WATER FIGURES

TURNING RESEARCH INTO DEVELOPMENT

QUARTERLY NEWSLETTER OF THE
INTERNATIONAL WATER MANAGEMENT INSTITUTE

CONTENTS

ISSUE 1
2007

ANNOUNCEMENTS

22 March is World Water Day 2007

This year the World Water Day (WWD) 2007 theme is 'Coping with Water Scarcity'.
http://www.worldwaterday07.org/

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International
Water Management
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EDITORIAL

WATER FIGURES ISSUE 1, 2007

HOW DO WE COPE WITH WATER SCARCITY?

"A fifth of the world's people, more than 1.2 billion, live in areas of physical water scarcity, lacking enough water for everyone's demands. About 1.6 billion people live in water scarce basins, where human capacity or financial resources are likely to be insufficient to develop adequate water resources" (Water for Food Water for Life, Summary, Comprehensive Assessment of Water Management in Agriculture).

The understanding of what constitutes water scarcity has changed over the past years. Water scarcity is exemplified by problems related to access, resource scarcity, environmental degradation and health problems. They include the need to carry heavy pots of water several kilometers every day to meet household needs, poverty caused by farmers losing their land or the landless losing their jobs because of lack of irrigation water, the loss of wetlands or estuaries because of upstream water depletion, and water pollution giving rise to the incidence of water-borne diseases, particularly in cities.

Water scarcity affects people differently and unequally, and these disparities exist within countries as well as between countries. The Human Development Report, 2006 underscored this point: "In waterstressed parts of India irrigation pumps extract water from aquifers 24 hours a day for wealthy farmers, while neighbouring smallholders depend on the vagaries of rain. Here, too, the underlying cause of scarcity in the large majority of cases is institutional and political, not a physical deficiency of supplies".

"Is there enough land, water, and human capacity to produce food for a growing population over the next 50 years—or will we 'run out' of water?" This is the key question that guided the Comprehensive Assessment of Water Management in Agriculture (CA) . The CA engaged in a process of critical evaluation of 50 years of water development, challenges to water management, and solutions in order to try and answer the question. The Summary CA report informs that coping with water scarcity is about thinking differently about water management.

Water is a natural resource, a commodity, and increasingly seen as a perceived human entitlement. New thinking on understanding the effects of water scarcity is focused on policies and investment to increase water productivity through irrigation, upgrading rainfed agriculture and engaging in strategic trading to deal with scarcity. New emphasis on water management sees decisions on water interventions occurring in a more transparent and inclusive environment that encourages dialogue between decision makers and practitioners and ultimately puts solutions in the hands of communities.

Samyuktha Varma
Editor

The choice of WATER FIGURES as the name of our quarterly newsletter arises from its ability to communicate more than one meaning: "Water figures in the scheme of things…"; "WATER FIGURES as a reference to the science of water management"; "WATER FIGURES as a visual representation of the spaces the resource occupies and the shapes it takes".

EVENTS

COPING WITH WATER SCARCITY IN DEVELOPING COUNTRIES: WHAT ROLE FOR AGRICULTURAL BIOTECHNOLOGIES?
Internet, **05 March - 01 April 2007** Food and Agriculture Organization (FAO)
14th e-conference in FAO's Electronic Forum on Biotechnology in Food and Agriculture.

SOUTH ASIA WATER RESEARCH CONFERENCE
Hyderabad, India, **21 - 22 March 2007**
'Crossing Boundaries' project in the South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERs) (India) in collaboration with the Center for Water Resources, Anna University (India)

WATER MANAGEMENT AFRICA 2007
Pretoria, South Africa, **23 - 24 April 07**
Coping with water scarcity: A Pan-African platform for sharing water governance strategies and knowledge, with speakers from DWAF, Mvula Trust, WHO, Rand Water, DBSA and WWF.

Photo Credit Sanjini de Silva

PRODUCTION CREDITS

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Water Saving Technologies: Myths and Realities Revealed in Pakistan's Rice Wheat Systems

IWMI Research Report 108

Written by MOBIN-UD-DIN AHMAD, HUGH TURRAL, ILYAS MASIH, MARK GIORDANO AND ZUBAIR MASOOD

Over the past half century, one of the biggest challenges that the world faced was ensuring food and livelihood security for growing populations. An important factor in meeting this challenge has been the expansion of irrigation. However, today, with river basins both over-developed and over-committed this can no longer be considered a straight-forward option. One alternative is the growing of crops that require less water. In Pakistan, for example, various resource conservation technologies (RCTs) are being developed by both national and international audiences particularly for rice and wheat which make up 60 percent of the country's food grain production.

The Research Report is based on a study that assessed, through both farmer surveys and physical measurements, RCT adoption and resulting water saving impacts in Pakistan's Indus Basin. It tracks various water balance components at field, farm and higher scales of the irrigation system. In addition, it studies the conditions under which water savings at the field level can be translated into water savings at the irrigation system and the basin scale. The findings also sound a warning to the over optimistic: even when technologies increase water productivity they may not decrease actual water use unless institutional arrangements are in place to limit demand.

Photo Credit Dr. Riaz Ahmad Mann

Photo Credit Dr. Riaz Ahmad Mann

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IWMI Research Reports

The publications in this series cover a wide range of subjects—from computer modeling to experience with water user associations—and vary in content from directly applicable research to more basic studies, on which applied work ultimately depends. Some research reports are narrowly focused, analytical and detailed empirical studies; others are wide-ranging and synthetic overviews of generic problems.

Although most of the reports are published by IWMI staff and their collaborators, we welcome contributions from others. Each report is reviewed internally by IWMI's own staff and Fellows, and by external reviewers. The reports are published and distributed both in hard copy and electronically (www.iwmi.org) and where possible all data and analyses will be available as separate downloadable files. Reports may be copied freely and cited with due acknowledgment.

Climate Change: A New Avenue for IWMI?

VLADIMIR SMAKHTIN

Photo Credit Iskandar Abdullaev

The issue of Climate Change (CC) has become hot in recent years. Changes in precipitation patterns are anticipated to affect flow regimes, inflows to reservoirs, and the availability of water for agriculture and ecosystems. Changes in temperature regimes may shorten cropping seasons. Local impacts of climate change are much less clear than global and so are specific adaptation measures. The opportunities for CC-relevant research in agricultural and water sectors are therefore immense.

In the beginning of 2007, IWMI took stock of our work in terms of climate change and our relevant capacities. The results were promising. The main premise and overall framework for climate change-related research at IWMI has been that by understanding and adapting to existing climate variability better, society will develop resilience to CC. For example, CC is expected to further increase the frequency and magnitude of floods and droughts which will have a profound impact on livelihoods, the agricultural sector and water resources management in many world regions. Even today, these extreme conditions fall outside the bounds of existing institutional designs, and are not properly managed. It is in this context that IWMI carries out significant research in the field of drought assessment and mitigation. Drought is a major impediment to development of rural livelihoods, which hits millions of people in Africa and Asia, even in those regions The world is moving away from 'drought response' (a reactive approach, focusing primarily on drought relief after it had happened) to drought mitigation (a proactive approach, when anti-drought actions are taken in advance). The reactive approach is still dominating most of the developing world. If this doesn't change, it will adversely affect the ability of many developing countries to adapt to CC. The recently completed project in South-West Asia identified technical, institutional and policy gaps which existed in drought research and management in three countries—India, Pakistan and Afghanistan. It also enhanced regional cooperation in drought management and recommended steps for effective drought mitigation in the three countries. The project addressed a variety of technical and social issues, including developing a regional drought monitoring system based on remote sensing data and analysing drought frequency and magnitude using precipitation time series, socio-economic surveys of rural population, review and analysis of drought-related institutions and policies, etc. Current drought research activities at IWMI include quantification of drought risks and low flows in Iran, global mapping of drought-related indicators which reflect various aspects of drought, and developing a regional online drought information center. Attempts are being made to initiate drought-research projects in East and West Africa and in South-East Asia. All this places us in a good position to address issues associated with more extreme droughts.

The ADAPT project (Water, Climate, Food and Environment under Climate Change: An Assessment of Global and Regional Impacts and the formulation of Adaptation Strategies for River Basins) directly examined adaptation strategies to CC in various regions. It included studies in seven contrasting river basins: Rhine (Western Europe), Sacramento (USA), Syr Darya (Central Asia), Volta (Ghana), Mekong (Southeast Asia), Walawe (Sri Lanka) and Zayandeh (Iran). The predictions of Global Circulation Models (GCM) were downscaled to river basins for hydrological modeling and for evaluation of various response strategies to protect the environment, improve food production and enhance industrial capacity. IWMI coordinated the study, simulated adaptation strategies to sustain food security in all study basins and carried out full studies in Sri Lanka, Iran and Mekong. IWMI is currently working with Mekong River Commission (MRC) to incorporate IPCC CC scenarios into the MRC development plans and analyze impacts on the Mekong river flow.

IWMI developed a global model (WATERSIM) to analyze various scenarios of the food-water-environment nexus —a potentially useful tool for analyzing the impacts of CC scenarios.

The model is based on water accounting, fully integrates water and food modules, uses a combination of hydrological and administrative boundaries and allows the following issues of global change and adaptation to it to be examined:

- tradeoffs between irrigated and rainfed agriculture in food production
- impacts international agreements on trade and water use at regional and basin level
- impacts of alternative investment strategies in water infrastructure and agriculture
- impacts of environmental regulations on agricultural production
- impacts of rainfall and water resources variability on food production.

We are looking at interesting new angles in CC-related research. A current study analyzes, for the first time, the multiple trans-boundary water treaties to examine how the negative impacts of changes in trans-boundary water availability (associated with climate variability and change) can be mitigated. The study considers strategies in trans-boundary water law formation which are both politically feasible and can mitigate the impacts of variability on riparian relations. It is acknowledged that CC impacts will likely be most significant in Africa, where large water developments will also take place in the next decades. Therefore, making water resource variability an integral part of the trans-boundary water management (e.g. in the Nile basin) is particularly important if the impacts of CC on the African poor are to be alleviated

Another current project examines links between malaria incidence and climate variables in Sri Lanka. It aims to develop an early warning tool that may be able to predict, amongst others, the impacts of CC on the malaria hazard. IWMI also leads a System-wide Initiative on Malaria and Agriculture (SIMA), which aims to increase the understanding of links between malaria and agriculture, and to test innovative interventions for malaria control under different agricultural systems and, potentially, CC scenarios.

Ongoing research also examines some implicit hydrologic dimensions of international efforts to mitigate CC, like those of the Clean Development Mechanism (CDM) – "carbon sink" provisions of the UN Framework Convention on Climate Change's Kyoto Protocol – on global, regional and local water cycles. Conversion of large land areas to forestry, which is promoted by the CDM, impacts the redistribution of water use (through increased evaporation, reduced runoff, etc.) thus being the major component of CC mitigation process. Global and local datasets are used to simulate CDM-related changes in land-use and farming systems and their consequences for local communities and overall food security. A similar modeling approach is applied to examine regional and basin-wide water use impacts associated with CC. Climate variables from the future climate scenarios generated by GCMs are used as inputs, and both the implications of CDM carbon sink projects under CC conditions, and land-use changes in general, are examined. Potential water scarcity hotspots are thus being identified under combinations of land-use change and CC.

IWMI has contributed directly and indirectly to several international assessments on water, food and environment that take into account climate variability and change impacts (e.g. Comprehensive Assessment of Water Management in Agriculture, Millennium Ecosystem Assessment, International Assessment of Agricultural Science and Technology for Development, Global Environment Outlook).

We have developed a World Water and Climate Atlas, which provides information on climate and moisture availability for agriculture and is of direct relevance to CC researchers, planners and those carrying out adaptation activities. IWMI also leads the CGIAR Consortium for Spatial Information (CSI), which provides framework data for global spatial analysis and modeling conducted by various CG centers. The CSI activities include, amongst many others, the development of a spatial database of CC scenarios, which aims to promote and support CC analysis by a broader scientific community.

The move is on within the CGIAR system to work closely together with the Global Change Scientific community and to make use of complementary features of both in order to better quantify the possible impacts and to examine best adaptation measures to CC. We recently participated in a joint international workshop in UK, which brought together over thirty senior scientists from both communities and which mapped the way forward to collaborative work.

Overall, CC may indeed be a threat. But it is also and exciting challenge for global research community to deal with and a great avenue for IWMI to explore in the years to come.

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Photo Credit Sanjini de Silva

Understanding 'Triggers' of Water Policy Reform

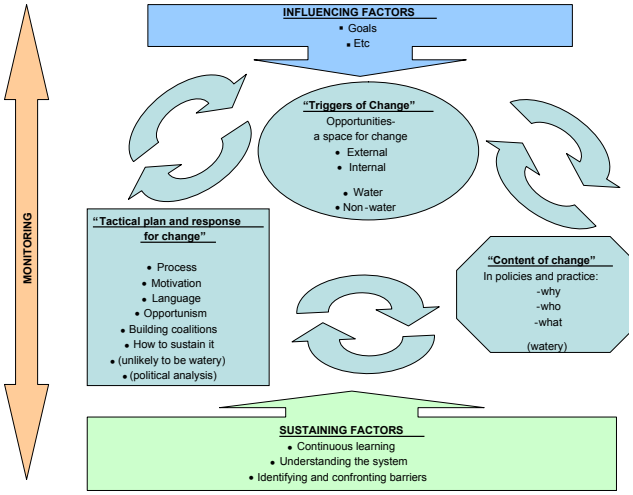
NADIA MANNING

Policy reform, and water policy reform in particular, is one way in which changes can be made in the way that water resources are managed. But how do these changes come about? There may be instances when a particular policy, related to water or any other sector, changes because of events triggered or driven by a single incident or factor. However, it is likely more generally to be the case that there is a convergence of factors which both lead to policy change and determine the particular nature of that change. What is it that 'triggers' a reform to take place?

The International Water Management Institute (IWMI) has joined efforts with the Global Water Partnership (GWP) to explore the concept of 'triggers of water policy reform' and to develop a joint program which would aim to (1) better understand the factors which bring about changes in water policy, and (2) apply this learning to help make positive and lasting changes in water policy.

A workshop was the first major step in this initiative and brought together a group of practitioners, researchers, and activists at IWMI HQ in Colombo, December 1st and 2nd 2006, to brainstorm and share experiences, both practical and theoretical. The workshop included several presentations by practitioners and researchers; a "world café" session to share knowledge and experience, a discussion of a potential framework to describe the tactics, content, and triggers of water policy change, and a closing session on possible next steps. Key results from this workshop were the (1)valuable experiences of participants in impelling policy change both within and outside the water sector that were shared, (2)recent research findings on the subject presented, (3) brainstorming on the topic (from world café), and (4) a jointly developed framework for understanding triggers.

Valuable insights were provided by the set of seven presentations given by practitioners and researchers. Four presentations provided examples and insights from personal experience on how change has been triggered. These included Mike Muller's account of South Africa's near revolution in water policy, Sunita Narain's insights into policy-making in India, Rajindra Ariyabandu's description of the process of Sri Lanka's proposed water policy, and Margaret Catley-Carlson's (GWP Chair) experience as deputy-director of UNICEF and other work. The remaining three presentations outlined the results of key research on policy and policy change/reform. David Molden, leader of the Comprehensive Assessment of Water Management in Agriculture presented the outcomes of the Assessment's chapter on "Policy & Institutional Reform: the Art of the Possible." Dr. R. Maria Saleth, senior institutional economist in IWMI's Institutions and Policy group, talked about "Triggers for Water Policy Reforms: Analytics, Theories, and Evidences" based on his work in this area. Mark Giordano, resource economist and head of IWMI's Institutions and Policy group, presented a typology for water policy change and framed the challenges inherent in developing such a typology.



Following the presentations, the group broke into a "World Café" session to share knowledge and begin to discuss the tactics, content, and triggers of water policy change. Participants gathered around four tables, each with an identified table host and a specific question such as "what have been the main areas of triggers of water policy reform in your experience?", and "what do you think of when you first hear the term policy trigger?" Insights that began to emerge from this session included the need to learn from the political science literature, value of using different idioms, and importance of identifying the moment and process of change rather than just the content.

On the second day of the workshop, participants began to put together a framework for fostering change in both policies and practices based on the insights that had come to the fore in the first day. After some discussion, a framework emerged, with three distinct though inter-related components. One component focuses on the Triggers of Change which provide the opportunity, i.e. a space for change, but may not in themselves guarantee that change will occur; they may be external or internal; and may or may not be water-related. The second component focuses on the Content of change in which detailed design of the desired changes is required. The third component that is required for achieving change is a Tactical plan and response for change, involving such activities as building coalitions for change, understanding the motivation of the various players, employing language and idioms that resonate with these players, knowing how to capitalize on potential opportunities for change, and learning how to sustain change. An important insight at the end of the workshop was that while focusing on understanding the trigger of policy change is important, sustaining change was also a vital component of effective policy change. To ensure lasting change involves continuous learning, understanding the system, and identifying and confronting barriers.

Further work on this initiative of 'Triggers of Water Policy change' is currently being planned together with GWP.

Nadia Manning is a communications coordinator working on the Knowledge Sharing in Research Pilot Project. She also works on research projects focused on livelihoods and water poverty.

Interview with David Molden

Photo Credit Sharni Jayawardena

WHAT WAS THE INSPIRATION FOR THE COMPREHENSIVE ASSESSMENT?

The idea for the Comprehensive Assessment (CA) goes back to the World Water Forum 2000 at The Hague. At the meeting, various experts were asked to give their opinions on the important issues related to water and it came out that there was a real rift between those that were concerned with 'water and nature' and those that were interested in developing 'water and agriculture'. The two groups were at loggerheads about how water should be used, with the irrigation engineers interested in water development for food production on one side, and the environment group arguing for water for the preservation of ecosystems on the other.

The Comprehensive Assessment started out as a gap filling research exercise to see how people use water. The main question that framed the process is "How much more water is needed for agriculture?" Later the exercise expanded into an assessment process involving a wide group of researchers and practitioners, with ample consultation and peer review to answer the questions, how can water be developed and managed: to end poverty and hunger; to promote sustainable water management practices; and to find a balance between food and environmental security. The process provided an opportunity to encourage communication between various perspectives on water to address the gaps in thinking.

WHAT HAVE BEEN IWMI'S CONTRIBUTIONS TO THE COMPREHENSIVE ASSESSMENT?

IWMI hosted the CA secretariat, a group that played an important role in mobilizing and facilitating the interaction amongst all partners involved in the process. The broad partnership is one of the most important outcomes of the CA, which will continue to be beneficial as we all work together on water, food and environment.

IWMI staff made significant contributions to the assessment as authors, reviewers, and researchers. In addition, IWMI staff were actively involved in the development of scientific tools and information products such as the Watersim model, and the global map of irrigated areas.

HOW DO YOU SEE THE CA INFLUENCING WHAT HAPPENS NEXT?

The publishing of the main report of the CA – Water for Food, Water for Life is an important event, and a big milestone, but by no means the end of the assessment process. There is still a big task in reaching a variety of audiences – policy makers, agricultural producers, water managers, researchers, academia, practitioners and the general public. The network established by the CA, in particular the co-sponsoring organizations FAO, CBD, CGIAR and the Ramsar Convention on Wetlands, plays an important role in reaching out to people. In a way, the easiest community to reach for us is the research community, and I know the CA has made an impact on the IWMI's own research, and that of the Challenge Programme on Water and Food. Key messages have been taken up by the media and received mention in popular magazines and international journals such as the Economist. CA material is also well suited for coursework. We have already started collaboration with Imperial College, London to develop course material for distance learning, and I believe there are many similar opportunities where the material can be used.

A big task remaining for the CA is to take it to different countries to find out what these ideas mean for different countries—tailor these ideas and see where they might be most useful.

CLIMATE CHANGE RESEARCH IS A TOPIC THAT SEEMS TO BE ON THE TIP OF PEOPLE'S TONGUES THESE DAYS, HOW DO YOU SEE IT FITTING IN WITH IWMI RESEARCH?

Knowing that climate change is a hot topic, it is still important to remember that there are other changes affecting water use and these are closer on the horizon. For instance, the use of biofuels and bio energies, urbanization, growing wealth in India and China, are all major drivers of changing water use. These have more of an impact on water use in the short run, than climate change.

That said, there are a lot of important issues that come up when we talk of climate change and water—the biggest ones have to do with within-year variability. For climate change research it is important to look at water scarce areas to get an idea of what might happen to other areas n the future. Farmers in sub-Saharan Africa have to deal with these climatic extremes all the time, and do not have the water systems that have been set up in Asia and the developing world to help overcome short term dry spells and long term drought. Good water management will go a long way to help people adapt.

We need to concentrate on finding ways to reduce poor communities' vulnerability to climate change as well as short-term variability. For example, research is needed on finding out appropriate water storage solutions, looking at risk reducing measures such as insurance, and prediction and communication tools to help know when drought is coming. Most importantly, research should be about figuring out what is appropriate to different people in different situations.

HOW DO YOU SEE YOUR NEW POSITION AS DEPUTY DIRECTOR GENERAL?

The experience of working on the CA has been good preparation for this position. The position gives me a chance to take the lessons from the CA into our research. I look forward to strengthening partnerships made through the CA to take the water-food-livelihood-environment research agenda forward.

Recent Publications

For on-line access to IWMI Research Reports and Working Papers, see **http://www.iwmi.cgiar.org/pubs/mindex/htm**

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