Third Rosenberg International Forum On Water Policy

SALINITY MANAGEMENT IN THE NILE DELTA
CASE STUDY :REUSE OF DRAINAGE WATER IN EGYPT

BY

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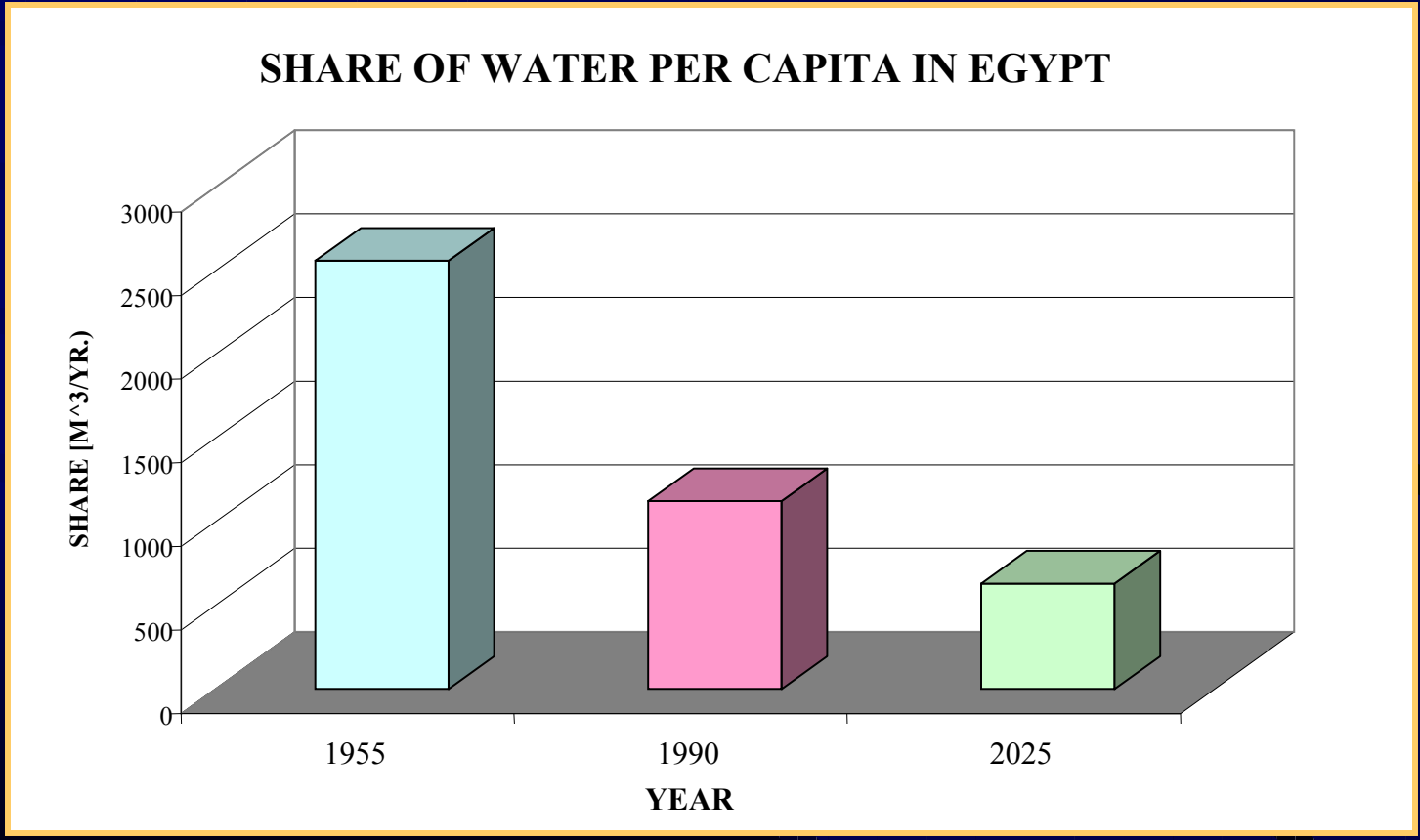
Introduction

Challenges

- **Limited Water Resources:**
  - Fixed Fresh Water Share.
  - Arid Climate.
  - Limited Safe Ground Water Abstraction.
- **Rapid Population Growth:**
  - Population : 67 million in 2002.
- **Environmental degradation:**
  - Water Salinity.
  - Water Quality Problems.

Introduction Cont.

- Limited Share of Water Per Capita



Introduction Cont.

- **High Population Density:**

- Nile Valley Area

= 4% of the Total Area.

- Population Density

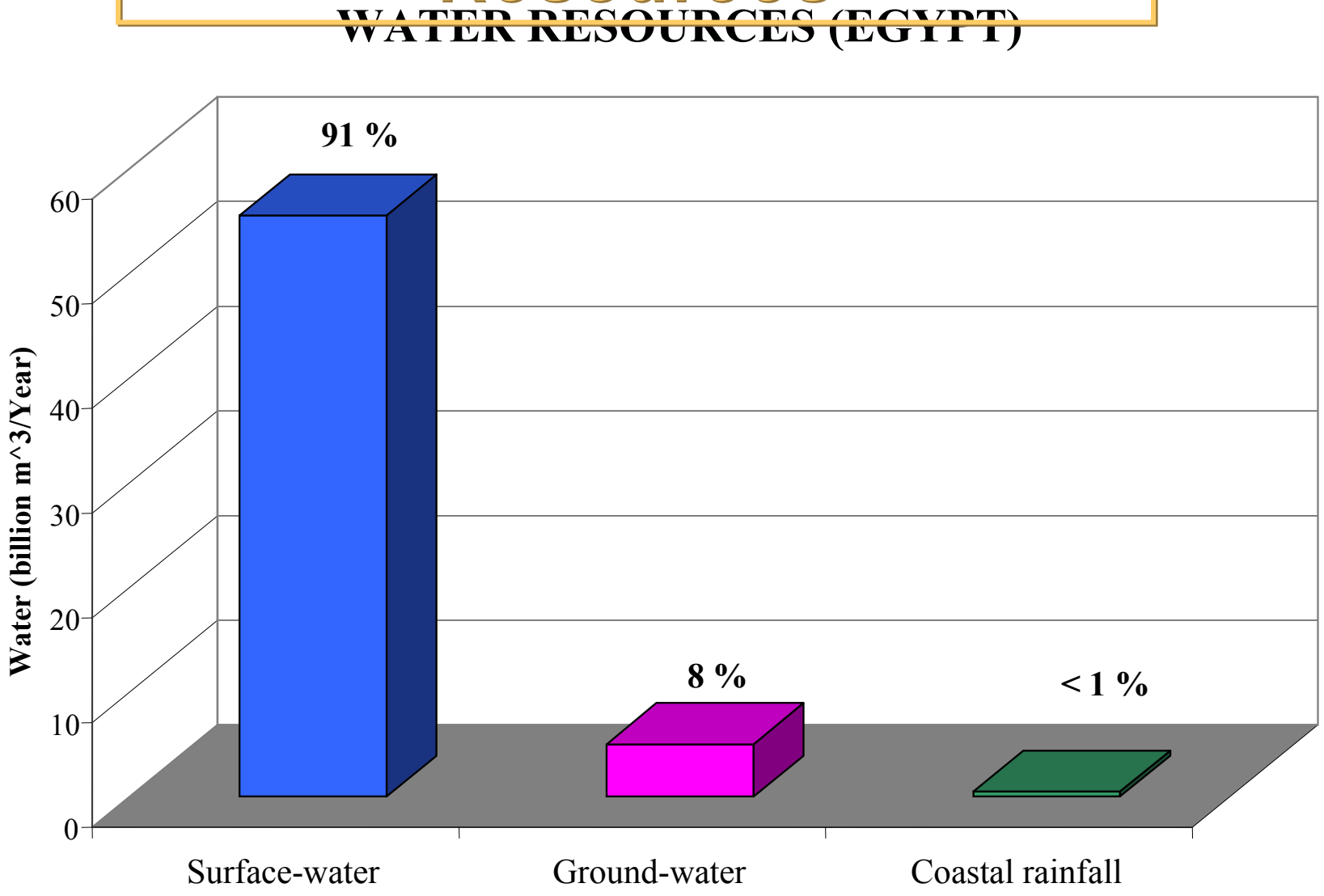
= 1200 inhabitants/Km².

Available Water Resources

Water Supply	Present	Future (2017)
Surface Water	55.5	55.5
Deep Ground Water (Renewable & Non)	5	6
Rainfall & Harvested Flash Floods	1.0	1.5
Total	61.5	63.0

* Figures in BCM

Available Water Resources



Projected Water Demand and Deficit

Water Demands	Present	2017
- Agriculture	61.5	66.5
- Domestic	4.5	7.0
- Industry	7.5	12.5
- Navigation	0.5	0.0
Total	**74**	**86**
Deficit	**12.5**	**23**

Solution : Water Use Utilization

Water Use Utilization

Utilization	BCM
- Drainage Water Reuse	4.0
- Irrigation Improvement (Drip, spray, .)	4.0
- Increasing Groundwater Potential	2.0
- Sea Water desalinization (Coastal Areas)	0.5
- Treated Sewage Water	2.0
- Improved Crop Patterns	3.0
Total	**15.5**

SALINITY MANAGEMENT

- **The Major Sources Of Water Pollution in River Nile are:**

Municipal & Rural domestic sewage

Industrial water & Agriculture chemical

- **Egypt & Netherlands jointly execute the project "Monitoring and Analysis of Drainage water Quality" "MADWQ project"**

1-1) Project objectives

- Implementation of measuring network to monitor drainage water quality in Nile-delta and Fayoum.
- Use of mathematical models to support drainage water management.
- Systematic publication of data and data-interpretation
- Enhancing research capacity at DRI.

Immediate Objectives of the Project are:

- Upgrading of the already existing monitoring network.
- Extension of the drainage monitoring network to coverall critical sites.
- Establishments of a database on the pollution drainage systems.

Immediate objectives of the project are (cont.)

- Cost-effective upgrading of the field
- Development of interpretation tools and protection models.
- As certain the availability of water quality and load models.
- Strengthening DRI with the well trained staff in water pollution, field sample.

3) Achievements:

- An integrated measuring network .
- The Use of numerical simulation models
- The research capacity at DRI.
- Systematic publication of Data and Data interpretation

3) Project implementation

- It started with the reconnaissance water quality survey, to obtain general insight in the water quality status.
- Monitoring program at selected points was designed for detailed insight in the water quality .
- Finally the quantity and quality programs were integrated into one program

4) NET WORKS DESEIGN IMPLEMENTATION

4.1) RECONNAISSANCE SURVERY NETWORK.

- The total number of parameters was 34 taking into consideration.

Microbiological& The classic parameters

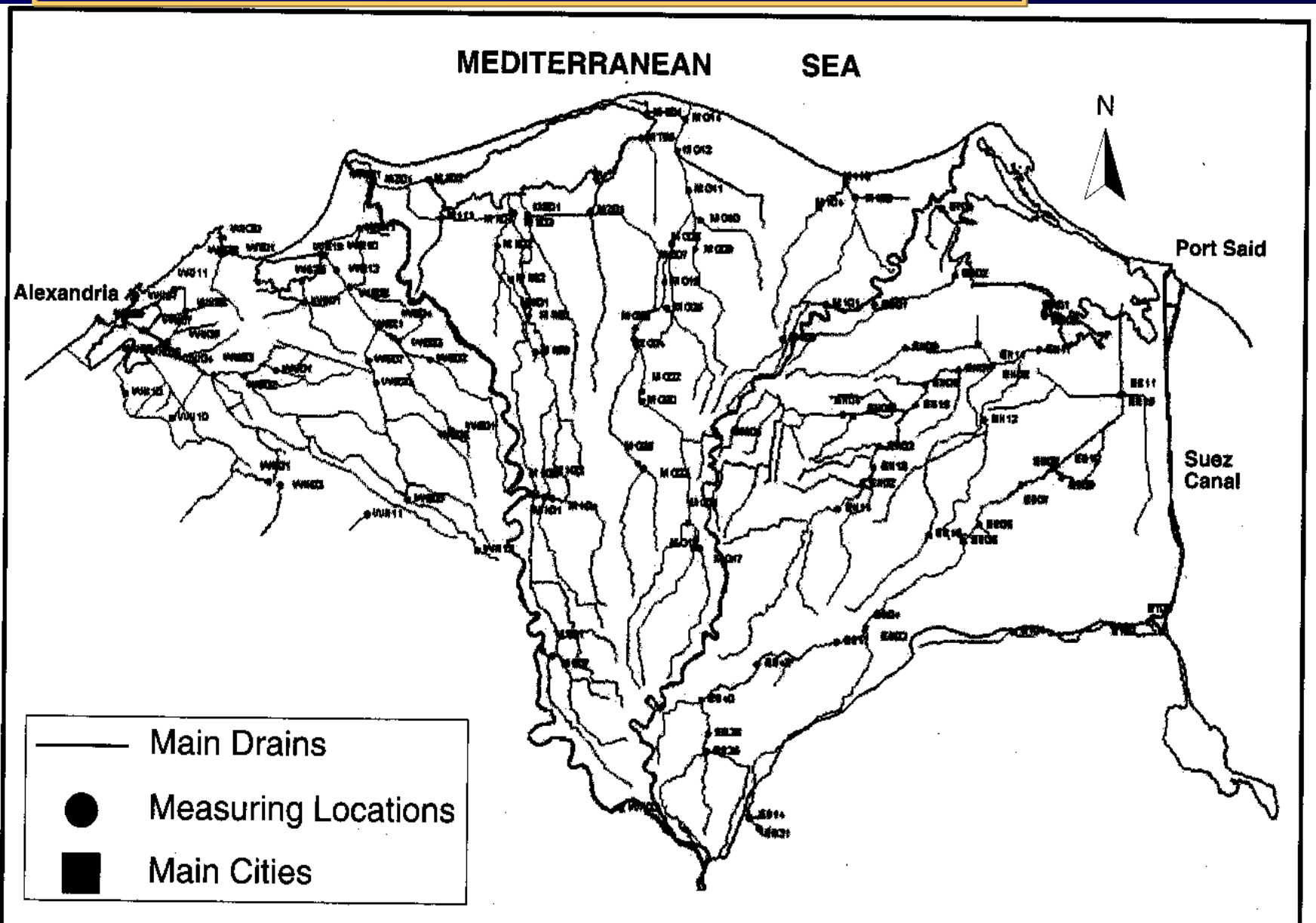
Oxygen related parameters.

Nutrients and extended cations.

Table.4.1. Number of monitoring locations in different regions included in the reconnaissance survey.

Region	Number of locations		
	Existing Monitoring Program	Additional	Total
Eastern-Delta	34	39	73
Middle-Delta	32	38	70
Western-Delta	29	40	69
Fayoum area	-	17	17
Reference point	-	1	1
Total	95	135	230

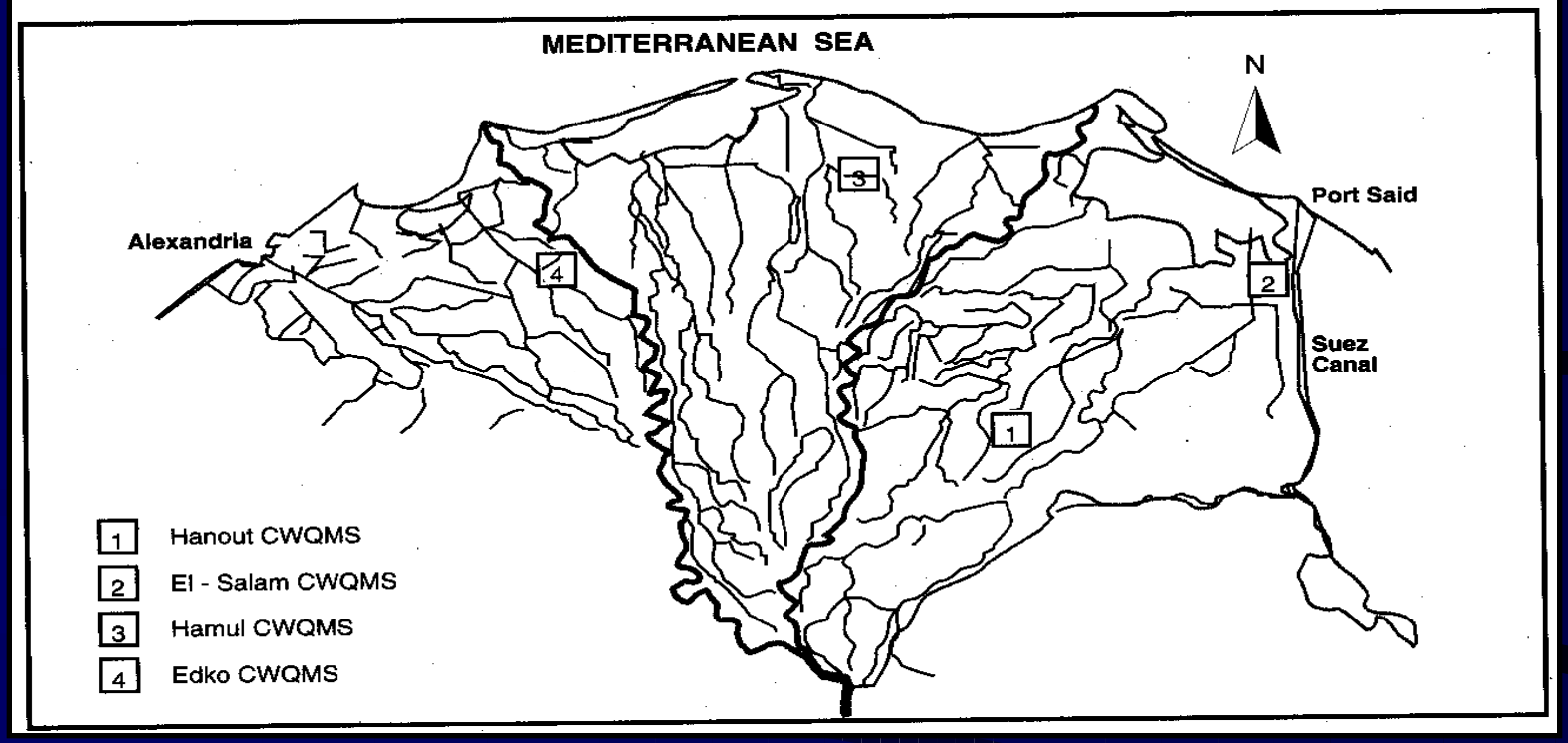
The monitoring network of the Nile delta



4.2 Automated Water Quality Monitoring Stations

- Four automated Water Quality Monitoring Station (CWQMS) were installed at strategic locations in the Nile Delta.

- Desk Study has been carried to identify sources of pollution to the drainage system.



Locations of the continuous water quality monitoring stations in the Nile Delta

- Intake of Hanout Irr. Pump station at Bahr Hadous Darin ;
- Intake of El-Salam 3 pump stations at Bahr Hadous drain;
- Intake of Hamul Irr. Pump station at Gharbia main

5) INFORMATION MANAGEMENT

- The supporting tools for managing to the end users are:

A powerful relational database capable of handling huge amounts of data.

Simulation models for evaluation the changes in surface water quality.

6) Modeling

- The SIWARE model & the three Delta models have been adjusted for integration to evaluate different water management strategies for the future.

- the input of SIWARE are:
  - The reuse of drainage water plans
  - The irrigation methods .
  - The municipal use of surface water

7) Drainage water quality status

- An extensive survey is available of the water quality in drainage system in the Nile Delta and Fayoum

- Data are now available for the years 1996-2000 and will be extended to allow for more analyses.

- The present monitoring results indicate that all drains suffer from domestic discharges and some drains receive

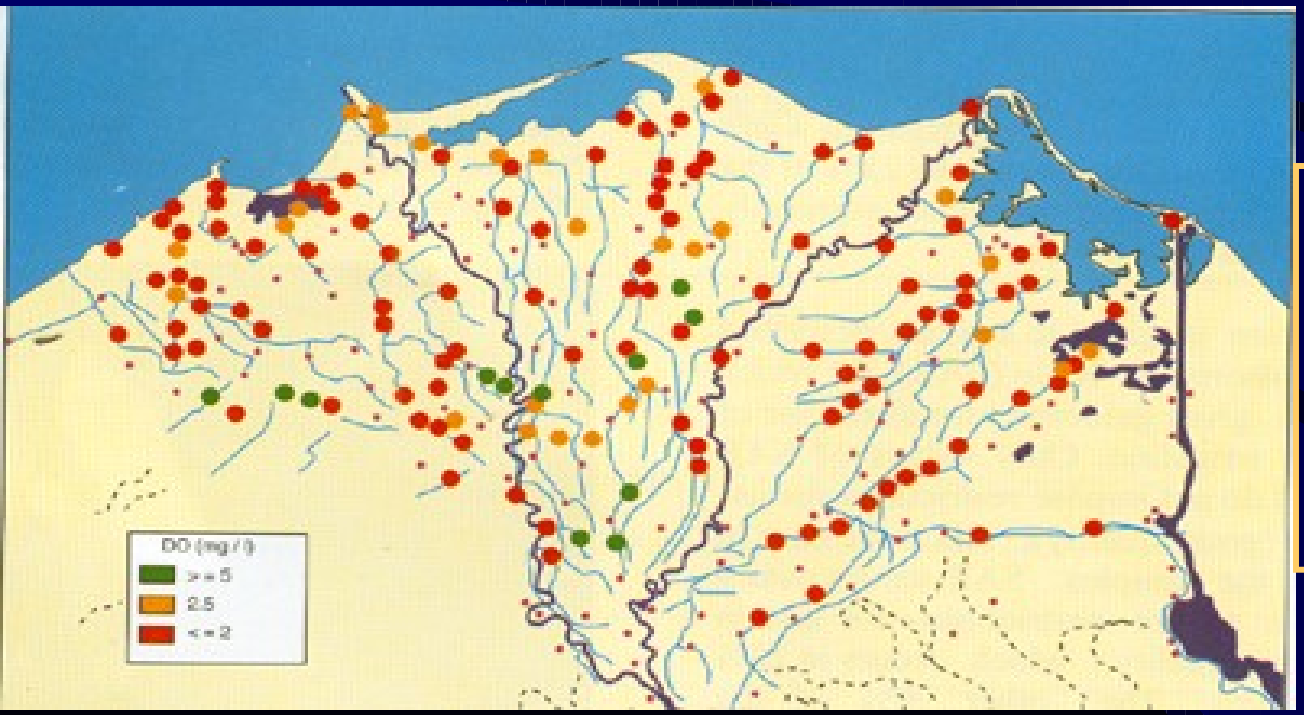
- **The most polluted drains are:**

The Bahar El Baqar in the Eastern Delta.

The Gharbia drain in the middle delta

The Umoum and Abu-Keer drins in the Western Delta.

Average BOD concentration in the Nile delta 1997



Av. Dissolved Oxygen concentration in the Nile delta 1997

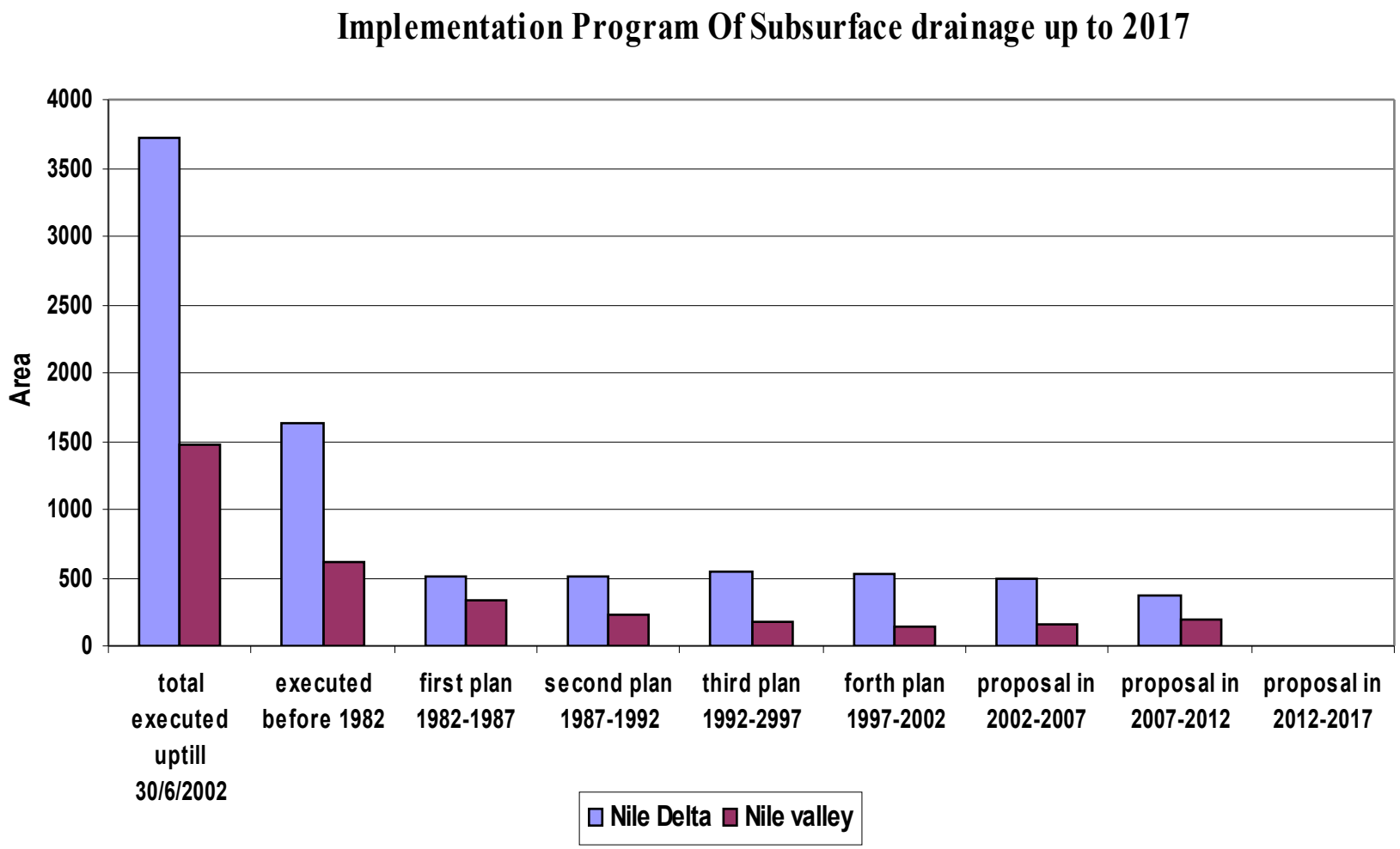
8) FUTURE DEVELOPMENT

- Preparation of the Central Laboratories for Environmental Quality Monitoring .
- The Drainage -monitoring networks is expanded into a national network.
- As more data become available,the statistical analysis for the data will be possible.
- computer models and techniques are expanded to include prediction of certain

Implementation program of subsurface drainage up to 2017

activity	total executed uptill 30/6/2002	executed before 1982	first plan 1982-1987	second plan 1987-1992	third plan 1992-2997	forth plan 1997-2002	proposal in 2002-2007	proposal in 2007-2012
	area	area	area	area	area	area	area	area
Nile Delta	3728	1640	509	507	552	520	500	372
Nile valley	1465	608	332	220	168	137	150	185
Total of subsurface drainage	5193	2248	841	727	720	657	650	557

activity	total executed uptill 30/6/2002	executed before 1982	first plan 1982-1987	second plan 1987-1992	third plan 1992-2997	forth plan 1997-2002	proposal in 2002-2007	proposal in 2007-2012
	cost	cost	cost	cost	cost	cost	cost	cost
Nile Delta	1670	310	124	277	459	500	720	600
Nile valley	782	130	82	107	213	250	292	300
Total of subsurface drainage	2452	440	206	384	672	750	1012	900


Implementation Program Of Subsurface drainage up to 2017
Area
4000
3500
3000
2500
2000
1500
1000
500
0
total executed uptill 30/6/2002
executed before 1982
first plan 1982-1987
second plan 1987-1992
third plan 1992-2997
forth plan 1997-2002
proposal in 2002-2007
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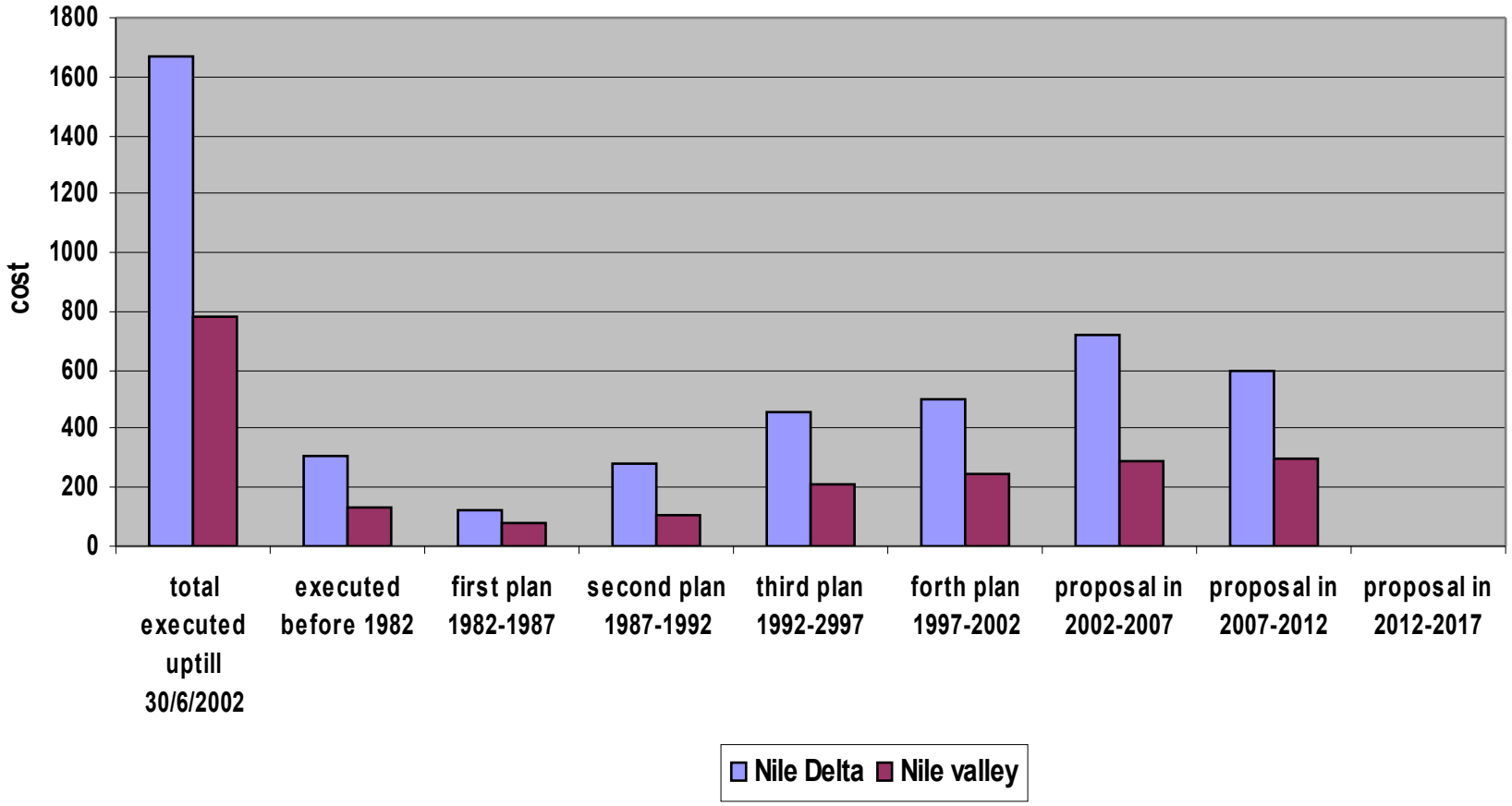
Nile Delta
Nile valley

Implementation Program Of Subsurface drainage up to 2017



Thank you for your attention