Ministry for the Environment, Land and Sea of Italy

IMPROWARE

INNOVATIVE MEANS TO PROTECT WATER RESOURCES IN THE MEDITERRANEAN COASTAL AREAS THROUGH RE-INJECTION OF TREATED WATER

Bruxelles, 8th December 2011

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Basic Data

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- **Reference of the Call for Proposals**
  EuropeAid/131046/C/ACT/Multi

- **Title of the Call for Proposals**
  Sustainable Water Integrated Management (SWIM) - Demonstration Projects

- **Title of the action:**
  IMPROWARE
  INNOVATIVE **M**EANS TO **PRO**TECT **WA**TER **RE**SOURCES IN THE MEDITERRANEAN COASTAL AREAS THROUGH RE-INJECTION OF TREATED WATER

- **No. of the Lot**
  Lot 3

- **Name of the applicant**
  Italian Ministry of the Environment, Land, and Sea

- **Location of the action:**
  Coastal areas of El-Arish, Northern Sinai (Egypt) and Korba (Tunisia)

- **Total duration of the action:**
  30 *months*

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Concept, objectives and methodology of IMPROWARE

- Demonstrate sustainable and environmentally friendly methodologies for reusing wastewaters;
- Sustainable cooperation on water among ENPI country (Egypt and Tunisia) and within ENPI Region;
- Recharge coastal aquifers by injection after a properly adequate improvement to obtain the required quality;

1. Efficiency action will be tested with two pilot projects run at sub-regional level in Egypt and Tunisia;
2. Dissemination of results and lessons learned to the target group (immediate beneficiaries) and to a wider audience (indirect beneficiaries).

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Overall Objectives

- To demonstrate, promote and disseminate environmentally sustainable water management policies and practices;
- To build consensus and sustainable co-operation on water issues among the two ENPI partner countries involved (Egypt and Tunisia) and within the Mediterranean region.

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Specific Objectives

- To improve the economic development prospects of rural communities in the targeted regions by increasing water availability for agricultural activities, and thus reducing the current over-exploitation of drinking groundwater;
- To draw the attention of policy decision-makers and stakeholders in the Partner Countries on the existence of solutions to tackle water scarcity problems;
- To facilitate know-how transfer and thus contribute to build-up the necessary planning and management skills at sub-regional and regional level;
- To encourage regional cooperation in the area of sustainable and integrated water management through capacity building, institutional strengthening and participation.

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Partners and their roles

1 **IMELS Italian Ministry of the Environment, Land, and Sea (Italy)**
Applicant and responsible for WP1.Project co-ordination and management, dissemination, capacity building and support to regional co-operation

2 **CUEIM Consorzio Universitario di Economia Industriale e Manageriale (Italy)**
Responsible for WP4. Artificial wetland as secondary/tertiary treatment stage of wastewaters

3 **CURSA Consorzio Universitario per la Ricerca Socioeconomica e per l'Ambiente (Italy)**
Responsible for WP2. Technical survey; primary/secondary treatment stages and aquifer recharge by treated waters

4 **FAO Food and Agriculture Organization (United Nations)**
Responsible for WP5. Involvement of local stakeholders, communication, capacity building, dissemination

5 **AAR University of Aarhus (Denmark)**
Responsible for WP3. Hydro-geological characterization of aquifers at El-Arish using geophysical methods

6 **EEAA Egyptian Environmental Affairs Agency (Egypt)**
Realisation, management, monitoring of the Egyptian demonstration site, and dissemination of results

7 **ONAS Office National de l'Assainissement (Tunisia)**
Realization, management, monitoring of the Tunisian demonstration site, and dissemination of results.

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Relevance of the action

The pilot demonstration project IMPROWARE is in line with the objectives and priorities of the EU ENPI SWIM Programme.

It promotes innovation and best practices for protecting water resources in Mediterranean coastal areas through re-injection of treated water.

It will help the two involved ENPI Partner Countries (Egypt and Tunisia) to:

a) identify the existing and forthcoming threats to water resources;

b) identify best practices and solutions to tackle the water scarcity problem;

c) adopt a more appropriate water consumption and water use model;

d) design and implement sustainable water management policies at national level and within the ENPI Mediterranean region, in harmony with EU policies and with other international initiatives and agreements.

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Main Activities (1)

- Establish 2 demonstration sites:
  I. El-Arish (Egypt) by building a new pilot plant;
  II. Korba (Tunisia) by improving the existing treatment and aquifer recharge plant

- Apply specific methodologies for reusing wastewaters to recharge coastal aquifers in arid regions suffering from saltwater intrusion. Compare the different methodologies used at the two sites.

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Main Activities (2)

- Export the experiences gained in these sites to other ENPI Mediterranean countries by disseminating the results of the project, demonstrating best practices and state-of-the-art technologies,
- Ensure extension and communication, society awareness, and participation at national and regional levels.
- Improve institutional capacities, and enhance regional cooperation for sustainable and integrated management

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Target groups (1)

Relevant institutions of the two ENPI Partner Countries:

In Egypt:

i) Egyptian Environmental Affairs Agency – EEAA;

ii) the Governorate of North Sinai, based in El-Arish;

iii) the Ministry of Water Resources and Irrigation – MWRI;

iv) the Holding Company for Water and Wastewater.

In Tunisia:

i) Office National de l'Assainissement – ONAS;

ii) Direction Générale des Ressources en Eau – DGRE at the Ministry of Agriculture and Water Resources (MAgWR);

iii) Groupement de Développement Agricole – GDA;

iv) Commissariats Régionaux au Dévéloppement Agricole – CRDA;

v) Association tunisienne de protection de l'environnement de Korba.

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Target groups (2)

Farmers and other members of rural communities active in agriculture in the involved area

IMPROWARE will target two specific sites:

- El-Arish, Northern Sinai, Egypt
- Korba, Tunisia

Both areas are characterized by a high water demand for agricultural activities and where there is a strong involvement of local / regional / national target groups, such as development and environmental agencies and institutions, national research centres, local companies for water and wastewater management, which:

- guarantee a high visibility for the demonstration projects;
- will facilitate sustainability and the continuation of project activities after the end of IMPROWARE; and
- will help supporting the replication of the developed methodology in other areas of the southern Mediterranean coastland.

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Final Beneficiaries

Immediate beneficiaries:

i) Officials of relevant institutions in the ENPI Partner Countries;

ii) inhabitants of the areas around El- Arish (Egypt) and Korba (Tunisia);

Indirect beneficiaries:

i) Public authorities, Development and Environmental agencies and institutions; National Research and Extension Services; Communication centers and networks; NGOs in the ENPI Mediterranean countries; and

ii) The population of the areas where the project will be replicated.

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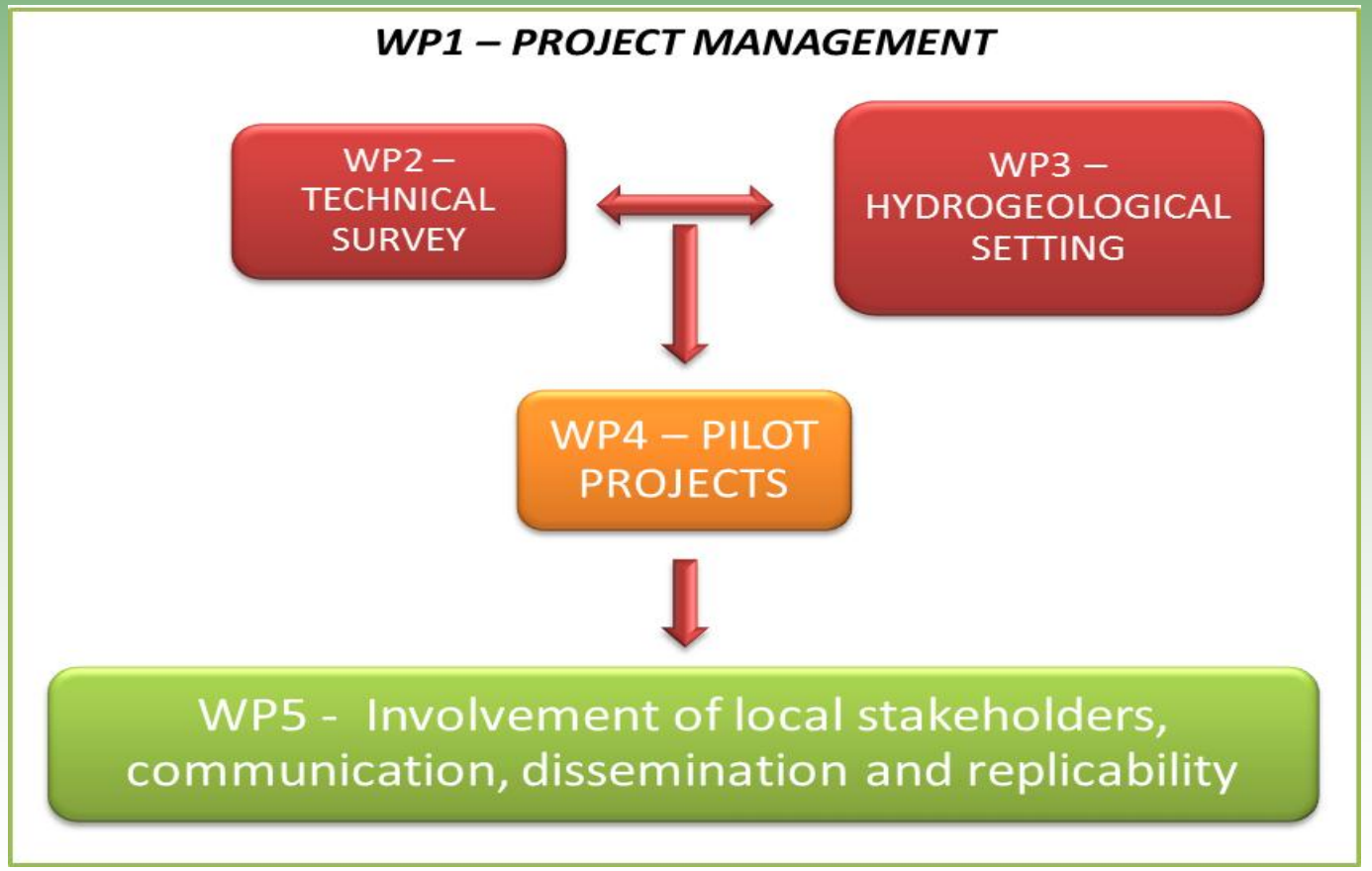
Work Packages



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Actions to be performed

IMPROWARE will:

i) improve the quality of wastewaters by building environmentally-friendly wetlands;

ii) recharge the aquifers with treated waters; and

iii) use the larger groundwater resource for agricultural purposes.

The procedure will increase water availability for agricultural activities of the local rural communities in the demonstration sites, reduce the exploitation of potable groundwater and, at the same time, contrast the aquifer deterioration caused by saltwater contamination induced by over-exploitation and climate changes.

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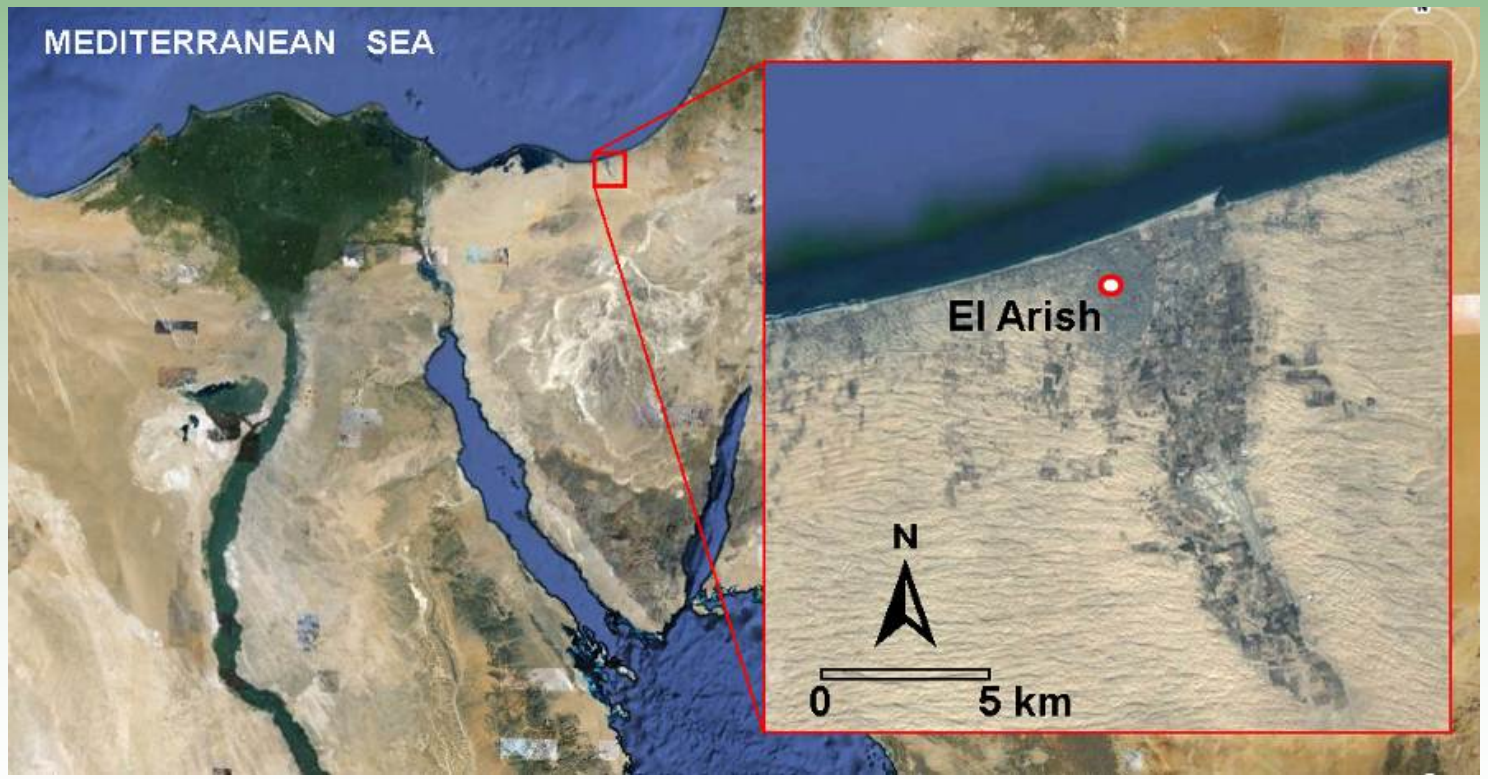
Demonstration site in El-Arish (Egypt)

Location of the El-Arish demonstration site in North Sinai, Egypt



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Demonstration site in El-Arish (Egypt)

Issues

The delta Wadi El-Arish area of the Sinai Peninsula is one of the most important parts of Egypt for industrial and agricultural expansion projects because of its relatively abundant supply of groundwater. Despite this availability, saltwater intrusion has increased along the coastland, and the irrigation suitability of groundwater pumped from wells in much of the area is limited to salt tolerant crops.

Unsustainable development has caused severe quality changes (salinisation and pollution). Currently the sewage is collected and transferred to the wastewater treatment plant (WWTP) of Garada and the level of the groundwater table has dramatically dropped.

As a result the aquifer is now contaminated by seawater intrusion that increased the total dissolved solid concetration (TDS) from 1,500 ppm to more than 5,000 ppm in the last 20 years, making the groundwater inadequate for agricultural purposes.

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Demonstration site in El-Arish (Egypt)

Solutions proposed (1)

- Treated wastewater, currently sunk in the desert, could be used to recharge the aquifer and restore former groundwater conditions.

- Garada's WWTP, though designed for a capacity up to 50,000 m^3/d, is currently equipped only for primary (mechanical) treatment and for a capacity of 15,000 m^3/d. After the upgrade of the WWTP, treated wastewater could be used for a safe recharge of the aquifer.

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Demonstration site in El-Arish (Egypt)

Solutions proposed (2)

With regard to the upgrade of the WWTP, to make the effluent adequate for injection in the aquifer it is necessary to implement a secondary treatment with activated sludge. This, coupled with a filtration process, will definitely increase the effluent quality, hence the speed of recharge.

The proposed pilot demonstration project includes also the realization of a Constructed Wetland (CW) as wastewater secondary/tertiary treatment in order to refine the effluent's quality, before being injected underground.

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Demonstration site in El-Arish (Egypt)

Solutions proposed (3)

The demonstration project at El-Arish will include the construction of a Sub-Surface (SS) wetland. The reason of such choice instead, of a more traditional Free Water System (FWS) wetland, is mainly due to the climatic context in which the facility will be located.

Sub Surface wetlands overcome different problems because the water, since its entrance in the wetland, remains underground so that worries about odours and mosquitoes development are eliminated; also the evaporation rate is dramatically reduced.

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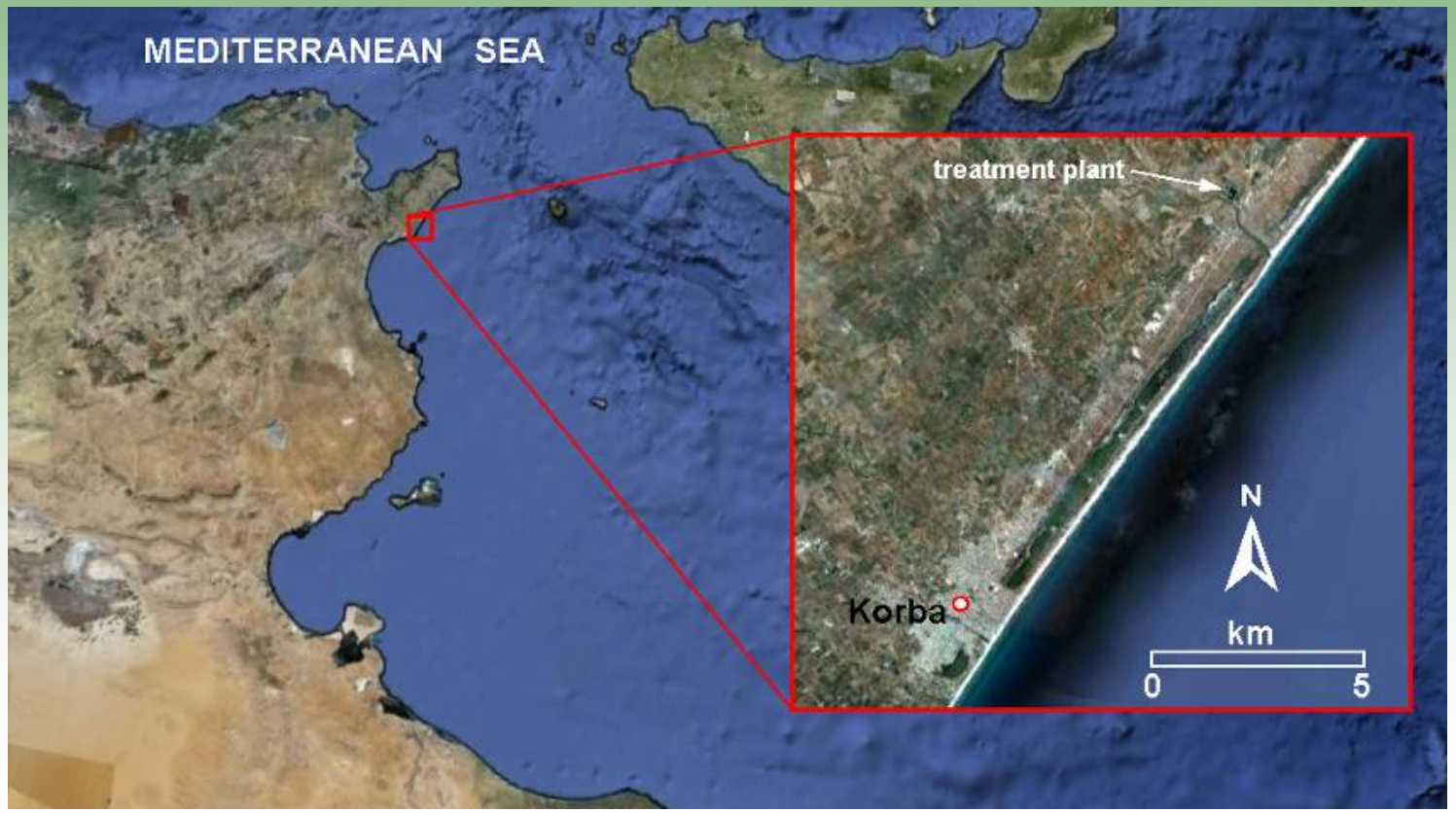
Demonstration site in Korba (Tunisia)

Location of the Korba demonstration site in Tunisia



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Demonstration site in Korba (Tunisia)

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Demonstration site in Korba (Tunisia)

Issues

The project area is located in the region of Korba, in north/east Tunisia. The climate in this region is semi-arid having a 400 mm mean annual precipitation with high variability and 19°C as a mean temperature.

The Korba aquifer is experiencing an alarming increase in salinity due to its over-exploitation. This is related on one side to the multiplication of and to the greater depth of wells, and on the other to the increase in pumped volumes of water after electricity was brought to these wells.

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Demonstration site in Korba (Tunisia) (4)

Solutions proposed

Upgrade of the Korba (Tunisia) WWTP and aquifer recharge facilities

it is proposed to carry out its extension to recharge the groundwater resources of the aquifer, restore hydrodynamic balance and well productivity and mitigate the salt water intrusion. Thus improvements and upgrade of the plant can provide for more recharge potential and test the system on a greater scale.

Demonstration site in Korba (Tunisia) (5)

Solutions proposed

Different actions are required to be implemented for the upgrading of Korba system:

I. Improve water circulation conditions in the maturation ponds by building walls or by installing a turbine so as to eliminate dead spots, increase the residence time and therefore improve the quality of water for groundwater recharge at the outlet of the WWTP.

II. Increase the pumped volume of water

III. Build 3 additional infiltration basins 1,500 m^2 each, which means 4,500 m^2 of total additional infiltration area.

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Capacity building

- To draw the attention of policy decision-makers and stakeholders in the Partner Countries on the existence of solutions to tackle water scarcity problems.

- To develop a capacity building plan to strengthen capability of officers of ministry of environment, ministry of agriculture and extension services on communication for development in the two ENPI Partner Countries;

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Communication and dissemination

- To strengthen participatory approaches and communication strategies among the key stakeholders of the project to promote innovative approaches to protect water resources;
- To encourage multi-stakeholders dialogue to identify needs and engage stakeholders to achieve the goals of the project;
- To develop a communication strategy that responds to the needs of stakeholders, including resource-poor communities through Participatory Rural Communication Appraisal methods;
- To raise awareness of the project and its benefits through a media campaign;

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Expected Results (1)

In the two ENPI Partner Countries (Egypt and Tunisia)

- Cost-effective, environmental-friendly, easily-replicable methodologies to treat waste waters and to use these to recharge aquifers developed as “pilot” models;
- Water availability for agricultural activities increased;
- Saltwater intrusion in coastal aquifers reduced;
- Living conditions of rural communities improved;
- Employment opportunities increased.

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Expected Results (2)

In all countries of the ENPI Mediterranean region

- Know-how transferred;
- Planning and management skills improved at sub-regional and regional level;
- Regional co-operation in the area of sustainable and integrated water management increased;
- Policy decision-makers and society empowered to:
  i) tackle increasing demand for water resources;
  ii) adapt to climate changes; and
  iii) act against desertification.

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Thank you for your kind attention

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