

5.4 Environmental Monitoring

(1) EIMP (Environmental Information and Monitoring Programme)

This section describes about Air Environment Monitoring Network Program, which was conducted as a part of EIMP with the financial support from DANIDA. During 1997 to 1999, 42 monitoring stations were established to monitor air environment throughout Egypt. The project was conducted as a EEAA's project, but actual monitoring and data analysis were done by the Centre for Environmental Hazard Mitigation (CEHM) of Cairo University and the Institute of Graduate Studies and Research(IGSR DANIDA) of University of Alexandria with guidance from experts sent by DANIDA.

Table 5.24: Outline of the EIPM Program

| | |
|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Monitoring Station | Greater Cairo area; 14 stations Alexandria are; 8 stations Delta area; 7 stations Suez Canal area; 3 stations Upper Egypt and Sinai peninsula area; 10 stations breakdown;12 stations in industrial area, 9 stations in central urban area, 3 stations in roadside, 15 stations in residential area, 3 stations in countryside and background area |
| Sampling instrument | SO ₂ , NO _x , PM ₁₀ , O ₃ , CO ₂ ; 46 Continuous gas monitoring equipment Sequential samplers for SO ₂ , NO _x ; 14 samplers High volume sampler for TSP; 5 samplers Dust jar for dust fall; 18 dust jars High volume sampler for PM ₁₀ ; 26 sampler Others; Passive sampler for SO ₂ , meteorological station |
| Parameters | Monitor; SO ₂ , NO _x , PM ₁₀ , O ₃ , CO ₂ Samplers; SO ₂ , NO _x , PM ₁₀ , BS, VOC, TSP, DF, PS |

BS; Black Smoke

VOC; Volatile Organic Compounds

TSP; Total Suspended Particulate Matter

DF; Dust Fall

PS; Passive sampler

(2) Water Quality Monitoring

Currently, MOWRI is in charge of fresh water quality monitoring and started monitoring in 1976 for agricultural waste drainage. After that, the Ministry started water quality monitoring for the Nile River and groundwater as well. Nowadays, those programs are integrated and conducted as The National Water Quality Monitoring Program. The project aims to the followings:

- Evaluate water quality of influx water to Egypt and runoff water from the Lake Nasser
- Comprehend seasonal water quality change of the Nile River and irrigation canals
- Comprehend quantitative water quality change of irrigation drainages related to existing pollution sources.
- Examine reusable water amount and quality for agricultural use.

Table 5.25 shows the outline of three components of the National Water Quality Monitoring Program. Monitoring of irrigations and drainage canals of the Nile River Delta are conducted monthly, the Nile River monitoring is done twice in a year whereas groundwater is monitored annually. Parameters of the monitoring are shown below:

Surface Water

- Package A: Physical Parameters, Water Quality Parameters, Oxygen Demands (BOD, COD), Nutrient Salts, Major Ions, Heavy Metals, Pesticides, and Parameters related to Microorganisms
- Package B: Physical Parameters, Water Quality Parameters, Oxygen Demands (BOD, COD), Nutrient Salts, Heavy Metals, and Parameters related to Microorganisms
- Package C: Physical Parameters, Water Quality Parameters, Oxygen Demands (BOD, COD), Nutrient Salts, Heavy Metals, Pesticides, and Parameters related to Microorganisms
- Package D: Physical Parameters, Water Quality Parameters, Oxygen Demands (BOD, COD), Nutrient Salts, Heavy Metals, and Parameters related to Microorganisms

Groundwater

- Package E: Physical Parameters, Nutrient Salts, Major Ions, and Heavy Metals

Table 5.25: Summary of National Water Quality Monitoring Program

| | River Nile | Irrigation and drainage canals in Nile Delta Region | Groundwater Monitoring |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| Implementing Body | Nile Research Institute, NRI | Drainage Research Institute, DRI | Research Institute for Ground Water RIGW |
| Frequency of Sampling | Twice in a year (in Feb. & Aug.) | Once in every month | Once in a year |
| Number of Sampling Points | Lake Nasser; 4 River Nile; 18 Damietta tributary; 4 Rosetta tributary; 3 Rayah; 2 Major canals in upper Egypt; 9 Major drainages in upper Egypt; 29 | Irrigation canals in Faiyum Governorate; 4 Irrigation canals in Eastern Delta; 19 Irrigation canals in Central Delta; 11 Irrigation canals in Western Delta; 14 Irrigation & Drainage canals in Faiyum Governorate; 7 Irrigation & Drainage canals in Eastern Delta; 41 Irrigation & Drainage canals in Central Delta; 35 Irrigation & Drainage canals in Western Delta; 32 | 195 Monitoring point nationwide (approximately 60% of monitoring wells in groundwater increment areas of River Nile) |
| Parameters | Lake Nasser; Package B River Nile; Package C Damietta tributary; Package C Rosetta tributary; Package C Layafs; Package A Major canals in upper Egypt; Package A Major drainages in upper Egypt; Package D | Irrigation canals in Nile Delta and Faiyum Governorate; Package A Irrigation & Drainage canals in Nile Delta and Faiyum Governorate; Package D | Monitoring Wells (Package D) |

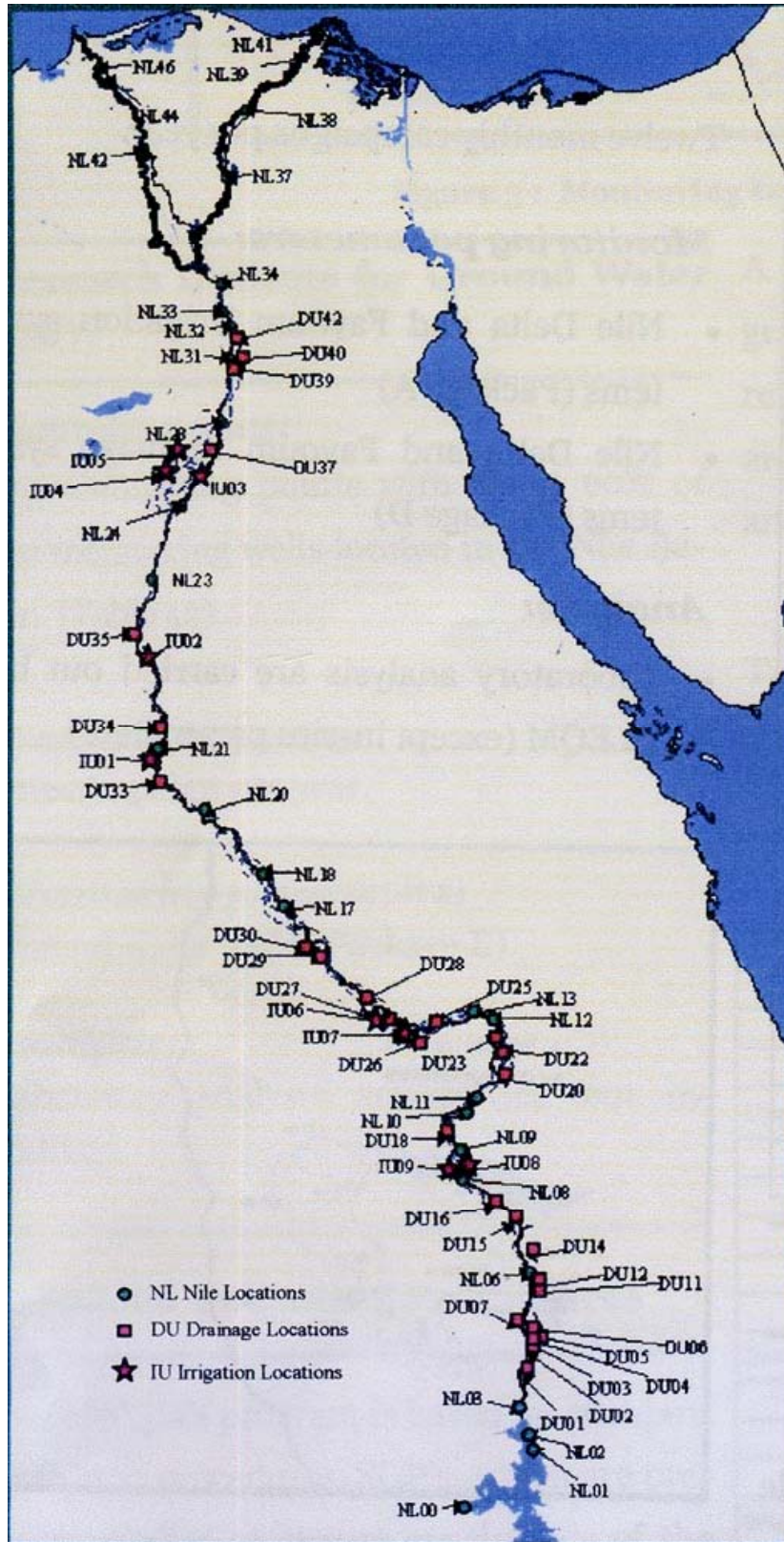


Figure 5.8: Location of Monitoring Points on River Nile by Nile Research Institute

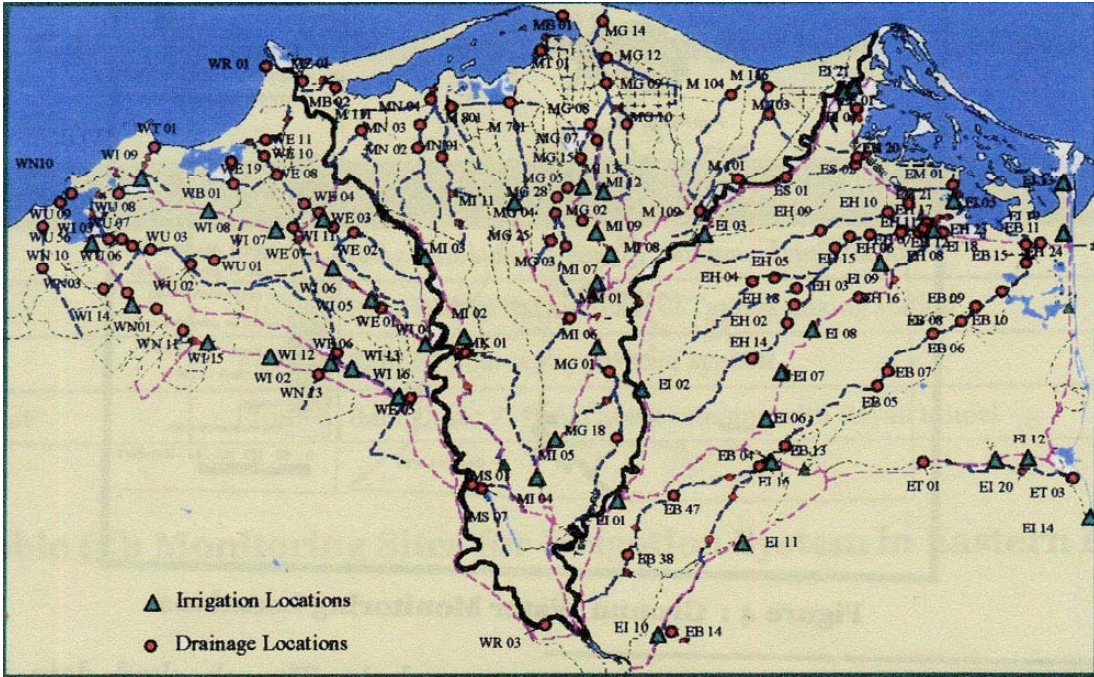


Figure 5.9: Location of Monitoring Points for Irrigation and Drainage Water by Drainage Research Institute

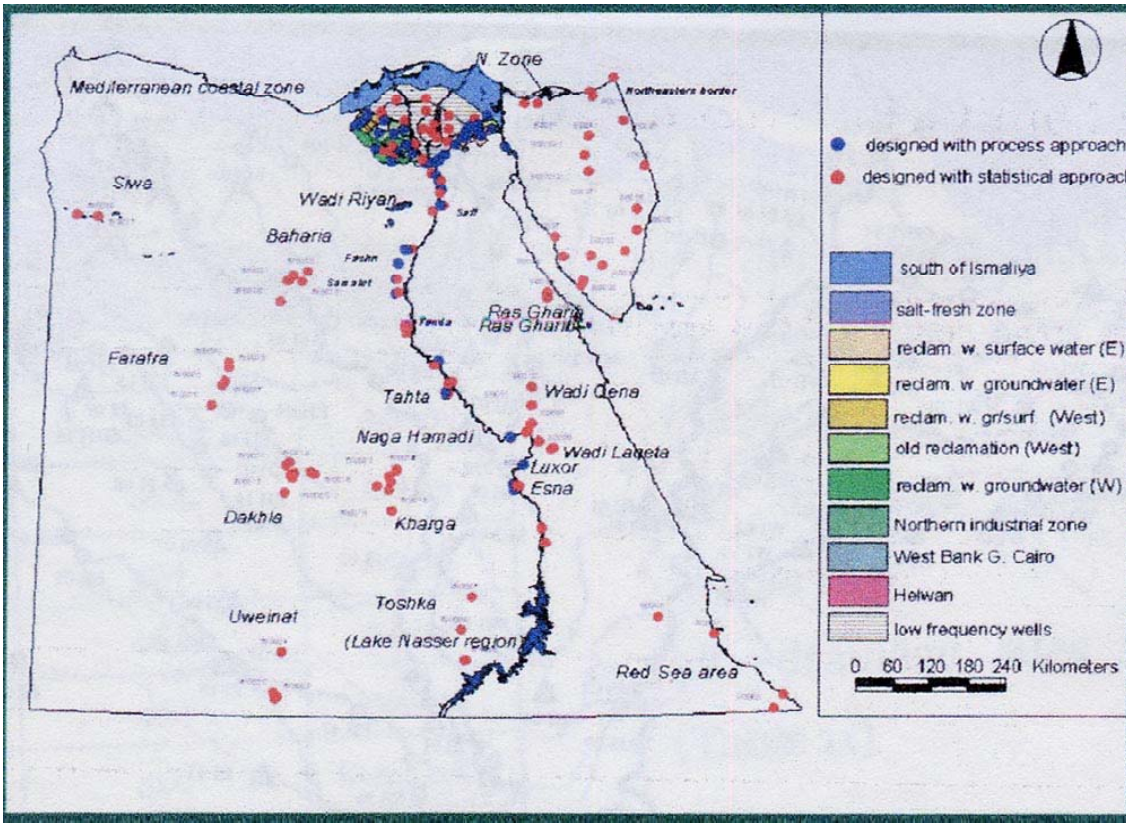


Figure 5.10: Location of Groundwater Monitoring Points by Research Institute for Ground Water

(3) EMTP: Environmental Monitoring and Training Center Project

The Government of Egypt established the Environmental Protection Law (Law 4/1994) and set environmental standards and discharge standards that are put fully in force and applied for existing facility from February 1998. EEAA was given the authority for implementing this law. There has been a need for EEAA to continuously monitor the compliance of business establishment for environmental standards, but lacked such monitoring system. Thus, the Egyptian government established Cairo Central Center (CCC) that has ordinary lab capabilities and function as training center, and 8 Regional Branch Office (RBO) under EEAA. This environmental monitoring network covers all of Egypt. Technical assistance (Environmental Monitoring Center Project) was based on grand aid scheme and aimed to provide basic analytical instruments and train personnel to utilize the instruments. The project lasted from 1997 to 2002. After the project ended, two experts were dispatched from Japan during 2002 to October of 2004 to conduct study focusing on hot spots as well as repeating practices for improving technical expertise. With the seven years of technical assistance, various analytical instruments were provided to Egyptian side (see Table 5.26 below), and analytical methods and basic monitoring procedures were successfully transferred.

Table 5.26: Major Instruments Provided by JICA to EEAA Laboratories

| | | CCC | GC | Alex. | Suez | Tanta | Mansoura |
|---------------|--------|-----|----|-------|------|-------|----------|
| EMTP | AAFL | X | X | X | X | X | X |
| | AA | X | | | | | |
| | IC | X | | | | | |
| | HPLC | X | | X | | | |
| | GC-FID | X | | X | | | |
| | GC-ECD | X | | X | | | |
| | GC-FPD | X | | X | | | |
| | GC-MS | X | | | | | |
| Grant 2003 | AA | | X | X | X | X | X |
| | IC | | X | X | X | X | X |
| | GC-FID | | | | X | | |

AAFL; Flameless Atomic Absorption

AA; Atomic Absorption Spectrophotometer

IC; Ion Chromatography

HPLC; High-Performance Liquid Chromatography (High Pressure Liquid Chromatography) (High Purity Liquid Chromatography)

GC-FID; Gas Chromatograph - Flame Ionization Detector

GC-ECD; Gas Chromatography Electron Capture Detector

GC-FPD; Gas Chromatography with a Flame Photometric Detector

GC-MS; Gas Chromatography-Mass Spectrometry