

Sustainable Water  
Integrated Management (SWIM) -  
Support Mechanism



Project funded by  
the European Union

*Water is too precious to waste*

**IMPROWARE**

PROJECT



AARHUS UNIVERSITY



CONSORZIO  
UNIVERSITARIO DI  
ECONOMIA  
INDUSTRIALE E  
MANAGERIALE  
**CUEIM**



**CURSA**  
Consorzio Universitario per la Ricerca  
Scientifica e per l'Ambiente



MINISTERO DELL'AMBIENTE  
E DELLA TUTELA DEL TERRITORIO E DEL LAGO



الديوان الوطني للبيئة  
OFFICE NATIONAL DE L'ENVIRONNEMENT

# IMPROWARE

Innovative Means to Protect Water Resources in the Mediterranean  
Coastal Areas through Re-injection of Treated Water

## General Data

<b>Reference of the Call for Proposals</b>	EuropeAid/131046/C/ACT/Multi
<b>Title of the Call for Proposals</b>	Sustainable Water Integrated Management (SWIM) – Demonstration Projects
<b>Priority</b>	Priority 3 – Promoting Water Demand Management and Efficiency, including Non-Conventional Water Resources
<b>Location of the Action</b>	Wadi El-Natrun (Egypt) Korba (Tunisia)
<b>Duration of the Action</b>	30 months
<b>Budget for the Action</b>	€ 3,593,908.33

## Partnership

 <p>MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE</p>	<p><b>IMELS</b> (<i>Applicant</i>) <b>Italian Ministry of the Environment, Land, and Sea</b> (<i>Italy</i>)</p>
 <p>CONSORZIO UNIVERSITARIO DI ECONOMIA INDUSTRIALE E MANAGERIALE CUEIM</p>	<p><b>CUEIM</b> <b>University Consortium for Industrial and Managerial Economics</b> (<i>Italy</i>)</p>
 <p><b>CURSA</b> Consorzio Universitario per la Ricerca SocioEconomiche e per l'Ambiente</p>	<p><b>CURSA</b> <b>University Consortium for Environmental and Socio-economic Research</b> (<i>Italy</i>)</p>
 <p>AARHUS UNIVERSITY</p>	<p><b>AU</b> <b>Aarhus University</b> (<i>Denmark</i>)</p>
	<p><b>EAEA</b> <b>Egyptian Environmental Affairs Agency</b> (<i>Egypt</i>)</p>
 <p>الجهان الوطني للتصريف ONAS NATIONAL SANITATION UTILITY</p>	<p><b>ONAS</b> <b>National Sanitation Utility</b> (<i>Tunisia</i>)</p>

## Overall Objectives

- **To demonstrate, promote and disseminate environmentally sustainable Water Management Policies and Practices**
- **To build consensus and sustainable Cooperation on Water issues among the (2) two ENPI Partner Countries and in the ENPI Mediterranean Region**

## Specific Objectives

- **To reduce the current over-exploitation of drinking Ground Water and to improve the economic development prospects of Rural Communities in the targeted Regions, by increasing the availability of Water for Agricultural Activities**
- **To draw the attention of Policy Decision-Makers and Stakeholders in the Partner Countries and in the ENPI Mediterranean Region on the existing solutions to tackle Water Scarcity problems**
- **To facilitate Know-How Transfer and to contribute to build-up the necessary Planning and Management Skills, both, at Sub-Regional and Regional level**
- **To encourage Cooperation in the area of Sustainable and Integrated Water Management, through Capacity Building, Institutional Strengthening and Public Participation**

## Target Groups

### Relevant Institutions of the two ENPI Partners Countries:

Egypt	Tunisia
<ul style="list-style-type: none"> <li>➤ Egyptian Environmental Affairs Agency (EEAA)</li> <li>➤ Governorate of Nobariya</li> <li>➤ Ministry of Water Resources and Irrigation (MWRI)</li> <li>➤ Holding Company for Water and Wastewater (HCWW)</li> <li>➤ Research Institute for Ground Water (RIGW)</li> </ul>	<ul style="list-style-type: none"> <li>➤ National Sanitation Utility (ONAS)</li> <li>➤ General Direction for Water Resources (DGRE), Ministry of Agriculture and Water Resources (MAgWR)</li> <li>➤ <i>Groupement de Développement Agricole (GDA)</i></li> <li>➤ <i>Commissariats Régionaux au Développement Agricole (CRDA)</i></li> <li>➤ <i>Association Tunisienne de Protection de l'Environnement de Korba</i></li> </ul>

Farmers and other members of rural communities that work in the agriculture sector, in particular, in both Project areas.

Beneficiaries	
Direct Beneficiaries	Indirect Beneficiaries
<ul style="list-style-type: none"> <li>➤ Officials of relevant Institutions in the ENPI Partners Countries</li> <li>➤ Inhabitants of the areas around the two (2) Project sites</li> </ul>	<ul style="list-style-type: none"> <li>➤ Public Authorities, Development and Environmental Agencies and Institutions, National Research and Extension Services, Communication Centres and Networks, NGOs in the ENPI Mediterranean Countries</li> <li>➤ the Population of the areas where the Project will be replicated</li> </ul>

## Main Activities

- Establish two (2) Demonstration Sites
  - Egypt – upgrade of Pilot Plant
  - Tunisia – improvement of the existing Treatment and Aquifer Recharge Plant
- Investigate and apply specific methodologies for reusing Waste Water to recharge coastal aquifers and irrigate arid Regions suffering from saltwater intrusion
- Compare the methodologies used at the two (2) sites
- Ensure Extension and Communication, Social awareness, and Participation, both, at National and Regional level
- Improve Institutional Capacities, and enhance Regional Cooperation for a Sustainable and Integrated Management of Water Resources
- Export the experience gained to other ENPI Mediterranean Countries by disseminating Project Results, demonstrating Best Practices and state-of-the-art Technologies

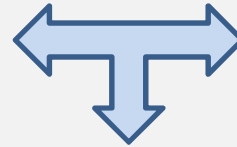


# Main Activities

Project Management

Technical Survey

Hydrogeological Setting at  
Nobariya-Wadi El-Natrun,  
Egypt



Pilot Projects in Egypt and  
Tunisia

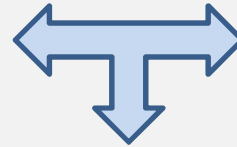
Participation, Capacity Building, Dissemination

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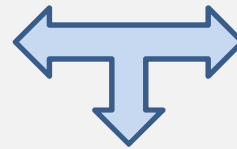
Technical Survey	
<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>➤ To acquire all available data on existing Waste Water Treatment Plants (WWTPs)</li> <li>➤ To acquire and homogenize all available information on subsurface aquifer systems at the targeted sites</li> <li>➤ To acquire and homogenize all available information on evolution of Ground Water use, pumping rates, piezometric level and Water Quality</li> </ul>
<b>TASKS</b>	<p>The Technical Survey aims to provide a detailed and comprehensive investigation on the present setting of the targeted sites, focusing principally on the following aspects:</p> <ul style="list-style-type: none"> <li>➤ Investigation on agricultural practices, needs and constraints</li> <li>➤ Investigation on Ground Water use and availability</li> <li>➤ Investigation on the WWTP in the present condition</li> <li>➤ Collection of hydrogeological information on the aquifer geometry and soil properties</li> <li>➤ Investigation on the location of pumping wells and evolution of the withdrawal rates</li> <li>➤ Investigation on time and areal evolution of the saltwater intrusion in the coastal aquifer</li> <li>➤ The gathered data will be homogenized, processed, and inserted into the GIS of the Project</li> </ul>
<b>DELIVERABLES</b>	<ul style="list-style-type: none"> <li>➤ Report on the state-of-the-art of the targeted Demonstration Sites</li> <li>➤ GIS Database combining existing Data and IMPROWARE Results</li> </ul>

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## Hydrogeological Setting at Nobariya-Wadi El-Natrun, *Egypt*

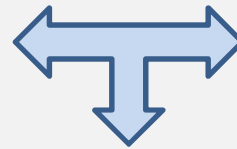
<p><b>OBJECTIVES</b></p>	<ul style="list-style-type: none"> <li>➤ To produce a high-density high-resolution 3D hydrogeological model of coastal area, based upon multi-parametric inversion of Data from different geophysical techniques and other sources</li> <li>➤ To indicate the extent of saline Water intrusion</li> <li>➤ To indicate areas potentially suitable for managed Aquifer Recharge</li> <li>➤ To set up a hydrogeological model</li> <li>➤ To establish a monitoring network of Ground Water level and Quality</li> <li>➤ To set up and calibrates the 3D numerical model of aquifer system at the Demonstration Site</li> </ul>
<p><b>TASKS</b></p>	<p>The characterization of the coastal aquifer will be obtained through dedicated geophysical measurements, integrated with ancillary information, to derive maps of hydrogeological interest through multi-parametric inversion.</p> <p>The geophysical state-of-the-art techniques applied will be:</p> <ul style="list-style-type: none"> <li>➤ Airborne Electro-Magnetics (AEM), both, for near surface and deeper penetration</li> <li>➤ Magnetic Resonance Sounding (MRS)</li> </ul>
<p><b>DELIVERABLES</b></p>	<ul style="list-style-type: none"> <li>➤ Data Analysis</li> <li>➤ Customized multi-parametric inversions taking into account all available information (AEM, MRS, logs), will generate maps of, e.g., clay content, water salinity, etc.</li> <li>➤ 3D characterization of the aquifer’s geometry, and the mapping of the saline intrusion (based on the above) Ground Water flow models</li> </ul>

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## Pilot Project in Nobariya Wadi El-Natron, Egypt

<b>OBJECTIVES</b>	<ul style="list-style-type: none"> <li>➤ To upgrade the WWTP at Nobariya-Wadi El Natrun, to improve the Quality of the effluent to be reclaimed for reuse or discharged in the environment</li> <li>➤ To build a Constructed Wetland (CW) as Refinement Treatment of the effluent of the WWTP at Nobariya-Wadi El Natrun, in order to improve the quality of Treated Water for irrigation or Aquifer Recharge purposes</li> </ul>
<b>TASKS</b>	<ul style="list-style-type: none"> <li>➤ General Analysis and Definition of the Plant configuration, process, and parameters</li> <li>➤ Detailed Engineering</li> <li>➤ Definition of the Aquifer Recharge Plant</li> <li>➤ Construction of the Facility</li> <li>➤ Start-up, operation and performance monitoring</li> </ul>
<b>DELIVERABLES</b>	<ul style="list-style-type: none"> <li>➤ Upgrade of the existing WWTP, in order to improve the Quality of the effluent. The upgrade of the system will be achieved through:                         <ul style="list-style-type: none"> <li>➤ intervention on the Pumping Station at the inlet of the Plant</li> <li>➤ Build-up pre-treatments to remove materials that can be easily collected from the raw sewage</li> <li>➤ Renewal of the Aeration System</li> </ul> </li> <li>➤ Design of the Tertiary Treatment Wetland</li> <li>➤ Numerical Modeling of Ground Water Recharge</li> </ul>

## Pilot Project in Korba, *Tunisia*

<p><b>OBJECTIVES</b></p>	<ul style="list-style-type: none"> <li>➤ To upgrade of the WWTP at Korba, in order to reuse Treated Waste Water for Aquifer Recharge</li> <li>➤ To increase Water Availability for Agricultural Activities in the targeted Regions and, thus, reducing the current over-exploitation of Drinking Ground Water</li> </ul>
<p><b>TASKS</b></p>	<ul style="list-style-type: none"> <li>➤ Preparation of tender documents and launch of the Project</li> <li>➤ Consultation of contractors</li> <li>➤ Examination schedules of conditions and establishment of the markets for the realization of Projects</li> <li>➤ Project execution</li> <li>➤ Equipment Acquisition</li> <li>➤ Monitoring</li> </ul>
<p><b>DELIVERABLES</b></p>	<ul style="list-style-type: none"> <li>➤ Upgrade of the WWTP for improving the monitoring of the Plant and to solve some potential criticalities</li> <li>➤ Improve Water Circulation Conditions in the maturation ponds by building walls or by installing a turbine so as to eliminate dead spots, reduce the variability of the hydraulic residence time in the ponds and improve the quality of Water for Ground Water recharge</li> <li>➤ Increase the capacity of the Pumping Station from the WWTP to the Recharge Basins from 1,500m to 3,000m</li> <li>➤ Build three (3) additional Infiltration Basins of 1,500m<sup>2</sup> each, which means 4,500 m<sup>2</sup> of additional Infiltration Area</li> </ul>

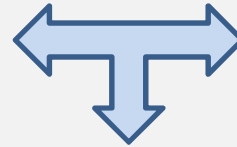


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## Participation, Capacity Building, Dissemination

<p><b>OBJECTIVES</b></p>	<ul style="list-style-type: none"> <li>➤ To strengthen Participatory Approaches and Communication Strategies among the key Stakeholders, in order to promote innovative approaches to Water Resources Protection</li> <li>➤ To encourage Multi-Stakeholder Dialogue, to identify needs and engage Stakeholders to achieve the goals of IMPROWARE</li> <li>➤ To develop a Participatory Communication Strategy that responds to the needs of the Stakeholders, including Agricultural Resources and Extension Services on Communication for Development in Egypt and Tunisia</li> <li>➤ To raise Awareness on the Project and its benefits through a local Media Campaign</li> <li>➤ To draw the attention of Policy Decision-Makers and Stakeholders in the Partner Countries on existing innovative solutions to tackle Water Scarcity issues</li> </ul>
<p><b>TASKS</b></p>	<ul style="list-style-type: none"> <li>➤ Stakeholders Identification and Analysis</li> <li>➤ Implementation of Participatory Process</li> <li>➤ Multimedia Campaign</li> <li>➤ Communication Strategy</li> <li>➤ Dissemination within the ENPI Mediterranean Region</li> </ul>
<p><b>DELIVERABLES</b></p>	<ul style="list-style-type: none"> <li>➤ Stakeholders Analysis Report</li> <li>➤ Participatory Process</li> <li>➤ E-Learning Courses</li> <li>➤ Final Conference</li> <li>➤ Policy and Technical Guidelines</li> </ul>

## Expected results

In the two ENPI Partner Countries	In all Countries of the ENPI Mediterranean Region
<ul style="list-style-type: none"> <li>➔ cost-effective, environmental-friendly and easily-replicable “Pilot Models” for Waste Water Treatment and Aquifer Recharge developed</li> <li>➔ Water Availability for Agricultural Activities increased</li> <li>➔ Saltwater intrusion in coastal aquifers reduced</li> <li>➔ Living conditions of Rural Communities improved</li> <li>➔ Employment Opportunities increased</li> </ul>	<ul style="list-style-type: none"> <li>➔ Know-How transferred</li> <li>➔ Planning and Management skills at Sub-Regional and Regional level improved</li> <li>➔ Regional Cooperation in the area of Sustainable and Integrated Water Management increased</li> <li>➔ Policy Decision-Makers and society empowered to:                             <ul style="list-style-type: none"> <li>➔ tackle increasing demand for Water Resources</li> <li>➔ adapt to Climate Changes</li> <li>➔ act against Desertification</li> </ul> </li> </ul>



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For more information, please visit:  
[www.improware.eu](http://www.improware.eu)

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