



INTERNATIONAL WATERS RESULTS NOTES

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Lake Manzala Engineered Wetland

GEFID#: 395, PIMS ID#: 77 Project Status: Completed



Key results:

1. Construction of a demonstration engineered wetland wastewater treatment facility, plus a fish farm which utilizes the treated water.
2. Demonstration through research and stakeholder involvement that engineered wetlands can be a cost effective, efficient way to clean and reuse scarce and polluted water in the Nile Delta and beyond.
3. Very strong backing of the government as indicated by subsequent replication projects; and expansion of national expertise via government ministries, research institutions and researchers.

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PROJECT OBJECTIVE

The goal of the Lake Manzala Engineered Wetland Project (LMEWP) was to reduce international water pollution and improve the global environment and national-to-global environment linkages, by demonstrating low-cost innovative water treatment solutions in the Nile Delta of Egypt.

The poor quality of north-flowing drainage waters in Egypt has been a major environmental and economic concern. Much of the heavily polluted water crossing the Nile Delta flows through a complex network of irrigation canals, including the Bahr El Baqar Drain (Bashtir Canal). These canals empty into coastal lakes, including Lake Manzala, before flowing into the Mediterranean Sea. The resulting pollution of the lakes imperils fisheries, and pollution of the Mediterranean Sea violates international agreements that Egypt is party to, in particular the Barcelona Convention.

The main objective of the project was to construct and operate a demonstration engineered wetland facility to treat wastewater from the Bahr El Baqar Drain flowing into Lake Manzala. The project also sought to enhance sustainable development by involving local residents and organisations in the design, construction, and operation of the facility, and by engaging stakeholders in research, training and other capacity building activities. The project evolved to include the initial development of a commercial scale fish farm, designed to utilise the treated water and help offset plant operational costs.

RESULTS: PROCESS

INDICATOR #1: Stakeholder involvement in capacity building, project development, and operations and management. [*Target: 10 national agencies and 10 national researchers and trainees.*]

10 national agencies involved in the project, including 5 ministries (Agriculture, Housing, Environment, Water and Port Said Governorate); 3 academic and private organizations (Cairo University, Agriculture Research Center, Arab Fisheries Company); and 2 NGOs (ICLARM and WESC). More than 15 national researchers with or obtaining advanced degrees were involved in research.

INDICATOR #2 Adoption of national and regional legal, policy and institutional reforms that address priority transboundary concerns. [*Target: A strategic vision and a national policy for the use of engineered wetlands in Egypt for reuse of wastewater.*]

A national policy incorporating engineered wetlands was under preparation with the interest of the Dutch-Egyptian Water Advisory Panel.

INDICATOR #3 National inter-ministry coordination and communication. [*Target: Ensure sustainability of operation after the GEF funds phase out.*]

Five ministries worked collaboratively on the LMEWP. The Ministries of Environment and Water Resources worked together to hand over the facility at completion to the Ministry of Water's National Water Research Center, which has assumed responsibility for operation and management using its own governmental resources.

RESULTS: STRESS REDUCTION

INDICATOR #1: A demonstration wetland treatment system constructed, consisting of a sedimentation pond, engineered wetlands, and aquaculture facility. [*Target: Treatment capacity of 25,000 cubic meters of water per day (approximately 1% of the Bahr El Baqar Drain flow).*]

Working under challenging site conditions, the project team constructed a functioning wastewater treatment facility that is effectively treating the targeted flow. Preliminary results showed that the LMEWP facility could accommodate a flow of up to 40,000 cubic meters per day due to better than expected influent quality coming from the Bahr El Baqar Drain and the climatic conditions (hot, sunny) of the region.

The project has demonstrated that treatment levels can be attained that enable a wide range of (non-potable) reuse options, in particular for fish farming. It has produced a business plan and several manuals that (i) demonstrate the efficiency and cost-effectiveness of the plant and (ii) provide the responsible institution with all the necessary information for its operation.

INDICATOR #2 Replication of the technology in other parts of the country. [*Target: Three replication projects.*]

Four new engineered wetlands have been established in the Port Said Governorate, which has developed a complete plan for using wetlands as a low cost technology for treating sewage water, to be funded by the World Bank and EIFAD. Additional discussions were underway to further replicate this model at the entry of Lake Manzala.

INDICATOR #3: Improve the water quality of the drains and lakes, in turn improving fish quality and increasing fish production, and ultimately improving the quality of the Mediterranean Sea. [*Target: Treatment efficiency of 80%.*]

Analysis from collected field data from 2006 to 2007 indicated the following removal efficiencies of the facility, based on the ratio between the influent wastewater and effluent water concentrations: Biological Oxygen Demand: 61.2%; Total Suspended Solids: 80.0%; Total Phosphorous: 15.2%; Total Nitrogen: 51.4%; Organic Nitrogen: 25.9%; Total Coliform: 99.7%.

RESULTS: WATER RESOURCE AND ENVIRONMENTAL STATUS

While the scope of this project did not include measuring long-term changes in water quality, the results of water, sediment, plant and fish analyses at the demonstration project indicated that the potential for engineered wetland's removal efficiency for removing pollutants was very high.

KEY LESSONS LEARNED

- 1) A rough comparison between the LMEWP and conventional treatment methods suggests that the capital cost of engineered wetlands can be 1/4 that of conventional treatment methods, and operation / maintenance costs are also lower.
- 2) The open advocacy approach used by the project, which sought to maximize the involvement of relevant organizations and push for the merits of the technology, has been beneficial, contributing to a strengthening of national interest in the engineered wetlands.
- 3) During the course of facility construction, the LMEWP was sometimes subject to criticism from conservationists and ecologists due to confusion as to the purpose of the wetlands. When planning or initiating such an undertaking, it is crucial to communicate properly its intent. The purpose of the facility was to treat wastewater, not to create wetland habitats for species conservation. Ironically, several species of birds now nest in the engineered wetlands, proving through their presence the effectiveness of water treatment.
- 4) The development of a Business Plan for the facility only at project end creates difficulties for agencies to set their budgets and staffing effectively. The LMEWP would have benefited from an "Exit Strategy"

being developed soon after the project midpoint, to assist the Egyptian Ministries in planning for the facility post-GEF support, to include a business plan drafted at least 18 months prior to project conclusion.

5) The project was initially viewed with suspicion by the local community, in part due to issues of land ownership and squatters rights. The constructive and cooperative approach taken by project management has meant increased site safety, and the building of local interest and support. Future projects in Egypt and elsewhere will surely encounter land ownership rights issues and need to include strategies for local buy-in.

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