



On-site rainwater harvesting to achieve household water security among rural and peri-urban communities in Jordan

Almoayied Assayed*, Zaid Hatokay, Rania Al-Zoubi, Shadi Azzam, Mohammad Qbailat, Ahmad Al-Ulayyan, Ma'ab Abu Saleem, Shadi Bushnaq, Robert Maroni

Mercy Corps Organization, Amman 11183, P.O. Box 830684, Jordan

ARTICLE INFO

Article history:

Received 26 December 2011
Received in revised form 13 January 2013
Accepted 17 January 2013

Keywords:

Rainwater harvesting
Water demand management
Community based organization
Household water security
Revolving loans

ABSTRACT

This paper presents the experience of Mercy Corps' "Community Based Initiatives for Water Demand Management" project, a five year project (2006–2011), in terms of community-based initiatives for water management. This project was designed to build the capacity of local community-based organizations (CBOs) to raise the awareness level around water demand management (WDM) and engage community members in water management measures. It showed how local solutions decrease the reliance on public water systems and ultimately help in facing the water shortage on a national level. This paper also showed that on-site rainwater harvesting Cisterns funded through this project have been able to harvest 88,335 m³ annually. The paper found that rainwater harvesting at household level was able to save an average of 24% in potable water per year.

© 2013 Elsevier B.V. All rights reserved.

1. Background

Jordan is one of the ten most water-deprived countries in the world. Available per capita fresh water lags far behind that available in most other countries. In the year 2008 the renewable freshwater resources available per capita in Jordan were about 145 m³/year. This is less than one third of the widely recognized "water poverty line" of 500 cubic meters per capita per year ([Jordan's Water Strategy, 2008](#)).

Jordan is located in an arid to semi-arid part of the world where water resources are limited and scarce. Water resources are highly dependent on rainfall, which varies in quantity, intensity and distribution from year to year. Surface water supplies contribute approximately 37% of Jordan's total water supply. Groundwater contributes 54% of the total water supply. The unsustainable abstraction of groundwater due to population growth, rainfall shortage and agricultural expansion is a major problem today. Ten out of 12 water basins are over pumped and groundwater is used at twice the recharge rate ([Nortcliff et al., 2008](#)).

Abbreviations: MC, Mercy Corps Organization; WDM, Water Demand Management; CBOs, Community Based Organizations; CBIWDM, Community Based Initiative for Water Demand Management; USAID, United States Agency for International Development; FF, Filling Frequency; CV, Cistern Volume; nC, number of Cisterns; VR, volume of rainfall that could be harvested; AR, average rainfall; A, catchment area.

* Corresponding author. Tel.: +962 777 726 716; fax: +962 554 85 73.

E-mail addresses: almoayied.assayed@gmail.com,
moayed1948@yahoo.com (A. Assayed).

Demand for water far exceeds supply and the deficit is increasing. The future challenges on water demand are enormous. Any unexpected population growth due to regional instability, as was the case during the past decades, would further increase water demand and impact the country's plans to reach a balanced demand and supply ([Annual report, 2007](#)).

The Jordanian government has realized this alarming water status. The ministry of water and irrigation (the official body dealing with all water-related issues in the country) has identified several measures to reduce the stress on available water resources and to ensure that water is allocated wisely for all sectors. In Jordan's water strategy for 2008–2022, rainwater harvesting has been considered a potential measure to reduce water demand and a significant alternative resource for domestic and irrigation water supply. Jordan's water strategy states: "Jordan will encourage regulations to encourage rainwater harvesting". In water supply section, the strategy stipulates "we will look to maximizing the use of alternative water resources including the use of greywater and rainwater harvesting".

In May 2006, Mercy Corps Organization (MC), with a financial support from the United States Agency for International Development (USAID), began implementing the project entitled "Community Based Initiatives for Water Demand Management in Jordan (CBIWDM)". This five-year project was designed to enable communities in Jordan to improve water use efficiency through building the local CBOs' capacity to take the lead in promoting and raising the awareness of their constituents around Water Demand Management. The whole project is based on the concept of revolving loans, in which each CBO received a specific amount of

money as a grant. These grants are managed by the selected CBOs and operated as revolving loan funds to support households and small farms to develop and implement water saving and efficiency projects.

This paper tackles rainwater harvesting revolving projects implemented through the “Community Based Initiatives for Water Demand Management in Jordan CBIWDM” project. The aim of this paper is to evaluate the role of rainwater harvesting projects in household water security and estimate how much on-site rainwater harvesting contributes in Jordan’s water budget.

2. Method

2.1. Selection of eligible Community Based Organizations

Throughout the project’s life span, 135 Community Based Organizations (CBOs) have been awarded averaging 10,000 JDs (\$ 14,114 USD). The selection of participating CBOs was done through a highly-competitive and transparent process involving all relevant stakeholders. Evaluation process started with an invitation of all CBOs to a “Project Awareness Session”, in which general objectives of the project were explained and discussed. Afterwards, all interested CBOs were asked to attend a “Proposal Orientation Workshop”, where proposal template was discussed and then distributed. All proposals that had been received before the deadline were considered and evaluated. The evaluation of proposals went through the following subsequent steps:

- (1) Site visits to all CBOs who submitted proposals: the purpose of site visits was to discuss the proposal items and to ensure that all information mentioned in the proposal is accurate. The site visit report was attached with the original proposal to be considered in later steps.
- (2) All information gathered through the field visit and mentioned in the proposal was summarized by using an evaluation matrix, developed by the project team.
- (3) All proposals, in addition to the field visit reports and evaluation matrix, were thoroughly studied and discussed by the project’s steering committee, which is comprised of representatives of relevant governmental bodies, international donors and experts in Water Demand Management. Depending on the proposals, field visit reports as well as the evaluation matrix, the steering committee was able to finally select the eligible CBOs for funding.

2.2. Building the managerial and technical capacity of granted CBOs

The CBIWDM started out by building the leadership capacity of the local CBOs in project management and technical aspects related to Water Demand Management projects. The managerial training includes: 1 day of revolving loan management and 2 days of business management training. The technical training is comprised of: estimating the Cistern Volume required for rainwater harvesting, health aspects related to rainwater harvesting, gray water management at household level, best management practices to manage irrigation water at farm level including drip irrigation techniques, springs rehabilitation, and residential network maintenance. In addition to the formal training listed above, CBOs received on-the-job training during supervision and monitoring visits by project team members to reinforce learning and insure smooth implementation of the Water Demand Management projects.

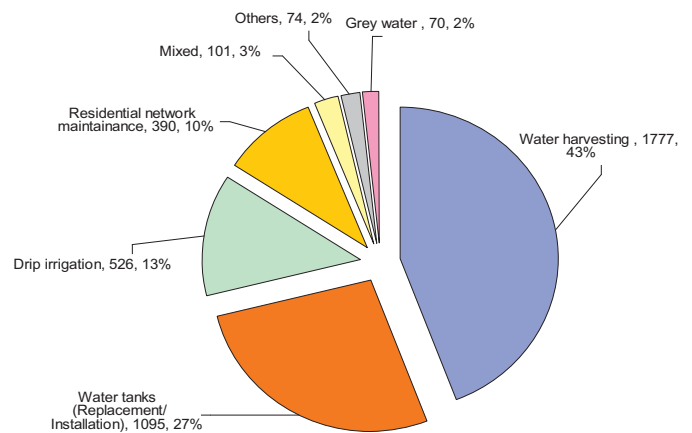


Fig. 1. The distribution of beneficiaries within CBIWDM.

2.3. Disbursing loans and starting implementation

After acquiring the required technical and managerial knowledge, CBOs began disbursing loans to beneficiaries in order to implement Water Demand Management projects. The types of projects funded by CBOs are varied due to several factors, such as: average rainfall, land topography and community interest. Examples of such projects are rainwater harvesting Cisterns and reservoirs, roman Cistern rehabilitation, residential network maintenance, drip irrigation, small agricultural canal maintenance, spring improvement, gray water treatment and other small-scale high impact water efficiency investments. Fig. 1 shows the distribution of individual beneficiaries according to the type of project.

As shown in the figure above, rainwater harvesting projects have been the most dominant project within CBIWDM. Granted CBOs have given 1777 revolving loans for rainwater harvesting to local beneficiaries (average of 1200 \$ for each loan), which constitutes 43% of all projects. This can be attributed to three main factors: firstly, people in rural and peri-urban areas in Jordan look at rainwater harvesting as a conventional and indigenous technique to save water. This technique has been used in Jordan for thousands of years, in particular during the Roman Empire. Although modern services have reduced reliance on such age-old traditions, abundant of ancient roman rainwater harvesting is still in use since then. The second factor is that, the know-how of establishing a rainwater harvesting system among rural communities is well-known. Households who obtained the loans have been able to design and construct the rainwater harvesting system without any external assistance. The last factor is that the impact of rainwater harvesting on household water supply is direct and tangible, in contrary to other projects where the impacts are indirect or require more time to be evaluated.

2.4. Rainwater harvesting: salient revolving project in CBIWDM

Rainwater harvesting is a technology best described as the collection and storage of rainwater runoff from rooftops, land surfaces, road surfaces or rock catchments (Abdulla and Al-Shareef, 2009; Kahinda et al., 2007). Every rainwater harvesting system consists of a catchment surface for collecting rainwater (i.e. roof or ground surface) and a delivery system for transporting rainwater into a storage tank (Zimmermann et al., 2009; Hanida et al., 2003).

More than 1777 rainwater harvesting Cisterns have been implemented through the project of CBIWDM. Two structures have been adopted for rainwater storage. An underground pear-shape storage Cistern has been the preferred structure as this structure does not need concrete and steel. This structure can only be installed in

Download English Version:

<https://daneshyari.com/en/article/1063158>

Download Persian Version:

<https://daneshyari.com/article/1063158>

[Daneshyari.com](https://daneshyari.com)