, agencies and foundations:

- **African Development Bank**
- **Asian Development Bank**
- **Australia/Australian Centre for International Agricultural Research**
- **Belgium**
- **Canada**
- **CARE, Nepal**
- **Denmark**
- **Food and Agriculture Organization**
- **Ford Foundation**
- **France**
- **Germany**
- **International Commission on Irrigation and Drainage (ICID)**
- **International Development Research Centre (IDRC), Canada**
- **Ireland**
- **Japan**
- **Netherlands**
- **Norway**
- **Rockefeller Foundation**
- **Sir Ratan Tata Trust**
- **Sweden**
- **Switzerland**
- **Taiwan**
- **United Kingdom (DFID/DES)**
- **United Nations Educational, Scientific and Cultural Organization (UNESCO)**
- **United Nations Environmental Programme (UNEP)**
- **United States Agency for International Development (USAID)**
- **World Bank**
- **World Health Organization (WHO)**

The Governments of Cambodia, China, India, Iran, Nepal, Pakistan, South Africa and Sri Lanka provided program support for IWMI-related activities in those countries.

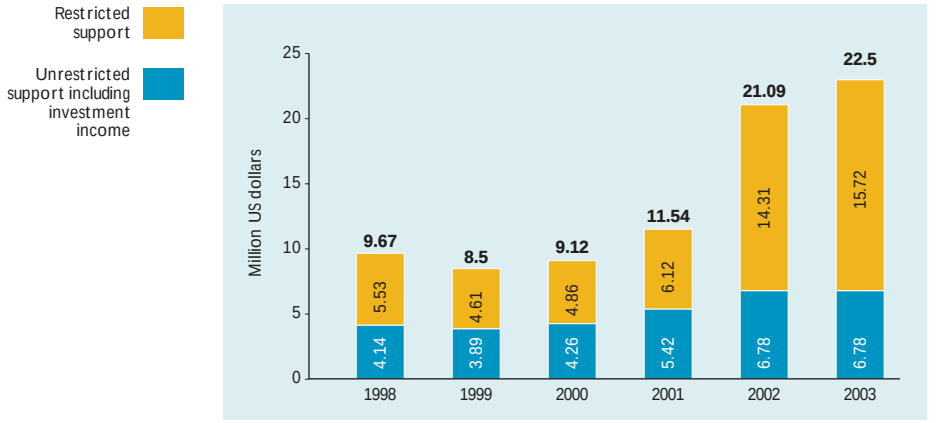
Board of Governors - 2002

Financial Statement

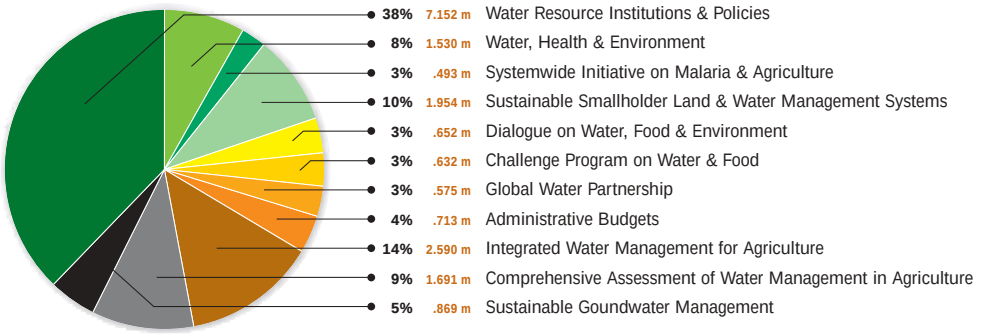
In 2002, the net assets of the Institute recorded an increase of $103,000 compared to the increase of net assets of $95,000 in 2001.

In 2002, the total revenue amounted to $21.09 million. Unrestricted income amounted to $6.78 million.

Income 1998 – 2003



Direct Research Expenditure by Program - 2002



Interview with Financial Controller, Gamini Halvitige

Last year was an unprecedented period of growth for IWMI—our budget almost doubled from $11.5 million in 2001 to $21 million in 2002. I think there are a number of changes in the way the organization does business that have contributed to this dramatic increase.

IWMI's expanded mission has meant more funding opportunities. In particular, the increased emphasis on health and environment research has helped IWMI access ODA funding outside traditional CGIAR agriculture 'pockets.'

IWMI's role in a number of international initiatives, such as the Dialogue on Water, Food and Environment and the Challenge Program on Water and Food, have increased IWMI's reputation as an organization that works actively with others to achieve change—obviously this makes IWMI an attractive partner and a more attractive investment for donors.

Our participation in a number of regional and international events over the past 2 years, such as the ministerial dialogues in Accra and Bangkok and the WaterDome at the World Summit in Johannesburg, have raised the profile of the organization and helped to reposition IWMI as a key player on the global stage.

Another factor is the establishment of long-term regional offices, rather than temporary field offices to support specific research projects. For example, over the past 2 years a regional office was established in South Africa, with two sub-regional offices in Ghana and Ethiopia. This change has signaled the Institute's lasting commitment to helping countries deal with their evolving water- management challenges. And, as a result, this has enabled the organization to access more bilateral funding and to attract new types of partners, such as India's Sir Ratan Tata Trust, which is co-funding a major India-wide water policy research program with IWMI.

Finally, I think donors are seeing IWMI as a good investment as a result of the new and more effective ways of working and managing research introduced with the 2000 Strategic Plan.

Restricted Research Contracts over $50,000 Awarded in 2002

ADAPT – Water, Climate, Food and Environment under Climate Change (Netherlands)—$282,667, over 1 year

To contribute to an assessment of global and regional impacts on water, food and environment under climate change, and the formulation of adaptation strategies at the river-basin level.

Glowa Volta Basin Study (ZEF - Center for Development Research, Germany)—$100,000, over 1 year

To produce an integrated decision-support system for the Volta river basin.

Research - Fellowship Project (Swiss Centre for International Agriculture - ZIL /Switzerland) — $226,381, over 3 years

For collaborative research on water savings and increasing productivity in water-scarce basins and developing a decision-support system for improved irrigation management.

Accra Conference on Water and Sustainable Development (Netherlands)—$112,290, over 1 year

For the Regional Stakeholders' Conference for Priority Setting held in Accra, Ghana on 15-17 April, 2002.

Livestock Environment - Watershed Interactions (Switzerland)—$290,600, over 2 years

To design better targeted technological and policy interventions for the livestock component in watershed development programs and disseminate information.

North Gujarat Sustainable Groundwater Initiative (Sir Ratan Tata Trust, India)—Indian Rupees 4,850,000, over 2 years

To support the development of local groundwater management regimes based on technically sound, socially and economically viable practices.

Maikaal Research Project (Switzerland)—$554,732, over 3 years

To contribute to a study of the implications and impacts of growing organic cotton in areas under groundwater stress.

Water Energy Nexus in Agriculture (WENEXA) (USAID)—$65,358, over 1 1/2 years

To provide strategic input to the USAID Water Team on bridging the gap between the water and power sectors and addressing the problems faced by the two sectors through dialogue and policy reform.

Impact Assessment of Infrastructure Development on Poverty Alleviation II, Japan Bank for International Cooperation (JBIC)—$260,233, over 5 months

To support the development of a database for rigorous quantitative analysis of the impact of irrigation infrastructure development on reducing poverty in poor rural communities.

African WaterDome (Multi Donors)—$4,334,664, over 9 months

For the WaterDome, a parallel event to the World Summit on Sustainable Development, held in Johannesburg, South Africa from 28th August to 3rd September 2002.

Integrated Water Management Ferghana Valley (Switzerland)—$1,601,000, over 3 years

To contribute to improved organization of water management in the Ferghana valley, shared between Uzbekistan, Tajikstan and the Kyrgyz Republic.

Systemwide Initiative on Malaria and Agriculture (African Development Bank)—$440,000, over 3 years; **(Netherlands)**— $542,900, over 1 1/4 years; **(International Development Research Centre, Canada)—**$109,341, and **(World Bank)**—$200,000, over 1 year

To support research on the links between agriculture and malaria and contribute to the identification of opportunities for minimizing malaria risks through agriculture-based interventions.

Comprehensive Assessment of Water Management in Agriculture (IFPRI)—$349,947, over 3 years; **(Netherlands)** - $7,500,000, over 5 years

To take stock of the costs and benefits of the past 50 years of water development for agriculture, the water-management challenges communities are facing today, and solutions people have developed.

Hanoi International Water Conference-Asian Development Bank (ADB)—$50,000 and **(Netherlands)**—$100,000, over 2 days

To support IWMI in coorganizing and implementing the International Water Conference in Hanoi on 14-16 October 2002.

Challenge Program on Water and Food (World Bank)—$3,000,000; $68,182; $200,000, over 1 year

To develop a full proposal for the Challenge Program (CP) on Water and Food, which focuses on food security, poverty alleviation, improved health and environmental security, and to assist IWMI in financing the implementation of the Challenge Program's 2003 work program.

Unrestricted, restricted—2002

	Donor	Grants 2002 US$'000	Grants 2001 US$'000
Unrestricted	Australia	243	264
	Belgium	85	77
	Canada	357	323
	China	10	—
	Denmark	530	347
	France	98	51
	Germany	239	140
	India	38	37
	Ireland	452	312
	Japan	60	139
	Netherlands	737	453
	Norway	307	110
	Sweden	298	269
	Switzerland	287	390
	United States Agency for International Development (USAID)	805	805
	World Bank	2,047	1,170
	Subtotal (Unrestricted)	**6,593**	**4,887**
Other Revenue	Investment income	113	393
	Sundry income	73	137
	Subtotal (Other revenue)	**186**	**530**
	Total (Unrestricted resources)	**6,779**	**5,417**
Restricted			
	African Development Bank	132	92
	Asian Development Bank	995	1,116
	Australia/Australian Centre for International Agricultural Research	153	130
	Cambodia	13	—
	Canada	—	32
	CARE Nepal	2	5
	CEMAGREF	21	—
	Centro Internacional de Agricultura Tropical (CIAT)	—	109
	Colombo Plan	5	—
	Denmark	64	119
	Food and Agriculture Organization / IPTRID	346	118
	Ford Foundation	3	66
	France	1,202	364
	Germany	32	292
	International Commission on Irrigation and Drainage (ICID) India	54	94
	International Development Research Centre (IDRC)	134	165
	International Food Policy Research Institute (IFPRI)	41	40
	Iran	140	102
	Japan	260	723
	Japan Bank for International Cooperation (JBIC)	122	—
	Netherlands	2,545	509
	Other (Multi-Integrated Nutrient Management)	2	97
	Rockefeller Foundation	16	—
	South Africa	70	92
	Sri Lanka	73	36
	Sweden	755	174
	Switzerland	842	396
	Taiwan	69	40
	TATA Foundation	180	—
	United Kingdom	276	284
	United Nations Environmental Programme (UNEP)	26	—
	United Nations Educational, Scientific and Cultural Organization (UNESCO)	55	9
	United States Agency for International Development (USAID)	314	243
	Water & Power Development Authority (WAPDA)	42	44
	World Bank	884	630
	World Health Organization (WHO)	3	—
	Zentrum für Entwicklungsforschung (ZEF)	83	—
	Swiss Centre for International Agriculture (ZIL)	21	—
		9,975	6,121
	AFRICAN WATERDOME	4,335	—
	Total (Restricted resources)	**14,310**	**6,121**
	Total Grants	**21,089**	**11,538**

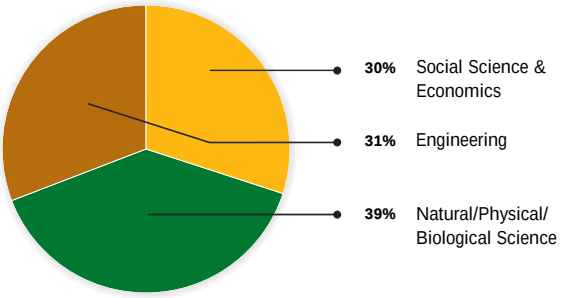
Statement of Financial Position, December 31, 2002 and 2001

	2002 US$'000	2001 US$'000
Assets		
Current Assets		
Cash and cash equivalents	1,531	4,106
Accounts receivable:		
(Net of $171,208 allowance for doubtful accounts)		
Donors	3,813	1,587
Employees	254	219
Others	757	327
Inventories	33	32
Prepaid expenses	415	269
Total Current Assets	**6,803**	**6,540**
Noncurrent Assets		
Property and equipment, net	2,256	1,945
Other assets	2,993	1,390
Total Assets	**12,052**	**9,875**
Liabilities and Net Assets		
Current Liabilities		
Accounts payable		
Donors	3,624	2,036
Employees	209	197
Others	753	507
Accruals	101	133
Total Current Liabilities	**4,687**	**2,873**
Long-Term Liabilities		
Accounts payable		
Employees	1,158	898
Total Long-Term Liabilities	**1,158**	**898**
Total Liabilities	**5,845**	**3,771**
Net Assets		
Unrestricted		
Appropriated	3,271	3,276
Unappropriated	2,936	2,828
	6,207	**6,104**
Restricted	–	–
Total Net Assets	**6,207**	**6,104**
Total Liabilities and Net Assets	**12,052**	**9,875**

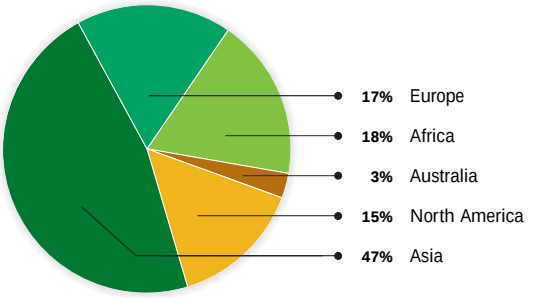
IWMI Staff

In 2002, the Institute had 109 research staff, of whom 75 were internationally and regionally recruited. The latter includes 14 postdoctoral scientists and 4 associate experts seconded by the Netherlands and Sweden. IWMI's total staff numbered 354.

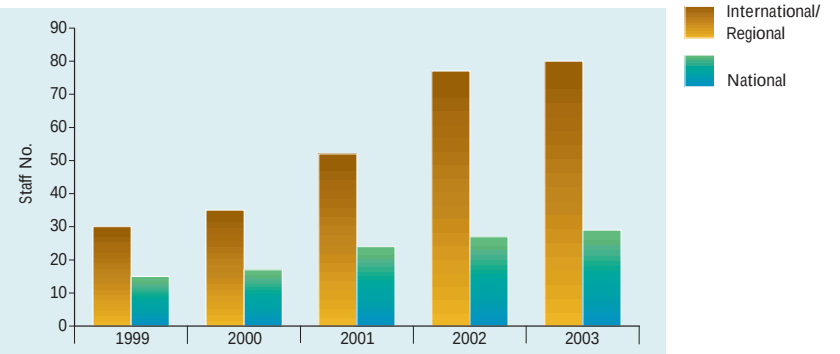
IWMI Research Staff
(by Discipline - 2002)



IWMI Research Staff
(by Nationality - 2002)



Research Staff Numbers from 1999 to 2003



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Overview of IWMI Staff by Nationality

Research	Research	Non-Research
Australia	2	0
Bangladesh	2	0
China	2	0
Denmark	0	1
Ethiopia	1	1
France	15	0
Germany	3	0
Ghana	5	6
India	22	11
Ireland	0	1
Japan	3	0
Kenya	2	0
Nepal	4	1
Netherlands	13	1
Nigeria	1	0
Pakistan	44	40
Philippines	2	0
Russia	1	0
Senegal	1	0
Sierra Leone	1	0
South Africa	8	8
Sri Lanka	44	106
Sweden	1	0
Switzerland	1	0
Thailand	7	11
UK	6	2
USA	16	1
Uzbekistan	4	7
Vietnam	1	0
Zimbabwe	1	0

Targeting promising young researchers

In 2001, IWMI instituted two capacity building programs targeted particularly at promising young researchers: a Postdoctoral Program and Ph.D. Scholarship Program. These programs currently provide support and research experience to 49 young scientists. Training and Capacity Building Officer, Shanthi Weerasekera, speaks on the progress of the two programs.

IWMI's Ph.D. Scholarship Program builds the capacity of future researchers whose proposed Ph.D. research is compatible with the Institute's interests. The program provides full scholarships through the development of sandwich programs jointly with partner universities; and partial support for students already registered with universities on a case by case basis. Under sandwich programs, course work is carried out at the partner university and fieldwork at an IWMI research site, supervised by IWMI scientists. Currently 28 Ph.D. candidates are receiving full or partial support through the program.

The Postdoctoral Program gives young, promising researchers the opportunity to work in a multi-cultural environment and at the same time build and enrich IWMI's research capacity through their work. Disciplines range from soil and water resources engineering, to irrigation and health, crop protection, remote sensing, etc. Many of IWMI's postdoctoral researchers have won awards for innovative research.

In addition to these programs, IWMI establishes long-term relationships with national agricultural research institutes and universities in Asia and Africa and offers sabbaticals and fellowships to staff to write lecture notes and course material based on IWMI research. In turn, IWMI scientists lecture at these universities and university students get involved in IWMI research.

GLOBAL RESEARCH CENTER (SRI LANKA)

Principal Researchers: Dr. Felix Amerasinghe, Theme Leader, Water Health and Environment • Mr. Tissa Bandaragoda, Principal Researcher • Dr. Randolph Barker, Principal Economist • Prof. Wolfgang Flugel, Principal Hydrologist • Mr. Naoya Fujimoto, Principal Researcher • Dr. Francis Gichuki, Principal Researcher • Dr. David Molden, Leader, Comprehensive Assessment of Water Management in Agriculture • Dr. Francois Molle, Water Management Specialist • Dr. Mark Rosegrant, Principal Researcher • Dr. R. Sakthivadivel*, Principal Researcher • Dr. Vladimir Smakhtin • Principal Eco-Hydrologist • Dr. Zhongping Zhu, Principal Water Resources Specialist **Senior Researchers:** Dr. Sarath Abayawardena, Acting Director, Global Research Division/Wastewater Treatment Specialist • Dr. Upali Amarasinghe, Senior Statistician • Dr. Deborah Bossio, Senior Soil Scientist • Dr. Peter Droogers*, Senior Researcher • Dr. Mark Giordano, Resource Economist • Dr. Chu Thai Hoanh, Senior Water Resources Engineer • Dr. Intizar Hussain, Senior Economist • Dr. Peter McCornick, Senior Water Resources Specialist • Dr. (Ms.) Liqa Raschid-Sally, Wastewater Specialist • Dr. R. Maria Saleth, Senior Institutional Economist • Dr. M.Samad, Theme Leader, Water Resource Institutions and Policies • Dr. Prasad Thenkabail, Senior Researcher • Dr. Hugh Turral, Senior Irrigation Specialist • Dr. Robert Zomer, Senior Landscape Ecologist **Researchers:** Ms. Sitara Atapattu, Coastal Zone Management Specialist • Dr. Eline Boelee, Health and Irrigation Specialist • Dr. Ximing Cai, Researcher • Ms. Dilkushi De Alwis, Junior Hydrologist • Ms. Charlotte De Fraiture, Irrigation Engineer • Dr. D.M. Gunawardena*, Research Associate • Mr. Manju Hemakumara, Benchmark Basin Coordinator • Ms. Gayathree Jayasinghe, Biometrician (seconded to CGIAR G&D Program at ICRAF, Nairobi wef 1/2/2003) • Mr. K.Jinapala, Institutions Specialist • Ms. Sophie Nguyan Khoa, Fisheries Specialist • Mr. D.P.W.H.Niriella, Environmental Engineer • Ms. Rebecca Tharme, Freshwater Ecologist **Postdoctoral Scientists/Associate Experts:** Mr. Mobin Ahmed, PostDoctoral Scientist • Dr. Shrinivas Badiger* • Postdoctoral Scientist • Dr. Madhusudan Bhattarai, Postdoctoral Scientist • Mr. Olivier Briet, Associate Expert • Mr. Francis Canisius, Postdoctoral Scientist/Remote Sensing • Mr. Ronald Loeve*, Associate Expert • Dr. Regassa Namara, Postdoctoral Scientist • Mr. Nicolas Roost, Postdoctoral Scientist • Dr. Katsuyuki Shimizu*, Postdoctoral Scientist • Dr. Jinxia Wang*, Postdoctoral Scientist **Research Officers:** Mr. Noel Aloysius, Water Resources Engineer • Mr. Markandu Anputhas, Biometrician • Mr. B.R.Ariyaratne, Benchmark Basin Coordinator • Mr. Chandana Gangodagamage, Remote Sensing Specialist • Mr. Priyantha Jayakody, Agricultural Engineer • Mr. Lal Muthuwatta, Remote Sensing/GIS Specialist • Mr. L.R.Perera, Social Scientist • Mr. Shahriar Pervez, GIS Specialist • Mr. S.C. Piyankarage, Chemist • Mr. P.G. Somaratne, Sociologist • Mr. Sunil Thrikawala, Agricultural Economist • Mr. Parakrama Weligamage, Economist • Mr. Neelanga Weragala, Civil Engineer • Mr. Deeptha Wijeratne, Agricultural Economist **Research Support:** Mr. Sujith Abeysekera*, Field Assistant • Mr. M. Dayananda, Field Data Collector • Mr. D.N. Dayasena, Field Data Collector • Ms. Shyamlie De Silva, Research Assistant • Mr. D.G.S. Gunasinghe, Digitizing Operator • Mr. N.G. Indrajith, Field Data Collector • Mr. Sarath Lionalratne, Field Data Collector • Ms. Thushari Perera, Research Assistant • Mr. M.K. Piyaratne*, Research Assistant • Mr. D.W. Premachandra, Data Entry Clerk • Mr. D.R.G.S.P. Ranasinghe, Field Data Collector • Mr. A.D. Ranjith, Digitizing Operator **Non-Research:** Ms. Dhammika De Silva, Conference Coordinator • Ms. Himani Elangasinghe, Secretary • Ms. Ashra Fernando, Secretary • Ms. Janitha Godamuduna, Senior Secretary • Ms. Sepali Goonaratne, Administrative Officer • Ms. Samanmali Jayatillaka, Secretary • Ms. Samudra Mendis, Secretary • Ms. Nilupuli Pethiyagoda, Secretary

REGIONAL OFFICE AFRICA (SOUTH AFRICA)

Principal Researchers: Dr. Douglas Merrey, Regional Director (Africa) • Dr. Frits Penning de Vries, Theme Leader, Sustainable Smallholder Land and Water Management Systems **Senior Researchers:** Dr. Cliff Mutero, Senior Researcher • Dr. Hilmy Sally, Senior Researcher • Dr. Barbara Van Koppen • Senior Researcher **Researchers:** Mr. Charles Crosby, Senior Advisor • Ms. Marna De Lange, Researcher • Mr. Pierrick Fraval*, Researcher • Dr. Arlene Inocencio, Researcher • Ms. Tshepo Khumbane, Senior Advisor • Mr. Herve Levite, Researcher • Mr. Litha Magingxa, Ph.D. Fellow • Dr. Mutsa Masiyandima, Researcher • Dr. Matthew McCartney, Researcher • Mr. Krishna Prasad, Ph.D. Fellow **Postdoctoral Scientists:** Dr. Nicholas Faysse, Postdoctoral Scientist • Dr. Nitish Jha, Postdoctoral Scientist • Dr. Abdul Kamara • Postdoctoral Scientist • Dr. Daniel Yawson, Postdoctoral Scientist **Research Support:** Mr. Tendani Navondo, Program Officer, SIMA • Ms. Vivian Phadime, Research Assistant • Mr. Jetric Seshoka, Research Assistant **Non-Research:** Mr. Harold Magagula, Driver • Ms. Rachel Mashele, Junior Secretary • Ms. Alex Msitshana*, Office Manager • Ms. Portia Ndlovu, Admin Clerk • Ms. Mary Njonge, Office Manager • Mr. Kobus Ras, IT Specialist • Ms. Maite Sotsaka, Admin Support Officer • Mr. Makgwadi Sylvester, Accounts Clerk **Sub-Regional Office (Ethiopia)** **Researcher:** Philippe Lemperiere, Researcher **Non-Research:** Ms. Nigist Wagaye, Administrative • Research Support Officer **Sub-Regional Office (Ghana)** **Senior Researchers:** Dr. Marc Andreini, Senior Researcher • Dr. Pay Drechsel, Senior Researcher **Researchers:** Dr. Boubacar Barry, Researcher • Dr. Olufunke Cofie, Researcher • Postdoctoral Scientist • Ms. Eveline Klinkenberg, Associate Expert **Research Support:** Mr. Philip Amoah, Research Assistant • Mr. George Danso, Agricultural Economist • Ms. Lucy Gyiele, Senior Research Assistant • Mr. Bernard Keraita, Water Engineer **Non-Research:** Mr. Ebenezer Aboah • Cleaner/Gardener • Mrs. Louise Agyeman-Barning, Office Manager/Admin-HR • Mr. Siegfried Gbadago, Finance Officer • Mr. Martin Ofori, Driver • Mr. Daniel Twumasi, Driver • Ms. Linda Yeboah-Abrokwa, Administrative Assistant

REGIONAL OFFICE SOUTHEAST ASIA (THAILAND)

Principal Researchers: Mr. Ian Makin, Regional Director (Southeast Asia) • Dr. Andrew Noble, Principal Researcher/Soil Scientist • Dr. Christian Valentin, Principal Researcher (visiting scientist from IRD, based in Laos) • Dr. Doug Vermillion, Principal Researcher **Senior Researchers:** Mr. Jean-Pierre Bricquet, Hydrologist (visiting scientist from IRD) • Dr. Suraphol Chandrapatya, Senior Researcher • Dr. Anneke De Rouw, Agronomist (visiting scientist from IRD, based in Laos) • Dr. Amado Maglinao, Senior Researcher • Dr. Didier Orange, Hydrologist and Geochemist (visiting scientist from IRD based in Vietnam) • Dr. Pascal Podwojewski, Soil Scientist **Researchers:** Dr. Vincent Chaplot, Soil Scientist, GIS Specialist (visiting scientist from IRD based in Laos) • Mr. Jean-Louis Janeau, Soil Scientist (visiting scientist from IRD) • Mr. Guillaume

Lestrelin, Geographer (visiting scientist from IRD will be based in Laos wef 01/10/2002) • Mr. Nobert Silvera, Hydrologist (visiting scientist from IRD, based in Laos) • Mr. Jean-Pierre Thiebaux, Hydrologist (based in Laos) **Postdoctoral Scientists:** Dr. Eric Biltonen*, Postdoctoral Scientist (based in Vietnam) • Dr. Mathew Kurian, Associate Expert • Dr. Mohammed Mainuddin, Postdoctoral Scientist • Dr. Rob Simmons • Researcher, Soil Scientist • Dr. Shinji Suzuki, Postdoctoral Scientist **Research Support:** Ms. Sararin Klinphonklap, Research Assistant (Project based) • Mr. Rungnadhee Phonkarm, Research Assistant (Database) • Ms. Duangdao Saiyasitpanich, Research Assistant (Project Based) • Ms. Lakana Sangkhakorn • Research Assistant (Information) • Ms. Sirijit Sangunurai, Research Assistant • Ms. Wannipa Soda, Research Assistant **Non-Research:** Ms. Jutima Anumatratchakit, Secretary to Regional Director • Ms. Jirapar Boonyasurakul, Secretary • Ms. Vipavee Charoensidhi*, Finance and Administration Manager • Mr. Tanadol Compo, Administrative Assistant and Compositor (Publication) • Mr. Pornchai Luechatmatikul, Office Administrative Aide • Mr. Narin Peeraoranum, Cashier • Ms. Orn Uma Polpanich, Accounts Assistant • Ms. Naiyana Puranachoti, Administrative Assistant • Mr. Suparuek Puttakhot, System Network Administrator • Ms. Darakul Srichoorom, Accountant • Ms. Banyen Taruen, Janitor

REGIONAL OFFICE SOUTH ASIA (INDIA)

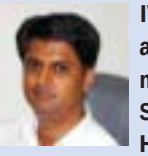
Principal Researchers: Dr. Hammond Murray-Rust, Theme Leader, Integrated Water Management for Agriculture • Dr. Chris Scott, Director (India) • Dr. Tushaar Shah, Theme Leader, Sustainable Groundwater Management **Senior Researchers:** Dr. B.R. Sharma, Liaison Officer **Researchers:** Mr. Jeroen Ensink • Research Associate • Dr. Ranjitha Puskur, SPL Project Scientist **Postdoctoral Scientists:** Ms. Jetske Bouma, Associate Expert • Dr. Stephanie Buechler, Postdoctoral Scientist • Ms. Bhawana Upadhyay, Associate Expert **Research Support:** Mr. Vaibhav Bhamoriya • Junior Consultant • Ms. Gayathri Devi, Scientific Officer • Mr. T.P.Gangadhara, Scientific Officer (GIS Modeling) • Mr. B. Girish, Consultant • Mr. Murali Krishna Gumma, Scientific Officer (GIS Modeling) • Mr. Avinash Kishore, Junior Consultant • Mr. Dinesh Kumar, Consultant • Ms. Archana Londhe, Junior Consultant • Ms. Aditi Mukherji, Junior Consultant • Mr. P. Narayana, Scientific Officer • Mr. Abhishek Sharma, Junior Consultant • Dr. O.P. Singh, Consultant • Mr. Jayesh Talati, Consultant • Mr. Shilp Verma, Junior Consultant **Non-Research:** Mr. P.K. Kole, Consultant • Project Coordination and Administration • Mr. Syed Liaqatullah, Driver-cum-General Assistant • Ms. Navanitha Raghupathi, Administrative Associate • Ms. Roja Rani, Administrative Associate • Mr. P. Reghu, Executive Secretary • Mr. Gopinath Shinde, Administrative Officer **Sub-Regional Office (Nepal) Researcher:** Dr. Dhruba Pant, Research Coordinator (Nepal) **Non-Research:** Mr. Sudarshan Pandey, Office Manager (Nepal)

REGIONAL OFFICE PAKISTAN, CENTRAL ASIA & MIDDLE EAST (PAKISTAN)

Principal Researcher: Ms. Vilma Horinkova*, Director (Central Asia) **Researchers:** Dr. Muhammad Nadeem Asghar, Senior Agricultural Engineer • Dr. Muhammad Ashfaq, Senior Agricultural Economist (On secondment from University of Agriculture, Faisalabad) • Dr. Waqar A.Jehangir, Senior Agricultural Economist • Dr. Asad Sarwar Qureshi, Acting Director **Research Officers:** Mr. Shehzad Ahmed, Junior Researcher • Mr. Mujeeb Akhtar, Research Officer • Mr. Mohammad R.Aslam, Water Resource Engineer • Mr. Abdul Hamid, Social Scientist • Mr. Muhammad Kaleem Ullah, Junior Civil Engineer • Mr. Muhammad Rafiq Khan, Social Scientist • Mr. Abdul Hakeem Khan, Project Manager • Mr. Shahzad Mahmood, Assistant Engineer • Mr. Kashif Majeed, Junior Researcher • Mr. Ilyas Masih, Research Officer • Mr. Zubair Masood, Junior Researcher • Mr. Khalid Mehmood, Associate Engineer • Mr. Muhammad Mudasser, Agricultural Economist • Mr. Muhammad Mukhtar, Junior Researcher (Malaria) • Mr. Sarfraz Munir, Junior Researcher (WM) • Mr. Amir Nazir, Economist • Mr. Ata-ur-Rehman, Research Officer • Mr. Muhammad N.Sarawar, Junior Researcher • Mr. Salman Sarawar, Junior Researcher • Mr. Muhammad Shoaib, Research Officer • Mr. Muhammad Younas, Junior Researcher **Research Support:** Mr. Muhammad Arshad, Field Assistant • Mr. Asghar Hussain, Spatial Data Analyst • Mr. Manzoor Hussain, Data Collector • Mr. Anwar Iqbal • Sr. Research Assistant • Mr. Najaf Ali Khan, Data Analyst/IT Support • Mr. Shahzad Khan, Field Assistant • Mr. Abdul Mateen, Junior Data Analyst • Mr. Tariq Mehmood, Research Assistant • Mr. Asim Munawar, Research Assistant • Mr. Tipu Naveed, Research Assistant • Mr. Tariq Nazeer, Research Assistant • Mr. Khalid Siddiqui, Junior Data Analyst • Mr. Fazal Subhan, Sub-Engineer • Ms. Nyla Tabassum, Research Assistant • Ms. Mahmooda Tabbassum, Assistant Data Analyst **Non-Research:** Mr. Tabrez Ahmad, Secretary/Personnel Assistant • Mr. Moghis Ahmed, Accountant • Mr. Siddique Akbar, Maintenance Supervisor • Mr. Yousaf Amin, Driver/Office Assistant • Mr. Muhammad Anwar, Cook cum Chowkidar • Mr. Muhammad Arshad, Cook cum Chowkidar • Mr. Muhammad Asghar, Laborer • Ms. Shahar Bano • Secretary • Saiqa Batool, Communication Assistant • Mr. Eric Benjamin, Travel and Logistics Counselor • Ms. Aysha Bhatti, Technical Editor/ Communication Head • Mr. Cheragh Din, Gardener • Mr. Nadeem George, Bearer/Cleaner • Mr. Mohammad Jabar Iqbal, Driver • Mr. Mohammad Javaid Iqbal, Driver • Mr. Muhammad Javed, Office Boy • Mr. Mohammad Jehangir, Bearer/ Cleaner • Mr. Abdul Hayee Kashif, Assistant Accountant • Mr. Mohammad Iqbal Khan, Secretary • Mr. Muqarab Khan, Driver • Mr. Muhammad Manshah, Purchase Officer • Mr. Wilson Masih, Sweeper • Cleaner • Mr. Akram Masih, Sweeper/ Cleaner • Mr. Ashraf Masih, Gardener • Mr. Nazar Masih, Night Chowkidar • Mr. Asif Mehmood, Administrator IT • Mr. Ishaq Muhabbat, Assistant Network Administrator • Mr. Pervaiz Ramzan, Driver/Office Assistant • Mr. Muhammad Saleem, Driver • Mr. Mohammad Shafiq, Office Assistant • Mr. Riaz Wicky, Office Aide/General Helper • Mr. Muhammad Yousaf, Cook cum Chowkidar **Sub-Regional Office (Uzbekistan) Researcher:** Mr. Mehmood ul Hassan, Regional Researcher **Research Officers:** Dr. Iskandar Abdullaev, Researcher-N • Dr. Bakhtyar Matyakubov, Research Officer • Ms. Nargiza Nizamtdinkhojaeva, Research Officer **Non-Research:** Mr. Ilhom Babaev, Administrative Secretary • Mr. Alexy Filonenko, IT Specialist/Administrative Support Staff • Ms. Liliya Gatina, Finance • Personnel Manager • Mr. Ilya Pak, Driver/Office Assistant • Mr. Ilshat Tukhvatullin, Driver/Office Assistant • Mr. Murat Yakubov, Translator/Interpreter

*Left in 2002/2003

A new approach to human resources



IWMI recently completed a reorganization of its human-resources function. Sharat Kumar, Head of Human Resources (HR) at IWMI, describes the changes and the results.

An integrated change-management program is underway at IWMI, aligning HR to the organization's strategic goals. The new staff classification and performance evaluation processes clearly define the frameworks for staff to progress. It clearly sets out the competencies required for each job and how staff will be measured for promotion. IWMI can expect a very agile manpower over the next 5 years and greater mobility for staff to move from national to regional or international positions depending on performance.

The role of HR will also change with the rest of the organization, moving from an operational role to that of a 'strategic advisor.' Line managers will take over the operational HR, using new technology. Speed, accuracy and effectiveness will be the hallmarks of the future IWMI. We will continue to go about, talking to, motivating and developing our people. Communication will be the key challenge.

Publications

A complete listing of publications for 2002—including working papers, proceedings, chapters in books & papers presented at conferences—and access to IWMI Research Reports, Working Papers and Water Policy Briefings are available on the CD-ROM version of the Annual Report or at www.iwmi.org/pubs

Research Reports

1. **Albinson, B.; Perry, C. J. 2002**. Fundamentals of smallholder irrigation: The structured system concept. Colombo, Sri Lanka: IWMI. v, 21p. (IWMI research report 58).

2. **Van Koppen, B. 2002**. A gender performance indicator for irrigation: Concepts, tools and applications. Colombo, Sri Lanka: IWMI. 42p. (IWMI Research report 59).

3. **Shah, T.; van Koppen, B.; Merrey, D.; de Lange, M.; Samad, M. 2002**. Institutional alternatives in African smallholder irrigation: Lessons from international experience with irrigation management transfer. Colombo, Sri Lanka: IWMI. v, 24p. (IWMI research report 60).

4. **van Koppen, B.; Parthasarathy, R.; Safiliou, C. 2002**. Poverty dimensions of irrigation management transfer in large-scale canal irrigation in Andhra Pradesh and Gujarat, India. Colombo, Sri Lanka: IWMI. v, 26p. (IWMI research report 61).

5. **Kikuchi, M.; Barker, R.; Weligamage, P.; Samad, M. 2002**. Irrigation sector in Sri Lanka: Recent investment trends and the development path ahead. Colombo, Sri Lanka: IWMI. vi, 48p. (IWMI research report 62).

6. **van der Hoek, W.; Ul Hassan, M.; Ensink, J. H. J.; Feenstra, S.; Raschid-Sally, L.; Munir, S.; Aslam, R.; Ali, N.; Hussain, R.; Matsuno, Y. 2002**. Urban wastewater: A valuable resource for agriculture: A case study from Haroonabad, Pakistan. Colombo, Sri Lanka: IWMI. v, 20p. (IWMI research report 63).

7. **Ensink, J. H. J.; van der Hoek, W.; Matsuno, Y.; Munir, S.; Aslam, M. R. 2002**. Use of untreated wastewater in peri-urban agriculture in Pakistan: Risks and opportunities. Colombo, Sri Lanka: IWMI. v, 22p. (IWMI research report 64).

Journal articles

1. **Abdul-Ghaniyu, S., Kranjec-Berisavljevic, G., Yakubu, I.B., and Keraita, B. 2002.** Sources and Quality of Water for urban vegetable production (Tamale, Ghana). *Urban Agriculture Magazine 8 (December 2002): p.10.*

2. **Abdullaev, I. 2002.** Effects of large scale irrigation on drinking water quality in the Bukhara and Kashkadarya provinces of Uzbekistan. *Water International,* 27(2):266-270.

3. **Ahmad, M. D.; Bastiaanssen, W. G. M.; Feddes, R. A. 2002.** Sustainable use of groundwater for irrigation: A numerical analysis of the subsoil water fluxes. *Irrigation and Drainage,* 51(3):227-241.

4. **Amerasinghe, F. P.; Mukhtar, M.; Herrel, N. 2002.** Keys to the Anopheline mosquitoes (Diptera: Culcidae) of Pakistan. *Journal of Medical Entomology,* 39(1):28-35.

5. **Asghar, M N.; Prathapar, S. A.; Shafique, M. S. 2002.** Extracting relatively-fresh groundwater from aquifers underlain by salty groundwater. *Agricultural Water Management,* 52(2):119-137.

6. **Ashfaque, M.; Jehangir, W.A.; Younus, M.; 2002.** Micro credit: An instrument for poverty reduction. Pakistan *Journal of Applied Sciences,* 2(8):826-830, 2002.

7. **Ashraf, M., Saeed, M. M.; Asghar, M. N. 2002.** Evaporation pan: A tool for irrigation scheduling. *Journal of Drainage and Water Management*, 6(1):45-51.

8. **Bastiaanssen, W. G. M.; Ahmad, M. D.; Chemin, Y. 2002.** Satellite surveillance of evaporative depletion across the Indus Basin. *Water Resources Research,* 38(12):9p.

9. **Buechler, S.; Devi, M. G; Raschid-Sally, L. 2002.** "Livelihoods and Wastewater Irrigated Agriculture Along the Musi River in Hyderabad City, Andhra Pradesh, India". *Urban Agriculture Magazine* 8: 14-17.

10. **Cai, X.; McKinney, D. C.; Lasdon, L. 2002.** A framework for sustainability analysis in water resources management and application to the Syr Darya Basin. *Water Resources Research* 38(6).

11. **Cai, X.; Rosegrant, M. W. 2002.** Global water demand and supply projections Part 1: A modeling approach. *Water International* 27 (2): 159-169.

12. **Danso, G. ; Drechsel, P. ; Fialor, S. C. 2002.** Perceptions of organic agriculture by urban vegetable farmers and consumers in Ghana. *Urban Agriculture Magazine* 6: 23-24

13. **Danso, G. ; Drechsel, P. ; Wiafe-Antwi, T. ; Gyiele, L.A. 2002.** Income of farming systems around Kumasi. *Urban Agriculture Magazine* 7: 5-6

14. **Drechsel, P.; Blumenthal, U.J.; Keraita, B. 2002.** Balancing health and livelihoods: Adjusting wastewater irrigation guidelines for resource-poor countries. *Urban Agriculture Magazine* 8:7-9

15. **Drechsel, P., Cofie, O.O. Danso. G. 2002.** Closing the rural-urban nutrient cycle. *Insights 41 (May 2002).*

16. **Droogers, P.; Allen, R. G. 2002.** Estimating reference evapotranspiration under inaccurate data conditions. *Irrigation and Drainage Systems,* 16(1):33-45.

17. **Droogers, P.; Bastiaanssen, W. 2002.** Irrigation performance using hydrological and remote sensing modeling. *Journal of Irrigation and Drainage Engineering,* 128(1):11-18.

18. **Eddleston, M.; Karalliedde, L.; Buckley, N.; Fernando, R.; Hutchinson, G.; Isbister, G.; Konradsen, F.; Murray, D.; Piola, J. C.; Senanayake, N.; Sheriff, R.; Singh, S.; Siwach, S. B.; Smit, L. 2002.** Pesticide poisoning in the developing world: A minimum pesticide list. *The Lancet,* 360:1163-1167.

19. **Ekanayake, L.; Van der Hoek, W. 2002.** Dental caries and developmental defects of enamel in relation to fluoride levels in drinking water in an arid area in Sri Lanka. *Caries Research* 36:398-404.

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