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REGIONAL COOPERATION AND INTEGRATION DIVISION

MISSION REPORT

INTERNATIONAL DEVELOPMENT RESEARCH CENTER (IDRC)
POLICY WORKSHOP ON
LOCAL WATER MANAGEMENT

OTTAWA, CANADA
18-19 March 2002

S.M.K. Donkor
March 2002

CONTENTS

1. INTRODUCTION

The International Development Research Centre (IDRC) is a public corporation created in 1970 to help developing countries find long-term solutions to the social, economic, and environmental problems they face. IDRC's architects believed that the powers of science and technology could be harnessed to promote economic growth and development in the South. They envisioned an organization that would follow the lead established by Southerners themselves. The result was the first international organization to focus on knowledge gained through research as a means for empowering the people of the South.

The broad goal is to initiate, encourage, support, and conduct research into the problems of the developing regions of the world and into the means for applying and adapting scientific, technical, and other knowledge to the economic and social advancement of those regions.

This goal is translated into the following objectives:

- to assist scientists in developing countries to identify sustainable long-term, practical solutions to pressing development problems.
- to mobilize and strengthen the research capacity of developing countries, particularly capacity for policies and technologies that promote healthier and more prosperous societies, food security, biodiversity, and access to information.
- to develop links among developing-country researchers, and provide them access to the results of research around the globe, in particular through developing and strengthening the electronic networking capacity of institutions in developing countries that receive IDRC funding.
- to ensure that the products from the activities it supports are used by communities in the developing world, and that existing research capacity is used effectively to solve development problems.

To achieve these objectives, IDRC funds the work of scientists working in universities, private enterprise, government, and nonprofit organizations in developing countries and provides some support to regional research networks and institutions in the Third World.

The Regional Adviser for Water Resources Development and Management undertook the mission to International Development Research Centre (IDRC) at the request of the Deputy Executive Secretary of the Economic Commission for Africa, Mrs. Lalla Ben Barka to represent her at the " **POLICY WORKSHOP ON LOCAL WATER MANAGEMENT"** organised by the IDRC in Ottawa from 18 and 19 March 2002.

2. THEMES FOR THE WORKSHOP

The Workshop addressed three principal points, all of which will appear as themes in the various types of presentations:

- Decision-makers occur at all levels of the system from farmers or householders at one end to senior officials at the other. The need to influence decision-making is not, therefore, exclusively aimed at government.

- Local management is an important response to scarcity, but it is no panacea. It is just as important to identify limitations to local management as to emphasize potential. For example, how does local water management work when the river or aquifer has sources and outflows beyond the reach of the community?

- Past IDRC research has done much to identify what can be called "the option boundaries" for local water management, and future IDRC research will continue to define the extent to which, and the times and conditions when, local management seems most likely to offer sustainable and equitable development.

The Workshop also provided a Forum for launching a new IDRC book "Water: Local –Level Management" by Dr. David Brooks.

The Program of the Workshop is attached as Appendix I.

3. ISSUES

A water crisis is looming in Africa and the Middle East, where annual renewable freshwater available per person has declined by half since 1950, and continues to decline. As reported by the United Nations Population Fund (UNFPA), the global population has tripled in 70 years while water use has grown six-fold. More than 1 billion people currently lack access to safe drinking water and 3 billion people lack access to basic sewage systems. More than 90 percent of all the sewage produced in the developing countries returns to the land and water untreated. UNFPA calculates that 508 million people lived in 31 water-stressed or water-scarce countries in 2000; by 2025 those numbers will likely rise to 3 billion people in 48 countries.

On a global basis, watersheds in arid and semi-arid regions are home to about one billion people but contain 70% of the world's poorest people, and 44% of the children whose growth is stunted by malnutrition. The Middle East and North Africa (MENA) region itself has 5% of the world's population but less than 1% of its renewable freshwater availability. Of 20 nations with internal renewable fresh water availability below 1000 cubic meters per capita, 15 are in MENA.

Water, one of the historic causes of conflict in the Middle East is emerging as a potential instrument for promoting regional cooperation. In the long run, the common need for water can also serve as an important element in the peace building process,

> *If there is political will for peace, water will not be a hindrance. If you want reasons to fight, water will give you ample opportunities. (Uri Shamir, Israeli Hydrologist)*

Community-based natural resource management — specifically water management — must play a critical part in solving scarcity problems. Local water management permits a democratizing decentralization of decision and accountability. Well done, it empowers people to take part in the decisions that define their own futures. And it encourages the integration of traditional knowledge with innovative science to promote fair and efficient supply management.

Whether it be a local dispute between neighboring farmers or an international debate over shared resources such as a waterway, people compete for the natural resources they need to ensure or enhance their quality of life. In many instances where a natural resource lies at the

center of a dispute, solutions are increasingly being found in the form of a new and growing field of research and practice: community-based natural resource management (CBNRM).

> *Young men in Silmiougou, a village in central Burkina Faso, would like a fair chance at finding wives in nearby villages. But they have a big handicap that is unrelated to their own suitability as husbands: their village has only one hand pump for 3,000 people. This fact makes women from outside Silmiougou dread the idea of marrying a man from there. They know their lives would be filled with the daily drudgery of spending hours fetching enough water to meet their family's needs.*

4. APPROACHES

IDRC's approaches to Local Water Management Research are categorised into:

1. Aquifer Protection and Discharge to protect groundwater from salinisation, infiltration of fertilizers, chemical wastes and other contaminants.
2. Small-Scale Water Supply such as Fog Catchers, Rooftop Water Harvesting, Field and Water Harvesting.
3. Wastewater Treatment and Use. This means reusing treated "gray water" after bathing, laundering, cooking and other domestic chores.
4. Watershed management and small-scale Irrigation
5. Miscellaneous technologies such as portable water testing kits, PVC Hand pump and solar desalinators.
6. Water demand management for mainly urban areas.

Details of these approaches are presented in Appendix II

5. RESULTS

The results of IDRC's Research in Water Management has been very far reaching and important.

Brief summaries of some of the resulting publications as presented below:

Management of Shared Groundwater Resources: The Israeli–Palestinian Case with an International Perspective
(edited by Eran Feitelson and Marwan Haddad; IDRC/Kluwer Academic 2001)

For their supply of freshwater, both Palestinians and Israelis rely heavily on underground aquifers beneath Israel and the Palestinians territories. These aquifers are at the heart of ongoing negotiations between Palestine and Israel, as water is often alluded to as a major obstacle to peace. This book presents a framework for the joint management of shared aquifers,

with specific reference and proposals for the major Israeli–Palestinian case: the Mountain Aquifer. It is the first book to explicitly address the issue of cross-border groundwater management, an issue that is increasingly becoming a focal point of discussions at both the international and cross-jurisdictional levels.

Management of Water Demand in Africa and the Middle East: Current Practices and Futureneeds
(edited by David B. Brooks, Eglal Rached, and Maurice Saade; IDRC 1997)

Throughout Africa and the Middle East, supplies of fresh water for growing and processing food, for household and urban uses, and for industrial cooling and processing have not kept pace with population growth and economic growth. As well, additional sources of supply are becoming scarce and more expensive to develop. In these circumstances, Water Demand Management (WDM) offers perhaps the only significant hope for major improvements in the standard of living and quality of life for people living in Africa and the Middle East. This publication documents WDM research activities in North Africa and the Middle East, Western and Central Africa, Eastern Africa, and Southern Africa. It also identifies social issues stemming from the application of specific WDM options and, generally, discusses the nature and scope of WDM as a field of study.

Modern and Traditional Irrigation Technologies in the Eastern Mediterranean
(edited by Özay Mehmet and Hasan Ali Biçak; IDRC 2002)

A water crisis is threatening several regions of the world. In the Middle East and North Africa, the crisis is serious and getting worse. Contributing factors include mismanagement of water resources, population trends and explosive urban growth, structural imbalance between demand and available resources, and a dearth of water-related information. This book presents an analysis of irrigation technologies used in the Eastern Mediterranean region, both past and present. It discusses the reuse of wastewater and other conservation technologies through case studies from Israel, Jordan, Lebanon, North Cyprus, and Turkey. It presents a multidisciplinary view of the water crisis, with discussion in the disciplines of economics, hydrology, agronomics, engineering, and environmental sciences.

Water Balances in the Eastern Mediterranean
(edited by David B. Brooks and Ozay Mehmet; IDRC 2000)

The roots of destabilization, migration, and local conflict around the world can often be traced to a lack of fresh water. As a result, the importance of fresh water to economic development, quality of life, ecosystem sustainability, and political stability is gaining renewed global recognition. In the Middle East and the countries of the Eastern Mediterranean region, the situation is approaching crisis proportions. People living in this part of the world have only one-sixth as much fresh water available per capita as the global average. Although predictions of a Middle Eastern "water war" are dissipating, the need for regional cooperation in the effective management of water resources is no less urgent. This book presents an overview of freshwater resources in the Eastern Mediterranean.

Water Hyacinth in Africa and the Middle East: A Survey of Problems and Solutions
(edited by Luis A. Navarro and George Phiri; IDRC 2000)

Freshwater infestation by the water hyacinth weed has reached crisis proportions in many areas of Africa and the Middle East. Accumulated environmental, economic, and social damages to date are estimated in the billions of dollars. Most severely affected are riparian communities and

those people who depend upon the environmental services or production from affected water bodies. Early in 1996, and in response to disparate requests for water hyacinth research support from across Africa and the Middle East, IDRC launched an initiative to assess the extent of the problem. Most importantly, the initiative was to investigate the apparent lethargy of governments and affected communities to acknowledge, react to, and manage impending water hyacinth infestations.

Water Management in Africa and the Middle East: Challenges and Opportunities
(edited by Eglal Rached, Eva Rathgeber, and David B. Brooks; IDRC 1996)

A water crisis is looming in Africa and the Middle East, where annual renewable freshwater available per person has declined by half since 1950, and continues to decline. In this book, scientists take stock of the crisis, identify key issues and trends, and map out strategies for further research and action. They take a close look at the problems that beset different regions: from drought-prone East Africa to the Middle East — where water is a major factor in regional conflicts — to tropical areas — where water quality is a concern and water-borne diseases are endemic.

Water Management in Islam
(edited by Naser I. Faruqui, Asit K. Biswas, and Murad J. Bino; IDRC/UNU Press 2001)

In the Middle East and North Africa, water is rapidly becoming the key development issue. In response, policymakers have proposed or tried to implement policies such as higher water tariffs or privatization, but have done so without considering local culture and values. Yet culture, including religion, clearly influences how people perceive and manage a resource such as water, and must be considered during policy development. This book presents Islamic perspectives on a number of proposed water-management policies, including water demand management, wastewater reuse, and fair pricing. The book opens avenues for a wider dialogue amongst researchers working at identifying the most promising water management policies, adds to our knowledge of some of the influences on formal policy and informal practice, and makes these ideas available to a broader public. It dispels common misconceptions about the Islamic view on water-management practices, such as selling water and wastewater reuse, and serves as a concrete example of the benefit of examining development in the context of values and culture.

5. RECOMMENDATIONS

The Workshop concluded with five major recommendations linked to research work by IDRC in developing countries. These are:

RECOMMENDATION # 1:

Up, down, and sideways. Local water management should always be informed by a three-part economic analysis

Water Policy in Manila

(June 1996) Residents of the middle-class Better Living Subdivision on the southern flank of Metro Manila consider themselves lucky to have water service from the city's water utility. No matter that the water flows from their faucets for just a few hours per day, and only every other day. Up until the mid-1980s, residents had to make do with water from pump wells and delivery

services. The water still had to be boiled for drinking. Residents often drove to work with car trunks full of water containers to be filled.

Rethinking Municipal Water Tariffs

(January 1999) Municipal water tariffs are hurting both the poor and the environment in many developing countries. The most widely used water tariff — called the increasing block tariff system — is seriously flawed, argued Dale Whittington, Professor of Environmental Sciences and Engineering at the University of North Carolina, during a workshop hosted by the Economy and Environment Program for Southeast Asia (EEPSEA).

Economy and Environment Program for Southeast Asia

This IDRC-supported program publishes numerous papers on water pricing issues.

RECOMMENDATION # 2:

Policy and research should shift focus from enlarging supplies of water to managing demand

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Water Demand Management Research Network

This Web site describes the goals, activities, projects, and publications of the IDRC-funded Water Demand Management Research Network (WDMRN).

RECOMMENDATION # 3:

Policy-making should always start by accepting social custom and cultural norms as given, but not sacrosanct

http://www.idrc.ca/acb/showdetl.cfm?&DID=6&Product_ID=549&CATID=15

Water Management in Islam

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Identifying Islamic Approaches to Water Management

(April 2001) Water management projects in the Middle East and North Africa are more likely to be sustainable if they take Islamic teachings into account, say the co-editors of *Water Management in Islam*, published by IDRC and the United Nations University Press. The book dispels "persistent notions" among some Muslims that wastewater reuse and the sale of water is against Islam, and makes some surprising conclusions, says Naser Faruqui of IDRC.

In Conversation: Asit K. Biswas and Murad J. Bino

(June 2001) In the Middle East and North Africa, water is rapidly becoming the key development issue. In response, policymakers have proposed or tried to implement policies such as higher water tariffs or privatization, but have done so without considering local culture and values. Yet culture, including religion, clearly influences how people perceive and manage a resource such as water, and must be considered during policy development. Exploring the intersection of Islamic law and the modern water crisis is the goal of *Water Management in Islam*, published by IDRC and United Nations University Press.

RECOMMENDATION #4

Beware of generalizations, but share knowledge promptly

AQUAtox© 2000: The International School Network on Water Toxicity

IDRC created this network to link young students and teachers around the world with scientific experts working in water quality laboratories in the North and South. Under the AQUAtox© 2000 project, students from more than 90 schools in Canada, Africa, Asia, Latin America, and Europe have learned how to use simple and inexpensive water quality tests to detect chemical and microbial pollution in water samples taken from their local environment.

Testing the Waters

Explore the development of simple tests for water quality and their impact on the lives of people in remote communities in Canada and the developing world.

In Search of the Mythical Policymaker (July 2001) Ajaya Dixit, of the Nepal Water Conservation Foundation, is part of a local water management project involving India and Nepal, supported by IDRC. This three-year project, now in its second phase, began in 2000. The project examines small-scale, local solutions to water scarcity, taking a community-based approach to natural resources management. In this interview, Mr Dixit speaks about how his team views the dynamics involved in influencing water policy in South Asia.

RECOMMENDATION # 5:

To achieve good government, and good science, conduct evaluation that is transparent, participatory, and continuous

IDRC Evaluation Unit

One of IDRC's challenges is to ensure that development research achieves results. The Centre's commitment to results-oriented research has led to the decentralization of program responsibilities and a shift to programs that cut across sectors and academic disciplines. Such innovations increase the need to monitor performance and measure program achievements — activities coordinated by the IDRC Evaluation Unit.

APPENDIX I

PROGRAM FOR THE WORKSHOP

Monday, March 18

16h00 - Registration and Opening / Reception / Book Launch

18h00 - Formal welcome by Maureen O'Neil.

18h30 Dinner

After Dinner – First Keynote Presentation

Robert Watson of the World Bank will focus on global change and the world water crisis. He will also underscore that global climate change is likely to make a bad problem worse, but that research can mitigate the problem.

Tuesday, March 19

08h30 - Introduction of day's program by Margaret Catley-Carlson

09h00 - Second keynote presentation

Dipak Gyawali from the Nepal Water Conservation Foundation has been working on local options for water management for years, and is thoroughly familiar with projects around the world, including both surface and underground water. He will give a conceptual perspective on water, poverty and institutions.

10h00- Regional Reviews

The first roundtable would allow each of the four presenters to describe the general water situation and the specific role of locally based water management in her/his country and region. The session will provide an opportunity to compare and contrast, and to get a perspective of the breadth of program and policy choices for locally based water management. Presentations:

- Ruth Beukman, South Africa (Southern Africa)
- Mark Winfield, Ontario (Canada)
- Juan Carlos Alurralde, Bolivia (Andean countries)
- Malik Gaye, Sénégal (West Africa)

11h15 – **Coffee Break**

11h30 – ***Sectoral Analysis***

The second half of the morning will be devoted to presentations by the same people (plus Mr. Gyawali), but this time with emphasis on a problem or issue typically encountered in local water management regimes.

- Socio-economic aspects of "local" water management in urban areas (M. Gaye)
- Demand management with local management (R. Beukman)
- Pricing and valuation for local use / equity and efficiency (D. Gyawali)
- Legal approaches to empowering local water managers (J.C. Alurralde)
- Institutional linkages to higher levels of government and to local government (M. Winfield)

13h00 – **Lunch**

14h00 – ***Break-out Sessions***

In workshop format, break-out sessions on the five topics discussed in the sectoral analysis of Tuesday morning. The goal of each break-out session is to develop a set of guidelines (ranging from ideas that local management groups should consider, at one end of the scale, to regulatory frameworks, at the other). Conclusions will come by consensus if possible, but alternative or conflicting options can also be preserved. Each session will have a rapporteur whose job it will be to write up the results and conclusions from each session.

16h30 – **Light Refreshments**

17h00 – ***Reporting back from the break out sessions.***

18h00 – ***Formal closing of the Workshop by Maureen O'Neil.***

APPENDIX II

APPROACHES

SMALL-SCALE WATER SUPPLY

Fog catchers

Fog catchers are fine-mesh, polypropylene nets used to transform windborne mists into water. IDRC-supported research dating back to the mid-1980s shows they can supply small volumes of potable water where alternatives are inaccessible or unaffordable. Yet for all their technical elegance, fog catchers have not succeeded as well in practice. Now, research on fog collection is taking new and unexpected directions. In Sweden, Israel, and Tanzania, researchers are experimenting with harvesting dew — taking the moisture from the night winds that blow across even the driest deserts.

Clouds on Tap: Harvesting Fog Around the World

(October 1998) Six years ago, fog collectors were used for the first time to supplement the water supply of Chungungo, a remote Chilean village. This simple technology has more than doubled the amount of water available in Chungungo, while inspiring similar efforts in other communities around the world.

Technology File: Tapping Into Fog

The frugal use of expensive water trucked in from distant wells was once a way of life in the parched desert village of Chungungo, Chile — located in one of the driest parts of the world. With IDRC funding, Chilean and Canadian scientists fashioned an inexpensive, sustainable water supply system by stretching polypropylene mesh between two posts — like an oversized volleyball net.

Rooftop water harvesting

Rooftop water harvesting has been practiced for centuries in arid and semi-arid zones, but is also a familiar approach in monsoon climates of seasonal downpours and on islands where fresh water is never plentiful. The main challenges concern keeping the collected water clean and engineering cost-effective storage.

Catching Rooftop Rainwater in Gaza

(November 1998) A roof is not just a means to keep rain off our heads. It can also be used to bolster drinking water supplies. With funding from IDRC, scientists from Canada and Palestine tested 11 rooftop catchment systems in the Gaza Strip — an area plagued by water shortages because of arid conditions, ground water pollution, and political instability. The project looked at their technical and economic efficiency, as well as the social acceptability of rooftop water.

Field water harvesting

Diverting and gathering scarce rainwater — for household gardens, watering stock, and drinking water — have busied communities for thousands of years. It works best where there

is not enough rain to support agriculture without intervention, but enough rain to produce crops at least in occasional years.

Combating desertification: Rainwater harvesting in Jordan

(May 1997) On a windy morning, the dust of Muwaggar, near Amman, turns the world into a uniform beige, hiding the sun and covering the stunted cypress trees at the University of Jordan's experimental farm with a thick layer of sand. The Muwaggar watershed, which measures 5 kilometers (km) wide by 15 km long, is typical of other arid and semi-arid areas in Jordan and neighboring countries, where the average rainfall is less than 200 millimeters per year.

AQUIFER PROTECTION AND RECHARGE

From the Sahel to Latin America to Indonesia, aquifers are suffering the desperate effects of bad management (or no management). In many regions, freshwater supplies from aquifers have declined catastrophically; some have completely stopped, at least in the dry seasons. The quality of aquifers has also been degraded, either by salinisation or by infiltration of fertilizers, chemical wastes, and other contaminants.

Sao Paulo's Troubled Waters

(April 1994) In Sao Paulo, South America's largest city and the continent's industrial center, the price of industrialization can be seen in the murky, contaminated waters of the Tiete and Pinheiros Rivers that cross the sprawling megalopolis. What is not so clear is the effect that these rivers — choked with sewage and industrial waste — have on the groundwater supply, to which they are connected by a shallow aquifer.

The University of Costa Rica's Masters Program in Water Resource Management and Hydrogeology

(January 1998) Last August, some 50 high-ranking government ministers, vice ministers, and institute directors met in Managua, Nicaragua to consider the future of the city's water supply. According to Managua's master water supply plan, dependence on an aquifer located right below the city should be reduced. The plan claims that the aquifer has been pumped too hard in recent decades and can not supply Managua's growing population much longer. But the news they heard that day challenged the plan. In a detailed presentation, a graduate student working with the Nicaraguan Ministry of the Environment and Natural Resources argued that the Managua aquifer still has plenty of water left.

Laying a Foundation for Joint Management of the Israeli-Palestinian Mountain Aquifer

(September 1998) Since 1993, Israelis and Palestinians from a range of disciplines have been developing a plan for joint management of the Mountain Aquifer, which provides about 50% of Israel's drinking water.

Management of Shared Groundwater Resources: The Israeli–Palestinian Case with an International Perspective
(edited by Eran Feitelson and Marwan Haddad; IDRC/Kluwer Academic 2001)

For their supply of freshwater, both Palestinians and Israelis rely heavily on underground

aquifers beneath Israel and the Palestinians territories. These aquifers are at the heart of ongoing negotiations between Palestine and Israel, as water is often considered a major obstacle to peace. This book presents a framework for the joint management of shared aquifers, with specific reference and proposals for the major Israeli–Palestinian case: the Mountain Aquifer. It is the first book to explicitly address the issue of cross-border groundwater management, an issue that is increasingly becoming a focal point of discussions at both the international and cross-jurisdictional levels.

MISCELLANEOUS TECHNOLOGIES

Technology File: Portable Water-Testing Kit

Safe drinking water is essential to good health, but conventional methods of water testing have depended on sophisticated laboratories and highly trained technicians largely unavailable in developing countries and remote communities in Canada. IDRC has funded research in Asia, Africa and Latin America to evaluate existing water tests for their accuracy, simplicity, and cost. The results speak for themselves.

(see also: **Testing the Waters**)

Detecting the Presence of Waterborne Chemicals: Alternative Water Tests for the South

(December 1997) Dampen a piece of absorbent paper with a sample of untreated water. Place some buttercrunch lettuce seeds on the paper. Incubate them at room temperature for four to five days. Compare the length of the emerging seedlings or roots to those of seeds grown under normal conditions with potable water that is not chemically contaminated.

Technology File: The PVC Handpump

Groundwater — cleansed by the soil's natural filters — is the best water in many parts of the world. But in developing countries, the technology used to get water out of the ground has not always been reliable. For years, handpumps in rural areas broke down because they were not suited to rugged conditions and heavy use. They were often left in disrepair when spare parts were hard to obtain. Today, 13 developing nations and thousands of people are benefiting from a better handpump designed with IDRC support.

Technology File: Solar-powered Desalinators to Provide Drinking Water in Arid Areas

Providing potable water is a major problem in many areas across Africa. Years of drought in desert regions have meant that surface water and shallow wells are not being replenished by rainfall. Climate changes in these fragile ecosystems can affect the survival of entire groups of people. In Botswana, 80% of the population depend on boreholes for water. However, drilling for water is expensive and often disappointing. More than half the boreholes in some areas of Botswana result in scarce or salty water. Some communities depend on water that is delivered by truck — an expensive and often unreliable system.

Technology File: Water Disinfection Using Solar Radiation

Drawing inspiration from water treatment practices developed in India as long ago as 2000

B.C., researchers at the American University of Beirut in Lebanon developed, with IDRC support, a low-cost, practical means to provide safe drinking water in rural and urban areas in developing countries. The key to this method lies in the ability of direct sunlight to destroy bacteria. The treated water is suitable for drinking, and can also be used to prepare Oral Rehydration Therapy solutions to treat dehydration suffered by children with diarrhea.

Water Without Arsenic

(July 1993) The altiplano plateau of northeastern Chile is a sparsely populated, desolate area. What little water can be found contains high levels of arsenic, a poisonous element that leaches out of the plateau's volcanic soils. With no water treatment plants serving the region, local residents drink water containing levels of arsenic up to 200 times higher than the maximum recommended by international guidelines. But in some quarters, arsenic exposure is decreasing. As a result of a project funded by IDRC, school children there are now drinking safer water that has more acceptable levels of the element.

WASTEWATER TREATMENT AND REUSE

An old response to water shortage is to recycle dirty water after it is used. That can mean reusing treated "gray water" after bathing, laundering, and cooking; it can also extend, with much more care, to reuse of "black water" from toilets. In some places, recycling wastewater carries the approval of local tradition. Elsewhere, it has become a new and pressing necessity.

Regenerative Solutions for Managing Community-generated Organic Waste

(February 2000) Gregory Rose is searching for a silver lining in one of the world's most pressing environmental and public health problems: what to do with the increasing amounts of human waste, also known as 'black water'. Over the past 50 years, the volume of domestic sewage produced globally has more than doubled. Much of that sewage is generated in the rapidly urbanizing areas of the South, creating the same kind of public health crisis for developing countries that led to the so-called 'sanitary reforms' in 18th century Europe.

CFP Report 27: Community-Based Technologies for Domestic Wastewater Treatment and Reuse: Options for Urban Agriculture

(Gregory D. Rose; Spring 1999)

The under-management of domestic wastewater in many southern urban areas presents a major challenge. The accumulation of human bio-waste is constant and unmanaged wastewater directly contributes to the contamination of locally available fresh water. The cumulative results of unmanaged wastewater can have broad degenerative effects on both public and ecosystem health. Urban waste management can and must be transformed from a disposal-based linear system to a recovery-based closed-loop system that promotes the conservation of water and nutrient resources and contributes to public health.

Wastewater Treatment and Reuse for Food and Water Security

(Naser I. Faruqui, April 2000)

This brief discusses wastewater treatment and reuse as a tool for addressing food and water security in the Middle East and North Africa.

Reuse and Urban Waste and Water Management project descriptions

WATERSHED MANAGEMENT AND IRRIGATION

Surface water management

IDRC-supported research in surface water has concentrated primarily on the arid and semi-arid regions — where water is the limiting factor on development, and where gains in income and quality of life depend critically on achieving irrigation efficiencies. In many of these areas, water gets multiple uses, meeting a variety of agricultural and household needs.

Seeking sustainability in rural Egypt: Linking scientific and indigenous knowledge

(March 1997) On Egypt's dry north-west coast, everything depends on rain. For 300,000 indigenous Bedouin, whose ancestors have lived in the area since the 17th century, rainfall levels dictate how much barley to plant, where the sheep and goats will graze even the timing of weddings, which occur more often in good rainfall years. The area's water resources are not only scarce, but also extremely variable. In response, the Bedouin have developed an intricate web of strategies for managing their water resources.

Promoting Local Water Management in Nepal

(January 1998) In the Himalayan kingdom of Nepal, the land of the world's tallest mountains, smaller may be better. At least, that's what two engineers believe when it comes to water management. "We've got to get rid of the fixation in our part of the world that water means projects, and projects means large projects," says Dipak Gyawali of the Nepal Water Conservation Foundation (NWCF). Gyawali and his partner, Ajaya Dixit, see themselves as myth-busters with a mission: to convince the government to examine all of the options for wise water management before embarking on costly high risk, large projects.

Promoting Sustainable Agriculture in China's Tarim Basin

(March 2000) The Tarim Basin of northwestern China is Eurasia's driest spot. Despite its harsh climate, local farmers produce one-sixth of China's cotton, as well as grains, fruits, silk, and wool. While farming has traditionally been centered on the region's oases, water diversion and irrigation initiatives have allowed the expansion of agriculture. However, according to an ongoing IDRC-funded study, unsustainable water use and inappropriate farming practices have contributed to deforestation, soil alkalinity, and decreasing agricultural productivity in the basin.

Water Management: An Uphill Battle in the Andes

(May 2000) The water coming into our village is totally contaminated... And there is practically no water during the dry season, said the farmer from Mascarilla, Ecuador. This problem affects thousands of farmers in the El Angel river basin, who rely on an irrigation network developed over hundreds of years. In late 1995, researchers in the region established the Consorcio Carchi as a forum for ordinary citizens, NGOs, national and foreign universities, international research institutions, and government agencies to jointly manage the irrigation network.

Forecasting Water Flows in Pakistan's Indus River

(May 2001) A Pakistan-Canada research partnership has led to the launch of a sophisticated forecasting system that promises to help Pakistani authorities accurately estimate how much water flows into the Indus River — the lifeline of one of the largest irrigation networks in the world. The water forecasting system could ultimately help Pakistan to optimize water allocation at a national level by deciding how much water is used for irrigation, industry, and domestic purposes.

Tapping into Community Resources in China

(June 2001) In remote highland villages in Guizhou — one of China's poorest provinces — villagers have solved a problem that had existed for 200 years. Working with researchers from the Guizhou Academy of Agricultural Sciences, with support from IDRC, they have secured a steady supply of water. They have also reforested land, transformed a wasteland into a peach orchard, and undertaken other productive initiatives by applying community-based natural resource management.

Subsurface water management

Men and women have been drawing water from below ground since Biblical times and before. For most of those centuries, wells were limited to the depth of hand-dug holes (few deeper than 10 meters), or those drilled (to a few tens of meters) by human or animal power. Modern technology permits much deeper drilling — and can lead to catastrophic depletion of water resources. So new management approaches are needed.

Divining Jordan's desert waters

(January 2002) Researchers have discovered a system of shallow aquifers just below the surface of Jordan's badia that may provide a vital source of water for the semi-nomadic people who live there. What accounts for the unlikely presence of water a short distance below the surface of the desert? Mostly a quirk of the local geology.

Conjunctive water management

Many communities around the world survive by exploiting both surface and subsurface water supplies — the conjunctive use that often alternates with the rhythms of seasonal rainfalls. Typically, households and farms draw water from below ground to prolong crop growth after the rainy season ends, but in some regions surface water is itself the temporary supplement to year-round groundwater and aquifers.

Technology File: Improving Water Resources: the Deccan Trap in India

In the Akole Taluka tribal area of central India, people once spent much of each day fetching water for household use. Today, life in this region — where poverty, disease, low agricultural productivity, and poor morale were once common — has been transformed. Some communities here now have water virtually year-round, with enough left over to irrigate crops on once-unproductive land. This dramatic turnaround is due in large part to a new water management strategy — developed with IDRC support — that employs a variety of techniques to make the most of surface and groundwater resources.

Improving Access to Water on India's Deccan Trap Plateau

(March 1998) Life in the Akole Taluka tribal area of central India had long been marked by hardship and deprivation, exacerbated by a lack of water. In the dry season from February to May, women and children spent most of each day collecting water for domestic use, venturing farther from their villages as available water dwindled. Though challenges remain, the mood in Akole Taluka is considerably brighter now thanks to a new water management strategy developed with support from IDRC.