



## IMPROVING WATER QUALITY IN LAKE MANZALA

Located on the northeastern edge of the Nile Delta in Egypt, close to Port Said, Lake Manzala once provided 30 percent of all fish consumed in Egypt. Environmental and contaminant stresses have changed this. The public has become wary of eating Lake Manzala fish because they show a high frequency of organ malformation and discoloration. This situation has severely affected the fishing community, both socially and economically.

In general, access to clean, reliable water is a primary concern for Egypt. Pollution from farms, cities, and industrial centers flows through the Nile Delta, entering Lake Manzala and other large coastal lakes before pouring in the Mediterranean Sea. Traditionally, the wastewater has been left untreated, degrading the Lake and sending pollution downstream into the Mediterranean.

### THE PROJECT

In 2001, construction began on a 100-hectare engineered wetlands facility southwest of Port Said. The project is a cooperative effort among the Global Environmental Facility (GEF), the Egyptian Government (Egyptian Environmental Affairs Agency), and the United Nations Development Programme. The wetlands are designed to treat 25,000 cubic meters per day of polluted drain water from the Bahr El Baqar Drain and to assess the feasibility of wetlands treatment as an alternative for improving water quality in Lake Manzala and the Mediterranean Sea.

The project will pilot an innovative, low-cost method for cleaning polluted waters in the wetlands region of Lake Manzala. It aims to reduce the level of municipal, industrial, and agricultural

pollutants flowing into the Mediterranean Sea from Egyptian sources and to improve the overall water quality of the Lake. This will be done by using plants in specially constructed ponds that will filter polluted water coming through a drainage system into the Lake. The facilities for the wetlands include intake screw pumps, sediment basins, surface treatment cells, subsurface reciprocating cells, pilot test cells, a fish-rearing facility, and an effluent reuse area.

The five-year demonstration project includes three years for design and construction, followed by two years of operation to assess performance, design criteria, and rate constants for wetlands systems in Egypt. Its immediate objectives are to build capacity for sustainable development in managing Lake Manzala and to demonstrate engineered wetlands technology as a low-cost and efficient method of treating large bodies of water in Egypt. Its overall goal is to promote a cleaner Mediterranean Sea. The project also contains income-generating activities for the local fishing communities.

### PROJECT IMPACT AND REPLICATION

It is expected that the successful operation of the engineered wetlands will encourage the government to replicate the technology in other parts of the Lake, thus reducing the pollution load that reaches the Mediterranean Sea. Because they are the first of their type in Egypt and the Middle East, the wetlands should generate design criteria for new engineered wetlands in the region. In addition, the Ministry of Water Resources and Irrigation has expressed interest in using the engineered

wetlands facility as a center of excellence for low-cost wastewater treatment technologies following the phaseout of the GEF funds.

Engineered wetlands also appear to be an appropriate decentralized wastewater treatment technique for remote communities in Egypt and the Middle East, especially with the availability of spacious desert lands. The knowledge gained in designing the engineered wetlands has already been communicated to other projects; currently, five engineered wetlands are under construction for treatment of sewage water in small agricultural communities at the fringes of the Nile Delta.

During operation, the project aims to engage members of the local community in economic activities related to the operation and maintenance of the facility to increase their awareness of the technology and cover some of the operational costs of the facility. Local residents will also be involved in harvesting and processing plants into marketable products. Meanwhile, the effluent will provide clean water for the aquaculture facility to produce fingerlings and juvenile fish for restocking the lake and for other aquaculture ventures.

There is a large potential for engineered wetlands applications in Egypt for fish farming. The engineered wetlands even include an aquaculture facility to investigate the feasibility of fish farming using the treated wastewater. The aquaculture

will test the possibility of breeding some fish species that have already disappeared from Lake Manzala because of high pollution stress. In this context, the technology can be used near the project area to produce high-quality fish.

## **BENEFICIARIES**

A variety of groups stand to benefit from this project:

- Local residents living around Lake Manzala and, in particular, those who are involved in managing the wetlands for biomass products and aquaculture
- All residents, because of the enhanced environmental awareness and the improved water quality
- Local fishermen who adopt improved fish-farming techniques demonstrated by the aquaculture facility
- Nongovernmental organizations (NGOs) that participate in the wetlands demonstration project and focus on the project area and its development
- Regional scientific institutions and individual scientists who use the wetlands facility for research studies and training
- The regional and national governmental agencies, in particular the Egyptian Environmental Affairs Agency.

## **FOR MORE INFORMATION**

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