

FINAL REPORT

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RESEARCH INFLUENCE ON POLICY  
THE GREYWATER REUSE CASE of JORDAN

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Submitted by

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For

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## EXECUTIVE SUMMARY

In spite of both internal and external hindering factors, the projects reviewed as part of this case study can be said to have had a positive influence on public policy in Jordan, as the following outcomes indicate. This in addition to channeling worldwide attention on new and creative methods and systems of dealing with wastewater reuse.

- Public Policy Outcomes
  - ❖ Revision of Housing Codes and Formation of a Committee to work on Greywater Reuse Guidelines
  - ❖ Policy Makers Become Communicators/Promoters
  - ❖ Model Replication of Greywater Reuse Project of Greywater Technology in Jordan, Palestine, Lebanon, and Designed to Expand to Syria
  - ❖ Ratified Hyderabad Declaration on Wastewater Use in Agriculture
  - ❖ Formation of Networks through which Knowledge (Policy and Technology Flows)
  - ❖ Capacity Building of Policy Makers
- Contributing Factors
  - ❖ Strategic Project Development
  - ❖ A Step towards Poverty Alleviation
- Internal Facilitating Factors
  - ❖ Strategic Use of Available Resources
  - ❖ Methodical Build-up and Replication of Projects
  - ❖ Technical Input and Good Relations
  - ❖ A Solution
- Internal Hindering Factors
  - ❖ Lack of Gender Targeting
  - ❖ Insufficient Funds for Follow-up Evaluations
- External Facilitating Factors
  - ❖ Conducive Country Environment
  - ❖ Credibility and Expertise of Implementing Organizations/Individuals
  - ❖ Dissemination of Findings
- External Hindering Factors
  - ❖ Lack of Governmental Learning Environment
  - ❖ Insufficient Use of Mass Media
  - ❖ Lack of Authority/Conflict in Palestine
  - ❖ Perceptions of Religious Beliefs

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## ACRONYMS

CFP	Cities Feeding People
CIDA	Canadian International Development Agency
DOS	Department of Statistics
GTZ	Gesellschaft fur Technische Zusammenarbeit (agency for technical cooperation – Germany)
IDRC	International Development Research Centre
INWRDAM	Inter-Islamic Network on Water Resources Development and Management
IWMI	International Water Management Institute
m <sup>3</sup> /p/y	cubic meters per person per year
MECTAT	Middle East Centre for the Transfer of Appropriate Technology
MENA	Middle East and North Africa
MERO	Middle East Regional Office
MOA	Ministry of Agriculture
MOH	Ministry of Health
MOPWH	Ministry of Public Works and Housing
MW&I	Ministry of Water and Irrigation
NCARTT	National Center for Agricultural Research and Technology Transfer
NGO	Nongovernmental Organization
OIC	Organization of the Islamic Conference
PARC	Palestinian Agriculture Relief Committee
PI	Program Initiative
PPP	Permaculture Pilot Project
PWA	Palestinian Water Authority
UA	Urban Agriculture
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Education, Scientific, Cultural Organization
USAID	United States Agency for International Development
WAJ	Water Authority of Jordan
WEPIA	Water Efficiency and Public Involvement for Action
WHO	World Health Organization

# Section 1

## Introduction

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Many IDRC supported programs and projects express the expectation that the research supported will influence public policy at the national, regional, or local levels. Within projects and programs, Centre staff promote various means of linking research to public policy and research supported is often reported to have increased the decision makers' knowledge of policy options or to have been utilized in policy processes. If the Center is going to improve the performance of its portfolio of projects with this mandate, the Centre needs to address what it means by "policy influence." Thus, in order to clarify "public policy" and how this is achieved through its project work, 23 case studies were undertaken worldwide, amongst them this Jordan Greywater Reuse Case Study based on success to date. The major objectives of this report are to:

- Identify what constitutes public policy influence in the five projects reviewed (File #003740, File #004211, File #100618, File #100880, File #100980);
- Describe how these IDRC supported research projects influenced public policy and;
- Find factors that facilitated or inhibited the public policy influence or potential to influence these IDRC supported research projects.

The case studies will form one important set of data in improving the Centre's capacity to support research that "will foster and support the production, dissemination and application of research results leading to policies and technologies that enhance the lives of people in developing countries." The focus of this report will be on the development of a rich case study that explores not only the work undertaken by Centre supported-researchers, but also on the changing context in which the work was carried out and the processes that were used.

## 1.1 Background

The Global Initiative for Urban Agriculture was created in March 1996 at the third meeting of the Urban Agriculture Support Group (SGUA), which was hosted by IDRC and attended by 35 individuals representing 8 different agencies. This was originally convened by the UNDP in 1992 to advise a major study of urban agriculture and food security in Asia, Africa and Latin America. The new Global Initiative responded to an escalating demand worldwide for information, expertise, and technical assistance for sustainable urban food production and recognized the need to coordinate information, training, technical support, and policy development at the global level to achieve a positive impact at the city level. There was a growing recognition that cities and metropolitan regions need to give priority to the availability and accessibility of food and develop their own food security plans as part of their economic and social planning. Cities need to encourage urban and peri-urban agriculture...as well as safe waste (such as water) recycling, as elements of more self-reliant local food system initiatives. Under the Cities Feeding People (CFP) Program Initiative, IDRC supported development research to remove constraints and enhance the potential for UA.<sup>1</sup> “Urban Agriculture encompasses the production of food and nonfood plant and tree crops and animal husbandry (livestock, fowl, fish, and so forth), both within (intra-) and fringing (peri) built-up urban areas.” (Mougeot, 1994, p.1) “Food and non-food production can tap idle resources and, through income and savings, improve food security, local employment, and urban resource management.” (Koc, MacRae, Mougeot, and Welsh, 1999, p. 6.) Urban farming as a basic urban function is nothing new; in fact it seems to be as ancient as cities themselves. Paramount to justifying and encouraging the attitudes of governments in this direction is the mounting evidence on UA’s contribution to urban food security. “Urban food supplies in developing countries can no longer be taken for granted. There is a growing body of data on the benefits accruing to practicing households, in terms of self-grown food intake, child nutritional status and general health, cash savings and generated income.” (Mougeot, 1994, pp. 23-24) This is of relevance to arid countries as it will alleviate poverty, provide coping strategies to the poor, provide food security, and raise income levels.

A survey commissioned by the UNDP estimated that roughly 800 million people were already engaged in UA worldwide in interventions to improve household food security, income generation, public health, and waste and land management. CFP’s objectives are to reduce the gap between demand and supply for expertise through three specific objectives:

- 1) To strengthen local research capacity and generate information on UA at the household and community level so that cities can formulate and implement policy and technology options, primarily for the benefit of the urban poor;

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<sup>1</sup> Urban Agriculture is defined as an activity that produces, processes, and markets food and other products (plant and tree crops) grown or raised in urban and peri-urban areas by applying intensive production methods and re-using natural resources and urban wastes. Massive urbanization, growing urban poverty and other factors will push UA to employ more people, use more land and supply more of the food consumed in cities in the decades to come.

- 2) To mobilize and enhance regional capacities to share experiences in UA, identify common policy and technology obstacles, and share and adapt solutions training and networking; and
- 3) To influence governments, policy-makers and international agencies to effectively incorporate UA into their development programs.

The research areas targeted are:

- 1) Space-confined production systems for low-income urban producers;
- 2) Wastewater treatment and reuse; and
- 3) Urban agriculture policy and processes.

In order to assess the impact of policy on projects, CFP identified the following indicators:

- 1) Human resource development;
- 2) Institutional capacity building;
- 3) Effective partnerships;
- 4) Gender analysis;
- 5) Added value of multi-disciplinary research;
- 6) Scientific and methodological advances;
- 7) Research utilization; and
- 8) Fund leverage.

## **1.2 Regional and Country Contexts**

### **Regional Context**

Water Demand Management (WDM) is widely recognized to be essential to the Middle East and North Africa (MENA). In particular, agriculture in Israel, Jordan, and Palestine, which currently uses about 70% of available fresh water resources, will likely be allocated only wastewater and low quality fresh water within the next twenty years. At 2.8%, MENA has one of the highest average population growth rates in the world. Combined with scarce natural water supplies this results in a very low per capita water availability, expected to decline to 725 m<sup>3</sup> per capita, per year (pcpy), by 2025, far below the level of 1000 m<sup>3</sup>pcpy – a benchmark indicator of severe water scarcity. This situation is compounded by the high urbanization rate in MENA, which at 3.2% is higher than the rate for developing countries as a whole, which is 2.9%. Overall, within the region, about 80% of fresh water is used in agriculture. “Even with low urban tariffs the value of water is at least 10 times higher in urban areas than it is in agriculture.” (Gibbons 1986) Because of this, it is likely that water will increasingly be taken out of agriculture and into urban areas. This means that the region will increasingly suffer from twin and related problems of food and water insecurity.

## Country Context

Jordan covers a land area of 89,342 sq km extending from the borders with Syria in the north to the tip of the Red Sea in the south and from the Jordan River border in the west to the deserts of the east bordering Iraq and Saudi Arabia. The Hashemite Kingdom of Jordan is a small country with a population of about 5,182,000 as estimated by the Department of Statistics.

Jordan's economy has experienced a decline since the middle of the last decade. The Jordanian Dinar was devalued in 1988 against foreign currencies by 60% and resulted in inflation and a sharp increase in the price of commodities. Although economic reforms have had a significant impact on portions of society, unemployment and poverty have increased. "The nation's per capita income is \$US 1,680 and has risen steadily over the last 25 years." (World Bank Annual Report, 2001) Nevertheless, "15 percent of the population lies below the national poverty line, based upon an annual income of \$US 3,204 per household (or \$US 525 per capita), with an average of 6.1 people per household" (Royal Scientific Society of Jordan, 1998). About 7 percent of the population earns less than the international poverty line of US \$1 dollar/day. "Furthermore, Jordan's high population growth and unprecedented urbanization rate threaten its recent economic gains. Its population growth is 2.7 percent, and the proportion of its population living in urban areas, already 73 percent, is expected to reach 80 percent by 2015 (United Nations Development Program, 2000, p. 290)."

The economic and demographic trends have greatly threatened the food and water security of the poor, who increasingly find themselves in towns and cities. "Jordan has always had scarce water resources, but the high population growth over the last 20 years has pushed its per capita water availability to below 198 m<sup>3</sup>/capita/year (World Bank 2000), far below the benchmark level of 1,000 m<sup>3</sup>/c/y often used as an indicator of water scarcity. Below this, a country is likely to experience chronic water scarcity on a scale sufficient to impede development and harm human health (Falkenmark and Lindh, 1974, pp. 114-22)."

Water management in Jordan has undergone a paradigm shift in terms of how water is valued and managed. Historically, water was viewed as a free good and this is reflected in the evolution of irrigation water pricing. Currently, the Water Strategy for Ministry of Water and Irrigation calls for covering the operation and maintenance costs for supplying, treating, and distributing water; water now has a recognized economic value. Water conservation and wastewater treatment and reuse are considered "priorities" for water demand management. Jordan reuses nearly all wastewater collected by public sewer systems after treatment and mixing with fresh water stored in dams and reservoirs. More than 60% of the population is not yet served by sewerage services, and it is this segment of the population that is the target of the greywater reuse projects.

Throughout the interview process and as part of the questionnaire, I asked the interviewees about their opinion of the issues surrounding water in Palestine and Jordan. There is wide recognition of the severity of the situation. All those interviewed, from



scientists to researchers, government and donor agencies, and beneficiaries consistently expressed the same opinion that water demand management was a necessity, as Palestine and Jordan are facing a very serious water crisis.

*Islam and the Developing Principles on Greywater Reuse*

The Program Managers noted that there were real or perceived opposition to the idea of greywater reuse. For example, in the West Bank, the beneficiaries were worried about reusing water because they thought that this was not allowed by Islam; however, this perception was quickly overcome once the Imams in the mosques explained that humans are viewed as trustees (khulafa) in the Quran, and that their responsibility is to ensure that all resources, including water, are used in a reasonable, equitable, and sustainable manner. Given the emphasis that Islam, like other religions, places on cleanliness, there is also a persistent notion within the region that wastewater reuse is against Islam. In order to study this issue, Mr. Naser I. Faruqi, Dr. Murad J. Bino, and Dr. Asit K. Biswas (originator of the idea) edited the book *Water Management in Islam*, which is presently being disseminated throughout the world in English, Arabic, and French. As noted in the book *Water Management in Islam*, the Council of Leading Islamic Scholars of Saudi Arabia had issued a special fatwa, in 1978, to regulate the rules of treated effluents for different purposes. Wastewater reuse was made permissible for all purposes, including wudu<sup>2</sup>, provided that the wastewater was treated at the required level of purity for its intended use and did not result in any adverse public health effects. The book illustrates how Islam presents a reference and code of conduct for humans toward resource management.

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<sup>2</sup> Cleansing prior to prayer.

### 1.3 Project Development and Briefs

In 1998, while in Palestine attending a UA Workshop in Gaza, Mr. Faruqui of IDRC became aware that the work of the Palestinian Agricultural Relief Committees (PARC) was relevant to the priorities of the CFP Initiative in MENA. Workshop participants concluded that greywater reuse was a very promising research area, as some local communities were dealing with their water shortage by constructing rough homemade devices to separate greywater from blackwater.<sup>33</sup> IDRC's Mr. Faruqui decided to fund and develop a greywater reuse project. This project began with the objective of studying Urban Agriculture projects, however, it has expanded and taken a 360-degree turn. Many of the projects were initially implemented in rural areas but are now in the process of being implemented in urban areas. As a result of the success of this initial project, it has been strategically replicated into a series of inter-related projects in Jordan, Lebanon, and possibly Syria. This has formed the basis for an informal network. (IDRC is presently working on mapping out a formalized network). The projects included in this study are the first four listed below and the fifth has been included to serve as evidence of the replication effect of the Greywater Reuse Projects in Palestine and Jordan, which are serving as Models for the MENA Region:

- 1998 Policies for Urban Agriculture, Jordan (File #003740)  
Research project on opportunities and constraints for UA in Amman, Jordan (DOS, \$199,070);
- 1999 Greywater Treatment Reuse for Peri-Urban Horticulture, West Bank, Palestine (File #004211)  
Research project supporting small-scale household greywater treatment systems in Palestine (PARC, \$179,540);
- 2001 Evaluation of CARE Permaculture Pilot Project (PPP), Jordan (File #100618)  
An assessment of a CARE Jordan (untreated) greywater reuse and home gardening project (INWRDAM and CARE, \$50,341);
- 2001 Greywater Reuse Project in Tafila, Jordan (File #100880)  
Based on evaluation recommendations, followed-up a greywater reuse project in Tafila, Jordan (INWRDAM and CARE, \$200,000). Systems were installed in roughly 20 homes, as well as the main mosque in Ein Al-Baida and a girl's school; and
- 2002 Greywater Treatment and Reuse in West Bekaa Valley, Lebanon (File #100980)  
A pilot research project in Lebanon. (MECTAT, \$220,000).

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<sup>3</sup> Greywater reuse is all domestic wastewater discharged from the home including from the kitchen, bathroom, laundry, etc. Blackwater includes water and wastewater from the toilet.

The analysis will revolve around these four projects that are closely intertwined. First, it is crucial to present a brief of each of the projects and their objectives, goals, and accomplishments to date as background reading.

**1.3.1 Policies for Urban Agriculture, Jordan**

**File #: 003740**

**Recipient: Department of Statistics within Ministry of Planning (Government)**

**IDRC Grant: \$199,070**

**Recipient Contribution: 37,500 JOD**

**Commencement Date: January 26, 1998 for 24 months**

**Completion Date: March 31, 2001**

*Relevance*

At the time that this project began, Urban Agriculture was becoming an increasingly visible phenomenon in Jordan, particularly in 1998 in the capital city of Amman. The city contained 1.35 million inhabitants, and represented over 31% of the country's total population. An assessment undertaken by the Department of Statistics found that although the practice was growing rapidly, there was no reliable data on the magnitude of urban agriculture either in terms of its contribution to the total economy or to that of individual households. Nor had there been an attempt to examine current laws and regulation pertaining to urban agriculture. Throughout the Middle East, studies on UA were scarce although practice was widespread in countries like Lebanon, Sudan, Egypt, Syria, and Morocco. Findings from this project were expected to have wider applications to other Arab countries sharing similar cultural, social, and environmental conditions.

*Goal of Project*

The project was aimed to facilitate appropriate policy development in support of urban agriculture at the municipal and national levels, and was undertaken as part of the CFP program to generate critical information on the nature and extent of UA activities in Jordan. By further strengthening UA, the project's aim was to enhance urban food security in Jordan, a country with scarce natural resources, particularly water. Based on a multifaceted survey, the project identified the main characteristics of Urban Agriculture in Amman, identified bottlenecks, and reviewed current regulations and environmental health concerns. Surveys and analyses were designed to account for gender issues and examined resources used and problems faced, and their implication for urban farmers. As part of the project, a critical appraisal of municipal and state regulations pertaining to urban agriculture was undertaken, and formed the basis for recommendations for future policy directions and given to the Department of Statistics.

The Department of Statistics, an arm of the Ministry of Planning, was responsible for the management and Administration of the project. Dr. Abdulhadi Alawin, the Director General of DOS provided overall leadership and direction to the project.

### *Objectives and Achievements*

- a) To critically analyze current municipal and national policies and regulations pertaining to urban agriculture, identify their strengths and weaknesses and suggest changes;

The project found that no policies or regulations specific to UA existed in greater Amman or elsewhere in Jordan. Various articles from “The General Rules and Systems related to the Greater Amman Municipality” contained clauses, which gave the municipality the right to order any activity to cease which created unsanitary conditions, caused odors, endangered public health, or caused damage to land or water resources. One of the policies, “Systems of Building and Organization in Amman City” in Article 21 of system No. 67 (1979), mentions that 10% of the land was to be planted in minimum by trees in a garden within a residential area. There were no by-laws regulating the use of pesticides or greywater reuse for irrigation.

- b) To determine the size of urban agriculture in terms of the total land area covered and the number of households involved;

Most of the total area of land devoted to urban agriculture in Amman, was government-owned. In total 50,097 households representing 16% of the total households in Amman carried out UA. In other words, almost 1 out of 6 households practiced UA.

- c) To analyze the socio-economic characteristics of the households practicing urban agriculture and of those providing the major labor input;

Surprisingly, there was gender parity in that the labor input for UA was roughly equally split by sex - women provided 49% of the labor input, while men provided 51% of the input. However, the majority of the men (54%) were hired workers, and 25% had other income. In contrast, 84% of the women were housewives and only 7% were hired workers. However, while the majority of women (77%) provided free UA labor, only 46% of men did so. Urban gardeners or practitioners in Amman had diverse backgrounds: 28% were professionals, 17% were services workers (shops and marketplace) and 18% were craft and related trades workers. Their educational background also varied greatly. While 24% of UA practitioners were barely literate or illiterate, 15% of them had elementary education, and more than 25% of them had more than secondary level education.

- d) To determine the type of input used and output produced from these small-scale operations and the end-use of the produce (household consumption, market sale, etc.);

The main source of irrigation was the public water network. About 87% of urban farmers used fresh water for irrigation. Untreated greywater, which was separated from the blackwater system, was used by about 40% of households as a secondary source. In most cases, irrigation was done manually. In the survey undertaken, 91% of homes carrying out UA had separate grey and blackwater systems and 17% of households collected rainfall for both irrigation and domestic use and this depended on the amount of rainfall received annually. The study also found that there was widespread use of pesticides that should have been regulated by the government. UA products were mainly consumed by households, and these products grown consumed a large amount of water. Thus a change in the type of products grown was required.

- e) To critically analyze problems (environmental, financial, regulatory, administrative) faced by urban farmers;

The most significant problem that faced UA farmers was pests and plant diseases and the lack of knowledge of how to deal with these. The next most significant problem was scarcity of water for irrigation followed by poor soil, lack of urban farming knowledge and lack of financing.

- f) To examine environmental and health issues pertaining to urban agriculture;

It was found that UA practitioners made heavy use of pesticides, fertilizers, and untreated greywater. There was little awareness of the implications for the first two and households that were surveyed reported more incidences of stomachaches, headaches, skin disease, and respiratory ailments. These were partly attributed to the environmental and health hazards of using these inputs.

- g) To recommend appropriate urban agriculture policy changes to municipal, city and state authorities on the basis of the research findings; and

Though practiced widely in Amman, UA had received little “official” attention or formal recognition, and there was little recognition of the benefits of UA as a means to strengthening food security, particularly among the poor. No policies or regulations at the local or national levels existed to protect and promote UA. Official agricultural statutes did not include urban agriculture. Researchers recommended that policy makers recognize UA as a useful practice and take steps to encourage, nourish, and strengthen specific policies required to regulate pesticide, fertilizer, and greywater reuse. They recommended that this should be integrated into the National Water

Management Strategy. They also recommended that credit facilities open to UA practitioners and that better information, education, and training on soil and plant management be provided to UA practitioners.

- h) To self monitor and document, in progress and final technical reports, the following impacts of the project; additional non-IDRC grant leverage, human resources development and capacity strengthening at DOS and associated organizations, scientific and methodological advances attributable to the project value added by the multidisciplinary approach to problem-solving and uptake of project results for specific or technological interventions.

DOS was to approach funding agencies to support the extension of these findings to other cities. With regard to human resource development, DOS staff gained new knowledge and expertise in designing and conducting a complex survey and looking at statistics more holistically by combining statistics, agriculture, economic, and environmental issues. DOS has formed a relationship with the Municipality of Amman and the University of Jordan, policy makers with researchers. No major scientific advances were noted. With regard to the project results, many international agencies were interested in the findings of this project, as well as other regional and national agencies such as universities and research centers, as well as local and national governments in Arab countries. International organizations that have contacted the team are WHO, Urban Agricultural Network, UNESCO, Jordan University of Science and Technology, and the UN. Further contact with donors has not occurred but is being planned for the year 2003, as Dr. Hussein Shakhathreh, the Director General of the Department of Statistics in Jordan has said. This report from this study has been placed on their website: [www.dos.gov.jo/env/env\\_all\\_e.htm](http://www.dos.gov.jo/env/env_all_e.htm) (via the Internet Explorer), presently under Environment but they have decided to place it on the main page of the website. They are presently requesting IDRC's assistance in continuing the UA studies throughout Jordan.

**1.3.2 Greywater Treatment Reuse for Peri-Urban Horticulture, West Bank (Palestine)**

**File #: 004211**

**Recipient: Palestinian Agricultural Relief Committee (PARC) (NGO)**

**IDRC Grant: \$179,540**

**Recipient Contribution: 85,359 JOD**

**Commencement Date: 9 September 1999 for 36 months**

**Completion Date: 9 February 2003**

*Relevance*

In 1998, upon exploration of project possibilities in Palestine at a UA Workshop in Gaza, Mr. Faruqui discovered that PARC (a large, well-known Palestinian NGO which focuses on community strengthening and agricultural extension and is a pioneer in the field of agricultural development and environmental protection) had established approximately 24 small-scale confined space onsite domestic grey wastewater treatment plants that had received favorable preliminary lab results. These plants were made essentially of recycled plastic barrels of shampoo and the filtration media was essentially of wadi, or valley gravel and recycled plastic soft drink bottles. At this point, two issues were pinpointed: a) further testing of the greywater reuse system was required to validate this low cost alternative; and b) PARC was seen to require capacity building. Both of these issues fell within CFP's mandate. The Principal Researcher, Dr. Abdellatif Mohammed, is the Director of PARC's Irrigation and Environment Program. This project was undertaken in concert with Al-Najah University,

Naser Faruqui and Eglal Rached developed the first proposal, which was submitted in May 1998. The project related directly to the first two CFP objectives: i) to strengthen local research capacity to carry out urban agriculture and ii) to promote regional networking of UA projects. The latter is presently being achieved as part of several CFP projects that have been recently implemented in MENA, and the framework for a regional network is presently under discussion. The project addressed two of the research areas supported by CFP: space intensive production systems for the urban poor and safe reuse of organic wastes in UA.

*Goal of Project*

This project was expected to contribute as much to building PARC's capacity and to conduct applied research as well as to the production of new knowledge. The aim of this pilot project was to optimize the design of a small-scale trickling filter for treating greywater for reuse in home gardens in hilly, peri-urban areas of the West Bank. The filters were made to serve individual or groups of 10-15 homes and are built from recycled materials. The treated greywater from a properly operating system can be used safely for irrigating any produce from a home garden, including vegetables that are eaten raw.

### *Objectives and Achievements to Date*

a) To improve and standardize existing individual on-site treatment plant design;

In the past, homeowners complained from odors and PARC has remedied that by putting vents on both septic tanks. Additionally, they have added an aerobic sand unit to ensure the trickle irrigators do not clog and has now combined three units into one. The treatment system is being standardized in terms of recycled materials and in terms of size. Three sizes were made to fit the size of rural families in Palestine: 1) 10 person families; 2) 15 person families; and 3) 20 person families.

PARC has installed about 200 individual systems in Ramallah, Nablus, Jenin (38 systems in one small village); funded by Dutch Embassy Funds (funded 90 of the 200 already built). It has also built one collective system, using funding of about \$250,000 from the Spanish NGO, IBALA. They have built one in Nablus for 30 households for \$40,000. Furthermore, the European Commission, Humanitarian Program Ecofund has given about \$40,000 for 38 units, implemented through the European NGO's such as the Italian GPC. Dr. Abdel Latif indicated that PARC is planning to hold a National Seminar to present their findings and modules in January, prior to the project's completion. They are working on developing a manual at present.

b) To pilot test the effectiveness of larger systems (a group of houses);

A large collective system has been built in Beit Dukko village, and PARC is currently monitoring and evaluating the plant. PARC has tried to head off potential problems by asking homeowners and users of the greywater effluent to sign agreements outlining the roles and responsibilities of each party. In this case, the individual who donated the land for the treatment plant has the right to use 50% of the water, while the remainder is for the community. No significant problems have been reported. Some technical observations reported that the advantages of larger systems are its positive health aspects and amount of water available for reuse, but requires more effort in operation and maintenance.

c) To monitor and evaluate the performance of pilot waste treatment and reuse systems;

PARC indicated that it asked the Palestinian Hydrology Group to carry out the technical testing, so as to have objective, independent analysis. This was done at the Palestinian Water Authority labs in Ramallah. PARC did not provide technical monitoring figures regarding this matter. The first phase is completed but the second has been considerably slowed down by the restrictions placed on Palestinian movements by Israel.



- d) To prepare capital and operation and maintenance cost figures for the system, which can be used to compare costs with other waste treatment systems;

PARC reported that an individual on-site system cost between \$US 800 – 1000, including irrigation network. In most cases, the households were financially responsible for making all of internal plumbing modifications necessary for greywater reuse, but these costs differ from district to district in Palestine. It was concluded that these types of treatment systems are the most appropriate for rural communities. PARC estimates that this represents about 12 – 20% of total project cost. Under the current deteriorating political/socio-economic situation, according to the UN Secretary General, income has reached as low as \$2 a day, thus, people are no longer willing to pay to install rainwater catchments systems, even though the subsidy provided through the PA has been increased from 35% to 75%. Due to the erratic nature of the weather and amount of rainfall received, the water saved or recycled through the greywater systems were felt to be more important. Furthermore, PARC has received letters from beneficiaries detailing money saved on pumping out septic tank costs (which used to include both grey and black water) that can reach up to \$400 per year.

- e) To self-monitor and document, in progress and final technical reports, the following impacts of the project: 1) additional non-IDRC grant leverage after approval; 2) human resources development and capacity strengthening at PARC and associated organizations in project areas; 3) effectiveness of partnerships between PARC and local organizations; 4) scientific and methodical advances attributed to the project; 5) value added by the multi-disciplinary approach to problem-solving; 6) uptake of project results for social or technological interventions.

The women's unit helped select the villages in which the systems would be placed and developed a pre and post installation questionnaire. Dr. Abdel-Latif reported that the women are more interested in individual home garden systems than the collective systems because the benefits of the former tend to be more controlled by women. There does not seem to be good coordination and integration between the Environment Department and the Women's unit within PARC.

Dr. Abdel Latif feels that PARC's research capacity has improved. PARC represents most of the other Palestinian NGO's in a committee with PWA, who have put PARC in charge of greywater reuse research in Palestine, According to Dr. Abdel-Latif, the UNDP considers PARC the leading Palestinian NGO in Palestine.

PARC is also working with INWRDAM, Al Najah University, and Al-Azhar University in Gaza. PARC's links with PWA have been strengthened as a result of this project.

- f) To develop water resources for agricultural purposes by increasing the amount of water available through effective wastewater treatment and recovery;

PARC has now achieved an impressive average of 56% greywater recovery in the home. To increase recovery further to the maximum possible recovery of 80% will require changes in the ways that the houses are constructed. PARC is continuing to lobby Engineering Syndicates to change new housing practices. People are willing to pay for the greywater systems out of pocket since they have realized the benefits of their investment in less than 2 years. PARC feels that its growing reputation will, in time increase its influence and be beneficial for changing the plumbing and building codes.

- g) To establish an optimal process for urban agricultural domestic waste reuse;

People are generally using the greywater for most irrigation purposes with the exception of vegetables that are eaten raw. So far, PARC has taken a cautious approach to the use of wastewater.

- h) To promote community involvement concerning the issue of wastewater treatment and reuse; and

Community involvement was at first hampered by confusion amongst the beneficiaries regarding the difference between grey and black water. However, this has been overcome via mosques whereby Imams (religious advisors) encouraged people to separate grey from black water. The community has been involved in planning, determining problems, and implementing activities following a course given in liquid waste management. They are involved in monitoring and evaluation and are disseminating the knowledge gained by word of mouth to people in their community as well as to people in neighboring villages. People who have the systems are running, operating, and maintaining the system on their own, as per the agreement that PARC's responsibility ends at construction and training of local plumbers and masons, but has the right to monitor and bring visitors.

- i) To promote the involvement of local governmental authorities, regional institutions and policy makers in the appropriate and cost-effective community based wastewater management schemes.

The government authorities (village councils), institutions such as the Palestinian Water Authority, Ministry of Environment, Ministry of Local Government, most Palestinian Universities, water and wastewater labs in Palestine, and NGO's have all been involved in this endeavor.

Thus, to date this project has proven to be novel, whereby materials utilized were readily available, inexpensive, and simple to put together.<sup>45</sup> One of the obstacles faced was that of a cultural and religious nature regarding the reuse of greywater, which has since been addressed in a creative manner by getting the Sheiks to speak to the people documenting this experience in the book *Water Management in Islam (2001)* has been helpful for project implementers and donors.

Due to trouble in the region, there have been delays and it has been difficult to monitor this project. The project is significant in how it has mobilized groups in Palestine to support semi-collective treatment of household greywater. Prior to the Oslo Peace Treaty and the establishment of the Palestinian Authority, the NGO's were responsible for performing most government functions, such as health, education, research and maintaining infrastructure. This project has provided the means and opportunities for some of these groups to continue their essential work in a very troubled environment.

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<sup>4</sup> All components except for short lengths of piping can be made of recycled materials and the system requires little energy; this has led to the development of this technology.

### **1.3.3 Evaluation of CARE Permaculture Pilot Project (PPP), Jordan**

**File #: 100618**

**Recipient: INWRDAM (Government)**

**IDRC Grant: \$50,341**

**Commencement Date: July 6, 2000 for 9 months**

**Completion Date: January 12, 2001**

#### *Relevance*

During the period 1997-1999, CARE Australia conducted a pilot project at a kindergarten in Ein Al-Baida, a suburb of Tafila Governorate in the southern part of Jordan, to study and examine the possibility of applying Permanent Agriculture (Permaculture). CARE worked with a community based NGO, Ein Al Baida Voluntary Society, to demonstrate specific techniques of growing and caring for both plants and livestock that conserve soil and water. Following the success of the demonstration project, the Ein Al Baida Voluntary Society used a revolving fund (monies loaned out to the beneficiaries which had to be repaid to the Society) to loan money to 50 poor families in the area to set up the Permaculture Pilot Project (PPP) and greywater reuse systems in their own homes. Forty-nine of the 50 recipients were women and the loan repayment was 100 percent. Women were the direct beneficiaries in that they were responsible for caring for the home and garden while the men worked out of the home. This Permaculture Pilot Project was conducted with the rationale of utilizing local knowledge, materials and practices in enhancing the livelihood of local communities through participation. The PPP was based on the concept of financial sustainability through a revolving and sharing fund to build up a sense of ownership among beneficiaries. The most significant results of the PPP Project were:

- 1) Identification of permaculture technologies and techniques;
- 2) Implementation of about 25 permaculture techniques and practices from local materials; and
- 3) Improvement of the economic well being of the local poor.

The project was discovered by Naser Faruqi. PPP seemed to be a successful project, but because of budget constraints and staff turnover, CARE Jordan had almost no documentation on the project and did not intend to pursue it. Mr. Faruqi decided to evaluate it in order to decide whether the PPP could be built-upon and scaled up, if the project was sustainable, and to ensure that the water reuse practices adopted and employed in the project were neither harmful to humans nor to the environment. Moreover, there was a need to verify the outcomes of socio-economic analyses of the project as well as to identify the regulatory framework related to water reuse in Jordan.

Under the direction of Dr. Bino, the Inter Islamic Network on Water Resources Development and Management (INWRDAM), a think tank that focuses on policy and applied research and conducts networking, reviewed the lessons learned from the PPP and utilized them in the Greywater Reuse Project in Tafila, Jordan.

### *Findings of Project Evaluation*

- More than two thirds of (87%) of the beneficiaries separated greywater and utilized it for irrigation of different fruit and plants such as olive trees, medicinal and ornamental plants. All beneficiaries believed the greywater separation and collection was worth the effort, and showed intention of pursuing this practice in the future. About two thirds of the beneficiaries planned and had the desire to separate greywater from other sources, i.e., laundry and shower. This indicated that the PPP is sustainable. The percentage of greywater collected was reasonable. About half of the beneficiaries used all their produce for home consumption or for social gifts to relatives and neighbors. The average annual return from PPP was about 300 JD. The average annual increase in family income was from 60 up to 100 JD.
- The PPP promoted positive family and social practices in terms of cooperation, appreciating the value of land and rural agriculture and enhancing sound sense of home economics and marketing. Most beneficiaries (80%) did not report any complaints from neighbors as a result of using greywater. The local community had a good sense of environmentally sound practices with respect to the use of detergents.
- Females played a leadership role in both the operation and management of the PPP. They were in charge of financial management of the project.
- Female activities in the PPP were mainly in the following areas:
  - Applying and repaying the revolving fund loan obtained from the PPP;
  - Delegating tasks to children;
  - Planting and irrigating plants;
  - Marketing the produce; and
  - Maintaining the greywater filters.
- The PPP helped in capacity building of the local voluntary association in terms of management and planning. The project also succeeded in formalizing public awareness about water conservation and reuse.

The documented issues and benefits were utilized in a follow-up project. The low percentage of application of permaculture techniques was explained by the fact that greywater collection was relatively low. Most of the PPP beneficiaries needed the rewards of the financial fund and adopted greywater as a means to qualify for application to the fund. The analyses revealed that 50% of the sampled families relied on the PPP to get their basic food needs. Specifically, they benefited from the daily nutrition of vegetables and fruits. Also the PPP allowed users to benefit from crops and plants that were not planted in the past due to high prices in the market. This percentage amounted to about 40% of the beneficiaries. More importantly, 73% of the respondents gained self-sufficiency by growing crops for their own consumption, which in turn reduced their dependency on purchasing from local markets. Because basic daily family needs were obtained through the PPP projects, they made its activities part of the new culture in the village.

The evaluation found that PPP allowed the community to offset food purchases and generate income by selling surplus production, saving or earning an average of 10 percent of its income. It was found that if the households used municipal sources for this supplemental irrigation, they would have used 15 percent more water and had 27 percent higher water bills. Moreover, the project helped community members gain valuable gardening, irrigation, and food preservations skills. Female beneficiaries in the project reported feeling more independent and proud because of the income they generated, the skills that they gained, and their enhanced ability to feed their families.

### **1.3.4 Greywater Reuse Project in Tafila, Jordan**

**File #: 100880**

**Recipient: INWRDAM (Government)**

**IDRC Grant: \$200,000**

**Recipient Contribution: \$30,000**

**Commencement Date: May 1, 2001 for 24 months**

**Completion Date: May 5, 2003**

#### *Relevance*

This project was inspired by the positive outcomes of DOS, PARC, and PPP-CARE and was designed to build on the outcomes and lessons learned from these projects in addressing the role of greywater reuse in poverty alleviation. The target group is female due to their involvement in household activities. The project is pursuing the findings of the project on policies for UA with regard to educating policy makers about potentials and benefits of greywater reuse so that wastewater reuse standards and building codes can be modified to facilitate greywater collection and reuse. The experience accumulated by PARC is being utilized in this project in terms of sharing knowledge with them about design and operation and maintenance of on-site, low cost units treatment, which in brief showed that greywater reuse contributed significantly to food security and poverty alleviation to its beneficiaries. Moreover, in terms of contributing to household income, it contributed an average of 10% to total household income. The PPP evaluation study showed that IDRC could implement a project, which could optimize and validate a system for reusing greywater in UA for food security and poverty alleviation. This was then implemented in the same town, utilizing some of the same beneficiaries and the services of the Ein Al-Baida Voluntary Society.

This was implemented by INWRDAM whose mandate is to support more effective use of water in Islamic countries. It is sponsored and funded by a number of organizations to establish and maintain an integrated water data bank for OIC countries, waste management workshops for regional professionals, and water conservation and demand management.

#### *Goal of Project*

The project goal was to help the peri-urban poor in Jordan preserve precious fresh water, achieve food security, and generate income, while helping to protect the environment. and the main objective was to optimize and validate a system for reusing greywater in home gardens in Ein Al-Baida, Jordan.

#### *Objectives and Achievements to Date*

- a) To increase greywater recovery and make it more convenient and safe to handle;

The number of beneficiaries has increased. Wudu<sup>6</sup> for the mosque is recycled for landscaping and most households indicated they are saving water. Social acceptability of reuse is very high. More households, approximately 200, are demanding the greywater kits and are prepared to pay for them out of pocket.

- b) **Minimize environmental impacts associated with greywater reuse and ascertain whether greywater treatment is necessary and cost-effective;**

The creation and marketing of organic soaps at cheaper cost has occurred. The greywater from pretreatment units is suitable for restricted irrigation for landscaping, ornamental plants and cooked vegetables. The residents are contributing in-kind amounts by digging the collective systems. A drawing and cost estimate of each system has been requested.

- c) **Improve gardening permaculture practices;**

A permaculture engineer recruited by MOA will advocate greywater reuse. INWRDAM developed a greywater distribution and irrigation system and trained beneficiaries on their uses and on how to design their gardens in separate irrigation units. A workshop was held regarding better irrigation requirements. Beneficiaries were encouraged to adopt new crops with better tolerance to pretreated greywater.

- d) **Strengthen local capacity to safely and efficiently reuse greywater;**

All the planned workshops have been conducted, by the Society, on the operation and maintenance of the system. More local plumbers and electricians were trained on environmental concepts, water pollution and material conservation.

- e) **Promote changes in policies to encourage greater greywater reuse in Jordan;**

INWRDAM provided the National Committee for Building Codes with a proposed modified version of building codes related to sanitary connections, so that houses are built to allow occupants to practice greywater reuse without need for further plumbing. This has been accepted by the standing committee and requested RSS to evaluate INWRDAM's proposal. WAJ Subcommittee on Wastewater Reuse requested Dr. Bino to make a presentation of the project and as a result the subcommittee agreed to set up a national committee to formulate greywater reuse guidelines. The mandate of this committee is to take its own independent measurement of quality of influent and effluent. They will spend from their own budget and send staff to follow the project's progress. CARE expanded its use of this system to all its relevant projects in Jordan. INWRDAM installed 53 units for CARE in 5 different communities, funded by the European Union who has expressed their satisfaction with the system. CARE and INWRDAM received a contract from the Ministry of Planning (funded by

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<sup>6</sup> Washing up for the purpose of praying.



USAID) to install 1000 units of Pretreatment kits and 12 of full and pretreatment kits. This project will cover 12 governorates and 90 different communities in Jordan at a budget of \$250,000 U.S. Ms. Mona Grieser, Chief of Party of the NGO Water Efficiency and Public Involvement for Action (WEPIA) conducted a field visit in 2002. She indicated WEPIA with INWRDAM will include the system as a component of a community grant program which will be implemented in Jordan this year to install full treatment units in selected locations in 2 cities, funded by USAID. Deputy Minister El-Bakri of the Ministry of Water and Irrigation asked WEPIA/INWRDAM to implement 100 more systems in poor villages in the south. The President of Ein Al-Baida Society reported that, during a recent meeting of all welfare societies operating in the southern part of Jordan, the Governor of Tafila commended the project and encouraged other societies to consider reuse as a means of alleviating poverty. INWRDAM and the Regional Center on Agrarian Reform and Rural Development for the Near East (CARDNE) subsidiary of FAO signed an MOU for collaboration and coordination, on reuse as a means for rural development and they have asked INWRDAM to organize a session on greywater reuse as part of their workshop funded by the Islamic Development Bank. The Deputy Minister of Social Welfare, Mr. Tayel Al-Haaji heard about the project and visited the site and offered his help. INWRDAM with the Islamic Educational Scientific and Cultural Organization (ISESCO) in Rabat, Morocco and the Syrian Minister of State conducted a regional Training Workshop “Greywater Recommendation and Reuse in Irrigation of Home Gardens of Low Income Households”. More than 30 participants from 13 Arab countries attended. Two students under Odeh Al-Jayyousi, one of the members of the project team, are implementing greywater reuse in the hostels in Jordan University.

- f) To self-monitor and document, in progress and final technical reports, the following impacts of the project; additional grant leverage after approval, capacity building of INWRDAM and associated organizations, improved partnerships between INWRDAM and local organizations, scientific and methodological advances attributed to the project, value added by multidisciplinary approach to problem solving, and uptake of project results; and

This is being undertaken by INWRDAM, along with Mr. Faruqui`s input. In the meantime local and international organizations expressed interest in adopting this system in projects related to rural development and wastewater reuse. Two M.Sc. students are conducting research on greywater with the assistance of INWRDAM.

- g) Evaluate the impacts of the project by conducting a post project evaluation. This will occur upon project completion, should funding be available.

### **1.3.5 Pilot Research Project in Lebanon**

#### **Greywater Treatment and Reuse in West Bekaa Valley, Lebanon**

**File #: 100980**

**Recipient: MECTAT**

**IDRC Grant: \$242,782**

**Recipient Contribution:**

**Commencement Date: May 2002**

**Completion Date: May 2005**

Though this project is not included in this case study, it serves to demonstrate the replication effect of the Greywater Reuse Projects in Palestine and Jordan, which have been utilized as the Models for the MENA Region.

#### *Relevance*

During a Water Demand Management Forum held in Lebanon, the evaluation of the WDM research network concluded that the network was too focused on researchers and that the research was not reaching policy-makers. Mr. Faruqui took the opportunity to outline the concrete results of the CFP greywater reuse project in Jordan, and noted that wastewater results presented at the forum were largely based on large central plants, rather than small separate units at the community level, let alone the household level where the real gap exists. Thus, MECTAT decided to adopt this project. IDRC suggested that MECTAT ask INWRDAM to aid not only in the preliminary planning phase, but also in future project phases in order for MECTAT to benefit from INWRDAM's experience. As in the INWRDAM project, households would have to sign a contract outlining responsibilities in exchange for the greywater systems, supplies for gardening, and training. It was suggested that an informal network of regional visits take place, with Dr. Ghougassian visiting INWRDAM in Jordan to see the systems in Ein Al-Baida. He is drafting a design of the systems, which INWRDAM and PARC will advise him on by undertaking regional visits. This has been occurring to date, except in the case of PARC due to the political situation.

#### *Goal of Project*

The anticipated benefits are that the: availability of water will increase by 50% for crop production, without additional cost; increase in crop yield leading to food security; income generation; and decrease in expenditures related to the emptying of over-flown septic tanks by vacuum trucks.

#### *Objectives*

- a) Increase greywater recovery and make it more convenient and safe to handle;
- b) Minimize environmental impacts associated with greywater reuse;
- c) Improve the gardening/permaculture practices;

- d) Identify and incorporate relevant socio-economic, including gender issues related to greywater reuse;
- e) Strengthen local capacity to safely and efficiently reuse greywater;
- f) Promote changes in policies to encourage greater greywater reuse in Lebanon; and
- g) Establish a regional cooperation with similar ongoing greywater projects.

### *Donor Responses*

Other donors are beginning to appreciate the value of the systems. These donors include the European Union (EU), which has funded 50 of the systems implemented by CARE in Jordan, and another by PARC in Palestine. Dutch Aid funded 30 in Palestine, and USAID has funded a project of 1000 units through the Ministry of Planning. Working with its Jordanian partners and CIDA, IDRC will clearly synthesize the project results in appropriate outputs, and disseminate the results to donors and policy makers within Jordan and throughout the Middle East. It is important to work with other donor agencies towards building a learning/enabling environment (institution building) within the ministries and the private sector. One mechanism for dissemination will be the on-going Water Demand Management Forum (WDMF) project co-funded by IDRC, CIDA, USAID and the Japanese Government. The forum targets decision-makers in Jordan, Lebanon, Tunisia and Morocco. The WHO has endorsed the Hyderabad Declaration, held in India in November 2002, and sponsored by the International Water Management Institute “which takes into account new evidence in reviewing the guidelines for wastewater use in agriculture.”<sup>7</sup>

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<sup>7</sup> Found in Hyderabad Declaration on [www.cgiar.org/iwmi/home/wastewater.htm](http://www.cgiar.org/iwmi/home/wastewater.htm)

## Section 2 Methodology

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Case studies were determined to be the most appropriate approach to exploring the projects supported by IDRC because they present detailed stories about how projects engage with policy processes in the particular context. Case studies were selected to ensure that rich, qualitative data is available for analysis.

The case presented here has been developed from a number of information sources: relevant IDRC project files and documents of which the Trip Reports played a key role in the evaluation of this Case Study, interviews with project leaders, project participants, government officials, project beneficiaries and IDRC staff. This case study is not intended as a comprehensive project evaluation; only aspects related to public policy influence were studied in-depth and are included in this report.

### **2.1 Methods of Data Collection**

#### 2.1.1 Document review

Reviews of project files and IDRC documents were undertaken prior to conducting interviews. These were used to provide indications of who might have been influenced, and to generate working hypotheses about how that influence might have taken place. In general the documentation consisted of project proposals, IDRC Project Approval Documents, technical reports, progress reports, summary trip reports, meeting minutes and correspondence between IDRC and project participants. Along with project files, IDRC publications and documents about the program initiative, “Cities Feeding People”, research and development in the Middle East, as well as various books and publications on water issues, the UN Gender website and ratified gender declarations with direct relevance to Jordan, the Hyderabad Declaration, and brochures from the Department of Statistics and INWRDAM were reviewed to better understand the context in which the projects took place. A number of background studies prepared by the Evaluation Unit were used to provide conceptual guidance. A complete bibliography is provided in Annex 1.

#### 2.1.2 Interviews with key informants

Information from key informants was collected in three ways: one-on-one in-depth interviews; telephone interviews; and email. One-on-one, in-person was regarded as the most desirable method of data gathering from project participants. Of the twenty-seven people interviewed, two were interviewed in person at IDRC in Ottawa and twenty-three were interviewed in person in Jordan, either at their offices or at the offices of INWRDAM. Two of the interviews were conducted by telephone with those whom it was not possible to meet during travel, such as PARC in Palestine. Finally, as information and ambiguity came to light during the course of the investigation, it was sometimes necessary to telephone or e-mail previous interviewees to re-check and verify data.

All interviews were conducted using an interview guide, and most interviews lasted between 1-1.5 hours. Of the twenty-seven individuals interviewed, Arabic was the primary language used in fourteen of the interviews and English was used in thirteen of the interviews, although in five of these thirteen interviews, a mix of both languages was utilized.

In the course of interviews, interviewees often brought out unforeseen topics of discussion, which were probed and pursued, and then the interview returned to the structured format. Allowing a freer rein on the interview meant that the conversation could, at times, wander into unforeseen territory. This was regarded as a positive approach, however, as it provided opportunities for information to be given that might not have been solicited through a structured question format.

In general, the individuals interviewed were very cooperative in their responses to interview questions, and kindly gave of their time towards this case.

### 2.1.3 Selection of interviewees

The sample of respondents from each project was chosen deliberately from project files. There was also a snowball component to this selection, as the actors identified were asked if they could suggest anyone else to interview, which occurred in this Jordan Greywater Reuse Case.

Various groups were identified and interviewed to ensure a balanced appraisal. The groups included were policy makers – (seven), professors and researchers – (seven), IDRC staff – (two), donor agencies – (four), and townspeople/beneficiaries – (seven). Of the twenty-seven individuals, twenty were male and seven were female. However, there were some gaps in the selection sample as individuals relevant to some of the projects could not be tracked down and others were away on vacation. The time duration in Jordan was insufficient for interviewing a more comprehensive group of individuals. One of the problems faced was not being able to track relevant individuals who had worked on the Urban Agriculture Project with the Department of Statistics in 2001.

Interviews with women beneficiaries were part of the random sample of those interviewed in Tafila. Of the total 25 beneficiaries of the project, I met with five, of whom 4 were women.

The IDRC program officer responsible for the projects and a research associate were interviewed as a point of departure, and then interviews were conducted with relevant others in the project. This enabled the evaluator to understand what the projects set out to achieve, which was a useful anchor from which to better understand the perceptions of others involved with or influenced by the project.

## **2.2 Analysis and validation**

The information collected from the documentation and interviews was analyzed and integrated for this case study report, focusing on the policy influence aspects of each project.

Triangulation was used extensively during interviews and through the documentation to ensure validity of the findings. In a number of cases, where certain points needed clarification or further triangulation, it was necessary to conduct telephonic or email interviews with repeat or new interviewees after a series of interviews. In general the key informants were very cooperative in their responses to requests for additional information.

The first draft of each case study report was circulated to key interviewees to obtain their views on the interpretation as well as their confirmation of the accuracy of facts given in the report. In several cases this was also necessary in order to ensure that quotations by specific individuals could be used in the report.

### **3.1 Public Policy Influence of IDRC Supported Research in Wastewater Reuse in Jordan**

The types of influences referenced within this Case Study are incorporated within the framework outlined by Mr. Lindquist, a researcher at the University of Victoria. The framework consists of the following three points: 1) expanding policy capacities; 2) broadening policy horizons; and 3) affecting policy regimes. The first consists of improving the knowledge/data of certain actors, supporting recipients to develop innovative ideas, improving the capability to communicate ideas, and developing new talent for research and analysis. The second includes providing opportunities for networking/learning within the jurisdiction or with colleagues elsewhere, introducing new concepts to frame debates (putting ideas on the agenda or stimulating public debate), educating researchers and others who take up new positions with a broader understanding of issues, and stimulating quiet dialogue among decision makers. Finally, the third covers modification of existing programs or policies and fundamental re-design of programs or policies.

Although they took different forms, all in all, public policy influence took place, within the framework described above, as a result of these projects. These influences are: 1) revision of the National Housing Codes, and formation of a National Committee to formulate Greywater Reuse Guidelines; 2) policy makers taking on the role of Communicators of the Policies for Urban Agriculture Project; 3) replication of this Model of greywater treatment kits in other MENA countries; 4) ratified Hyderabad Declaration that takes into account issues of assessment of global use of wastewater, health, and environmental implications, as well as related guidelines. The World Health Organization has made a commitment to take into account new evidence of the research findings and implications in reviewing the guidelines for wastewater use in agriculture, incorporating the findings of the greywater reuse projects; 5) networks were formed amongst policy makers, researchers, donors, and beneficiaries; and 6) capacity building, i.e. training, educating, and/or raising awareness of policy makers.

#### **3.1.1 Revision of Housing Codes and Formation of National Committee**

The project, “Policies for Urban Agriculture” had a direct influence on public policy in Jordan. One of the findings of the survey was that urban agricultural policies at the municipal, city and state levels were non-existent. Implementation of this objective of urban agricultural policy setting is currently under way through the Greywater Reuse Projects.

As a consequence of seeing the results of the technical and social impacts to the beneficiaries – mainly those of treated water reuse and cost of water savings, the Ministry of Public Works and Housing asked INWRDAM to provide the National Committee of Jordan, on which Dr. Bino serves as a member, with a proposal for a modified version of the chapter of the building codes related to sanitary connections so that houses in urban and rural areas are built to allow occupants to practice greywater reuse without the need for further plumbing modifications. Engineer Al-Beiruti of INWRDAM serves on the Engineers Association, which is responsible for implementing the codes. Additionally, the subcommittee on wastewater in the Water Authority of Jordan asked Dr. Bino to make a presentation about the project in early 2002 and as a result agreed to set up a National Committee to formulate Greywater Reuse Guidelines.

It is significant that the Water Authority of Jordan is spending its own budget on sending staff to monitor the project and to take independent measurements of the water quality. This implies that the Water Authority is aware of and participating indirectly in the process and is doing things differently based on the project results they saw and may play a role in their future policy making agendas.

### 3.1.2 Policy Makers as Communicators

Policy makers that were not a part of the project have become communicators of the project results. Dr. Shakhathreh and Mr. Badriyah, of the Jordanian Department of Statistics, worked on the design for the website of the Department of Statistics, and included the results of the Policies for Urban Agriculture Project on the front page of their website for broader dissemination to the donor and research communities. Although they were not involved with the project per se, they have taken on the role of communicators of the research results, which reflects another type of more indirect public policy influence of the project. Dr. Shakhathreh had been aware of the project and requested Mr. Badriyah to study the findings of the project. This led to mutual discussions in which it was decided that the findings were pertinent to Jordan's well-being and placed on the newly designed website for further action and to generate the interest of both the donor community for undertaking similar studies throughout Jordan as well as for the benefit of the research community.

### 3.1.3 Replication of the Model

The project in Palestine and the consecutive projects in Jordan were methodically built, one upon the other, and led to the replication of greywater reuse projects throughout the MENA region. Dr. Bino of INWRDAM aptly summed up this replication effect by saying that, "in the Middle East, the projects in Palestine and Jordan are now spreading to Lebanon, and Syria has expressed its interest as well."

The replication effect of the greywater reuse system is occurring as a result of the continually evolving project structure that suits the cultural context of the relevant country. Greywater household kits are utilized for the treatment of used water or



greywater that is reused for agricultural purposes and to water crops that are not eaten raw, as a precautionary measure.

Replication of the project has occurred across Jordan because of partnerships between INWRDAM, the recognized technical expert in the area of grey water reuse, and other international and national agencies. Some examples of this include:

- CARE Jordan expanded the use of this system to all its projects in Jordan. A total of 53 units of the system were installed by INWRDAM for CARE in five different communities in Jordan, which was funded by the European Union. At present, Mr. Maguire of CARE, said that, “they are partnering with INWRDAM in implementing the greywater reuse project awarded to them by the Ministry of Planning (1000 units), which is being funded by USAID for a total of \$250,000 US.” Mr. Faruqi of IDRC noted that credit goes to the researchers for developing environmentally-friendly shampoos, soaps, and detergents for use along with greywater reuse, which are being distributed free of charge to the beneficiaries and will be utilized within the greywater reuse project for the Ministry of Planning.
- A Memorandum of Understanding for cooperation and collaboration was signed by INWRDAM with the Regional Center on Agrarian Reform and Development for the Near East (CARDNE) in order to develop joint projects, training activities and seminars appropriate to the needs and requirements at the national and regional levels based on the application of greywater. The application of greywater is a creative method of dealing with the existing water shortage in reusing water for agriculture.
- A Water Demand Management Unit, dealing with water conservation in Jordan, is being established at the Water Authority of Jordan,” explained Engineer Haddadin, at WEPIA, USAID. This unit will centralize water issues for Jordan and draw upon INWRDAM’s expertise on greywater reuse.
- “An official Committee of Public Works and the Ministry of Water will revise the beautification codes, which have not been revised since 1978. The trend is the effect on municipal use of water, such as greywater and beautification, which will probably be incorporated with INWRDAM,” said Ms. Greiser of WEPIA, USAID. Jordan’s Codes on Beautification will be revised by utilizing greywater reuse for beautification of areas for tourist attraction. They will draw upon INWRDAM’s expertise on greywater reuse.

### 3.1.4 Ratified Hyderabad Declaration

On the 14<sup>th</sup> of November 2002, two major breakthroughs occurred regarding wastewater management in Hyderabad, India, as a result of a workshop entitled, “Wastewater Use in Irrigated Agriculture: Confronting the Livelihood and Environmental Realities.” The first was the commitment of the World Health Organization to take into account new evidence in reviewing the guidelines for wastewater use in agriculture, which included the presentation by the IDRC staff on the Greywater Reuse Projects. The second was to set a

common vision of goals and an agenda worldwide. Researchers and practitioners in water, health, environment, agriculture and aquaculture, who represented 27 international and national institutions from 18 countries around the world, drafted this declaration. The declaration in and of itself represents worldwide concern and commitment towards ensuring safe water reuse by building a wastewater “community of practice” integrating a variety of research, implementation and policy institutions and partners. Among the partners included were PARC, who were unable to attend due to the political situation in Palestine, and INWRDAM of Jordan, who are well on their way to building a “community of practice” within their own countries and within the Middle Eastern Region.

During this meeting with the International Water Management Institute, Wastewater Reuse in Hyderabad, India. IDRC staff presented the experience from the Middle East and North Africa regional office. This generated interest and debate on this topic. “As a result, these projects contributed and will impact on public policy of the Hyderabad Declaration. The U.S. Environmental Protection Agency has included the Declaration in the draft of its upcoming guidelines for the reuse of water. The Declaration has also been published in issue 8 of the UA Magazine published by the Resource Centre on Urban Agriculture ([www.ruaf.org/news\\_and\\_agenda\\_fr.html](http://www.ruaf.org/news_and_agenda_fr.html)). The WHO was among the international signatories to Hyderabad,” said Mr. Redwood of IDRC.

### 3.1.5 Formation of Networks

Bringing together governments, the private sector, and the research community interested in the issue of wastewater reuse for the first time is another example of the public policy influence of these projects. On a larger scale, Mr. Faruqui of IDRC added that, “all the individuals in the Jordanian research, engineering, and policy-making communities know each other and invite each other to workshops, as it is a small country.”

Following are examples of the informal networks built up as a result of the projects included in this case between the government and the private sector, research community, and beneficiaries in order to implement the findings of the projects on a countrywide scale.

Engineer Al-Kloub, member of the Engineers Association who works at the Ministry of Public Works and Housing stated, “The government is working with the Engineers Associations and training/informing them on the use of the revised greywater codes.” “The government in Jordan is asking the research community to work with them,” said Mr. Faruqui of IDRC. Engineer Burnat of PARC mentioned that in the West Bank and Gaza, they are working directly with Birzeit University, Al-Najah University, University of Al-Khalil, American University in Jenin, and the Islamic and Al-Azhar Universities in Gaza. These networks built in the West Bank and Gaza, Jordan, and now in Lebanon have been working together on an informal basis, but IDRC is now in the process of mapping a region-wide formal greywater reuse network.

Networking has also occurred at the local level between policy makers, researchers, and beneficiaries. This greywater reuse project has given Mr. Al-Humran - Head of the Ein Al-Baida Society, a stronger standing in the community as he is voted into his position by the community, by inviting lecturers from the University of Jordan and the Ministry of Agriculture to address the beneficiaries directly. It is unusual for the government and farmer community to openly sit and discuss issues of concern together and this provided the beneficiary community the opportunity to discuss their concerns with the government directly, as one of the community members mentioned.

These networks have been established based on the consensus of what the problem is and the agreed upon steps towards a solution.

### 3.1.6 Capacity Building of Policy Makers

As a result of project implementation, the IDRC supported projects have trained, educated, and/or raised the awareness levels of policy makers about greywater reuse. Some examples of this growing awareness include:

- The Ministry of Social Development is utilizing the lessons learnt from the PPP and Greywater Reuse Projects in assisting the poor by teaching them new trades. Some of the examples the Ministry of Social Development was made aware of by Dr. Bino and CARE are: the beneficiaries themselves are being trained to Train the Trainer in relevant topics to greywater reuse, such as plumbing. Mr. Al-Awabdeh, one of the beneficiaries of the greywater reuse project in Tafila, mentioned that, “he is learning from this experience as he never knew about agriculture, and now he is well trained and capable of maintaining the greywater units that have saved money on the water bill as well as in the plumbing of the septic tanks.” The female beneficiaries found that they were saving “50% on their water bills.” “When the PPP project was handed over to the local management of Ein Al-Baida Voluntary Society, the members were trained in financial management, administrative management, agricultural techniques, communication skills, and networking,” said Mr. Tarabey of CARE.
- University level researchers are involved in the Greywater Reuse Project as experts who increase academic knowledge of the process. Many briefings have been undertaken with the Ministry of Water and Irrigation via different committees, sub-committees, and ad-hoc committees. “Within the Ministry of Public Works and Housing, there is a scheduled time of 6 months to 1 year, in which to finalize changes in the sanitary codes dealing with greywater reuse,” said Engineer Al-Kloub of the Ministry of Public Works and Housing. “The impact of the project is on the people who are quite happy using certain techniques to get treatment units and improved units, as greywater is nothing new to them,” he added.
- Dr. Abdel-Latif of PARC reiterated the same since “they have been raising awareness by working with the Palestinian Water Authority, Ministry of Agriculture, thirty-two international engineers and researchers, universities, and NGO’s in the West Bank Greywater Reuse Project.”

- Dr. Shakhathreh of the Department of Statistics indicated that capacity building of the staff in the area of research took place in the Department of Statistics in the Policy on UA Project.

### **3.2 Contributing Factors**

These influences on public policy in the area of greywater reuse in Jordan can be attributed to a number of factors, including the fact that IDRC: 1) took a strategic, planned approach by building a series of projects that methodically built upon past ones, and 2) the research supported by IDRC provided evidence that there was a linkage between economic development and environmental sustainability. The significance of this is that it helped to influence the viewpoints of policy makers. Dr. Al-Jayyousi expressed this by saying that, “there was a divergence and now there is convergence in Jordan as the value of this project contributed to make a convergence between economic development and environmental sustainability.”

#### **3.2.1 Strategic Project Development**

Since joining IDRC and being involved in the Urban Agriculture workshop in Gaza, it became clear to Mr. Faruqui of IDRC that wastewater reuse was even more important in the Middle East than elsewhere in the world because of the region’s acute water scarcity. As a result, he methodically and strategically utilized the technical experiences of greywater reuse and existing partnerships to build successive projects and to call upon partners to assist each other in their areas of expertise. Mr. Faruqui did this deliberately in order to increase the potential for the research to have significant public policy influence.

As Dr. Abdel-Latif of PARC said, “we were the first ones to implement this project, and the results of this important work have been continued.” Following the project with PARC, Mr. Faruqui of IDRC insisted that an evaluation of the PPP project in Jordan be undertaken which was to the benefit of the project, with the findings being utilized in all the greywater reuse project replications. This was relevant since the evaluation revealed that greywater reuse is an accepted practice most likely to be continued. Family income increased on average from 60 to 100 JD per month; it promoted positive family and social practices in terms of cooperation; females played a leadership role; and capacity of the local voluntary association was built in terms of management and planning. As Dr. Bino of INWRDAM pointed out, “IDRC helped in building a well-defined project with clear objectives, built and based on the PPP experience. IDRC has good capacity to improve on the lessons learnt in future for follow-up projects.” This statement was reiterated by Dr. Sawwan, from the University of Jordan, that IDRC has “continued the dream of the PPP.”

#### **3.2.2 A Step Towards Poverty Alleviation**

Based on the findings of Jordan’s Department of Statistics, one of the significant problems facing Jordan was scarcity of water for irrigation and lack of farming knowledge and financing. PARC has now achieved 56% greywater recovery in the home and those who have units are becoming self-sufficient in running, operating, and

maintaining the inexpensive system. Irrigation was done manually, but at present there is an automated small-scale trickling filter. Evaluation of the PPP found that family income increased from 60 JD up to 100 JD a month. Positive family and social practices were enhanced in home economics and marketing. Of the respondents, 73% gained self-sufficiency by growing crops for their own consumption. The project allowed the community to offset food purchases and generate income by selling surplus production, saving or earning an average of 10% of its income. Had the households utilized municipal sources for this supplemental irrigation, they would have used 15% more water and had 27% higher water bills. The project helped the community gain valuable gardening, irrigation, and food preservation skills.

As a result of these findings and knowledge dissemination, policy makers are taking an interest in the wastewater system, as per the following statements:

Dr. Bino of INWRDAM stated that Mr. Tayel Al Haaji, Deputy Minister of the Ministry of Social Welfare is interested in the project and has offered his assistance based on the impact on poverty alleviation,<sup>8</sup> growth and sales of crops, and removing the manual burden of women in operating this system by developing an automated system. The Governor of Tafila commended the project and encouraged other societies throughout Jordan to consider greywater reuse as a means of alleviating poverty. Additionally, Dr. Fardous of the Ministry of Agriculture stated that, “as a specialist in the ministry, if they could get better water quality, it is better for agriculture. The separation of grey and black water is an excellent approach, especially for environmental and agricultural production and health hazards.”

### **3.3 Factors Impacting Policy**

#### **3.3.1 Internal to IDRC**

##### *Factors that facilitated influence*

The factors found to facilitate policy impact from within IDRC are: a) strategic use of available resources; b) methodical build-up of one project upon the next, as well as replication of the greywater reuse kits; c) technical input of IDRC and good relations between the Jordanian Partners and IDRC; and d) the sense that the projects provided an immediate “solution to a problem” within the framework of the cultural context.

a) Financially, there is a limited amount of money to be distributed for projects. Thus, Mr. Faruqui methodically built one project upon the next and improved each one, by selectively and strategically utilizing the available resources. This is important as the lessons learnt from one project were utilized to build on the next; thus, efficiently saving on time and costs, as new projects begun would probably have required a larger budget and would have presented their own sets of issues and problems.

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<sup>8</sup> Saving money that used to be spent on pumping out septic tanks and utilization of precious drinking water for irrigation purposes.

b) The project sequence was very strategic in methodically building one project upon the next and consequently achieving a regional and international effect as well as replication of the greywater reuse systems in projects, from Palestine to Jordan to Lebanon. The experiences utilized have refined the project and implementing counterparts have become technical experts in the field of greywater reuse.

c) As Engineer Al-Beiruti of INWRDAM pointed out, “IDRC played a major role financially, in addition to the important guidance and feedback of Mr. Faruqui of IDRC.” Dr. Shakhathreh of the Department of Statistics also noted “that IDRC helped with the funding and expertise and the Ministry worked with them as very good partners to the end. It is hoped this relationship will continue.” The technical input from IDRC helped the counterparts in developing their expertise and has earned IDRC well-earned respect and good relationships.

d) A solution was found to the problem of water shortage and insufficient amount of water that helped the poor in irrigating their crops and cost saving on their water bills and septic tank drainage bills. The target of the Cities Feeding People initiative is to assist in poverty alleviation and to teach self-sufficiency while dealing with the growing issue of water shortage. This target has been achieved within the scope of these projects.

#### *Factors that hindered influence*

The factors, internal to IDRC, found to hinder influence are: a) directed gender targeting; and b) insufficient funds for follow-up evaluation.

a) If gender targeting had been undertaken, at the outset from the planning stage to project implementation in promoting women as participants as well as beneficiaries, it could have possibly played a key role in impacting public policy, specifically with the Greywater Reuse Project in Tafila, Jordan. As the Deputy Minister of Planning, Ms. Reema Khalaf, is active in women’s rights and affairs, it would have been possible to link the project with the Ministry of Planning in order to both utilize her experience and for the project to attain public policy influence from the perspective of gender equality and further ease of policy making with regard to the issues of gender. Since the environment in Jordan is conducive to gender equality, this could be utilized to enhance the gender component in this and other future projects, in Jordan.

b) As there is insufficient funding available for project completion, the funds set aside for project evaluations are being utilized for project completion. Lack of funding for follow-up evaluation is a constant problem, as most of the emphasis within IDRC is on developing new projects—there is not enough emphasis on monitoring existing ones or on follow-up evaluations. This became a clear hindrance to my ability in locating pertinent individuals, in completed projects, and preparing my findings for the case study. Project evaluations are crucial for future project developments. For example, in the case of the project, Policies for Urban Agriculture, if a follow-up evaluation had been undertaken, we would have been able to track the 15 female researchers who undertook the evaluation, as well as the policy makers who were involved. Evaluations are crucial

for tracking and keeping records of the outcomes as well as of lessons learnt for future project development and implementation, rather than starting up new projects without utilizing previous valuable experience.

### 3.3.2 External to IDRC

#### *Factors that facilitated influence*

The factors found to facilitate influence, external to IDRC, are: a) conducive country environment; b) credibility and expertise of the various individuals/organizations involved with project implementation; and c) dissemination of findings.

a) Different issues can have impact on a project, such as changes in politics or politicians, the economy, and so forth. This is evidenced by the paradigm shift of policy makers, as Dr. Al-Jayyousi of the Applied Sciences University so aptly put it – “in the last three decades, there was no interest in the environment at the grassroots level or development and human rights in Jordan, and this has now changed as a result of awareness of the water crisis facing the country.” This, in addition to the fact that “the link between researchers and public policy makers is improving with time as a result of the 1998 problem with the polluted water provided them, which was unknowingly utilized as drinking water. In the country-wide crisis that ensued, the government called upon researchers to help them to resolve this crisis, and thus developed a closer relationship than that which previously existed,” Dr. Bino of INWRDAM pointed out. The shift in thinking towards development and human rights and the importance of water, in the last decade, have had an impact on the policy makers in Jordan. This is an important factor as it has worked towards forging the link between policy makers and researchers for future policy and project developments and relationships amongst each other.

As an additional note of relevance to our study, Jordan has historically been one of the Middle Eastern countries receptive to research. The Royal Scientific Society was established by the monarch and headed by Prince Hasan (King Hussein’s brother) and has worked to attract some of the best scientists.

b) In essence, the reputation and expertise of highly respected organizations, such as PARC, INWRDAM, and MECTAT have played a major role in facilitating policy influence. According to Mr. Faruqui, “it is now clear that in terms of relative strengths within the IDRC developed greywater reuse projects, PARC is stronger at securing the rights of the poor, INWRDAM provides stronger technical design, and MECTAT provides stronger environmental training and awareness campaigns.”

Quiet diplomacy is a relevant and effective means of sharing policy ideas but it requires people of stature and credibility. By quiet diplomacy, I am referring to Dr. Bino’s credibility as having the “characteristics of a policy entrepreneur”, who can easily move between the world of policy and the world of research and “has a hearing” by policy makers. Dr. Bino serves on the National Commission to restructure building codes and retrofitting of homes due to his technical expertise. Dr. Bino’s involvement as the Project

Leader greatly facilitated the ability of the research findings to have an influence in the public policy arena. The reputation and expertise of organizations/individuals in their country is crucial to the success of any and every project, as perceptions of success are associated with the implementing organizations/individuals involved.

c) The findings of the research have been disseminated widely in a variety of formats appropriate to the audience. The quantity and quality of the dissemination has supported the ability of these wastewater reuse projects to influence public policy. This is crucial, specifically in the Middle East, as the outcomes of the project are being replicated throughout the region and are gaining worldwide attention. Some examples of how the findings have been disseminated through various venues and formats are listed below:

- Dr. Al-Jayyousi, who is one of the researchers on the team and Dean of the Applied Sciences University noted that, “the findings of the project, on the technical level, are serving as guidelines for the World Health Organization on greywater. A User Guide for Greywater is being developed in order to transfer and disseminate the findings regionally and internationally.”
- Workshops are regularly being held locally and regionally as for example, INWRDAM in cooperation with the Islamic Educational, Scientific and Cultural Organizations (ISESCO) and the Syrian Ministry of State for the Environment conducted a Regional Training Workshop entitled “Recovery and Reuse in Irrigation of Home Gardens of Low Income Households. This workshop was held in Damascus, Syria in March 2002 whereby over 30 participants from 13 Arab countries participated in this training workshop. As a result, Syria has expressed its interest in implementing the greywater reuse project in Syria.
- The Centre for Agricultural Reform and Rural Development in the Near East (CARDNE), which is an organization set up and funded by the Food and Agricultural Organization (FAO) of the UN and the Arab League, is organizing a workshop on water management in which nine countries in the region will participate. They have asked INWRDAM to prepare a session on greywater reuse.

#### *Factors that hindered influence*

Factors, external to IDRC, that were found to hinder influence of these projects include: a) lack of learning environment in the government; b) insufficient use of mass media; c) lack of authority/conflict in Palestine; and d) religious beliefs perceived to be contrary to the ideas of wastewater reuse.

a) A conducive environment for learning incentives within the various governmental departments would provide a basis for continually addressing the issue of greywater reuse. In the case of the project, Policies for Urban Agriculture, it is hypothetically possible to say that the findings of the survey would have been acted upon sooner and project findings replicated throughout Jordan with the assistance of donors. In order to ensure continuity and awareness, it is important that governmental officials, at all levels, are educated about the benefits of wastewater.



b) The media is another method of dissemination which many of the policy makers pointed out was not well utilized by the projects. Engineer Al-Kloub of the Ministry of Public Works and Housing added that, “the greywater reuse project requires more publicity, as well as educating the private sector through the media and committees formed to include all sectors of society.” Mr. Al Ma’abra of the Ministry of Social Development for the Tafila Governorate was also “in favor of dissemination of the knowledge by having the Ministries of Agriculture, Water, and Environment hold more workshops to spread the knowledge of these projects throughout Jordan.” Dr. El-Hadidi of the Water Authority of Jordan mentioned that, “this is a good project with not enough propaganda.” Dr. Bino mentioned that he would like to err on the side of caution prior to publicizing the project. Some of the policy makers met were not aware of the benefits of wastewater and were very interested in finding out more about it. It is important that policy makers are educated and are made aware of the possibilities of greywater reuse, which will in turn lead to further policy revisions and incorporation of wastewater reuse in other projects throughout Jordan.

c) The social, political, and economical environments have been conducive to the success of these projects in Jordan but this is not the case in Palestine. In Palestine, the original intention was to impact policy making with the Palestinian Authority. This has been made difficult for PARC because of the lack of authority of the Palestinian Authority and the fact that “Israelis do not recognize the Palestinian water resources,” according to Dr. Abdel-Latif of PARC. Furthermore, “there is competition between different water users amongst Palestinians – domestic, agricultural, and industrial and water is a “crucial chronic problem”. Mr. Faruqui of IDRC said that, “it is important at the outset to recognize that Israel is taking more water than its share--- 350 litres per capita versus 50 litres per capita for the Palestinians. This inequity is unlikely to be addressed until the parties come to peace. In the meantime, it is imperative to address what can be done for the Palestinians to use what little water they have available now in a more sustainable way.” The project was to have been completed approximately one year ago, but the political conflict has hindered completion as well as many of the project requirements, such as going to the field to take samples.

d) This was not a hindrance per se to the public policy influence of these wastewater projects but the real or perceived opposition of greywater reuse in Islam was an issue for beneficiaries at one point. For example, in the project in Palestine the community members in whose houses the wastewater systems were to be installed believed their religion prohibited wastewater reuse. However, once the beneficiaries were educated, by the Imams in mosques during prayers, on Islam’s role and its views on water, there was no further opposition to water reuse. This was done by correlating water reuse to the Quran and by having the Imams preach these findings. Mr. Faruqui, Dr. Biswas, and Dr. Bino co-edited the book *Water Management in Islam* in order to disseminate this knowledge to donors, policy makers, researchers and others who may be interested. This opposition, had it been fullblown, could have thwarted the project goals and objectives, but it seems to have actually worked in favour, to date, with the wastewater projects.

### 3.3.3 Conclusion

The expected and unexpected outcomes of the project included: 1) revision of the National Housing Codes and formation of a National Committee to formulate Greywater Reuse Guidelines; 2) increased awareness and support of the government regarding greywater reuse, leading to policy makers taking on the role of Communicators; 3) replication of the greywater treatment kits in the MENA region; 4) ratified Hyderabad Declaration taking into account the findings of wastewater reuse projects; 5) network formation between policy makers, researchers, private sector, and beneficiaries; and 6) capacity building of policy makers. This was achieved despite hindrances faced. All in all, this case represents a creative and methodical system, which is being replicated throughout the MENA region. This, in addition to channelling worldwide attention, as per the Hyderabad Declaration, on new and creative methods and systems of dealing with wastewater reuse, is an accomplishment in and of itself.

## Section 4

### Summary

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Most of the Middle Eastern countries are aware of the water crisis facing them. There is an awareness of water demand management and a desire to implement projects that focus on the alleviation of water demand. As Ms. Assad (Researcher in the Community Infrastructure Enhanced Productivity Program of the Ministry of Planning in Jordan) contended, “necessity is the mother of invention”. Perhaps the most important constraint on solving the water resources crisis is time. There is very little time to do all that needs to be done to accommodate the 1 billion new people to be born, in the Middle East, in the next 10 years.

The projects included in this case study dealt with incorporating the CFP objectives by: first, strengthening local research capacity and generating information on UA, thus formulating and implementing policy and technical options for the benefit of the peri-urban poor which were incorporated into the succeeding projects; second, specifically mobilizing and enhancing regional capacities to share experiences in UA, identify common policy and technical obstacles and share and adapt solutions as well as networking, as has been accomplished by the sharing of expertise and skill amongst PARC, INWRDAM, and MECTAT; and finally, indirectly influencing governments, policy makers and international agencies to incorporate UA into their development programmes, which have been incorporated in an informal way, although the Government of Jordan is now requesting that the UA study be replicated throughout Jordan and are disseminating the findings of this project via their web site.

In this case study, public policy consisted of: a) revision of National Housing Codes and formation of a National Committee to formulate Greywater Reuse Guidelines; b) policy makers taking on the role of Communicators; c) replication of Model for other MENA countries; d) ratified Hyderabad Declaration on wastewater reuse by the WHO; e) formation of networks; and f) capacity building of policy makers. This influence can be attributed to: a) strategic project development by building on the experience of one project to improve on consecutive projects; and b) a step that is helping the convergence between economic development, environmental sustainability, and poverty alleviation. The gender analysis and multi-disciplinary aspects have been incorporated to some extent, although my interviews found there to be a conducive environment in Jordan to even further integrate these concerns.

Policy influence is a stated objective throughout the projects. The projects, except for the UA, influenced policy from the “bottom up” as well as “top down” according to Dr. Bino. The policy influence targeted the community level, but exceeded expectations by replication to the local, regional, national, and international levels. The methodically built-up effect of the carefully studied and implemented greywater projects, throughout the Palestinian Territories and presently throughout Jordan, on to Lebanon, and possibly Syria show that a change in the thinking and approaches of individuals concerned has occurred. It is the finding of this case study that this is a result of the straightforward design of the project, the direct and apparent solution to one of the region’s water problems, straightforward nature of the policy to be implemented, ease of transferring the knowledge which has been implemented in Palestine via the “seeing is believing” adage, and due to the fact that the results are easily foreseeable.

The factors and conditions found to facilitate or inhibit public policy influence, internally and externally to IDRC, are as follow:

Internal to IDRC, the factors found to facilitate public policy are: a) strategic use of available resources; b) methodically building one project upon the next and replication of the project in the region; c) technical input of IDRC and good relations between partners and IDRC; and d) the sense of an immediate solution to a problem. The factors found to hinder public policy influence are: a) directed gender targeting; and b) insufficient funds for follow-up evaluations.

External to IDRC, the factors found to facilitate public policy are: a) conducive country environment; b) credibility and expertise of organizations/individuals involved with implementation; and c) dissemination of findings. The factors found to hinder influence are: a) lack of learning environment in the government; b) insufficient use of mass media; c) lack of authority/conflict in Palestine; and d) religious beliefs perceived to be contrary to the ideas of wastewater reuse.

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## ANNEX 2: Key Informants

	Name	Position	Organization	Phone No. Fax No.	E-mail
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