

Making the Most of Scarce Resources

Wastewater recovery and urban farming in the Middle East

Population growth, rapid urbanization, and the shortage of water have led to rising food insecurity in the Middle East and North Africa. People in the region address this complex of problems by encouraging urban agriculture and by using recycled water to feed it. In Jordan and other countries, city farms are irrigated with “greywater” drawn from showers, bathrooms, and sinks. This innovative response, supported by IDRC, has had a wide-ranging influence on public policy.

Although “urban agriculture” has been practiced for as long as cities have existed, only in recent years has the world awakened to the importance of city farming in ensuring that people have enough to eat.

In fact, urban agriculture is booming. The United Nations Development Programme (UNDP) estimates the number of city farmers at about 800 million worldwide. Most are poor or middle class people who raise livestock and grow produce to feed their families and to generate extra income. In the process, they recycle waste, reuse water, and put idle land to productive use.

In the Middle East and North Africa, already one of the planet’s most arid regions, the amount of water available to each person is actually decreasing. This is due mainly to the rapid rise in population. The inventory of water is expected to decline to 725 cubic metres per capita per year (m^3pcpy) – far below 1,000 m^3pcpy , the benchmark indicator of severe water scarcity.

This dire situation is aggravated by increasing urbanization in the region. As more people move to the cities, more water likely will be diverted away from agriculture and channeled into built-up areas for drinking and domestic purposes. Thus, the region may suffer increasingly from the related problems of food insecurity and water scarcity.

This crisis is particularly severe in Jordan.

Jordan is a small country of about 5.2 million people. Its economy has been in decline for years. About 7% of the population earns less than the

international poverty line of US \$1 a day. According to the UNDP, “Jordan’s high population growth and unprecedented urbanization rate threaten its recent economic gains. Its population growth is 2.7%, and the proportion of its population living in urban areas, already 73%, is expected to reach 80% by 2015.”

These economic and demographic trends jeopardize the food and water security of Jordan’s poor, more and more of whom are found in towns and cities. According to the World Bank, high population growth over the past 20 years has pushed Jordan’s per capita water availability to below 198 m^3pcpy . Clearly, water scarcity on such a dramatic scale is sufficient to impede development and to harm human health.

Because of this crisis, attitudes toward water management in Jordan have undergone a radical shift. In the past, water was viewed as a free public good, but now everyone accepts that it has an economic value. Conservation, as well as wastewater treatment and reuse, are considered priorities, and so is research into these measures.

The International Development Research Centre’s (IDRC) urban agriculture program has been supporting research and development activities that bolster the food security and incomes of the poor, while maintaining public health and a clean urban environment. As part of this initiative, during 1998–2003 IDRC sponsored a series of research projects to investigate the use of greywater in urban agriculture. These studies have had an important influence on water management policies, in Jordan and elsewhere in the region.



What was done: The urban agriculture and greywater projects

The initial study was mainly a data-gathering exercise. It compiled for the first time reliable information about the nature and extent of urban farming. Researchers focused on the capital city, Amman, and examined a range of issues with a view to suggesting policy changes.

Among the more interesting findings were that one in six Amman households practiced urban agriculture, that gender parity prevailed and the sexes performed equal portions of the work (unlike the men, however, most women went unpaid), and that untreated greywater was already being used by 40% of farming households. Significantly, the study found that *no* policies or regulations specific to urban agriculture existed in Jordan, indeed that there was little official recognition of its benefits for strengthening food security.

A second project, conducted in the West Bank (Palestine), was primarily technical in nature. It sought to improve the design of a small-scale trickling filter for treating greywater for reuse in home gardens. The researchers tested “domestic wastewater treatment plants” – essentially recycled plastic shampoo barrels with a filtration media of valley gravel and recycled plastic soft drink bottles. Using such cheap and readily available materials, an impressive average of 56% greywater recovery was achieved.

Incidentally, this project also responded to cultural and religious concerns about the use of recycled wastewater by engaging local sheiks to advise the community on the advantages of greywater.

Meanwhile, during 1997-99, CARE Australia carried out a very successful pilot project in southern Jordan to test soil and water conservation techniques of “permanent agriculture” or “permaculture.” An IDRC-funded evaluation identified this project’s broad economic and cultural impact: it raised the income of participating families, promoted cooperation, enhanced a sound sense of home economics and marketing, and formalized awareness about water conservation and reuse. Notably, female participants reported feeling more independent and proud because of the income they generated, the skills they gained, and their enhanced ability to feed their families.

Finally, the ambitious Greywater Reuse Project in Tafila, Jordan, was inspired by the promising outcomes of the earlier three programs and was designed to build on the lessons learned from them. It was carried out during 2001-03.

The immediate goal was to improve a system for reusing greywater in home gardens in Jordan. Its broader goals were to help the peri-urban poor preserve fresh water, achieve food security, and generate income, all the while protecting the environment.

The project’s achievements were far-reaching. It increased greywater recovery and made greywater easier and safer to handle. It minimized environmental impacts by encouraging the production and marketing of cheaper organic soaps. It improved permaculture practices by enhancing irrigation systems and by fostering the adoption of new crops more tolerant of greywater. In particular, it promoted policy changes that will encourage wider greywater acceptance in Jordan.

What was learned: The influence of research on public policy

In 2001, IDRC launched a strategic evaluation of the policy influence of the research it has supported. To assess the influence of the greywater projects, the Centre engaged Eman Surani, who surveyed the work done and outlined six concrete instances of “policy influence.”

Revision of housing codes and launch of National Committee to Formulate Greywater Reuse Guidelines

The initial project, the data-gathering exercise, had a direct influence on public policy in that one of its startling discoveries was that laws and regulations governing city farming were non-existent in Jordan. This finding helped spur the process of policy-setting that is underway.

The Greywater Reuse Project has gone a long way toward filling this policy gap. This effort led, for example, to a proposal to modify domestic building codes to allow greywater use without the need for plumbing modifications. In addition, it prompted the establishment of a new National Committee to Formulate Greywater Reuse Guidelines.



Policymakers become communicators

In a form of indirect policy influence, government officials who were not involved in implementing these research projects nonetheless became enthusiastic communicators of their findings. Specifically, officers with Jordan's Department of Statistics charged with designing its Web site decided to add the results of the initial project to the home page, for broader dissemination to the donor and research communities.

Replication of the model

The Jordan and Palestine projects were built stepwise, one upon the other, and in their turn they fostered similar efforts elsewhere in the region. Observes Dr Murad Jabay Bino of the Inter-Islamic Network on Water Resources Development and Management (INWRDAM), "The projects in Palestine and Jordan are now spreading to Lebanon, and Syria has expressed its interest as well." This replication effect is encouraged by a continually evolving project structure adapted to the cultural context of each country.

Within Jordan, replication has occurred because of key partnerships between INWRDAM, the recognized technical expert, and other agencies:

- ❑ CARE Jordan installed the greywater system in all its projects. In five communities, 53 units were put in place by INWRDAM on behalf of CARE, in a scheme funded by the European Union.
- ❑ INWRDAM signed a memorandum of understanding with the Regional Center on Agrarian Reform and Rural Development for the Near East for cooperation in training people in the application of greywater.
- ❑ Drawing upon INWRDAM's expertise, a "water demand management unit" is being established at the Water Authority of Jordan to help coordinate water issues for the country.
- ❑ Again drawing upon INWRDAM, codes are being revised so that greywater can be used for the beautification of tourist attractions.

Hyderabad Declaration

In November 2002, an important international meeting on the topic of wastewater use in agriculture, sponsored by IDRC and other organizations, took place in Hyderabad, India. Two major breakthroughs occurred.

The first was a commitment by the World Health Organization to consider new evidence – including IDRC's reports on its greywater projects – in reviewing its guidelines for wastewater use in agriculture.

The second was the *Hyderabad Declaration on Wastewater Use in Agriculture*, a document drafted by researchers and practitioners representing 27 international bodies and national institutions from 18 countries. This statement expresses worldwide concern about ensuring safe water reuse, and sets out a common global agenda of building a wastewater "community of practice."

Networks formed

These projects brought together, for the first time, governments, the private sector, and the research community. Naser Faruqui of IDRC observed that Jordan is a small country and so "all the individuals in the Jordanian research, engineering, and policy-making communities know each other and invite each other to workshops."

While it is unusual for government officials and farmers to meet openly and to discuss issues of common concern, networking has occurred also at the local level, among policymakers, researchers, and beneficiaries.

Capacity building of policymakers

The IDRC-supported projects have trained, educated, and raised awareness levels of policymakers about greywater reuse.

For example, Jordan's Ministry of Social Development is adapting lessons learned from the projects and teaching new trades to the poor. As well as plumbing skills and agricultural techniques, these include expertise in financial and administrative management, communications, and networking.

In addition, researchers have spread knowledge about their projects widely, and have briefed government officials, nongovernmental organizations (NGOs), and other scholars and researchers.



Why it works: Factors affecting research influence on policy

Surani went to considerable lengths to analyze why these projects have been so successful in influencing policy, and also to identify the remaining challenges.

Indeed, work remains to be done. In Surani's view, some factors that may have hindered the policy influence of these projects are: the failure to focus explicitly on gender equality as a core research theme and policy goal; the scarcity of funds for project evaluation; the "lack of a learning environment" in some sectors of the Jordanian government; the insufficient use of the mass media; the administrative weakness of the Palestinian Authority; and – initially at least – religious beliefs unsympathetic to the idea of wastewater reuse.

Despite these obstacles, the policy influence of these projects is clear. Many factors gave rise to this success: the strategic use of limited resources, in that lessons learned in one project were applied

to subsequent projects; the warm personal links between IDRC and Jordanian partners; the awareness that these were not "ivory tower" research projects, but that they offered immediate answers to pressing human problems; the sympathetic political environment in Jordan, long worried about the water crisis and receptive to scientific solutions; the reputation and credibility of the highly respected individuals and organizations involved in implementation; and the wide dissemination of research findings using different formats appropriate to different audiences.

Surani highlighted two particular factors leading to success. First, much of the research demonstrated the politically attractive link between environmental sustainability and economic development, that is to say, between wastewater recovery and poverty alleviation. Second, IDRC took care to develop a long-term strategic plan and sponsored successive projects each built upon earlier work. According to INWRDAM's Dr Bino, having carried out "a well-defined project with clear objectives...IDRC has good capacity to improve on the lessons learnt in future for follow-up projects."

