Chapter 5: Fresh Water

Introduction

The River Nile has been Egypt's vein of life; that's why line ministries and authorities make concerted efforts to protect it against pollution and to improve water quality. The River Nile and its two branches, canals, main canals and watercourses have been, and are, generally, suffering from the pollution of direct and indirect drainage by industrial plants as well as sanitary drainage from villages and cities situated on these watercourses. Lack of sanitary drainage services along previous years and watercourse passage through residential areas in different villages and cities have led to draining sewage into the Nile. Agricultural drainage faces the same problem, as it can be reused in irrigation after mixing with irrigation water. Water Pollution in Egypt is a very complicated issue due to the variety and accumulation of pollution causes and the need for huge investments to eliminate them. Additionally, the variety of official entities as well as regulating laws sharing water resource management may be one factor of impeding the speedy solution of such problems. Coordination is currently made for ministerial and authority cooperation to solve this problem.

MSEA Achievements in Fresh Water

Efforts made for Protecting River Nile and Lakes from Pollution

MSEA makes all efforts to improve the quality of fresh water, in general, and the River Nile water, in particular, as the main source for drinking water in Egypt. Therefore, MSEA has set 12 programs for River Nile protection including ones for periodical monitoring and development of a database; stopping industrial effluents into the River Nile or to drains leading to it; stopping sanitary drainage; handling wastes from cruiser and transport means; treating agricultural wastes; solid waste management (SWM); and protecting Nile islands, in addition to programs for accidents and emergencies, information and awareness, studies and research, and law enforcement.

MSEA has identified a number of main focuses to improve fresh water quality by stopping untreated industrial effluent drained into the Nile, its watercourses or lakes; preventing direct sanitary drainage into watercourses, while using treated sanitary drainage in afforestation and raising agricultural wastewater quality before pumping them to water channels; and regulating the status of fish cages in addition to intensifying efforts of periodical monitoring to control the change in water quality.

MSEA is striving to implement some leading projects to protect fresh watercourses and combat desertification, supplying desert communities deprived of drinking water with an untraditional permanent drinking water source.

First: Industrial Effluents

1. Nile-polluting industrial effluents from 91 plants have been stopped, with total draining amount of 4.952bn m^3/year making 99.64% of the total effluents discharged to the Nile whether through blocking drainage offtakes or environmental compliance according to the following: totally stopping 61 plants from discharging 81.205m m^3/year making 1.63% of the total drainage into the Nile, as well as complying 30 plants with treatment systems by periodic inspection. They are currently discharging as per limits allowed by the Nile Protection Law 48/1982, with a total drainage amount of 4.871bn m^3/year making 98.01% of total effluents discharged into the Nile.
2. Incompliant drainage of 17.755m m^3/year making 0.36% of the total effluents discharged into the Nile by 25 violating plants is being stopped as follows: 10 plants undergoing environmental compliance ending in 2007 with total drainage of 4.574m m^3/year making 0.09% of total Nile drainage, and studying the provision of technical and financial support to 15 plants discharging 3.181m m^3/year making 0.27% of total Nile drainage, in order to be environmentally compliant at a cost of EGP 67m.
3. Industrial effluent (direct or indirect) discharged into Manzala Lake by 13 industrial plants makes 0.08% of the total (industrial, agricultural and sanitary) drainage. Environmental compliance is achieved by 8 industrial plants currently discharging as per the Nile Protection Law 48/1982 limits. Environmental compliance by the rest of plants is currently coordinated.
4. Industrial effluent discharged into Borollos Lake makes 1.25% of the total (agricultural, sanitary and industrial) drainage. MSEA has examined the environmental status of 16 industrial plants and how to financially and technically support them to environmentally comply with the rates allowed by the Nile Protection Law 48/1982. The status quo is as follows:
    - 5 companies have environmentally complied and currently discharge as per the Nile Protection Law 48/1982.
    - Coordination is made with the Ministry of Investment where EGP 200m have been allocated for the environmental compliance by 3 business sector companies.
    - MSEA is currently coordinating with KFW to provide soft loans for the environmental compliance by 8 private companies estimated with EGP 30 m.
5. Industrial effluent discharged into Mariout Lake makes 0.43% of the total direct and indirect effluents by 6 industrial plants. 4 companies are currently discharging as per the Nile Protection Law 48/1982. MSEA is currently working on phasing-out the funding for the remaining two to achieve environmental compliance and stop violating discharge into the Lake through a support from MSEA Industrial Pollution Control Project Phase II.

Second: Sanitary and Agricultural Effluents

1. Prioritizing the establishment of wastewater treatment plants in villages deprived of sanitary drainage services:

According to MSEA vision, a list has been made, prioritizing villages deprived of this service, amounting to 219. MSEA priorities were villages discharging into the Nile, Damietta and Rosetta Branches, and the northern lakes, due to the pollution arising from mixing water with sewage as a result of random drainage from villages. A single statement has been developed for 1165 villages with the vision of the Ministries of Housing, Utilities and Urban Communities (MoHUUC), Water Resources and Irrigation (MWRI), Health and Population (MoHP), and MSEA aiming at drawing up a plan for sewage treatment plants. The priority was for villages discharging in the River Nile and watercourses followed by villages with high surface water level.

2. River cruiser sanitary drainage and status quo:

a. 5plants have been established to receive river cruiser wastes at Cairo, Minia, Assiut, Sohag and Aswan. The plants are fully equipped for receiving of cruise tourism wastes and safely disposing of them in the sanitary drainage networks in the cities where they were established as per environmental standards issued in this respect.

b. A harbour was established in Aaqab, east Aswan at some EGP 5m to collect and treating effluents of river cruisers instead of discharging them untreated in the Nile. The harbor has a daily capacity of 900 m^3/day and a sewerage rising mains 4.5 km long ending with the liquid waste treatment plant for the afforestation of 69 feddans.

c. A harbor for river cruisers north Aswan is currently being established in coordination with the Ministry of Tourism and Aswan Governorate to cut down accumulation density and to provide operation services including sanitary drainage and the like.

d. The establishment of a new harbor has started south Luxor-al-Mereis Bridge aiming at a tourist investment cultural development for tourist attraction, job opportunity provision and advancement of the area surrounding the harbor. The implementation of such project would lead to facilitating river cruiser sanitary drainage disposal in the harbor and totally preventing its discharge to the River Nile.

e. A technical study has been finalized in coordination with the Ministry of Tourism for river cruiser sanitary drainage environmental compliance. This would be implemented by collecting sanitary drainage and bilge water in river barges then pumping it in the city sanitary drainage network where the cruisers pass. Fully prevention of cruiser discharge into the River Nile directly is in the pipeline.

3. Rehabilitation of Kitchener Drainage (Main Gharbeya):

Based on the study conducted on Kitchner Drainage and monitoring results proving the poor condition of water quality, a committee has been formed of stakeholders with specialists from MSEA, Gharbeya Governorate and the General Authority for Investment and Free Zones (GAFI) to undertake the rehabilitation of Kitchner Drainage for which pollution sources – whether those of the sanitary or industrial drainage – were identified and monitored. Coordinating has been made with MoHUUC to examine the possibility

of increasing Tanta, Kafr El-Sheikh and Mahala sanitary drainage plant efficiency, as they are the most significant drainage pollution sources. Furthermore, both private and GAFI factories have been identified and scheduled for environmental compliance.

4. Treating sanitary and agricultural drainage using new technology:

a. **Using Effective Microorganisms EM**:

A substance composed of a large harmonious group of microorganisms fed on organic substances existing in wastewater in order to mitigate organic pollution load.

Some Pilot Projects

(a) Using EM has started practically for the sewage resulting from Abou Rawash Plant to improve the quality of the water discharged into Rahawy Drainage which discharges into the River Nile Rosetta Branch; hence, solving the problem of poor water quality during the period of the least water needs (winter blockage) and the necessity of pumping additional large quantities of the strategic reserve of the River Nile water to mitigate such pollution impacts, where a daily amount of 470,000 m^3 is treated. Experiments have proven 80% efficacy of such method for wastewater treatment.

(b) Increasing Bramon Village, Daqahlya, sanitary drainage wastewater treatment efficiency. Findings have proved that using EM improves chemical and physical properties of the water discharged into al-Serw al-Asfal Drainage.

(c) Treatment of sanitary drainage and agricultural wastewater in Moheb and Sayyala drains polluting Manzala Lake. The drain is 5km long. Two months after using EM, foul odors polluting the air were totally removed; 6 months after treatment, sanitary drainage pollutants were reduced and water became unpolluted.

(d) Sanitary drainage treatment in Sharm el-Sheikh and Sokhna resorts (Halomy Sharm, Amar Sina, Riviera Sharm, Tropicana) and 5 Sokhna resorts of Amigo Co.

(e) Treatment of sanitary drainage wastewater in Zefta villages in cooperation with MWRI, where EM has been distributed to Zefta village households. One liter of EM was added weekly to be sprayed in household trenches. Foul odor was eliminated, harmful insects in trenches repelled, and sanitary drainage pollutants treated.

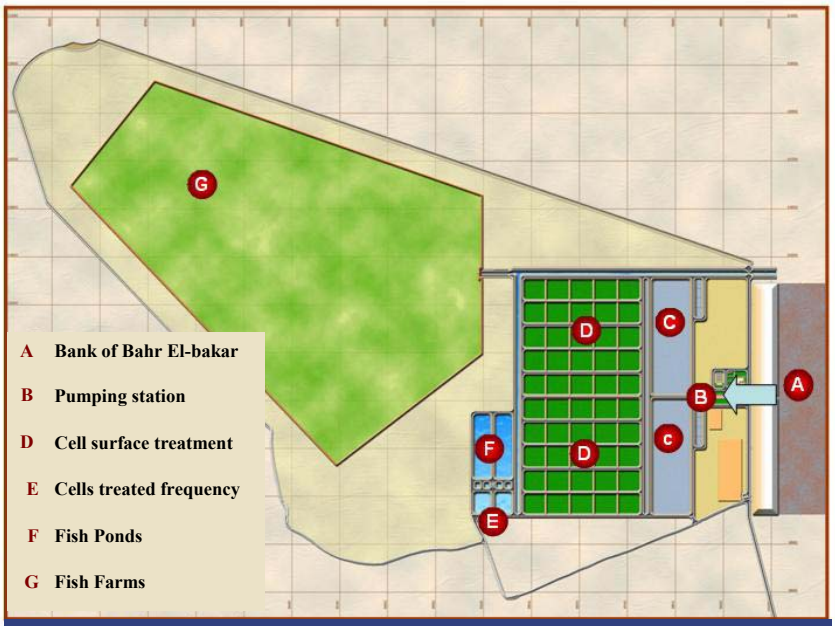
b. Manzala Lake Biological Treatment Project:

The deteriorated quality of water flowing towards northern Delta at the terminal of the irrigation and wastewater networks in Egypt is one of the main environmental and economic problems. Most of this water flows through drains into the Mediterranean via connected coastal lakes.

Biological purification provides the best alternative environmentally and economically for traditional purification operations, with costs affordable for developing countries. To testing this method, it was necessary to develop a pilot project to prove its advantages and benefits of preventing many pollutants from reaching drains, coastal lakes or the Mediterranean. Furthermore, the development of a pilot biological treatment plant provides this method that can be developed not only for Egypt, but for neighboring and developing countries in general.

MSEA implemented Manzala Lake Biological Treatment Project through funding from the Global Environment Facility (GEF). The project treats 25,000 m^3/day of Bahr al-

Baqar Drain wastewater before discharge into Manzala Lake. The project serves the protection of the ecosystem, support of sustainable development, and involvement of residents and NGOs through research, training and capacity building. The project aims at providing a low-cost alternative to improve water quality in a way affordable for country economic conditions and leading to self-sufficiency eventually. Wastes resulting from sedimentation and plant trimming as well as treated water will be used in aquaculture of fingerlings through which fish wealth in the area can be developed. Moreover, some of the water will be used to irrigate lands adjacent to the project site. This cost-effective method, as well as the increased agricultural and fish production, is expected to contribute to the achievement of sustainable development in the area.



picture (5-1) Manzala Lake Biological Treatment Project

Third: Procedures for Protecting the River Nile from Rosetta and Damietta Fish Cage Adverse Effects

The legal status of the Nile fish cages has been studied in terms of the extent of their impact on the quality of the river water riverbed sediments, which subsequently affects river water quality even after eliminating pollution causes. This was made clear through the results of analyses carried out on samples from the cage concentration area, showing high concentrations of ammonia, organic pollution as well as types of hormones prevented for existence in the water. The study revealed the illegality of the placement of cages, responsibility for water pollution in their area, and their adverse effect on riverbed sediments. Consequently, the Prime Minister issued a decree banning any placement of cages in fresh water and removing cages violating the Law issued in this respect. Cages on Rosetta and Damietta Branches have been removed according to a schedule.

Fourth: Water Quality Regular Monitoring

1. The Central Laboratory for Environmental Monitoring, in participation with EEAA Branch laboratories, has been carrying out regular water quality monitoring programs for the River Nile and Damietta and Rosetta Branches since the beginning of 1999 so far. Monitoring points increased from 26 in 1999 to 62 in 2006. Pollution indicators are monitored at fixed monitoring points from Aswan till the end of Damietta and Rosetta Branches in order to identify River Nile water quality and follow-up different pollution sources. Eight studies on River Nile water quality monitoring were issued during 1999-2006. Cooperation takes place with MOHP and MWRI to exchange data so as to identify the changes monitored by other ministers.
2. Two studies were conducted on Lake Qarun water quality in 2005 and 2006 to identify the reasons beyond the continuously augmenting water salinity resulting from agricultural drains and low bed level in order to examine pollutant quality and how fish wealth is affected by such salinity levels.
3. A report on the environmental conditions of Wadi al-Rayyan lakes was developed in 2006 based on a regular (quarterly) survey analyzing 20 samples from Wadi al-Rayyan Protectorate in order to realize lake pollutants and how far they are affected by neighboring fisheries.
4. A final polychlorinated biphenyl (PCBs) analysis report was issued based on analyzing 35 samples from Shubra al-Khayma warehouse soil and transformer oils in participation with the Japanese Project in 2006 and 2007.
5. Developing trained Central Laboratory and EEAA Branch Laboratory personnel to monitor different types of oils leaked, recognize their imprints, attribute them to their different sources, train on analysis methods and relevant techniques. This implies support to involved (Suez, Alexandria, Hurghada) RBO labs through providing trained technical experience, highly precise technologies provided at the Central Laboratory.
6. Participating in the development and conforming of Egyptian water codes with the international. This included the Egyptian Code of Chemicals Used in the Treatment of Water for Human Use; the Egyptian Code of BOD Estimation through Distillation and Use of Thiourea as an Additive with Bacteria; and the Egyptian Code for the Identification of Ammonia Concentrations in Water through Manual Spectrum Analysis.

Fifth: Leading anti-desertification and supplying desert communities with potable water projects

1. Gafgafahh Village Water Resources Development Project, North Sinai :

Encouraged by the State to develop Sinai and desert communities and to combat desertification, the project aims at supplying Gafgafah village population (10,000 persons) with fresh potable water, being one of the villages deprived of a permanent potable water source. The project is developed within the framework of a memorandum of understanding (MOU) signed between the Egyptian and Italian Environment Ministers for joint cooperation. It was agreed that the Italian Government would provide the necessary support for digging a well and establishing a water distribution network and a desalination plant for the well in Gafgafah. Project studies and engineering designs were assigned to an Italian expert house as well as project works to the Ministry of Defense Engineering

Authority Water Department. Project studies began at the beginning of 2006 while implementation of engineering works in August 2006. The following are works accomplished:

a. Development of produced water distribution network geographical maps, engineering drawings and designs; selection of the dual fresh and saline water distribution system through two alternative pipelines; and development of a map with the main 10 and general distribution points.

b. Development of the semi-final project report with the integrated mathematical model of water management at Gafgafah. It shows how to use water resources available in sustainable development.

c. Finalizing well digging works at 1185 meters deep with a flowing capacity of 50m^3/hr and pump depth of 300 m. The well was monitored by video. The final design of filters at 1050 meters deep was finalized, ensuring the digging work compliance with technical conditions.

Picture (5-2) General view of the site before well digging inception Gafgafa Project

Picture (5-3) Pump room after finishing Gafgafa Project

2. Nubian Sandstone Reservoir Management Project:

a. Participation in the planning meeting of Nubian Sandstone Reservoir Project with specialists from countries participating in the reservoir (Egypt, Sudan, Libya and Chad). The meeting targeted the development of an analytical and diagnostic framework of the regional borders of the four countries participating in the Reservoir, as well as the project action program strategy in order to ensure reservoir sustainability, taking into consideration the environmental dimension when planning and implementing developmental projects around the Reservoir. This can be achieved through the following:

(1) Developing an analytical and diagnostic framework Reservoir borders in each country with its neighboring one.

(2) Developing action program strategy framework.

(3) Identifying each country stakeholders that could participate in project implementation and their requirements.

b. Identifying four models for the development steps of the project analytical and diagnostic framework and the project action program strategy, and how to start such steps; and reviewing some models applied in some American, Middle African and European countries, which helps human capacity building and updating officials assigned for project planning in implementing stakeholders through the following three integrated programs:

(1) A preventive program to realize all threats to international waters and lands and their biological surrounding.

(2) A remedial program on the uses of water the quality of which has deteriorated as a result of wrong use as, well as treating poor water quality adverse effects on the biological surrounding.

(3) A diagnostic program for international water pollution at the international level.

EEAA RBO Activities for Water Quality Improvement

- Finalizing the establishment of Aaqab river harbor, Aswan, for receiving effluents of river cruisers.
- Developing a report on the environmental status of Ismailya Canal.
- Participating with MoHUUC in the treatment of sanitary drainage wastewater of Abuo Rawash Plant, using $FeCl_3$, and it proved successful.
- Allocating 500 feddans for EEAA in the industrial zone, Biad El-Arab, Beni Soueif, for afforestation, to be irrigated with treated wastewater from the industrial zone.
- Taking required measures to solve the problem of industrial effluents in al-Mahalla al-Kobra, either discharging into the sanitary drainage network or Kitchner Drain.