Arab Republic of Egypt
Ministry of State for Environmental Affairs
Egyptian Environmental Affairs Agency

Alexandria Integrated Coastal Zone Management Project (AICZMP)

Environmental and Social Impact Assessment

Executive Summary

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CURRENCY EQUIVALENTS

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ABREVIATIONS

AFD	French Agency for Development
AICZM	Alexandria Integrated Coastal Zone Management
ALAMIM	Alexandria Lake Mariout Integrated Management
ASDCO	Alexandria Sanitary Drainage Company
B.C.	Before Christ
BOD	Biological Oxygen Demand
BP	Best Practice
CAA	Competent Administrative Authority
CEDARE	The Center for Environment and Development for the Arab Region and Europe
CEO	Chief Executive Officer
cm	Centimetre
COD	Chemical Oxygen Demand
Cr	Chrome
Cu	Copper
CW	Constructed Wetland
CZM	Coastal Zone Management
DO	Dissolved Oxygen
DRI	Drainage Research Institute
EA	Environmental Assessment
EEAA	the Egyptian Environmental Affairs Agency
EGP	Egyptian Pound
ESIA	Environmental and Social Impact Assessment
EIB	European Investment Bank
ESMP	Environmental and Social Management Plan
EMU	Environmental Management Unit
EPAP	Egypt Pollution Abatement Project
ESIA	Environmental and Social Impact Assessment
ETP	East Waste Water Treatment Plant
FRP	Fiber Reinforced Polymer
GAFRD	General Authority for Fish Resources Development
GDCZM	General Directory for Coastal Zone Management
GEF	Global Environment Facility
GOE	Government of Egypt
HP	Horse Power
HRT	Hydraulic Retention Time
ICZM	Integrated Coastal Zone Management
IWLEARN	International Waters Learning Exchange and Resource Network

JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
Kg	Kilogram
Km	Kilo Meter
Km2	Square kilometre
kW	Kilo Watt
kWh	Kilo Watt hour
M	Meter
M&E	Monitoring and Evaluation
M3	Cubic meter
M3/d	Cubic meters per day
MALR	Ministry of Agriculture and Land Reclamation
MAP	Mediterranean Action Plan
Mg/l	Milligram per liter
mm	Millimetre
MSEA	Ministry of State for Environmental Affairs
MWRI	Ministry of Water Resources and Irrigation
N	Nitrogen
NCICZM	National Committee for Integrated Coastal Zone Management
NGO	Non Governmental Organisation
NH4	Ammonia
Ni	Nickel
NO3	Nitrates
O2	Oxygen
OP	Operation Policy
P	Phosphorous
Pb	Lead
PIT	Project Implementation Team
PM10	Particulate Matter
PMU	Project Management Unit
ppm	Part per million
PRP	Pollution Reduction Project
PRP	Pollution Reduction Project
PSC	Project Steering Committee
PWG	Project Working Group
Qrt	Quarter
RBO	Regional Branch Office
RPF	Resettlement Policy Framework
Sec	Second
SFD	Social Fund for Development
SMAP	Short and Medium term priority environmental Action Program

T	Ton
TSS	Total Suspended Solids
UNEP	United Nations Environment Programme
US$	United States Dollar
WB	The World Bank
WTP	West Waste Water Treatment Plant
WWTP	Waste Water Treatment Plant
Zn	Zinc

INTRODUCTION

The Government of Egypt, represented by the Egyptian Environmental Affairs Agency (EEAA) is currently preparing the Alexandria Integrated Coastal Zone Management Project (AICZM) which has the following main objectives:

a. to supply a strategic framework and immediate small- scale investments to reduce the load of land- based sources of pollution entering the Mediterranean Sea in the hot spots of El Mex Bay and Lake Mariout; and
b. to protect/restore globally significant coastal heritage and ecosystem processes by supporting the Government of Egypt's efforts to develop and implement a National Coastal Zone Management Plan.

This proposed project is developed with assistance from the World Bank (through a grant from the Global Environment Facility (GEF)) which continues to provide support to the Government of Egypt for improving its environmental management capabilities and to demonstrate the value added of an integrated and participatory approach to coastal zone management for sustainable development. The project is partially blended with the ongoing Second Egypt Pollution Abatement Project (EPAP II) implemented by the Egyptian Environmental Affairs Agency (EEAA), which aims at reducing industrial pollution in two hot spots in Egypt, namely Alexandria (primarily Lake Mariout) and Greater Cairo.

Purpose of the Report

The Alexandria Integrated Coastal Zone Management Project is expected to have important positive environmental impacts with the objective of contributing to a reduction in the load of land-based sources of pollution entering the Mediterranean Sea, especially from Lake Mariout, through the hot spots of El-Mex Bay and Alexandria.

The main purpose of this ESIA is to investigate potential impacts of the proposed main intervention projects on both the environment as well as the community living around near Lake Mariout.

Rationale of the Proposed Project

Lake Mariout is now considered a major source of pollution to the Mediterranean Sea through El Mex Bay. It is one of the major sources of conveyance of land based pollution to the El-Mex Bay. Lake Mariout receives polluted water from three major sources on a daily basis:

- Industrial effluents: Various industries discharge directly their effluents into the Lake or El Mex Bay.

- Domestic effluents: Two wastewater treatment plants discharge their primary treated effluents into the Lake Mariout.

- Drainage water from agriculture: The Lake receives an important part of agricultural drainage water coming from secondary drains and agricultural

activities upstream, bringing pesticides, nutrients along with organic matter from animal farming and domestic wastewater of nearby villages.

As a consequence of the environmental degradation, Lake Mariout has changed from being the most productive fisheries resource to the least productive in a couple of decades.

The proposed project will use a *two pronged approach* to sustainable coastal zone management including:

a) Use of institutional strengthening measures and
b) Pollution reduction interventions.

Given the scale of the environmental degradation in Alexandria, the project in itself may only contribute marginally to the reduction of pollution ultimately entering the Mediterranean Sea. However, its main advantage and value added reside in its catalytic function to trigger consensus building, awareness raising and institutional strengthening on sustainable coastal management using pilot investment interventions as a platform to bring all stakeholders closer on the issue. Besides, the project provides complimentarity with the two other ongoing related activities, namely the EPAP II project, and the Government of Egypt's project to upgrade the East and West Wastewater Treatment Plants in Alexandria. This is shown graphically in the Fig. 1.

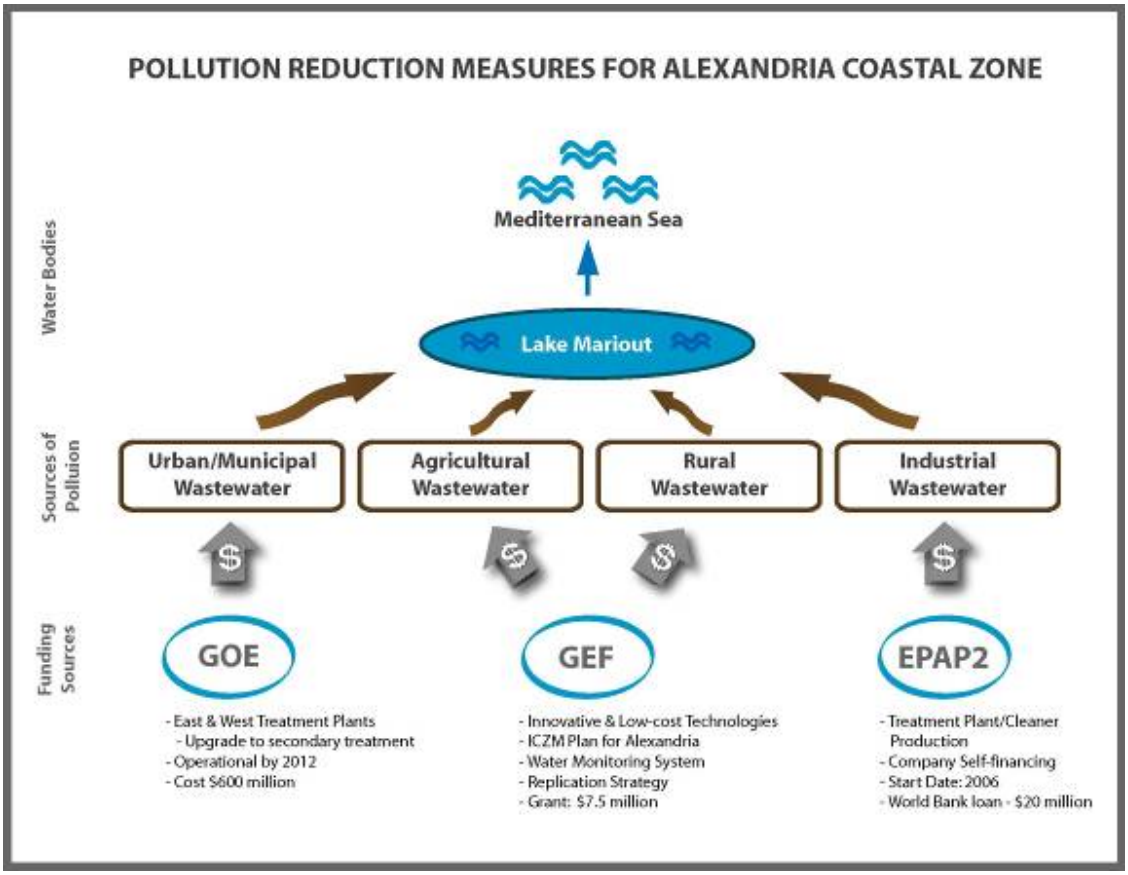

Figure 1: Complementarities of the proposed project with other on-going activities

POLICY, LEGAL AND REGULATORY FRAMEWORK

The Integrated Environmental and Social Assessment for the project must meet a number of policy and legal requirements associated with the environment, social issues and resettlement. The World Bank safeguard policies and the Egyptian Environmental Protection Law No. 4/1994 (amended by Law 9/2009), Law No. 48/1982 concerning the protection of River Nile, canals and drains, and detailed requirements for conducting EA as defined in Law 4/1994 have been complied with during the course of project preparation and implementation.

Concerning Coastal Zone Management in Egypt, Law No. 4/1994 for the environment (as amended by Law 9/2009) includes articles defining the coastal zones (art. 39) and the Integrated Coastal Zone Management (art. 40 & 48). The amended law also assigns to the Minister of State for Environment, a coordinating role with the relevant agencies/stakeholders to achieve the water protection and integrated coastal zone management objectives. Specifically, the EEAA was given the authority to "participate with the concerned agencies and ministries in the preparation of a National Integrated Coastal Zone Management Plan for the Mediterranean Sea and Red Sea coasts".

Institutional framework and Management Arrangements

EEAA is the agency responsible for overall project implementation. Together with the Governorate of Alexandria, the EEAA will also lead the coordination work with other implementing agencies, including the MWRI and the MALR. The institutional arrangements have been designed to ensure a multi-sector and participatory approach to sustainable Coastal Zone Management and to build on the technical expertise and comparative advantage of the different agencies. Synergies and cross-fertilization with the EPAP II PMU staff at EEAA will be ensured.

Project Description

The main objective of the project is to improve the institutional mechanisms for sustainable coastal zone management in Alexandria in particular to reduce land-based pollution to the Mediterranean Sea.

The proposed key outcome indicators of success are:

- The AICZM plan is officially adopted and the institutional mechanisms for implementation are successfully implemented;
- The pollution load entering the Mediterranean Sea through Lake Mariout is reduced by at least 5%.

The proposed project is composed of 3 components. These are:

Component (1): Planning, Institutional Capacity and Monitoring

This component is intended to help increase the institutional capacity of the relevant agencies involved in the management of Lake Mariout, in particular, and the coastal zone in Alexandria, in general. The outputs for this component will include:

(i) a master plan for the management of the coastal zones of Alexandria including Lake Mariout (the "Alexandria Coastal Zone Management (AICZM) Plan"), and

(ii) the development of a water quality monitoring network to assess impact of project interventions including a modeling activity for El-Mex bay..

The recommendations of the ACZM Plan will be reflected in the future land use plan for the city of Alexandria.

Component (2): Pollution Reduction.

The expected outcome is a reduction in the land-based source of pollution entering the Lake Mariout and subsequently the Mediterranean Sea through pilot pollution reduction measures. This will entail the implementation of a package of pollution reduction measures, to be implemented on **a pilot basis**,

The proposed interventions should be adequate to achieve the desired outputs within the overall project objectives if implemented in an **integrated package approach** which is composed of:

1. In-Lake Wetland
2. In-Stream Biofilm
3. In-Stream aeration
4. Reeds removal

The following is a brief description of each intervention independently.

Intervention 1: In-Lake Wetland

The most suitable location for the engineering wetland has been selected to be the East-Southern part of the lake at the outfall of El-Qalaa drain (Figure 2). This aims to neutralize the negative impact of pollutants entering the lake, to utilize the high nutrients input and increase the dissolved oxygen, directly and indirectly, and improve the water quality entering the other parts of the lake.

Figure 2: Preliminary Layout of the Proposed In-Lake Engineering Wetland

Conceptual Design:
An area of approximately 30 feddans has been chosen for the proposed wetland construction. The area will be facing the Qalaa Drain out-fall, and will be cleared from vegetation (reeds), excavated to depths of 2 m and surrounded by earthen/rock walls to isolate this part from the lake. This area will be then subdivided into a number of Plug-Flow units where duckweeds will be transplanted. Duckweed ponds can be qualified as secondary or tertiary treatment.

Intervention 2: In-stream Biofilm

The in-stream biofilm approach is considered to remove or reduce the organic pollutants by adapting the severely polluted segments of the drains to act as large plug-flow anaerobic/aerobic biofilm reactors in which bacterial culture will be intensified.
A specific location for applying the in-stream biofilm approach has been selected and it lies at the height of Qalaa Pumping station (Location “A” shown in Figure 3).

Figure 3: Location for Biofilm Application in Qalaa Drain

Conceptual Design:

Packing media: One meter length of corrugated collecting pipes for drainage water (used for sub-drains, 3 inch PVC is selected to be the packing media for the case of Al Qalaa Drain. The in-stream biofilm system is designed to be applied in 500 sections along the selected segment of the Qalaa Drain

Intervention 3: In Stream Electric powered Aeration

This application is utilized to increase the dissolved oxygen which will improve the drain conditions and thus self purification. It also helps in the consumption of COD/BOD as well as the conversion of ammonia into nitrates. The aerators selected will be energy efficient in a way that converts the least amount of energy into the maximum amount of aeration and mixing. The chosen location for this application is upstream at Location "A" by the Qalaa pump station to ensure to raise the DO in the drain.

Intervention 4: Reed Removal

Reed removal is considered a base intervention that will potentially improve water circulation in the basin, thus both improving its aeration and entraining some of the deteriorated sediments.

Figure 4: Area of Intervention for Reed Removal

Component (3): Project Management and Monitoring and Evaluation.

The expected outcome is the completion of a M&E system and the documentation of the project results for the purpose of up-scaling and replication. The outputs of this component include

1. a project monitoring system with measurable indicators; and
2. documentation of project's progress and results, dissemination of lessons learned from the project and adoption of a replication strategy.

This component entails supporting the Project Management Unit (PMU) currently associated with the EPAP II to carry out the various activities related to the project implementation.

SOCIO-ECONOMIC CONDITIONS

The fishermen community as a whole forms the poorest and most disadvantaged group in the target area. They are mainly located in inaccessible areas from land, as the infrastructure is limited or non-existent. The problems in reaching these communities with services and interventions have developmental, economic and social impacts. Fishing cannot be carried out throughout the year, and in the idle periods they lack alternative employment opportunities. The main demographical characteristics specified are:

- High illiteracy rates (especially that of females).
- Poor health services and high mortality rates.
- High crime rates Tendency to marry young and have large families

The following are specific recommendations the fishermen suggested for the development of the lake area:

- removing reeds and aquatic plants and opening channels in heavily vegetated areas,
- Stopping all filling activities,
- Ensuring that families are given fair compensation in case of their resettlement due to highway construction projects,
- Issuing fishing permits only to those fishermen who have been resident in the area for a long time,
- Providing health care centers in accessible areas, and
- Providing the community with soft loans for improving their fishing equipment.

POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS

The Global benefits expected from the project include:

- reducing trans-boundary pollution from Lake Mariout to the Mediterranean Sea.
- improving Lake Mariout's biodiversity.

Local benefits include:

- Potential sales of duckweeds
- Improved air quality
- Increase in fish production

Component (1): Planning, Institutional Capacity and Monitoring

Although this component has no direct impact on the environment, yet its indirect positive impacts are obvious. Strengthening the management and institutional capacity of the relevant agencies that are responsible for managing Lake Mariout will ensure that improvement programs for the Lake will be properly implemented and continuously monitored.

Component (2): Pollution Reduction

This component with its proposed intervention will result in improving the water quality of Lake Mariout. Although it is determined that the interventions under this component will be implemented as demonstration or pilot projects, the pre-feasibility studies expect some improvement in the Lake water quality.

The expected positive impacts of Component 2 can be summarized as follows:

- improvement of Lake Mariout water quality by reducing at least 5% of the pollution levels
- The fish yield is expected to increase due to the improvement of water quality
- Application of low-cost technologies as pilot projects provides a chance for scaling-up the project in the future to achieve more significant water quality improvement

- The interventions can be demonstrated as an appropriate model for replication in other polluted lakes in Egypt
- Reed removal will allow fishermen to have better access to fishing grounds and will remove a major source of problems in the Lake

Component (3): Project Management, Monitoring and Evaluation

The completion of the comprehensive monitoring and evaluation scheme for the project ensures the timely delivery of the entire project's activities. This will have an indirect positive environmental impact due to the assurance of the smooth implementation of the project and monitoring the progress of each of the project intervention programs.

Anticipated Negative Impacts

Impacts during Construction

Both components (1) and (3) have no physical interventions and there are no anticipated negative impacts associated with them.

Component (2) is mainly an environmental improvement intervention that aims at reducing pollution levels in Qalaa drain and the Main Basin of Lake Mariout. The technologies used are simple and do not include sophisticated equipment or use of any chemicals or hazardous materials. However, an assessment of some of the impacts that might be associated with the construction and operation of the proposed interventions will ensure achieving the desired goals and minimize the risks of negative results.

The following table summarize the potential negative impacts resulting from Component (2) and their impact rating.

Table 1: Overall Environmental Impact Assessment Matrix

Activity	Environmental Aspects	Environmental Receptors Affected							
		Air	Soil	Water Bodies	Aquatic Ecosystem	Terrestrial Ecosystem	Noise	Health & Safety	Overall Impact
Impacts during Construction									
Installation of In-Stream Biofilm	Transportation of materials and personnel	L	N	N	N	N	L	L	**L**
	Storage of construction material on drain sides	N	L	N	N	L	N	N	**L**
Dredging	Use of heavy machinery	L	N	N	N	N	L	L	**L**
	Temporary storage of excavated contaminated sediments	N	H	N	N	M	N	M	**H**
	Disposal of excavated contaminated sediments/sludge	N	H	N	N	H	N	M	**H**
	Degradation of water quality	N	N	L	L	N	N	L	**L**
	Disruption of aquatic ecosystems	N	N	N	M	N	N	N	**M**
Removal of Reeds	Use of heavy machinery	L	N	N	N	N	L	L	**L**
	Disruption of aquatic ecosystems	N	N	N	M	N	N	N	**M**
	Temporary storage of contaminated reeds	N	L	N	M	L	N	N	**L**
	Disposal of contaminated reeds	M	M	N	N	M	N	M	**M**
Construction of In-Lake wetland	Introduction of alien aquatic plant species	N	N	N	M	N	N	N	**M**
Impacts during Operation									
Maintenance of the in-stream biofilm	Cleaning and disposal of biofilm parts	N	L	L	N	N	N	N	L
Maintenance of In-Lake wetland	Removal, recycle or disposal of duckweeds	L	L	N	L	L	N	H	H
Use of electrically driven aerators	Consumption of fossil-based energy	L	N	N	N	N	N	N	L

N: Neutral or Negligible
L: Low
M: Moderate
H: High

Socio-economic impacts

The proposed project with its 3 components aims at improving the lake management schemes as well as reducing the environmental pollution in the lake. Although the expected pollution reduction in the lake is not expected to be high, yet any small improvement will result, on the long run, in increasing the fish yield and decreasing the health risks associated with fishermen activities in the lake.

As revealed in the public consultation and previous interviews with fishermen, the main basin, where the project is located, is not currently considered as fishing grounds for the fishermen due to the density of the reeds in that basin in addition to the high pollution levels in the shallow waters in the proposed project site. The fishermen actually requested that the implementation of the project starts as soon as possible due to the expected positive impacts of the interventions.

As for Qalaa drain, no fishing is taking place in the drain due to the high levels of pollutions in its waters. Generally, the drains are not a source of revenue and none of the pollution reduction activities on the drain would result in any land take nor would interfere with any of the economic activities of the residents.

In terms of the long term possible socio economic impacts of developing the Integrated Coastal Zone Management Plan, the project does include a set of checks and balances to ensure that social impacts, especially on marginalized groups, from the plan implementation is minimized, through the following:

(i) The National Committee on Coastal Zone Management Plan, which provides the ultimate oversight on coastal zone management issues in Egypt, including the endorsement of the development of the Integrated Coastal Zone Management Plan, includes representatives from nongovernmental organizations

(ii) The Project Steering Committee includes a representative from the Lake Mariout Development Committee, which represents the interests of the local communities, in particular the fishermen community during project implementation; as well as representatives from the civil society.

(iii) Financing for the project's first component will include "public consultation workshops and master plan dissemination", which will ensure that the views and interests of the civil society agencies are well represented.

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The principal purpose of the Environmental and Social Management Plan (ESMP) is to present a set of mitigation, monitoring, and institutional measures to be taken during planning and design, construction, operation and maintenance of the various project components and activities associated with potential negative impacts. The objective of these measures is to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels.

Institutional Arrangements

Management Setup

This Project is implemented through the coordinated efforts of four Ministries/Agencies:

- Egyptian Environmental Agency Authority (EEAA),
- Governorate of Alexandria,
- Ministry of Water Resources and Irrigation (MWRI); and
- Ministry of Agriculture and Land Reclamation (MALR).

EEAA is the executing agency ultimately responsible for the overall project implementation, and for leading the coordination activities with the other implementing agencies according to their specific roles and responsibilities.

A ***Project Steering Committee*** (PSC) will be established to provide oversight and direction to the project

The ***National Steering Committee for Integrated Coastal Zone Management*** will provide scientific advice and inputs into the preparation of the Alexandria Integrated Coastal Zone Management Plan serving as a scientific and advisory body in particular for Component (1) during the preparation stage.

Within the project's context, a ***Project Management Unit (PMU)*** will be established and staffed with the needed expertise required to manage and operate the project. Furthermore, an Environmental Specialist will be assigned by the EEAA on a part-time basis to address the environmental safeguards issues related to the project and oversee the implementation of the ESMP.

Summary of Impacts and Mitigation Measures

Potential negative environmental and social impacts that have been identified and ranked as "High", "Moderate" or "Low" are presented It is recommended to adopt and implement a series of mitigation measures as follows:

Table 2: Mitigation Measures and Associated Institutional and Financial Responsibilities

Environmental/Social Aspect(s)	Environmental/Social Impact(s)	Proposed Mitigation Measure(s)	Responsibility		Timeframe	Cost (US$)
			Implementation	Monitoring		
Transportation of materials and personnel	Air Pollution Health and Safety	Only vehicles which passes the legal environmental tests for exhaust are allowed to have access to the site. Drivers to be provided with Safe Driving Instructions H&S signs and gear should be available on site	Contractor in coordination with MWRI	PMU	Whenever materials or personnel are transported to project site	None Embedded in works contract
Storage of construction material on drain sides	Land contamination	Dedicate specific area for storage of construction material and restrict access to it by installing proper fences	Contractor in coordination with MWRI	PMU	During initial phases of mobilization	Embedded in works contract
Use of heavy machinery in dredging	Noise Disruption of the ecosystem Water pollution	Provide H&S equipment for workers and site visitors Properly mark the areas that will require	Contractor in coordination with MALR	PMU	Continuous during dredging	Embedded in works contract None

Environmental/Social	Environmental/Social	Proposed	Responsibility		Timeframe	Cost (US$)
		dredging Restrict access of equipment to the areas where no dredging is required				Embedded in works costs
Temporary storage of excavated contaminated sediments	Land contamination Solid wastes causing health risks	Designate specific area for temporary storage of excavated sediments Conduct a feasibility study for utilizing the sediments.	Contractor in coordination with MALR PMU in coordination with MALR	PMU PMU	Continuous during dredging	Embedded in works costs Included in the final feasibility study of the proposed interventions
Disposal of excavated contaminated sediments/sludge	Solid wastes causing health risks	Sign contract with waste collection contractor to properly dispose of the sediments	Contractor in coordination with MALR	PMU	During temporary storage and before end disposal	Embedded in works costs
storage and disposal of reeds and duckweeds	Solid wastes causing health risks	Conduct Sampling and Analysis for the removed reeds and duckweeds Conduct a feasibility study to find out best way to utilize the harvested reeds and duckweeds.	PMU PMU in coordination with MALR	PMU PMU	Before harvesting of reeds or duckweeds	Included in the final feasibility study of the proposed interventions

Environmental/Social	Environmental/Social	Proposed	Responsibility		Timeframe	Cost (US$)
		Designate area for temporary storage of reeds before final disposal	Contractor in coordination with MALR	PMU		Embedded in works contract
Cleaning and disposal of biofilm parts	Solid wastes causing health risks	Sign contract with waste collection company to remove and properly dispose of the un-used materials	MWRI	PMU	During the routine maintenance	To be determined during the feasibility studies.
Aerators consumption of fossil-based energy	Indirect air pollution	Purchase energy efficient aerators	PMU in coordination with MWRI	PMU	During procurement	Embedded in procurement costs
Introduction of alien aquatic plant species	Disruption of ecosystem	A native plant that can provide similar functions as the duckweeds should be researched and utilised	PMU in coordination with MALR	PMU	Before construction of in-lake wetland	Included in the final feasibility study of the proposed interventions
Interaction with fishermen community	Lack of participation threatening the sustainability of the project	Involve fishermen in project activities especially in reeds removal and harvesting of duckweeds	PMU	PMU	During project construction and during harvesting of the aquatic plants	15,000 (from the project budget)
Total Estimated Costs (US$)						**15,000**

The following table presents a fully fledged environmental monitoring program that needs to be implemented throughout the project's lifetime.

Table 3: Continuous Monitoring Program

Parameter	Location (**)	Number of Samples	frequency	Responsible Organization	Costs US$ **
Physical parameters: • Depth • Temperature • Transparency • Salinity • Conductivity • Dissolved oxygen (DO mg/l) • Oxygen saturation (DO%) • pH	• Effluent of west treatment plant • Qalaa Drain outfall • in the course of Nobareya Canal • in the course of El-Omoum drain • at the central part of the main basin. • At the northern corner of the main basin	One sample at each location	monthly	MWRI/ MALR/Alex RBO	None
Bacteriological parameters • Total coliforms • Faecal coliforms • Faecal streptococci	• Effluent of west treatment plant • Qalaa Drain outfall • in the course of Nobareya Canal • in the course of El-Omoum drain • at the central part of the main basin. • At the northern corner of the main basin	One sample at each location	monthly	MWRI/ MALR/Alex RBO	None
Eutrophication Parameters • Nitrate • Nitrite • Ammonia • Total nitrogen • Phosphate • Total phosphorus • Silicates • Total suspended solids • Chlorophyll a • BOD5 • COD • Oil and grease • Heavy metals	• Effluent of west treatment plant • Qalaa Drain outfall • in the course of Nobareya Canal • in the course of El-Omoum drain • at the central part of the main basin. • At the northern corner of the main basin	Representative Samples to be quantified by sampling agency	monthly	MWRI/ MALR/Alex RBO	None
Bottom sediments: • TOC • Heavy metals (Cr, Al, Fe, Cu,	• Qalaa Drain outfall • in the course of Nobareya Canal	Representative Samples to be quantified by sampling	Annual	Alex RBO/MWRI	None

Parameter	Location (**)	Number of Samples	frequency	Responsible Organization	Costs US$ **
Pb, Zn, As, Ni and Hg).	• in the course of El-Omoum drain • at the central part of the main basin. • At the northern corner of the main basin	agency			
Tissue of Fish (Tilapia) Heavy metals: (Cr, Al, Fe, Cu, Pb, Zn, As, Ni and Hg).	The Main basin Fisheries basin	Representative Samples to be quantified by sampling agency	Half Annual	MALR	None
Excavated Sediments Heavy metals: (Cr, Al, Fe, Cu, Pb, Zn, As, Ni and Hg).	Temporary storage site	Representative Samples to be quantified by sampling agency	Once after the sediments dry out	Alex RBO/MWRI	None
Removed reeds Heavy metals: (Cr, Al, Fe, Cu, Pb, Zn, As, Ni and Hg).	Temporary storage site	Representative Samples to be quantified by sampling agency	Once after the removed reeds dry out	Alex RBO/MALR	None
Duckweeds (or other aquatic plants used in CW) Heavy metals: (Cr, Al, Fe, Cu, Pb, Zn, As, Ni and Hg).	Temporary storage site	Representative Samples to be quantified by sampling agency	After the plants dry out	Alex RBO/MALR	None

(*) The location of sampling could be changed based on the final feasibility study

(**) Component 1 in the project will include procurement of monitoring equipment which will be utilized by the PMU and partner agencies.

PUBLIC CONSULTATION

The first stage of consultation with the public started by identifying stakeholder groups and affected communities by the proposed project. In the initial phases of the project design, several in-depth meetings and interviews were conducted with key stakeholders.

A draft non-technical executive summary was prepared and shared with the stakeholders prior to the consultation session. The summary was available in both Arabic and English languages and were posted on EEAA website to ensure reaching out to as many stakeholders as possible.

On September 30th, 2009, the public consultation session was held at one of Alexandria hotels. Representatives of the civil society, competent governmental authorities as well as technical consults participated effectively in the discussions.

The main outcomes from the public consultation session demonstrated that there is a very high level of interest in the project area, Lake Mariout, as well as in the proposed interventions and the degree of expected improvement from the project's activities.

All participants have expressed deep concern about the deteriorated environmental conditions of Lake Mariout and the causes of these problems. Several attempts and suggestions concerning improving the situation was proposed and discussed among the participants as well as EEAA team.

The socio-economic conditions of the fishermen community also gained a lot of attention from the attendants, especially from NGO's, who urged the project to involve the fishermen community in implementing the project activities to ensure buy-in as well finding opportunities to improve their livelihoods through small scale projects associated with the proposed interventions.

A discussion about the environmental and social impacts of each intervention also indicated that the positive impacts are more likely to dominate whereas negative impacts are minimal due to the fact that the interventions aim at improving the environmental conditions and the nature of the project being a demonstration and pilot activity.