



WADI Project

***Sustainable management of coastal fresh water bodies:
a socio-economic and environmental analysis to enhance and
sustain stakeholders' benefits***

Maryuit Lake:

"A preliminary assessment"

2006

1. Geographical setting

Lake Maryuit is one of the northern Egyptian lakes, located in the north western coast of Egypt. The lake extends for 80 km along the North West coast of Alexandria and 30 km south and is divided into a number of basins by highways and railroads.

In contrast to other northern lakes in Egypt, Lake Maryuit is a closed lake, not connected with the sea. The average depth of the lake ranges between 0.55 and 1.2 meter. The level of water surface is -3 meter compared to Average Sea Level.

The area of the lake extends for about 20 km between 31° 01' 48" and 31° 10' 30" North and 29° 49' 48" and 29° 57' 00" East (Figure 2).

The lake is divided into five main basins; namely, 6000 Feddan¹ Basin, 5000 Feddan basin, 3000 Feddan Basin, 2000 Feddan Basin, and 1000 Feddan Basin (Figure 3). The main characteristics of each of these basins are shown in table (1).

¹ Feddan = 1 Acre



Figure (1): Lake Maryuit and Wadi Maryuit

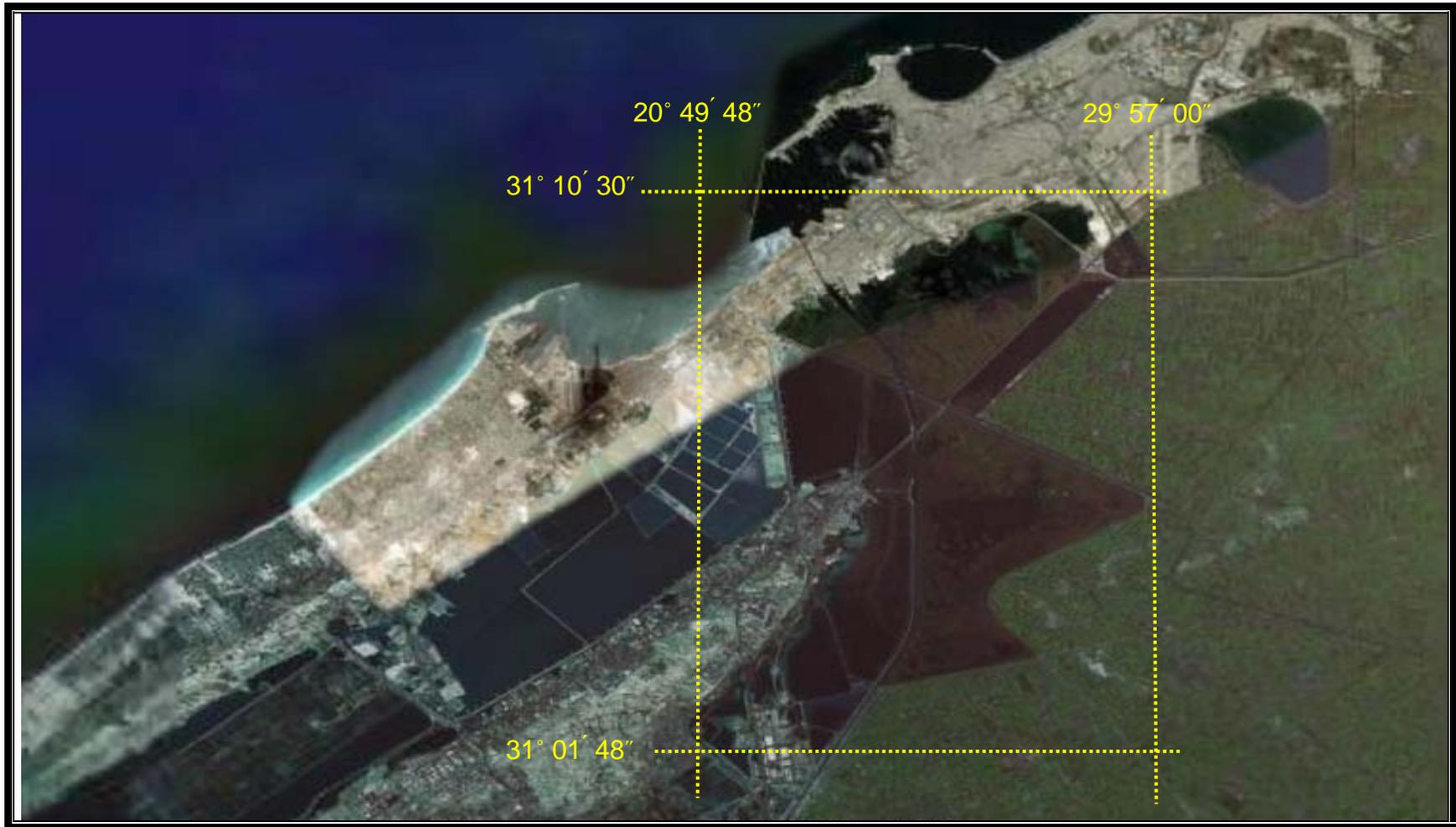


Figure (2): The extension of main basin

Table (1): The main characteristics of Lake Maryuit basins

S	Basin name	Depth	Vegetation cover
1	6000 Feddan Basin	0.5 – 3 m	60%
2	5000 Feddan basin	0.7 – 2 m	70%
3	3000 Feddan Basin	0.4 – 1.7 m	20%
4	2000 Feddan Basin	0.4 – 0.6 m	20%
5	1000 Feddan Basin	0.4 – 3 m	15%

2. Site characteristics

2.1 Physical characteristics of Lake Maryuit

Concerning physical characteristics of water, the following are the main parameters of water according previous work conducted in the lake:

Salinity : 42.2 (0/000)

POD : 0.56 mg/L

Heavy Metals

Fe : 8.1 (µg/L)

Ni : 0.09 (µg/L)

Zn : 0.225 (µg/L)

CU : 0.450 (µg/L)

Pb : 0.379 (µg/L)

Hg : 0.0125 (Nano gram/L)

2.2 Socioeconomic and cultural aspects

In general, fishing activities is one the most dominant economic activities in the lake. Fisheries of Lake Maryuit were characterized, historically, by large fish production in terms of quantity and quality. There's, also, the aquacultures, which occupy wide areas of the lake.

According to recent statistics, there are 2073 fishing boats in the lake and 20000 fishermen. Taking into consideration that the average family size is 4-5 persons, this means that about 100000 inhabitants rely on fishing activities in the lake to earn their livelihood.

Recently, it was estimated that the total fish production, including fish catch and aquacultures was 5000 tons annually, which means an annual production value = L.E. 35 million.

However, fishing activities have been declining steadily due to deterioration of water quality of the lake and filling of large areas for land acquisition purpose.

Table (2): Fish production in Lake Maryuit during the period 1984 - 2005

Year	Production (Ton)	Year	Production (Ton)
1984	6600	1995	3500
1985	7700	1996	4000
1986	8800	1997	4500
1987	8100	1998	4500
1988	7100	1999	5200
1989	3500	2000	6400
1990	1900	2001	6200
1991	2200	2002	5300
1992	2500	2003	4900
1993	4000	2004	5200
1994	3500	2005	5600

Source: General Authority of Fisheries.

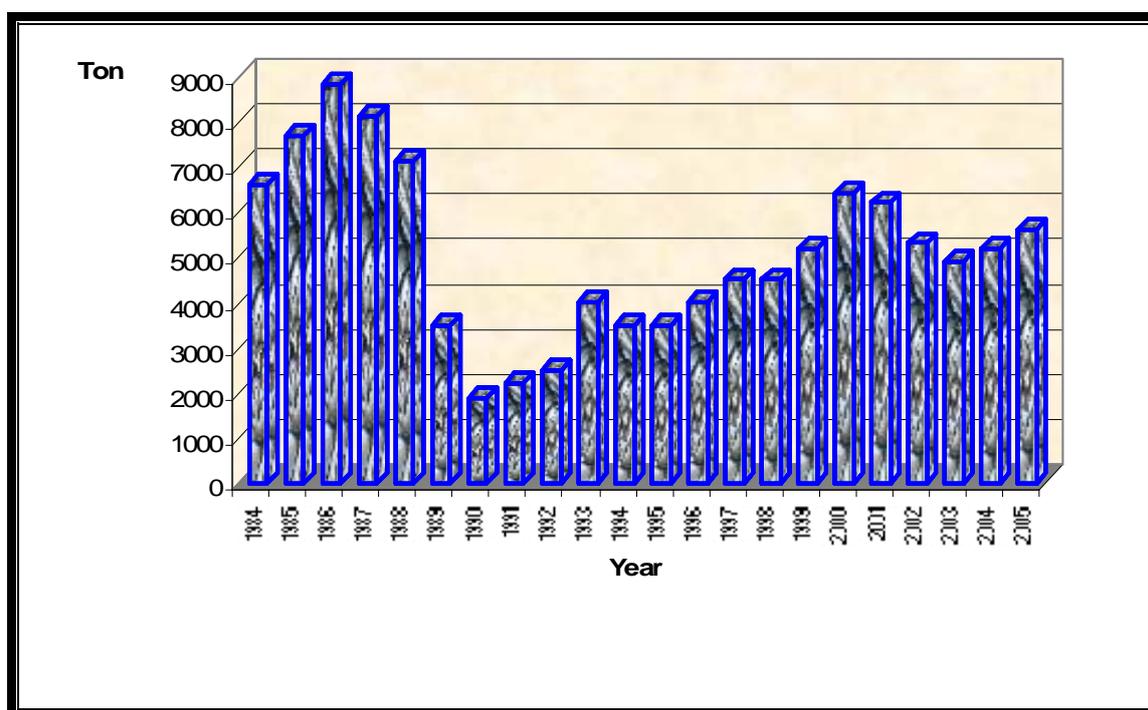


Figure (3): Fish production in lake Maryuit during the period 1984 - 2005

Source: General Authority of Fisheries.

It should be noted that, despite fluctuation of fish production during the last decade, fish catch from the lake is apparently declined.

Nearby the lake there is a wide area of newly-reclaimed land which includes a number of human settlements, mainly rural. Most of these settlements discharge their domestic wastewater (sewage) into irrigation and drainage canals, which discharge their water ultimately into the lake through El Qallah drain.

Also there is an industrial complex nearby the lake (mainly petrochemical industries), these industries discharge industrial wastewater into the lake after some sort of treatment.

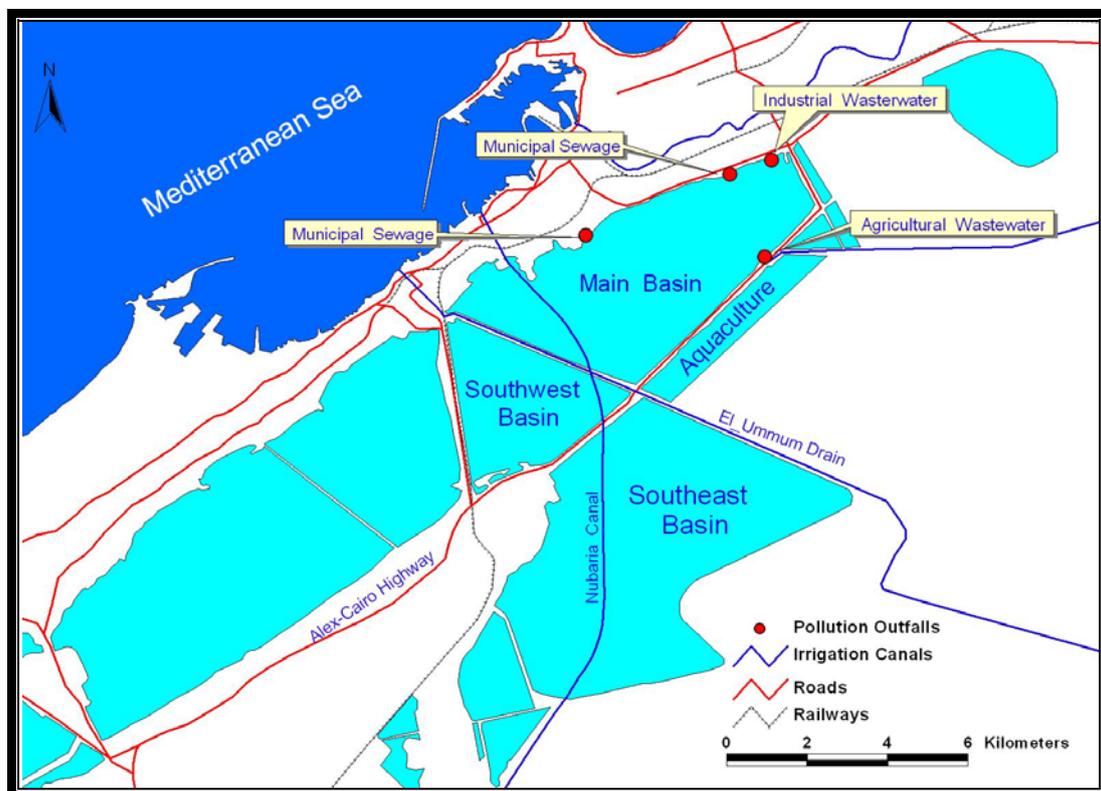


Figure (4): Divisions of Lake Maryuit and pollution outfalls

The area surrounding Lake Maryuit has some small-size cluster of population consisting mainly of fishermen.

2.3 Legal framework:

The area of the lake is managed according to Law 124 of 1983, which organizes the fishing activities in the Egyptian lakes.

According to this law:

- The General Authority of fisheries, Ministry of Agriculture, is the main agency that is responsible for managing the lake (Article 2).*
- It is forbidden to discharge industrial waste water, pesticides or any similar toxic or radioactive compounds into the water (Article 15).*
- It is not forbidden to fill in or drying any parts of the lake (Article 20).*

In addition, Law 4 of 1994 "Law of Environment", assigns the responsibility of protecting the environment and monitoring the discharges of various activities into the environment to the Ministry of state for Environment.

4. Main stakeholders and their interests

The case of Lake Maryuit involves a large number of stakeholders at both national and local levels with sometimes conflicting interests.

5.1 Stakeholders at national level

The main stakeholders at national levels may include:

a. Ministry of Irrigation and Water Resources:

The Ministry uses the Lake to dispose of agricultural wastewater into the lake. The main interest of the ministry is to keep the level of water in the lake as low as possible, to use the lake in emergency cases to discharge excessive drainage water.

b. Ministry of Agriculture:

The ministry, which is represented by General Authority of Fisheries, attempts to attain effective use of lake in fish production.

c. Ministry of Housing and Reconstruction:

Through development schemes, the ministry constructed a number of new roads subdividing the lake into small basins, which may lead finally to shrinking the area of the lake.

d. Ministry of Environment:

The ministry represents the main body responsible for environmental quality in Egypt and is interested in protecting and improving environmental conditions in the lake.

5.2 At local level

The main stakeholders at local level may include:

a. Alexandria Governorate:

The governorate represents the local authorities. Due to urban expansion and the increasing needs for land, the governorate filled in some areas to acquire more land. The governorate is also interested in creating investment opportunities from the lake.

b. Alexandria Sewerage Authorities:

Alexandria sewerage authorities dump municipal sewage water into the lake mostly after primary treatment.

c. Industrial Enterprises:

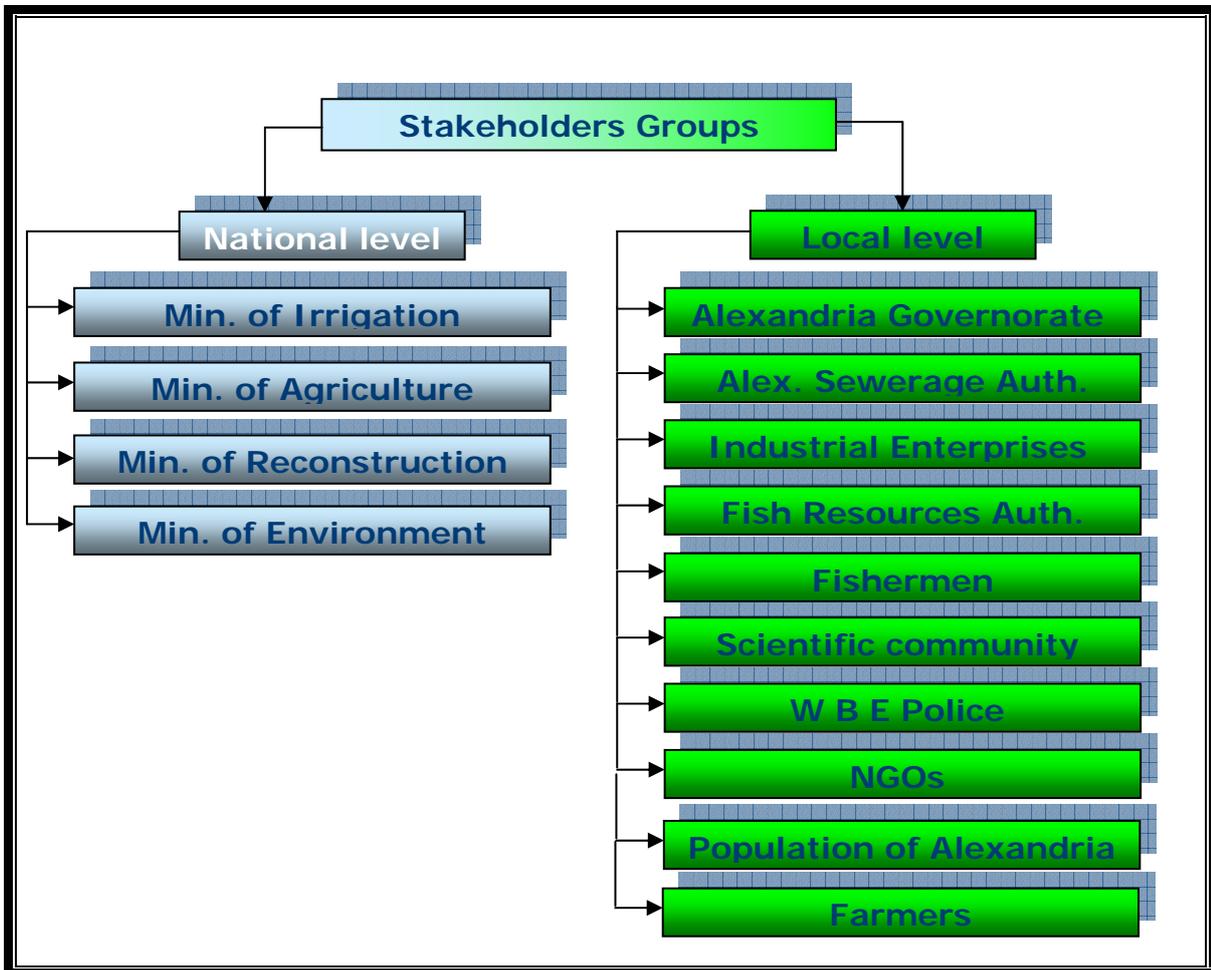
Some of the nearby industrial firms either discharging their industrial wastewater into the lake or using the Lake water for cooling purposes. Not all these firms discharge their wastewater into the lake after treatment.

d. Fishermen and fish traders:

This group of stakeholders involves fishermen and fish traders, who either lost their jobs and source of income or their jobs and income levels, are highly undermined due to deteriorating quality of water.

e. Scientific community:

This group is represented by Alexandria University with its various academic institutions conducting a number of research work on the lake.



*Figure (5): List of stakeholders groups
at both national and local levels*

f. Water Bodies and Environment Police:

The WBEP are responsible for maintaining the water body of the lake and enforcing the Law 4 of 1994 "Law of Environment".

g. NGOs:

This group of stakeholders is interested in protecting the environment and supporting the common causes of the population of Alexandria.

In addition to above-mentioned groups of stakeholders there are the farmers living and working in the area located to the south of the lake.

There is also, the population of Alexandria in general who have a stake in its natural resources, including the lake.

5. Areas of concern in Lake Maryuit

The preliminary assessment of the current situation of Lake Maryuit highlighting a number of areas of interest including:

5.1 Deteriorating water quality

Due to the discharging of industrial, agricultural wastewater and some municipal wastewater into the lake, the water quality of the lake has declined considerably. This decline in water quality is continuing despite partial treatment of some discharged industrial and municipal wastewater.

5.2 Declining area of the lake

The area of the lake has decreased due to filling in activities to acquire land for urban development of Alexandria city. In this context, it was estimated that the area of the lake

decreased from 38,000 Feddans in 1952 to 17,000 Feddans in 2000. This means that during the 2nd half of 20th century the area of the lake has declined to 50% of its original area.

Table (3): changes in Lake Maryuit area between 1952 - 2005

Year	Area (Feddans)
1950	60000
1965	48800
1985	17000
2005	16000

Source: General Authority of Fisheries

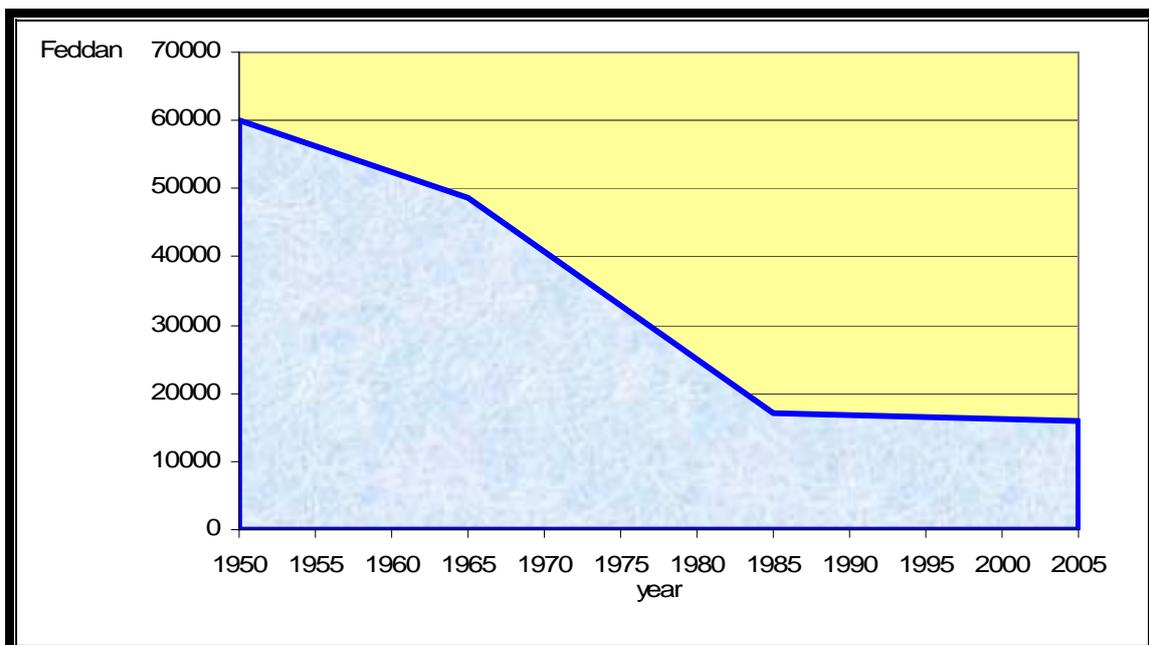


Figure (6): development of lake Maryuit area over the period 1952 - 2005

Source: General Authority of Fisheries

5.3 Spreading of vegetation

Due to increasing concentration of organic matter in the lake, the vegetation cover has increased, covering wide areas of the lake. Such an increase in vegetation cover affects adversely the fishing activities.

It should be noted also that the increasing vegetation cover affect adversely the fish production in the lake as it reduce water circulation in the lake. Furthermore, such large vegetation cover speeds up the process of sedimentation.

5.4 Declining fish production

As a result of continuous deterioration of water quality of the lake, the fishing production has considerably declined during the past two decades in terms of both quality and quantity. The fish caught is usually contaminated with heavy metals and other pollutants affecting it suitability for human consumption.

5.5 Aesthetic problems

The high levels of pollution cause bad smell and odor from the lake.

6. Conclusion²:

The main real issues can be in two main issues:

- *Pollution problems in the lake.*
- *Declining area of the lake.*

² *Based on the outcome of a three days stakeholders consultation meeting in Cairo and Alexandria.*

Concerning pollution problems we have past massive discharge, which affect water and sediments. Also, we have current discharges into the lake represented in:

- El Qalaa drain: domestic sewage, industrial and agricultural wastewater.*
- Al Omum drain: agricultural wastewater.*
- Domestic Sewage (treated or not).*
- Numerous illegal discharges.*

Concerning Declining area of the lake, there are:

- Land filling.*
- Illegal encroachment on the lake vicinity.*

The main causes of these problems can be summarized in:

- Mismanagement:*
 - Misinformed decisions*
 - Unclear Institutional setup: The lake is currently managed by a wide range of authorities at both local and national levels.*
 - Large number of stakeholders with conflicting interests*
- Lack of financial resources & misallocation of what exist*

Figure (7) illustrates the methodology of the work at Lake Maryuit site in the next stage.

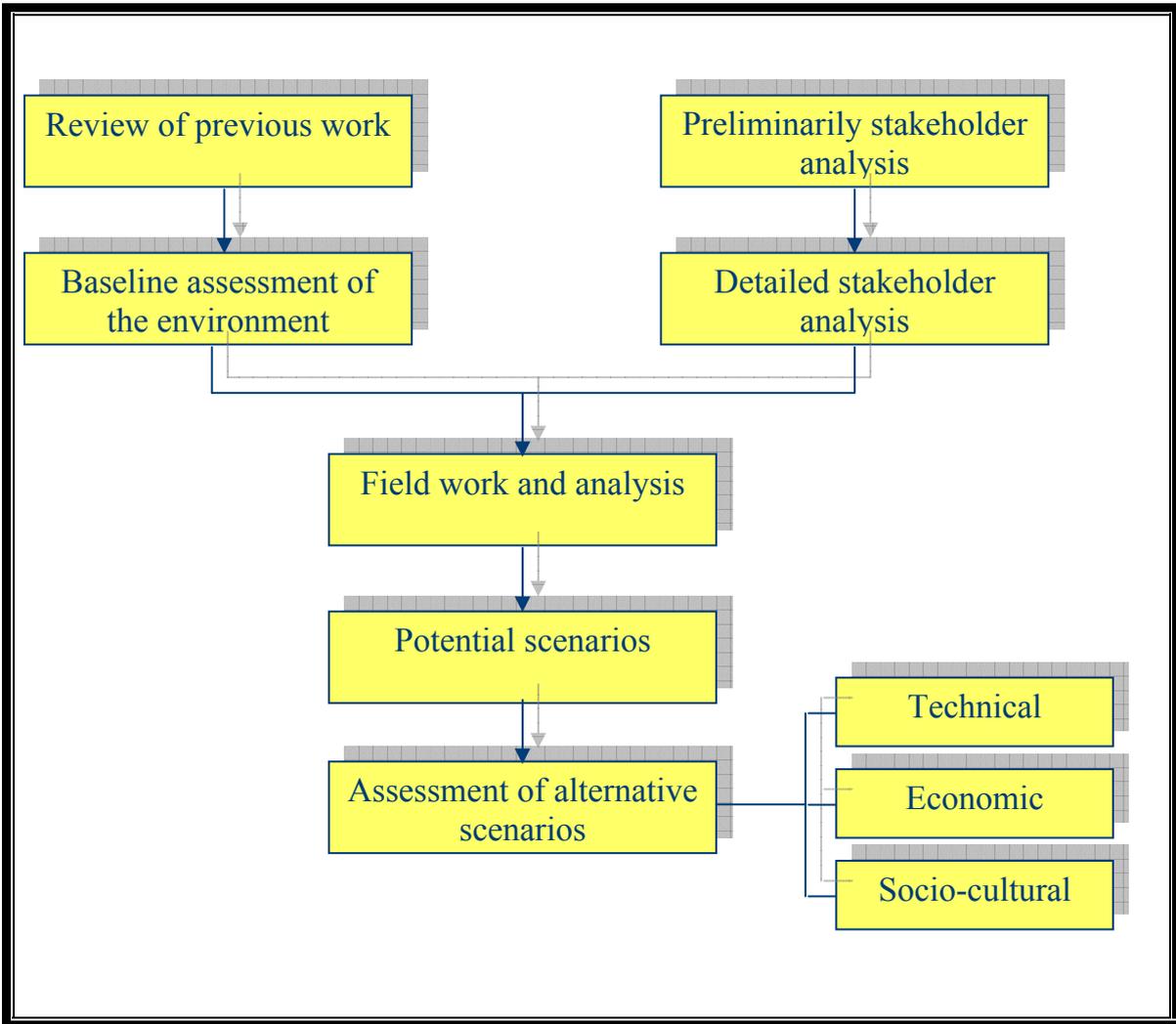


Figure (7): Work methodology at Egyptian site (lake Maryuit)