ECOSEC POST DISTRIBUTION MONITORING REPORT

ILOT – Rehabilitation of rainwater harvesting ponds in Abssan and Khuzaa border areas of Gaza Strip

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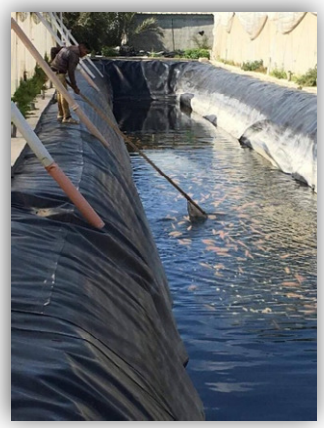
ICRC
Economic Security Unit

I. EXECUTIVE SUMMARY



The following report presents the results of Post-Distribution Monitoring (PDM) for the project of (Rehabilitation of rainwater harvesting system) in Abssan and Khuzaa border area communities in the Gaza Strip. The project was implemented by the ICRC EcoSec team from August to December 2018 and targeting 46 farming households. The PDM aims to assess the project`s impact on the irrigation water and crop yield of the targeted greenhouses and to measure the beneficiaries' satisfaction with the project activities.

In cooperation with the farmers' Learning and Facilitation Groups (LFGs) in Abssan and Khuzaa, the EcoSec team filled questionnaires with 46 beneficiaries to ask them a series of questions about the impact of the project on the water quality and quantity and plant production, and their satisfaction with the project activities.

According to the collected data; 97.8 % of the interviewed farmers reported that the greenhouse production increased by 25% on average due to the harvesting of rain water and rehabilitation of the irrigation pond.
All interviewed beneficiaries reported about improvement of fruit quality and improvement of plant health. 100% of the participants in the monitoring indicated that the pond rehabilitation and the rainwater harvesting system contributes to reducing of irrigation water expenditure by around 50%.

II. CONTEXT AND RATIONALE

1. CONTEXT

Gaza farmers have been suffering for many years from successive crises resulting in a breakdown or destruction of their livelihoods due to very low purchasing power of consumers, different military operations, and restrictions of movement which affected negatively their income and ability to rehabilitate or develop their production assets. An additional challenge is the effect of climate change (prolonged dry spells and frost or short heavy rain) which further eroded farmers' ability to recover. Those challenges are particularly affecting the small-scale farmers located in the border area. Such farmers are unable to continue farming without support following successive “shocks” (destruction of livelihood assets, water availability, quality, and high cost, aerial herbicide spraying, dry spells, and energy crisis and increase of water salinity).

Besides, farmers face a chronic shortage of irrigation water over the last years due to electricity shortage and increased temperature. The quality and quantity of the aquifer water have been rapidly deteriorating due to over-pumping of water, excessive use of agrochemicals, seawater intrusion, and, finally, dry spells caused by climate change. This has hampered not only the availability of water but also its accessibility as well, with prices soaring in many parts mainly in the BA. It becomes necessary to develop alternative ways to preserve the water resource, considering future water demand. One of these alternatives introduced to the farmers in the Gaza Strip is rainwater harvesting and using it for irrigation instead of only pumping groundwater from the aquifer through the Agro wells.

Farmers can harvest rainwater off the top of their greenhouses and are directed by drainage pipes to their constructed ponds near the greenhouse. In such conditions, sustainable storage of irrigation water becomes a priority for greenhouse farmers who dig ponds with an average capacity of 100 m3. Taking into consideration that the average rainfall in Gaza Strip is around 300 m^3, a farmer can store a maximum of 240 m^3 / rainwater season, with which two donoms of greenhouses can be irrigated for three months, on an average of 10 m3 per donom a week. The pond can be filled at least three times of harvested rainwater in the winter season, it can be mixed with ground salty water. Having rainwater or less saline water will give the farmer the ability to diversify his/her crops and cultivate salt-sensitive vegetables such as cucumber, peas, or french beans.

Due to a cost-saving measure, farmers sometimes do not install a protective fence around the pond, resulting in unsafe and less durable ponds, which are easily accessed by thirsty animals. This frequently leads to damage to the plastic layer, which means water is lost in the ground.
Also, farmers often skip installing a black mesh cover, which is used to limit evaporation and rises in water temperature (the latter harms crops). The mesh can reduce the water evaporation, also it has the added benefit of limiting algae formation in the pond, thereby preserving the greenhouse irrigation system as algae can cause clogs and complete damage to the irrigation system.

2. DESCRIPTION OF THE PROJECT

The project objective was to contribute towards protecting and improving the sustainable livelihood of 46 farming HHs (276individuals) in Abssan and Khuzza border areas by rehabilitating irrigation ponds and the attached rainwater harvesting system (damaged drainage pipes).
46 of beneficiaries have been supported by rehabilitating of 46 irrigation ponds and became able to harvest around 11'000 m^3 of rainwater from GH roofs/ year. The ICRC provided conditional cash transfer totaling 3'000 ILS / beneficiary.

Beneficiaries were selected according to the following criteria:

1- The farmer is the breadwinner for the family and agriculture is the main source of income.
2- The irrigation pond is operating, not abandoned, with a capacity of not less than 80 m^3, and require rehabilitation.
3- The farmer should not be an employee of a governmental or non-governmental entity.
4- The greenhouse owner/ tenant is willing to take the responsibility to ensure that the drainage system to harvest rainwater from the roof of the greenhouse is working properly by changing damaged pipes leading to the pond.
5- The farmer did not profit from a similar project during the last year.
6- Priority will be given to most vulnerable and small-scale farmers.
7- The target area is located between 500m -2000m from the Israeli security fence.

3. MONITORING OBJECTIVES

- Determine whether the projects' objectives achieved remain relevant and to generate a discussion on how to maximize the impact of the intervention.
- Measure the progress and quality of the implementation of the intervention.
- Contribute to a learning process considering the multidisciplinary nature of the intervention.
- Include recommendations for future interventions.

III. METHODS AND RELIABILITY OF THE DATA

1. METHODS OF THE MONITORING

1.1 Sample Size

- The sample size is 46 beneficiaries, which represent 100% of the total beneficiaries targeted by the rehabilitation of rainwater harvesting ponds.
- The response rate was 100% as we were able to meet all the 46 beneficiaries.

1.2 Data Collection and Analysis

- A structured questionnaire was designed in participation with the local farmers Learning and Facilitation Group (LFG) in the targeted areas (Abssan and Khuzaa).
- This questionnaire was uploaded to the device magic software and was used to collect the information from the beneficiaries.
- EcoSec team with the participation of LFGs filled 46 questionnaires from 46 farmers to ask them a series of questions about the impact of the project on the irrigation water quality, use, and management as well as the crop yield and their satisfaction of the project implementation activities.
- The database was designed using MS Excel and uploaded to the device magic, so the data were entered directly. The received data were formulated to excel spreadsheets to analyze the data.

2. LIMITATIONS AND RELIABILITY OF THE DATA

The data collection activity was smoothly accomplished due to the ICRC team's strong knowledge of the targeted area, in addition to the participation of the LFG members, which was an added value in all phases of the PDM.

IV. RESULTS

1) PONDS REHABILITATION

1.1 Impact of the rehabilitation of the ponds and rainwater harvesting system:

- Irrigation Water Quantity and water cost:

Greenhouse farmers mainly relied on agricultural ponds to store water, where groundwater is pumped directly from wells or the harvested rainwater, the majority of farmers in our target areas are buying irrigation water from few water suppliers.
All interviewed farmers reported about double benefits by rehabilitating the irrigation ponds and the rainwater harvesting system. On one side the farmers managed to conserve more than 90% of the harvested water and groundwater which is stored in the pond compared to the situation before the implementation of the project where the water losses reached in some cases 25% due to water leakage from the old plastic lining and evaporation. Installing the new liner and covering the pond with black mesh helped clearly to increase the quantity of saved water.

It was not easy to calculate the quantity of harvested rainwater as no one of our beneficiaries has a flowmeter installed at the irrigation pond to measure the quantity of harvested water. The team could measure the quantity of harvested water by comparing the water cost/ season before and after our intervention. All interviewed beneficiaries know what they have paid for one season of tomatoes cultivation (7 months long) before and after rehabilitating the rainwater harvesting system. Worth mentioning that the targeted area is famous in GH tomatoes cultivation due to the high salinity in irrigation water (EC > 4 ds/m).
It helped us also to perform the calculation that the price of irrigation water is unified by 1.8 ILS / m^3 and that the soil type in the two communities is almost the same (clay sandy soil).
By knowing the rainfall during the cultivation period and taking the efficiency of the harvesting system by 85%, we estimated that each m^2 of the GH roof area could harvest around 0,25 m^3 or 250 liters of water. The interviewed farmers reported that the quantity of harvested water or the irrigation cost-saving varied between 41% to 60 % of the total irrigation cost. We are aware that part of the saved cost resulted from the improved lining of the irrigation pond. We could estimate that the rainwater harvesting contributed at least to 33% of the needed water for irrigation.
All Interviewed tomato farmers reported that they could benefit from the rainwater harvesting for 4 months (December until April) and the remaining three months were depending totally on the groundwater.
17% of the beneficiaries with smaller ponds reported that they had sometimes to use the harvested rainwater to irrigate trees in open-field as the capacity of their ponds was not able to store all harvested water, especially during heavy rain days.

Diagram (1) The following diagram shows that 13% of farmers could save 41% of irrigation cost, 65% could save 52%, and 22% could save 60% of total irrigation cost.

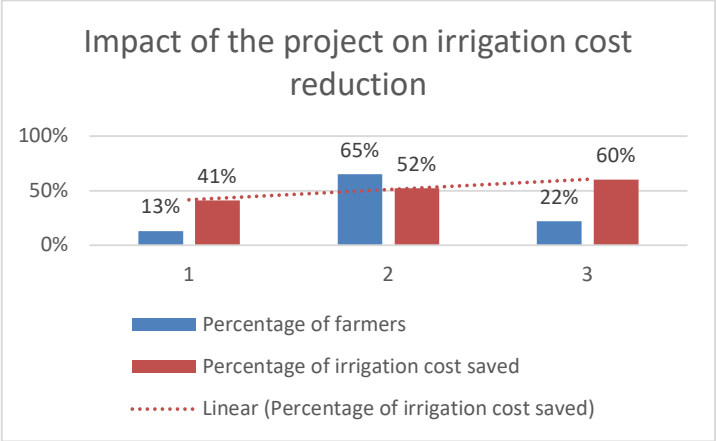


Diagram (1) Impact of the project on irrigation cost reduction

2) IMPACT OF HARVESTED RAINWATER ON YIELD AND FRUITS QUALITY AND DIVERSITY

2.1 Impact on crops yeild

97.8 % of all the interviewed farmers reported that the tomatoe yield of the greenhouse increased by 18 -30 % due to the irrigation with less salty water. The farmers indicated that the increase in production is due to the improvement of water quality by mixing the salty ground water with the harvested rainwater, additional reason was the improvement of plants health and ability to continue producing one to two month longer than before.

The production for one season of tomato increased as explained in the following table:

Percentage of farmers	Percentage of increase in production of tomatoe	Quantity increased mt/ donum (1000 m2)
72%	18%	from11 mt before to 13 mt after the intervention
14%	30%	10mt to 13mt
12%	25%	12mt to 15mt

Diagram (2) The following diagram shows the impact of the ICRC intervention on Tomato yields per meteric ton for one donum

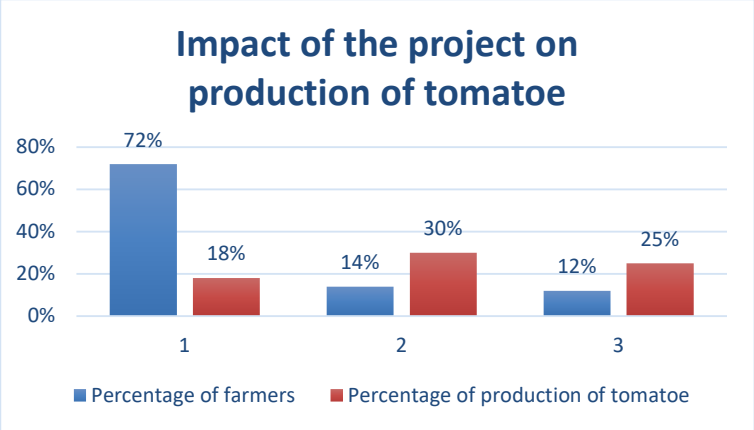


Diagram (2) Impact of the project yield increase

2.2 Impact on fruits' quality:

- All interviewed beneficiaries confirmed that the tomatoe fruit size increased after using the harvested rainwater and they could easier market their crops.
- All interviewed beneficiaries reported about improvement of tomatoe plants growth and colour. Comparing with previous seasons the plants irrigated with harvested rainwater were less yellow and more green.

2.3 Crops diversity:

The farmers options were limited on cultivating certain types of crops due to the salinity of irrigation water, that why the majority of farmers in the targeted area prefer to cultivate tomatoe, however, because of the implementation of this project, all interviewed farmers reported that after the recent positive experience, they plan to grow during the coming winter season various crops, which are sensitive to salinity e.g. cucumber or French beans.

3. Farmers satisfaction of ICRC intervention in the targeted area

3.1 Implementation date

87% of the farmers interviewed were satisfied with the implementation date. The greenhouse farmers use to prepare their greenhouses for the following season during September. The other 13 % of farmers have already started their greenhouse cultivation in mid-July which made it difficult to conduct the rehabilitation work while they have crops inside the GH.

3.2 Ponds rehabilitation activities

All farmers are satisfied with all pond rehabilitation activities.71.7% of them indicated that they prefer to receive conditional cash transfer and implement the project themselves than having the implementation done by the ICRC or a contractor. The cash transfer allowed them in managing the pond rehabilitation, according to their plans. The farmers also indicated that the amount of assistance is sufficient to complete all the required rehabilitation work.

Whereas 28.3% of the beneficiaries preferred the rehabilitation of ponds implemented by the ICRC to ensure the high quality of the materials needed for the rehabilitation.

V. SUCCESS AND LIMITATION FACTORS

1. Main factors that contributed to the success

- Distribution of cash grants in three installments with intensive monitoring operations after each instalment gave a strong impression to beneficiaries of the importance of being committed to carrying out the planned project.
- The intervention is highly needed considering the current water challenges and crisis.
- The commitment of greenhouse farmers.
- The participation of LFGs (Learning and Facilitation Groups in the targeted area) in all project phases was one of the factors that contributed to success.

2. Main constraints faced by the project

The restriction to impotrt some Agro items to Gaza Strip and the availability of high quality of materials in the local marker needed for the rehabilitation was the reasons behind some delay in the implementation.

VI. ADAPTING AND LEARNING

Lessons learned & recommendations for future interventions

- Regarding the Gaza Strip water crises and for sustainable support to the greenhouses farmers, rehabilitation of irrigation water harvesting ponds and irrigation systems is highly recommended.
- Giving farmers forms to register their yield or distributing unified plastic boxes makes the monitoring easier. Faced difficulties in the unit.
- Bigger size of irrigation pond, not only to rehabilitate but also to increase the size to adapt the heavy rain
    - The pond rehabilitation intervention is recommended to continue as designed. The grant covers all items of the rehabilitation for the pond. Also, it is recommended to replace old irrigation systems for greenhouses with new irrigation systems to ensure the achievement of integrated irrigation water management for greenhouses
    - Need assessment for the rainwater harvesting ponds and systems connected to the greenhouses in the other border areas is recommended to expand the idea and benefit more farmers.
    - This intervention is recommended to increase farmers resilience against shocks e.g. drought spells and climate change
    - The presence of a local committee that considered as a partner reduces the chance of fraud and increases the commitment of farmers. Moreover it ensures the best use of the materials and that the project time frame is respected..
    - Using tablets as a data collection tool is a very successful tool to ensure time efficiency and quick implementation with no need for another round of data entry after the data collection.
    - Coordination with other actors is essential to eliminate the duplication of benefits and to learn from their experience.

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