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IMPLEMENTATION COMPLETION AND RESULTS REPORT
(TF-96365)

ON A

GRANT

FROM THE

GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US\$7.15 MILLION

TO THE

ARAB REPUBLIC OF EGYPT

FOR THE

ALEXANDRIA COASTAL ZONE MANAGEMENT PROJECT
(UNDER THE INVESTMENT FUND FOR THE MEDITERRANEAN SEA LARGE MARINE
ECOSYSTEM)

December 8, 2017

Environment and Natural Resources Global Practice
Republic of Egypt
Middle East and North Africa Region

CURRENCY EQUIVALENTS

Exchange Rate Effective February 28, 2017

Currency Unit = Egyptian Pound (EGP)

EGP 1.00 = US\$0.06329

US\$1.00 = EGP 15.80

FISCAL YEAR

July 1 – June 30

ABBREVIATIONS AND ACRONYMS

ACZM	Alexandria Coastal Zone Management
ADP	Alexandria Development Project
BOD	Biological Oxygen Demand
CBA	Cost-Benefit Analysis
CEA	Cost-Effectiveness Analysis
COD	Chemical Oxygen Demand
CPF	Country Partnership Framework
CZM	Coastal Zone Management
DRI	Drainage Research Institute
E-WWTP	East Wastewater Treatment Plant
EEAA	Egyptian Environmental Affairs Agency
EPAP	Egypt Pollution Abatement Project
ESMP	Environmental and Social Management Plan
FMIS	Financial Management Information System
GAFRD	General Authority for Fish Resources Development
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEO	Global Environment Objective
GIS	Geographic Information System
GOE	Government of Egypt
GRM	Grievance Redress Mechanism
ICR	Implementation Completion and Results Report
ICZM	Integrated Coastal Zone Management
ISR	Implementation Status and Results Report
IT	Information Technology
IW:LEARN	International Waters Learning Exchange and Resources Network
IWC	International Water Conference
LME	Large Marine Ecosystem
M&E	Monitoring and Evaluation
MALR	Ministry of Agriculture and Land Reclamation
MSEA	Ministry of State for Environmental Affairs
MOU	Memorandum of Understanding

MWRI	Ministry of Water Resources and Irrigation
NCICZM	National Committee for Integrated Coastal Zone Management
NEAP	National Environment Action Plan
O&M	Operation and Maintenance
PDO	Project Development Objective
PMU	Project Management Unit
PSC	Project Steering Committee
RBO	Regional Branch Office
RFP	Request for Proposal
SAF	Submerged Aerated Fixed
TDS	Total Dissolved Solids
TN	Total Nitrogen
TOR	Terms of Reference
TP	Total Phosphorous
TSS	Total Suspended Solids
UNDP	United Nations Development Programme
WWTP	Wastewater Treatment Plant
W-WWTP	West Wastewater Treatment Plant

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ARAB REPUBLIC OF EGYPT
Alexandria Coastal Zone Management Project
(Under the Investment Fund for the Mediterranean Sea Large Marine Ecosystem)

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A. Basic Information			
Country:	Egypt, Arab Republic of	Project Name:	Alexandria Coastal Zone Management Project
Project ID:	P095925	L/C/TF Number(s):	TF-96365
ICR Date:	07/31/2017	ICR Type:	Core ICR
Lending Instrument:	Sector Investment and Maintenance Lending	Borrower:	Government of Egypt
Original Total Commitment:	US\$7.15 million	Disbursed Amount:	US\$6.95 million ¹
Revised Amount:	US\$7.15 million		
Environmental Category: B		Global Focal Area: I	
Implementing Agencies:			
Egyptian Environmental Affairs Agency			

B. Key Dates				
Process	Date	Process	Original Date	Revised / Actual Date(s)
Concept Review:	08/21/2008	Effectiveness:		06/10/2010
Appraisal:	10/30/2009	Restructuring(s):		09/26/2011 and 04/16/2015
Approval:	04/29/2010	Mid-term Review:		12/02/2012
		Closing:	06/30/2015	02/28/2017

C. Ratings Summary	
C.1 Performance Rating by ICR	
Outcomes:	Satisfactory
Risk to Global Environment Outcome	Substantial
Bank Performance:	Moderately Satisfactory
Borrower Performance:	Moderately Satisfactory

C.2 Detailed Ratings of Bank and Borrower Performance			
Bank	Ratings	Borrower	Ratings
Quality at Entry:	Moderately Satisfactory	Government:	Moderately Satisfactory
Quality of Supervision:	Moderately Satisfactory	Implementing Agency/Agencies:	Satisfactory
Overall Bank Performance:	Moderately Satisfactory	Overall Borrower Performance:	Moderately Satisfactory

¹ Project was fully disbursed at closing.

C.3 Quality at Entry and Implementation Performance Indicators			
Implementation Performance	Indicators	QAG Assessments (if any)	Rating
Potential Problem Project at any time (Yes/No):	No	Quality at Entry (QEA):	None
Problem Project at any time (Yes/No):	Yes	Quality of Supervision (QSA):	None
GEO rating before Closing/Inactive status	Moderately Unsatisfactory		

D. Sector and Theme Codes		
	Original	Actual
Sector Code (as % of total Bank financing)		
Water, Sanitation and Waste Management		
Other Water Supply, Sanitation and Waste Management	34	34
Public Administration - Water, Sanitation and Waste Management	33	33
Other Industry, Trade and Services	33	33

Theme Code (as % of total Bank financing)		
Environment and Natural Resource Management		
Environmental Health and Pollution Management	28	28
Air Quality Management	28	28
Water Pollution	28	28
Soil Pollution	28	28
Water Resource Management	16	16
Water Institutions, Policies and Reform	16	16

E. Bank Staff		
Positions	At ICR	At Approval
Vice President:	Hafez M. H. Ghanem	Shamshad Akhtar
Country Director:	Asad Alam	David Craig
Practice Manager/Manager:	Benoit Paul Blarel	Luis F. Constantino
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F. Results Framework Analysis

Global Environment Objectives (GEOs) and Key Indicators (as approved)

The Project Development Objective (PDO) 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 key indicators, as approved, are:

(i) The ICZM Plan is officially adopted and the institutional mechanisms for implementation are successfully in operation; and

(ii) The pollution load entering the Mediterranean Sea through Lake Mariout is reduced by at least 5%.

(a) GEO Indicator(s)²

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	The ICZM plan is officially adopted and the institutional mechanisms for implementation are successfully in operation			
Value	No plan exists	Adoption of the ICZM Plan and institutional arrangements of the ICZM Plan are in place. Small subset of action items proposed by the plan is being implemented.	The indicator has been revised and replaced by Indicator 2.	—
Date achieved	06/10/2010	06/30/2015	04/16/2015	—
Comments	The indicator has been revised during the April 16, 2015 restructuring to clarify adoption of the ICZM Plan and replaced by Indicator 2.			
Indicator 2:	Alexandria Integrated CZM plan adopted by the Alexandria Governorate			
Value	No	—	Yes	Yes
Date achieved	06/10/2010	—	02/28/2017	07/29/2017
Comments	Target achieved. The ICZM plan was prepared under the project and handed over to the Governorate on October 30, 2016. Adoption and implementation of the plan was delayed due to a change in Governors. After several meetings and direct communication			

² There are two Results Frameworks in the Project Appraisal Document (PAD); one on page 40 and the other (arrangements for results monitoring), on page 43. Some Intermediate Outcomes (IO) indicators appeared differently formulated in the tables, in the restructuring paper, and Implementation Status and Results Reports (ISRs), others were only in either one of them. For this Implementation Completion and Results Report (ICR), the Results Framework in the PAD (page 40) is used as it is more monitorable.

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
	with the new Alexandria Governor, the ICZM plan was adopted on July 29, 2017 (after project closing but during the ICR period), and the structure of the ICZM committee proposed by the ICZM plan was agreed upon. The decree was signed on July 29, 2017 and published. This is the first step towards a full ICZM system in Alexandria, and the first-time Egypt will adopt ICZM tools in management of its coastal resources. The plan is expected to be replicated in other governorates in Egypt. The expected benefits of the ICZM plan implementation include the reduction of the vulnerability of the people living on the coast to current and long-term coastal management issues, including habitat loss, degradation of water quality, sustainable use of the land and resources of the coastal zone of Alexandria including adaptation to sea level rise and other impacts of global climate change. This indicator captures the first PDO objective to improve institutional mechanisms and manage the coastal zones in Alexandria in an integrated, participatory and sustainable manner, including planning, consensus building and monitoring.			
Indicator 3:	The pollution load entering the Mediterranean Sea through Lake Mariout is reduced by at least 5%			
Value	0.00%	5.00%	The indicator has been revised and replaced by Indicator 4	—
Date achieved	06/10/2010	06/30/2015	04/16/2015	—
Comments	The indicator was revised during the April 16, 2015 restructuring to clarify both the specific location of the monitoring points and the type of pollutants.			
Indicator 4:	Pollution load entering the Mediterranean Sea from El-Mex Pumping Station (Biological Oxygen Demand-BOD mg/L)			
Value	55.59 mg/L	—	47.25 mg/L	48 mg/L
Date achieved	11/01/2011	—	02/28/2017	10/24/2017
Comments	Target Substantially achieved (98%). This indicator captures the reduced land-based pollution to the Mediterranean Sea aspect of the PDO and measures the amount of oxygen used by microorganisms (for example, aerobic bacteria) in the oxidation of organic matter entering the Mediterranean Sea from El-Mex Pumping Station. The baseline to measure the pollution load was determined during the restructuring of April 16, 2015, as the BOD concentration measured at the beginning of the project in 2011 at El-Mex Bay. At project closing, the water quality was further degraded (BOD measured at project closing was 121 mg/L) due to the closure of the 9N landfill. ³ This landfill collected the sludge generated by the West Wastewater Treatment Plant (W-WWTP). The situation led to an increase in the pollution load due to the increase of sludge; about 40 percent of the wastewater was bypassed by the plant and directly rejected into Lake Mariout. However, during the ICR period, on May 19, 2017 the landfill was reopened,			

³ See section 2.2 for more details. During a supervision mission in December 2015, the team learned that the secondary treatment at the East Wastewater Treatment Plant (E-WWTP) and the primary at the W-WWTP were stopped when the sludge disposal site (which was not part of the project) 9N landfill was closed. Informal settlers near the landfill prevented access to the site, claiming that it was negatively affecting them.

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
	and the E-WWTP and W-WWTP started to fully operate. As expected, the pollution loads started to decrease at El-Mex as soon as the steady state operation was reached within a few months. BOD measured in August 2017 was 49 mg/L and in October the BOD was 48 mg/L which is very close to the target value of 47.25 mg/L. The BOD is expected to decrease further in the coming months, as the steady-state hydrodynamics of the lake reaches its equilibrium (see page 10- <i>residence time</i>).			
Indicator 5:	Direct project beneficiaries			
Value	0.00	—	66,613	66,613
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	<p>Target achieved (100% of the target). This indicator was added during the April 16, 2015 restructuring. The beneficiaries are the population living around Lake Mariout who will benefit from the pollution reduction and the ICZM Plan. The number was calculated based on the socioeconomic study conducted under the project. This study, completed in 2012, helped establish a social baseline of the project area before the design and implementation phase.</p> <p>All the population in targeted areas are expected to benefit from the project. It can be deduced from the project design and results that the population residing in or living off coastal ecosystems, primarily coastal communities and individuals engaged in sustainable use activities (for example, fishing and tourism), will also benefit from the project in the long term. Safeguarding healthy ecosystems and promoting sustainable use of the natural resources will ensure that these populations will be able to continue to enjoy their benefits in the future.</p> <p>The population is already benefitting from having a coordination mechanism in place through the adoption of the ICZM Plan which will allow the regular monitoring of water quality and biodiversity along the coast. Beneficiaries were consulted and they participated in the development of the plan. Pollution reduction will allow the fishermen to catch less-contaminated fish and better-quality fish (<i>Mugil cephalus</i> instead of less-valuable fish such as <i>Tilapia</i>), including restoration of wetland and biodiversity conservation. There are several other equipment purchased by the project, such as thermal dryer and reed harvester in the lake, which benefitted the local people to increase the fish production (because less weeds are present in the lake). Stakeholders have been also benefitted from ICZM training which has helped sustainably manage the future land use of the city, potentially increasing coastal fishing and recreational activities.</p>			
Indicator 6:	Female beneficiaries			
Value	0.00%	—	48%	48%
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	Target achieved (100% of the target). This indicator was added during the April 16, 2015 restructuring. The socioeconomic study prepared by an independent consultant during the implementation phase helped determine these percentages.			
Indicator 7:	Mechanism for ensuring financial viability and use of land area for pollution reduction interventions established			
Value	No	—	Yes	Yes

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	<p>Target achieved. This indicator was added during the April 16, 2015 restructuring. The indicator has been added to reflect aspects of sustainability of the project’s interventions and to ensure that the project pollution reduction interventions (biofilm unit and engineered wetland) are sustained after the end of the project by ensuring the financial viability (commitment to be responsible for operation and maintenance (O&M) costs of EGP 950,000) and that land is available for the biofilm and wetland. The project looked for ideal sites for these interventions and signed a Memorandum of Understanding (MOU) between the Project Management Unit (PMU) and the Alexandria Drainage and Sanitation Company with the W-WWTP in April 2015. The handover ceremony was conducted in December 2016, and all the necessary documentation and training for the staff at W-WWTP has been provided by the project. The indicator measures the institutional mechanisms for sustainable coastal zone management and the reduced land-based pollution to the Mediterranean Sea aspect of the PDO.</p>			

(b) Intermediate Outcome Indicator(s)

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Indicator 1:	Adoption of the National Integrated Coastal Zone Management Strategy by the National CZM Committee			
Value	No strategy exists	The national ICZM strategy being adopted	The indicator has been revised and replaced by Indicator 2.	—
Date achieved	06/10/2010	06/30/2015	04/16/2015	—
Comments	The indicator was revised to the specific geographic area. The coastal zone management (CZM) strategy developed under this project is not a national strategy as it only includes a very small and environmentally ‘special’ part of the coast.			
Indicator 2:	Alexandria Integrated CZM plan prepared with stakeholder participation			
Value	No	—	Yes	Yes
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	<p>Target achieved. This indicator was added during the April 16, 2015 restructuring. It captures better the work done under the project as it is a plan instead of a strategy and is specific to the geographical area. The indicator measures the institutional mechanisms for sustainable coastal zone management aspect of the PDO. This ICZM Plan was prepared by incorporating and addressing, as much as possible, the diverse concerns and interests of stakeholders, including a mechanism to allow them to share information and provide feedback loops for intersectoral, vertical, and international sharing of lessons and best practices related to ICZM and mainstreaming coastal biodiversity management into development planning. Tools such as individual interviews, group interviews, and focus groups were used. The public consultation process was designed according to the</p>			

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
	needs of the two stages of the project: (a) the coastal diagnosis and (b) the ICZM planning (please see section 3 for more information on the participatory process). Social and communication specialists were hired due to the presence of fishermen communities. After an alternative location was found due to the El-Qalaa drain diversion (see section 2 implementation), the role of the two specialists was reduced but they still played a major role during the consultation process of the ICZM Plan.			
Indicator 3:	Commitment by relevant agencies towards sustainable coastal zone management reflected in medium term plans			
Value	No	Yes	—	—
Date achieved	06/10/2010	06/30/2015	—	—
Comments	This indicator was dropped during the April 16, 2015 restructuring due to lack of clarity on interpretation of 'commitment'.			
Indicator 4:	Major new investments decisions taken during the lifetime of the project by relevant agencies utilize sustainable coastal zone management principles according to the CZM plan			
Value	No	Yes	—	—
Date achieved	06/10/2010	06/30/2015	—	—
Comments	This indicator was dropped during the April 16, 2015 restructuring as increased investment is unrealistic within the project lifetime.			
Indicator 5:	At least 3 public consultations on the preparation and adoption of the CZM plan for Alexandria are held by 2015 (process).			
Value	0.00	3	—	—
Date achieved	06/10/2010	06/30/2015	—	—
Comments	This indicator was dropped during the April 16, 2015 restructuring since it is redundant as it is covered by stakeholder participation above (see Indicator 2).			
Indicator 6:	15% reduction of BOD within the area of influence of the project			
Value	0.00	15%	—	—
Date achieved	06/10/2010	06/30/2015	—	—
Comments	This indicator was dropped during the April 16, 2015 restructuring since it is redundant as the PDO indicator captures BOD reduction.			
Indicator 7:	Increase in percentage of surveyed population noticing an improvement in daily lives (in terms of improved water quality, fishing quantity, and quality)			
Value	TBD	TBD	—	—
Date achieved	06/10/2010	06/30/2015	—	—
Comments	The indicator was dropped during the April 16, 2015 restructuring. The intervention location has been changed due to the resistance from fishermen to pollution reduction interventions inside the lake. The general population was not included as the project does not target the urban population of Alexandria per se.			
Indicator 8:	A water quality monitoring network measuring project impacts fully operational and integrated with the EEAA database by 2011 (process)			
Value	No monitoring and evaluation (M&E) system in place	Yes	—	—
Date achieved	06/10/2010	06/30/2015	—	—

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Comments	This indicator was revised and replaced by Indicator 9 during the April 16, 2015 restructuring, to be more precise and indicate the monitoring point.			
Indicator 9:	Improved water quality monitoring system at El-Mex Pumping Station in place (Yes/No)			
Value	No	—	Yes	Yes
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	Target achieved. This indicator was added during the April 16, 2015 restructuring, to indicate the precise monitoring point. The indicator contributes to the reduced land-based pollution to the Mediterranean Sea aspect of the PDO. A continuous monitoring station at El-Mex Bay as well as some portable monitoring equipment have been purchased by the project to assess the level of pollution inside and around the lake and the Mediterranean Sea. Lab equipment for the Alexandria Regional Branch Office (RBO) of Egyptian Environmental Affairs Agency (EEAA) has also been purchased and installed to strengthen their monitoring capacity. Various trainings have been conducted at the lab on water sampling procedures and testing of the water quality. Now the Alexandria RBO is the most advanced in terms of water quality monitoring among all the labs owned by the EEAA.			
Indicator 10:	Report on “Lake Mariout: Results and Lessons Learned” published and disseminated by 2015			
Value	No	Yes	—	—
Date achieved	06/10/2010	06/30/2015	—	—
Comments	This indicator was revised slightly for consistency (all indicators are non-directional) and replaced by Indicator 11 during the April 16, 2015 restructuring.			
Indicator 11:	Report on “Lake Mariout: Results and Lessons Learned” published and disseminated			
Value	No	—	Yes	Yes
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	Target achieved. This indicator was added during the April 16, 2015 restructuring for consistency and to make it non-directional. The indicator contributes to the institutional mechanisms for sustainable coastal zone management and reduced land-based pollution to the Mediterranean Sea aspects of the PDO. A brief on the experience of low-cost wastewater treatment technologies has been prepared and was distributed at the inauguration event on October 30, 2016. The report was prepared using water quality data collected by the project (please see section 2.3 on M&E). This report on lessons learned was distributed to all the stakeholders, specifically to the six key stakeholders: (a) Alexandria Governorate, (b) EEAA under the Ministry of Environment, (c) Ministry of Water Resources and Irrigation (MWRI), (d) Ministry of Housing, (e) Shore Protection Authority, under MWRI, and (f) the General Authority for Fish Resources Development (GAFRD), under the Ministry of Agriculture and Land Reclamation. The report helped improve the knowledge of low-cost treatment plant and wetland design and is expected to serve as a basis for similar pilot projects in Egypt such as (a) Rahawy drain in the Nile delta and (b) Northern lakes: Edku, El-Burullus, El-Manzallah, and El-Bardaweel.			
Indicator 12:	Participation in IW learning activities			
Value	No	Yes	—	—
Date achieved	06/10/2010	06/30/2015	—	—

Indicator	Baseline Value	Original Target Values (from approval documents)	Formally Revised Target Values	Actual Value Achieved at Completion or Target Years
Comments	This indicator was dropped during the April 16, 2015 restructuring as it focuses on activities and not outcomes.			
Indicator 13:	Replication strategy prepared and adopted by 2015			
Value	No	Yes	—	—
Date achieved	06/10/2010	06/30/2015	—	—
Comments	This indicator was revised during the April 16, 2015 restructuring and replaced by Indicator 14 to clarify who will adopt the replication strategy and for consistency.			
Indicator 14:	Replication strategy prepared and adopted by National CZM Committee			
Value	No	—	Yes	Partially achieved
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	Target partially achieved. This indicator was added during the April 16, 2015 restructuring to clarify who will adopt the replication strategy and for consistency. This is to ensure the scaling up of the pilot developed by the project. The strategy to replicate these interventions has been prepared but is awaiting adoption by the CZM committee. Efforts have been made to share the pilot interventions and ICZM Plan with other donors such as the European Investment Bank and Japan International Cooperation Agency as well as other relevant government institutions such as the MWRI and the Ministry of Housing. Pilot interventions have been also shared with those involved in the World Bank's Rural Sanitation Program-for-Results. The indicator contributes to the institutional mechanisms for sustainable coastal zone management aspect of the PDO.			
Indicator 15:	Water treated at West Wastewater Treatment Plant (m ³)			
Value	0.00	—	50,000	50,000
Date achieved	06/10/2010	—	02/28/2017	08/23/2017
Comments	Target partially achieved (100% of the target). This indicator was added during the April 16, 2015 restructuring to reflect the volume of treated wastewater which will contribute to reduction in pollution load. The treatment was still partial until early August 2017 due to degradation of influents because of the 9N landfill closure. Today, all 50,000 m ³ of wastewater are treated at the treatment plant. The indicator contributes to the reduced land-based pollution to the Mediterranean Sea aspect of the PDO.			
Indicator 16:	Project's details and results published on the website of EEAA, in line with the IWLearn template			
Value	No	—	Yes	Yes
Date achieved	06/10/2010	—	02/28/2017	02/28/2017
Comments	Target achieved. Project's details and results have been published on the website of EEAA using the The International Waters Learning Exchange and Resource Network (IW:LEARN) of the Global Environment Facility (GEF) template and this serves two functions: The first is to help create a database of information about ongoing projects by having project managers and implementers input relevant data into the website's repository, and the second is for the experiences of these project managers organized in such a way that best practices are being recorded to provide detailed guidelines for project implementation and replication in other areas.			

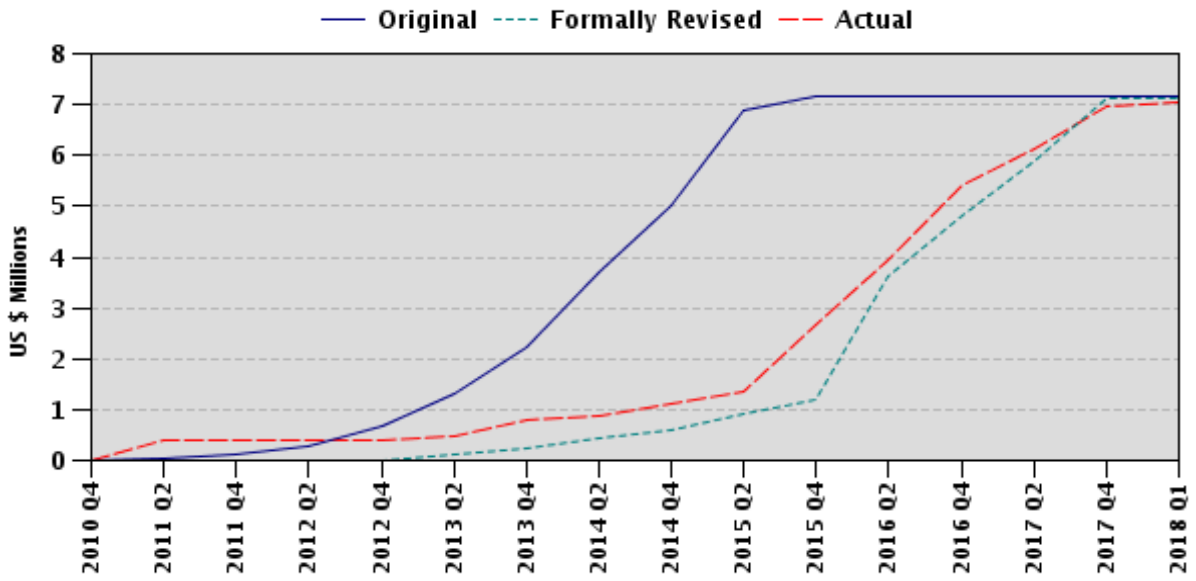
G. Ratings of Project Performance in ISRs

No.	Date ISR Archived	GEO	IP	Actual Disbursements (US\$, millions)
1	06/29/2010	Satisfactory	Satisfactory	0.00
2	01/09/2011	Satisfactory	Moderately Satisfactory	0.40
3	06/21/2011	Moderately Unsatisfactory	Moderately Unsatisfactory	0.40
4	01/01/2012	Moderately Unsatisfactory	Moderately Unsatisfactory	0.40
5	07/04/2012	Moderately Unsatisfactory	Moderately Unsatisfactory	0.47
6	01/02/2013	Moderately Satisfactory	Moderately Satisfactory	0.47
7	08/05/2013	Moderately Satisfactory	Moderately Satisfactory	0.78
8	02/23/2014	Satisfactory	Moderately Satisfactory	0.98
9	11/10/2014	Moderately Unsatisfactory	Moderately Unsatisfactory	1.34
10	05/11/2015	Satisfactory	Moderately Satisfactory	1.45
11	11/11/2015	Satisfactory	Moderately Satisfactory	3.48
12	05/15/2016	Satisfactory	Moderately Satisfactory	4.58
13	11/27/2016	Moderately Satisfactory	Moderately Satisfactory	5.82
14	02/28/2017	Moderately Unsatisfactory	Moderately Satisfactory	6.20

H. Restructuring (if any)

Restructuring Date(s)	Board Approved GEO Change	ISR Ratings at Restructuring		Amount Disbursed at Restructuring in US\$, millions	Reason for Restructuring & Key Changes Made
		GEO	IP		
09/26/2011	N	MU	MU	0.40	This was done to propose an amendment to the GEF Grant Agreement to (a) add a new Category of Expenditure for financing of Operating Costs and (b) to reallocate Grant funds from the Unallocated Category to Category for Consultants' Services and newly added Category for Operating Costs.
04/16/2015	N	S	MS	1.45	The Results Framework was revised by fine-tuning some PDO indicators and intermediate indicators to adequately capture all aspects of the PDO and help measure the achievement of the PDO. End target dates were also revised in line with the proposed new closing date. This level-2 restructuring included a reallocation of grant proceeds and a 20-month extension.

I. Disbursement Profile



1. Project Context, Global Environment Objectives, and Design

1.1 Context at Appraisal

1. **Country background.** At the time of appraisal, Egypt's population was expected to reach 86 million by 2020. The rapid population growth coupled with ambitious development and industrialization policies put heavy pressure on Egypt's natural resources in the form of severe air, water, and soil pollution. As elaborated in the Country Environment Analysis (2005) and conservatively estimated in the World Bank's Sector Note - Cost Assessment of Environmental Degradation (2002), the cost of environmental degradation in Egypt was estimated to be, on average, in the order of 4.8 percent of gross domestic product (GDP) (EGP 14.5 billion) for 1999, with add-on damage costs on global environment in the order of 0.6 percent of GDP⁴ (EGP 1.9 billion).

2. **Sector context.** The main environmental issues faced by Egypt were and still are (a) acute water scarcity, (b) land degradation,⁵ (c) increase in pollution and untreated urban and hazardous waste disposal, and (d) decline in water quality: the water quality in the Nile River and its canals deteriorates as one heads in a northward direction due to the disposal of municipal and industrial effluents, agricultural drainage, and decreasing flow. This also results in the pollution of the northern lakes, such as Lake Mariout, which ultimately affects the Mediterranean Sea. Lake Mariout is one of the major sources of conveyance of land-based pollution to the El-Mex Bay. The lake has no direct connection to the sea, and its surface is maintained at 2.8 m below mean sea level by pumping water from the lake to the Mediterranean Sea at El-Mex Bay. Lake Mariout receives polluted water daily from three major sources: industrial, domestic, and drainage water from agriculture, which was a persistent threat to public health and the livelihoods of local communities. The continuous pollution of the lake has had a critical impact on fish production over time. Despite the severe decline in fish catch, fishing activities remain a significant source of income for the fishermen and their families.

3. **To address these challenges, integrated planning is necessary to ensure the sustainability of coastal development.** At the time of appraisal, these increasing pressures on fragile ecosystems were exacerbated by the lack of integrated conservation and development planning along the Alexandria coast, coupled with poor management of resources in the face of increased pressures. A lack of sound economic and environmental baseline data has made it difficult for the national, regional, and local government to support decision making on how to define a sustainable path for coastal zone development, including the promotion of diversified livelihood options for coastal populations.

4. **On the environmental protection and management side, significant improvements have been achieved since the preparation of the first National Environmental Action Plan (NEAP) and the establishment and strengthening of the institutional and legal framework during 1992–1994.** An Environment Protection Law was enacted in 1994, and a Minister of

⁴ "Cost Assessment of Environmental Degradation, Arab Republic of Egypt", Sector Note, June 29, 2002, Report No. 25175 -EGT, The World Bank.

⁵ Annual loss of agricultural land due to urban encroachment is estimated to be between 15,000 acres and 30,000 acres.

State for Environmental Affairs was appointed in 1997. The Egyptian Environmental Affairs Agency (EEAA) has gradually expanded its functions and responsibilities in all fields of environmental management at the national, regional, and local levels.

5. **With the passing of Law No. 4/1994 for the Environment (and amended by Law No. 9/2009), the EEAA was given responsibility to initiate and coordinate the national Integrated Coastal Zone Management (ICZM) activities.** Specifically, the EEAA was given the authority to “participate with the concerned agencies and ministries in the preparation of a National ICZM Plan for the Mediterranean Sea and Red Sea coasts.” As a result, the ‘Framework Programme for the Development of a National ICZM Plan for Egypt’ was prepared in 1996 by the National Committee for Integrated Coastal Zone Management (NCICZM). Some of the main ICZM-related project development milestones in Egypt included the following: the 1995 GEF Red Sea Coastal and Marine Resource Management project (completed), the 1999 CAMP Fuka Matrouh project (completed), the 2002 Lake Manzala engineered wetland project (completed), and the 2005 ICZM planning for the coastal area between Marsa Matrouh and Sallum.

6. **Rationale for World bank assistance.** The World Bank was in a good position to assist the Government of Egypt (GOE) in this endeavor. With its large portfolio and knowledge of coastal management, the World Bank was well placed to assist Egypt in building its ICZM framework and to demonstrate the value added of an integrated and participatory approach to coastal zone management for sustainable development. The drafting and adoption of a master plan on coastal zone management for Alexandria, including Lake Mariout, was directly consistent with the ongoing preparation of the National Strategy for ICZM in Egypt, under the leadership of the EEAA. Based on consultations held for the preparation of the National Strategy for ICZM, the following issues were considered as cornerstones: shoreline erosion and flooding, unsustainable land use, water pollution, and deterioration of natural resources and habitats. To address these issues, the Alexandria ICZM Plan would include a shoreline management plan, a land use plan, a water quality monitoring plan, and a climate change/hazardous impact assessment plan.

7. **The project was a pilot for innovative and low-cost technologies for the reduction of pollution originating from agricultural drainage water and rural domestic wastewater, which were partially responsible for the severe eutrophication problem in the lake basins.** The project was to complement other ongoing projects, each addressing a different source of pollution (see figure 2.3 in annex 2). The other set of interventions included the Egypt Pollution Abatement Project (EPAP) II sub-projects on industrial pollution and the Government upgrade of the East and West Wastewater Treatment Plants (E-WWTP and W-WWTP) for domestic pollution as part of the Alexandria City Development Strategy. The project was meant to support the development of an ICZM Plan for Alexandria, a concept that could be replicated in the rest of the coastal zones in Egypt, most notably in the other northern lakes.

8. **The project was part of Egypt’s strategy to build upon the GOE’s previous efforts to create NEAP-1992, which was the first public document that clearly articulated Egypt’s environmental issues and provided a series of policy, institutional, and investment actions to help resolve them.** In 2002, the NEAP was updated with the United Nations Development

Programme (UNDP) assistance to delineate Egypt's agenda for environmental actions over the next 15 years.⁶

1.2 Original Global Environment Objectives (GEOs) and Key Indicators (as approved)

9. **The Global Environment Objective (GEO) of the project was to improve the institutional mechanisms for sustainable coastal zone management in Alexandria, in particular to reduce land-based pollution to the Mediterranean Sea.** The original key outcomes and intermediate outcome indicators selected for the above GEO are presented in annex 2.

10. **The key performance indicators were**

- (a) The ICZM Plan is officially adopted and the institutional mechanisms for implementation are successfully in operation and
- (b) The pollution load entering the Mediterranean Sea through Lake Mariout is reduced by at least 5 percent.

1.3 Revised GEO (as approved by original approving authority) and Key Indicators, and Reasons/Justification

11. **The GEO was not revised during project implementation; however, key indicators were modified during the Level 2 restructuring in April 2015. The key performance indicators were revised to improve their quality and precision.** Some target and baseline values, which were not defined in the Project Appraisal Document (PAD), were agreed upon early in the implementation of the project.

12. The first GEO indicator was deemed to be not clear enough, with the entity adopting the ICZM not properly defined, so the key indicator was reworded as follows:

- Alexandria Integrated CZM adopted by the Alexandria Governorate

13. **The second GEO indicator was deemed imprecise and was revised to clarify both the specific location of the monitoring points and the type of pollutants.**

- Pollution load (BOD) entering the Mediterranean Sea from El-Mex Pumping Station (mg/L) is reduced by at least 5 percent.

14. **Two GEO-level indicators were added, one of which was to measure the project beneficiaries as newly required by the World Bank, and the other to measure the financial sustainability of interventions.**

- (a) Direct project beneficiaries, of which female.

⁶ It is a demand-driven national report, developed through a very wide consultation with participation of the different segments of Egyptian civil society. It underlies a comprehensive program of policies and institutional and investment actions aimed at establishing the foundations of sustainable development.

- (b) Mechanisms for ensuring financial viability and use of land area for pollution reduction interventions established.

1.4 Main Beneficiaries

15. **The primary target groups identified in the PAD are the national and local stakeholders involved in coastal zones management.** At the national level, these included the Ministry of State for Environmental Affairs (MSEA), the EEAA, the Ministry of Water Resources and Irrigation (MWRI), and the Ministry of Agriculture and Land Reclamation (MALR). At the local level, these included the people living near Lake Mariout and fishermen benefitting from the lake, the Alexandria Governorate, nongovernmental organizations, Regional Branch Office (RBO) of the EEAA, Alexandria Drainage and Sanitation Company, Lake Mariout Development Committee, and the General Authority for Fish Resources Development (GAFRD).

16. **Female participation**⁷ in the project was significant, even if there was no formal monitoring on gender aspects except for GEO indicator 6 on female beneficiaries. In particular, female stakeholders participated in the training events and workshops organized by the PMU on ICZM in Alexandria.

17. **It can be deduced from the project design and results that the population residing in or living off coastal ecosystems, primarily coastal communities and individuals engaged in sustainable use activities (for example, fishing and tourism), will also benefit from the project in the long term.** Safeguarding healthy ecosystems and promoting sustainable use of the natural resources will ensure that these populations will be able to continue to enjoy their benefits in the future.

1.5 Original Components (as approved)

18. **The project was approved by the Board of Executive Directors on April 29, 2010, and consisted of three components, funded by a US\$7.15 million Global Environment Facility (GEF) grant:**

- (a) **Component 1: Planning, Institutional Capacity and Monitoring Strengthening (US\$1.982 million).** The first component aimed at increasing the institutional capacity of the relevant agencies involved in the management of Lake Mariout, in particular, and Alexandria's coastal zone, in general. This included (i) a master plan for the management of the coastal zones of Alexandria, including Lake Mariout (the Alexandria Coastal Zone Management [ACZM] Plan), preceded by a legal and regulatory framework analysis and (ii) the development of an integrated water

⁷ According to International Labor Organization data, as reported by the World Bank: Women are important players in water and agriculture, accounting for 47% of the labor force in agriculture. (This is relevant since as explained earlier, agricultural runoff contributes to Lake Mariout's inputs).
<http://data.worldbank.org/indicator/SL.AGR.EMPL.FE.ZS>

quality monitoring network for Lake Mariout and the Mediterranean Sea, including a modeling activity for El-Mex Bay, which can be used to estimate the overall impact of the project on the Mediterranean Sea.

- (b) **Component 2: Pollution Reduction (US\$4.625 million).** The second component was intended to reduce the land-based source of pollution entering Lake Mariout, and subsequently the Mediterranean Sea, through pilot pollution reduction measures. This included (i) in-stream treatment (set of biofilms) in the El Qalaa drains, (ii) a set of aerators in the El Qalaa drains, (iii) a small-scale engineered in-lake wetland located at the outfall of the El Qalaa drain, and (iv) reed removal to improve water circulation and the self-cleaning capacity of the lake.
- (c) **Component 3: Project Management and Monitoring and Evaluation (US\$0.543 million).** The third component was designed to support the Project Management Unit (PMU), currently associated with the EPAP II, to carry out the various activities related to project implementation. It included (i) a project monitoring system with measurable indicators that are consistent with the Investment Fund for the Mediterranean Sea Large Marine Ecosystem and complying with the GEF International Waters Tracking Tool and (ii) documentation of the project's progress and results, dissemination of lessons learned, and adoption of a replication strategy in conformity with the GEF International Waters Learning Exchange and Resources Network (IW:LEARN).

1.6 Revised Components

Not applicable

1.7 Other Significant Changes

19. Beginning in early 2011, Egypt faced significant political turnover and civic unrest, which slowed down project implementation and disbursement. During the seven years of implementation, the project underwent two restructurings. They are detailed in the following paragraphs.

20. **The first restructuring (Level 2) was approved in September 2011 to allocate US\$200,000 to a new category entitled 'Operational Expenses'.** The restructuring was completed on September 26, 2011. An amendment was added to the GEF Grant Agreement to (a) add a new category of expenditure for financing of operating costs and (b) reallocate grant funds from the unallocated category to the category for consultants' services and a newly added category for operating costs. The restructuring was approved by the Country Director.

21. **The second restructuring (Level 2) was approved in April 2015.** The closing date of the project was extended for 20 months to February 28, 2017, during which time, the grant proceeds were reallocated and the indicators and Results Framework were revised. This was necessary to allow additional time for completing the remaining grant activities. The allocation for works increased because the contract for pollution mitigation measures was combined and procured as 'Works', instead of 'Goods' and 'Works' separately. The allocation for 'Consultants' services' increased as water modeling work, originally listed as 'Goods', was

changed to the more appropriate category of ‘Consultants’ Services’. The Results Framework for the project was revised to allow for closer monitoring of key activities related to project implementation progress and to fine-tune some indicators. The restructuring also corrected the lack of alignment of intermediate indicators in the PAD Annex 3 between the table on key indicators (pages 40–42) and the results matrix (pages 43–45). Some intermediate indicators appeared differently formulated in both, while others appeared in only one of them. One indicator was dropped, which was not in the PAD Annex 3 Results Framework (neither in the table on key indicators nor in the results matrix, and it had been added in ISRs from December 12, 2012 to November 10, 2014)—Nutrient load reduction (Nitrogen (N) in tons/year) achieved under the project. The second restructuring was approved by the Country Director.

2. Key Factors Affecting Implementation and Outcomes

2.1 Project Preparation, Design, and Quality at Entry

(a) Soundness of the Background Analysis

22. **The background analysis undertaken during project preparation was sound.** Lessons from prior World Bank engagement in the region were taken into consideration during project design. In the prior projects supported by the World Bank, the importance of capacity building, strong government commitment, and coordinated support were emphasized as key, and these elements were evident in the design of the project.

23. **The preparation phase of the project was supported by a GEF Project Development Fund Block B⁸ grant amounting to US\$350,000, signed in November 2006.** A consulting firm conducted the preliminary reports for the preparation activities (June 2007 to May 2008). Detailed interagency agreements were prepared and signed between the EEAA and other ministries (the MWRI and MALR on October 26, 2009 and November 2, 2009, respectively) including handover of the project infrastructure (biofilm and wetland). Effective project preparation lasted 20 months (Concept to Approval), considering the time needed to undertake the complex feasibility studies and consultations with stakeholders⁹.

24. **Background analysis was conducted during this preparation phase:** (a) preliminary consultations took place during project preparation, including a workshop in Alexandria (May 2008) that helped design Components 1 and 3; (b) to design Component 2, a pre-feasibility analysis of the pollution reduction measures was conducted and found that the implementation of a number of small interventions (in-stream biofilms and aeration, pilot in lake wetland, and reed removal) would be mutually supportive; (c) a draft of terms of reference (TOR) for the legal and regulatory study related to the development of the ICZM Plan was prepared to feed into

⁸ GEF Project Development Fund Block B grants provide funding for the information gathering necessary to complete full project proposals and the essential supporting documentation.

⁹ This is not unusual for Egypt. Average preparation time for FY00-15 approved projects in Egypt in Sustainable Development sector is 19 months.

Component 1; (d) implementation arrangements were explained in sufficient detail; (e) detailed procurement arrangements and economic and financial analysis were done; and (f) an Environmental Management Plan was prepared to ensure that the environmental risks borne by the project would be adequately managed, in line with the World Bank safeguard policies. This included institutional arrangements and conflict resolution mechanism necessary for environmental and social management. Therefore, and as demonstrated in the PAD, the design of the project was supported by an adequate background analysis.

25. The project built upon the lessons learned and experiences of previous projects, including implementation of the EPAP I (completed at the time) and EPAP II (ongoing at the time). The most important lesson was that any investment needs to be accompanied by a significant institutional strengthening and capacity-building component, as well as public consultations to ensure the support and ownership from key stakeholders in the early stages of project preparation. This is reflected in the project design in terms of the activities included in Component 1 of the proposed project, such as public consultations, training on coastal zone management practices, a study tour, and a monitoring and evaluation (M&E) system with an M&E specialist dedicated to the project to collect feedback from the beneficiaries during project implementation, monitor progress and ensure correction measures in the project during implementation. The experience gained with the Lake Manzala UNDP-GEF project¹⁰ demonstrated the viability of engineered wetlands and related innovative low-cost water treatment methods in Egypt under conditions similar to those of Lake Mariout.

(b) Assessment of the Project Design

26. The overall project design is considered sound. Its design gave adequate weight to the legal and institutional framework, stakeholder participation, and capacity building. It built on the existing experience and lessons learned from ongoing World Bank, donor, and Government efforts on coastal and marine management and international best practices with regard to (a) ensuring adequate and strong institutional arrangements, (b) full-fledged environmental monitoring program implemented throughout the project's life time, and (c) mechanisms for the sustainability of outcomes using the participatory and consultative nature of the ICZM preparation.

27. A set of checks and balances was set up to ensure that social impacts, especially on marginalized groups, stemming from the plan's implementation were minimized through the following:

- (a) The National Coastal Zone Management (CZM) Committee included representatives from nongovernmental organizations.
- (b) The Project Steering Committee (PSC) included a representative from the Lake Mariout Development Committee, which represents the interests of the local

¹⁰ Engineered wetlands have demonstrated a satisfactory removal rate of key pollutants (61.2 percent for biological oxygen demand (BOD), 80 percent for total suspended solids [TSS], 15.2 percent for total phosphorous (TP), 51.4 percent for total nitrogen (TN), and 99.7 percent for total coliform, according to the UNDP Final Evaluation Report of Lake Manzala, October 2007, EGY/93/G31).

communities, in particular the fishing community and civil society during project implementation.

- (c) Financing for the project's first component included 'public consultation workshops and master plan dissemination', which ensured that the views and interests of the civil society agencies were well represented.

28. **Results Framework. The PDO was realistic, clear and relevant to the country's objectives with indicators established for each sub-objective and component.** Baseline data and target values, which could not be defined in the Project Appraisal Document (PAD), were to be established after the feasibility studies were done early in the implementation of the project. The key performance indicators were revised to improve their quality and precision during the restructuring of 2015 as explained above and in section 2.3.

(c) Adequacy of Government's Commitment

29. **The Government's commitment was relatively high to develop the ICZM framework promoted by the project.** This was demonstrated by the solid project preparation that included frequent consultations with stakeholders. These consultations helped build consensus on the identified issues and priorities and the proposed project design and institutional arrangements. Two interagency agreements were prepared and signed between the EEAA and both the MWRI and the MALR, including handover of project infrastructure.

(d) Assessment of Risks

30. The key risks were identified and related mitigation measures were proposed. The main risk to the project objective was the slow implementation pace due to complex institutional processes, lack of capacity at different levels. This risk, central to ICZM, was identified at appraisal and adequately rated as significant; its mitigation was at the heart of the project design and accomplished through (a) building high-level political support, (b) an extensive consultation process, and (c) regularly monitoring and closing capacity gaps. Conversely, the project encountered delays stemming from the political events in Egypt (not foreseen) during the first years of implementation (see section 2.2, Implementation).

31. Complicated implementation due to multiple active players was another risk—in other words, the fact that each responsible agency could take unilateral decisions without any consultation with the others, for example, the decision to release quantities of water to the drains could be taken by the MWRI without consulting with the GAFRD. This risk was rated modest as interagency agreements were signed between EEAA and MWRI and between EEAA and MALR clearly detailing roles and responsibilities. Also, a package of pollution reduction measures was proposed in the event that one measure resulted in lower efficiency of the interventions. The diversion of El Qalaa drain, built by the GAFRD, is an example of a unilateral decision which required the team to move the treatment intervention to the W-WWTP as described further in the section below.

2.2 Implementation

32. **Initial delays.** The implementation of the project lasted six years and eight months between 2010 and 2017. Effectiveness was declared less than two months after the Board approved the project.¹¹ Implementation progressed slowly during the first two years because of the unexpected political events in Egypt (early 2011) and built up an accumulative delay of approximately one year. These events at the start of the project (February 2011) resulted in the restructuring of project-related staff in the main implementing agencies,¹² namely the EEAA, MWRI, GAFRD, and the Alexandria Governorate. The entire PMU was reassigned, and a number of changes occurred to both the Project Working Group and the PSC, where two of the previous members were appointed as ministers. This resulted in delays, such as the team having to reintroduce the project to all new members, and providing relevant trainings on World Bank operations and project implementation for the new PMU.

33. **Diversion of El Qalaa drain occurred during the pre-appraisal mission (May 3-14, 2009) when the World Bank's team learned that the GAFRD had built a diversion from El Qalaa drain to El-Mex pumping station in response to repeated objections from fishermen who saw their fish catch suffer from the heavy and progressive pollution of Lake Mariout.** This affected the viability and relevance of the project's intervention under Component 2 to reduce pollution at El-Qalaa drain. The World Bank's team decided to move the pollution reduction interventions (biofilm and wetland) to the W-WWTP, with the objective of reducing the pollution after the primary treatment using a Submerged Aerated Fixed (SAF) media biofilm system and wetland.

34. **The team managed to implement corrective measures to expedite implementation, such as a six-month short-term action plan to remove the bottlenecks and prepare a revised implementation plan.** Nevertheless, the delay remained, due to the internal restructuring (following political events) of the Egyptian Environmental Affairs Agency (EEAA); and warranted an extension of the project.

35. **Lack of clarity on the procurement laws and regulations that applied to the project led to disbursement delays in the first year.** This issue was raised and resolved after communication between the ministry and the CEO of the EEAA. Also, issues related to the evaluation of the International Competitive Bidding for purchasing water monitoring equipment, caused delays in drafting the Memorandum of Understanding (MOU) between the project and the Alexandria Drainage and Sanitation Company.

36. **Midterm review.** A midterm review was conducted in December 2012 and concluded that the project's implementation status was Moderately Satisfactory. As such, the Government and the mission agreed that only minor restructuring was needed and that the project would need

¹¹ The average time from Board to effectiveness for projects in Egypt is 10 months; for Middle East and North African countries, it is 6 months.

¹² There was a high turnover of leadership from the government agencies; the project was implemented under a total of eight Governors of Alexandria, five Ministers of Environment, and five chief executive officers (CEOs) of the EEAA.

more time to achieve its PDO. The mission was in agreement with the PMU that an extension of the project was justified in light of the improved performance in project implementation.

37. **Closure of the 9N sanitary¹³ landfill for sludge disposal resulted in the stopping of the secondary treatment of the E-WWTP and the primary treatment of the W-WWTP in 2015.** The landfill (which was not part of this project) closed because informal settlers prevented access to the site claiming that it was negatively affecting them (odor and insects). Since the landfill could not collect the sludge generated from the treatment plants and because raw water bypassed the E-WWTP and W-WWTP, the pollution load at El-Mex Bay increased and negatively impacted the GEO indicator¹⁴. On May 19, 2017 during the ICR period, after proper government intervention¹⁵, the landfill was reopened. Due to the residence time of the lake,¹⁶ to fairly measure the impacts of the project's interventions, the ICR deadline was extended for four additional months (from August 2017 to December 2017).

2.3 Monitoring and Evaluation (M&E) Design, Implementation, and Utilization

38. **M&E design.** The initial Results Framework was broadly formulated and (page 40 in the PAD) comprised two GEO-level results indicators and nine intermediate results indicators. Baseline data and target values were to be established after the feasibility studies were done. In the initial Results Framework in the PAD (annex 3), there was a lack of alignment between intermediate indicators in the table on key indicators and the results matrix; this was addressed with the restructuring. The restructuring in 2015 was used to clarify and simplify the Results Framework, resulting in five clear GEO-level results indicators directly measuring the achievement of the GEO and limiting the intermediate results indicators to six. Moreover, the GEO seemed ambitious given the scale of the project and with what could also be considered a longer-term objective beyond the scope of the project. Nevertheless, the revised indicators were certainly relevant to the project objectives and the results framework on the whole fit the needs of the project.

39. The PAD detailed the M&E arrangements related to water quality monitoring. Initial M&E arrangements, as designed in the PAD, intended to have an M&E specialist at the PMU, including planned M&E arrangements for the piloting of low-cost water treatment technologies making water monitoring data publicly accessible, including a socioeconomic survey. However, due to delays during project implementation because of a reshuffling of the EEAA, a consultant was hired to design the M&E, and the head of the PMU became responsible for M&E.

40. **M&E implementation.** A continuous monitoring station was set up at El-Mex Bay to measure temperature, turbidity, dissolved oxygen, total dissolved solids (TDS), TSS, and pH. Ten specific locations for sampling were identified, which allowed the measurement of the project's impact on water quality. Water quality samples were collected from these locations, then samples were analyzed following international standard practices. This included sample

¹³ See safeguard section 2.4 to clarify the 9N landfill issue.

¹⁴ See data sheet, GEO indicator number 4.

¹⁵ In December 2014, the government formed a high-level committee headed by the Ministry of Health. The committee negotiated until May 19, 2017 and successfully reopened the landfill.

¹⁶ The amount of time taken for a substance introduced and treated into a lake to flow out of it again.

collection, frequency of measurements, and handling and analysis of laboratory results. The lab at the Alexandria RBO oversaw the sample analysis and was certified for quality assurance and quality control of the data generated.

41. **The M&E framework was implemented adequately¹⁷ with the support of a dedicated staff within the PMU.** Consultants were appointed on an ad hoc basis for the midterm review and the final evaluations. The reporting of results and indicators data was regularly documented in the Aide Memoires. The idea of developing a Geographic Information System (GIS) application, a database application, and information technology (IT) hardware was dropped because it was deemed too expensive. The M&E system complied with the GEF International Waters Tracking Tool. A simple project monitoring reporting tool (Excel sheets) was used during implementation to report the collection of the water quality data.

42. **M&E utilization.** The M&E data on project progress were used to identify delays in the implementation of activities, especially pollution reduction (BOD in mg/L). The data were used to help set up the baseline (55.59 mg/L) and target value (47.25 mg/L) for the BOD concentration during the restructuring. A prioritized monitoring program was set up toward the end of the project. As the frequency of the water quality analysis increased for priority sites, the number of sampling stations was reduced from ten to five but the frequency of sampling increased. M&E data from the pilot wastewater treatment technologies were used as inputs for the ‘Report on Lake Mariout: Results and Lessons Learned’. The water quality program was implemented, and the Ministry of Environment used the reports to evaluate the status of the lake.

43. Water quality monitoring data is going to be made publicly available so that it can be used by the local stakeholders and researchers. For example, the fishing community will be informed on the status of the lake’s water quality, since they depend on it for their livelihoods. It is functioning beyond the end of the project, and the M&E arrangements in place will serve the continued implementation of ICZM in the country.

2.4 Safeguard and Fiduciary Compliance

44. **Safeguards.** There were no major safeguard issues during project implementation. The project was considered Category B (site-specific, reversible potential impacts) at appraisal. The initial design triggered Operational Policy/Bank Policy (OP/BP) 4.01 on Environmental Assessment, as there were no associated significant, sensitive, diverse, unprecedented or irreversible impacts. Overall, the project activities complied with all applicable Bank policies. An Environmental and Social Management Plan (ESMP) was adopted before appraisal to address, among others, the potential environmental issues that had been identified during preparation. Before the political events, at the beginning of the project, two environmental specialists were assigned to carry out the monitoring of the Environmental Management Plan. Then, a newly appointed environmental specialist monitored the safeguards requirements of the project and offered training to stakeholders. A social expert was also assigned to communicate with key project stakeholders, including fishing communities, and help with discussions on the

¹⁷ The PMU also purchased two motor boats, chemicals, and lab car for the Drainage Research Institute (DRI) and the GAFRD Alexandria branch. These were necessary parts of the M&E system to collect, store and analyze water samples from Lake Mariout.

change of the project intervention from El Qalaa drain to the W-WWTP. The supervision of the safeguards aspects was regular and documented in most Aide Memoires. An effective local Grievance Redress Mechanism (GRM) was set up to provide the communities with the means to convey their concerns and allowed the PMU to address issues raised by the fishing community.

45. **9N landfill issue.** During a supervision mission in December 2015, the team learned that the secondary treatment at the E-WWTP and the primary at the W-WWTP were stopped when the sludge disposal site of the 9N landfill was closed. It is important to note that the 9N landfill issue is not part of the project. Informal settlers (settled during the political events) near the landfill prevented access to the site, claiming that it is negatively affecting them. The random urban expansion after the political events may have resulted in increased proximity between the settlements and the landfill. The World Bank stressed the importance of raising community awareness about the steps being taken to address the concerns of the communities and ensuring the safe operation of the site. It is worth noting that the landfill is not part of this project and was operating before the project.

46. **Financial Management.** The implementing agency maintained adequate financial management arrangements, and there were no major financial management issues. The PMU was adequately staffed for carrying out the financial management functions at all times and used a strong Financial Management Information System (FMIS). This FMIS greatly contributed to improving efficiency and transparency in the execution of financial transactions, as well as to building the capacity of project staff in financial management. The interim financial reports submitted to and reviewed by the World Bank during implementation were found satisfactory, in a format acceptable to the World Bank, and with minor issues identified. A minor issue occurred in November 2016, when the contract with the project financial management consultant was not renewed and no proper handover was made to the new financial officer (who had been seconded from the EEAA). This resulted in incomplete records, but the issue was resolved quickly by the PMU after follow-up by the World Bank's team. Thereafter, acceptable annual audit reports were received on time and no major internal control weaknesses were reported.

47. **Procurement.** The management of procurement activities was the responsibility of the implementing agency, which was adequately staffed with a full-time procurement officer. However, the consultant's packages for the development of the GIS application and database license package, including IT hardware equipment and software, were delayed throughout the life of the project; at the end of the project, the procurement of GIS-related material was dropped. Specific training and technical assistance from the World Bank team helped resolve the delay following the change in the PMU and the instability under the political events in Egypt, and no major procurement issues were noted later during the implementation period of the project. The procurement of works, goods, and consulting services was carried out in accordance with the World Bank Procurement Guidelines.

2.5 Post-completion Operation/Next Phase

48. **ICZM and pollution reduction.** The project finalized most of its activities before it closed in February 2017; there will not be a next phase. Transition arrangements for future operations include the following tasks:

- (a) The ICZM Plan was handed over to the Governor for its implementation, and a decree to form the ICZM Committee in Alexandria was approved on July 26, 2017. This is key to the sustainability of the project's outcomes.
- (b) The 9N landfill has reopened since May 19, 2017. This is critical to ensure the efficacy of the interventions (biofilm and wetland).
- (c) According to an MOU signed between the project and the W-WWTP, the latter is responsible in taking over the operation and maintenance (O&M) of the biofilm and wetland, at the time of writing this ICR, the Alexandria Drainage and Sanitation Company is taking over the O&M. The PMU will reduce its function but continue working to ensure an appropriate transition phase.

3. Assessment of Outcomes

3.1 Relevance of Objectives, Design, and Implementation

49. **The relevance of objectives is rated High.** The overall objective of the project, to improve the institutional mechanisms for sustainable coastal zone management in Alexandria, including the use of institutional strengthening measures and pollution reduction interventions, remains relevant to the priorities of Egypt and in line with the Government's program and policy on environmental management and the Convention for the Protection of the Mediterranean Sea against Pollution (the Barcelona Convention). The objectives are aligned with Egypt's NEAP, which identified Lake Mariout as the most polluted lake in Egypt. Moreover, since climate change effects are expected to exacerbate an already fragile coastal zone by contributing to coastal erosion, the project was relevant to Egypt's National Strategy for Adaptation to Climate Change and Disaster Risk Reduction, 2011.

50. **The project was in line with the country's higher development objectives, which are to reconcile economic development with environmental and social sustainability.** In particular, the project complemented the Government's strategy to increase and improve the treatment of point sources of pollution in Alexandria, particularly through the upgrading of the E-WWTP and the W-WWTP. In early 2009, a series of workshops were held to discuss the main components of a Draft National Strategy for ICZM (vision, objectives, and priorities) under the auspices of the NCICZM.

51. **At the time of appraisal (2009), no Country Partnership Framework (CPF) between Egypt and the World Bank was in place for the period.** However, the proposed project was fully consistent with the World Bank's Country Assistance Strategy for Egypt (2005), which called for supporting the GOE's environmental strategy to be able to address the environmental risks that could accompany economic growth. One long-term goal was to 'improve air and water quality and reduce water loss'.

52. **The project is also relevant to the current country and World Bank’s priorities and development objectives.** The most recent CPF for Egypt (2015–2019)¹⁸ confirms the World Bank’s support of environment and natural resource management, to help ensure environmental sustainability (paragraph 45, page 13). The CPF was committed to prioritize interventions to improve urban planning and reduce urban encroachment and agricultural pollution. Under the inclusion pillar, the project contributed to ensuring notable progress in water and air pollution abatement (successful scale-up for pollution abatement and wastewater management, EPAP II). The project’s activities are still fully consistent with the GEF Operational Program 2 for Coastal, Marine, and Freshwater Ecosystems.

53. **The relevance of design and implementation is rated Substantial.** The planned activities are aligned with the PDO, the outcome and intermediate outcome indicators. The combination of three components with activities and outputs, which would strengthen institutional capacities in ICZM, planning and monitoring, in addition to the piloting of pollution reduction measures for lessons learned and future replication (at the intermediate outcome level), was relevant to achieve improved institutional mechanisms for sustainable ICZM in Alexandria including the reduction of land-based sources of pollution entering the Mediterranean Sea, through El-Mex Bay. To improve these institutional mechanisms, it was also substantially relevant that implementation arrangements were designed to build on existing EPAP institutional arrangements, though reinforcing them with additional staff, and to incorporate interagency agreements between the EEAA and MWRI as well as the MALR in the design of the project. The project design was adapted to change under the evolving context and rising issues as seen when the location for the pollution reduction interventions was moved from inside the lake (El Qalaa drain) to the W-WWTP. The adaptive design allowed the purchase of a thermal dryer for the sludge to reduce the effects of the 9N landfill closure.

54. **With hindsight, the initial Results Framework could have benefitted from more clarity and precision.** This was addressed during the project restructuring in 2015 and the RF was simplified, resulting in five clear GEO-level results indicators directly measuring the achievement of the GEO and limiting the intermediate results indicators to six.

3.2 Achievement of Global Environmental Objectives

55. The overall achievement of the PDO/GEO is evaluated based on the performance of each of its two outcomes. The GEO of the project was to improve the institutional mechanisms for sustainable coastal zone management in Alexandria, in particular to reduce land-based pollution to the Mediterranean Sea. This objective can be split into two equally important sub-objectives, measured by the performance indicators.

¹⁸ World Bank. 2015. Egypt, Arab Republic of - Country partnership framework for the period FY2015-19. Washington, D.C.: World Bank Group. Report number: 94554-EG

Objective 1: To improve the institutional mechanisms for sustainable coastal zone management in Alexandria

56. The achievement of this objective is rated Substantial.

This objective was achieved by developing mechanisms for integrated coastal zone management, including an ICZM plan, ensuring financial viability of interventions, training, capacity building of institutions and stakeholders responsible for coastal zone management. The achievement of the objective can be measured using the following related Results Indicators:

- *GEO-Indicator 2: Alexandria Integrated CZM adopted by the Alexandria Governorate*

57. ICZM Plan. In order to have an institutional mechanism for sustainable coastal zone management, an ICZM plan¹⁹ had to be developed to guide and inform decisions on the management of the coastal zone. One of the major achievements of the project was the Alexandria ICZM Plan prepared in a participatory manner with all stakeholders involved and handed over to the Alexandria Governorate for its implementation. The adoption and subsequently the implementation of the ICZM plan will address current and long-term coastal management issues, including habitat loss, degradation of water quality, changes in hydrological cycles, depletion of coastal resources, and adaptation to sea level rise and other impacts of global climate change. The ICZM plan will help preserve coastal resources, their ecological functioning and ultimately their values by applying adequate land use planning within a social, institutional and economic context. A coordination mechanism (ICZM Committee) has been proposed, which is a critical step to begin implementation of the ICZM Plan. The plan also proposed an interesting balance of top-down and bottom-up approaches to integrated coastal management.²⁰ The methodological approach for preparing the plan is presented in annex 2. The ICZM Plan was handed over on October 30, 2016, to the Governor for its implementation.²¹ All necessary documents and training for the staff of the W-WWTP has been provided to ensure financial viability and O&M. It is worth noting that the Governor was replaced during the ICR mission (February 2017). This was the eighth Governor change since the project implementation started.

¹⁹ Integrated Coastal Zone Management (ICZM), is a planning and coordinating process which deals with development management and coastal resources and which is focused on the land/water interface. It provides institutional and legal framework, to focus on environmental planning and management, and help coordinate various concerned agencies to work together towards a common objective.

²⁰ The top-down approach includes mandatory and consultative communications between the ICZM Steering Committee, the ICZM Technical Secretariat, and an advisory board, namely the Research Advisory Group and the Coastal Forum. The bottom-up approach serves to raise specific proposals directly from the stakeholders. The different advisory boards are to channel these proposals to the ICZM Technical Secretariat for their analysis. The secretariat will raise its conclusions to the ICZM Steering Committee for their final consideration.

²¹ The official handover ceremony of the ICZM Plan to the Alexandria Governorate was held on October 30, 2016. The ceremony was attended by 59 people from 16 organizations including the Ministry of Investment and International Cooperation, MWRI, EEAA, Ministry of Local Development, Alexandria Governorate, Parliament, and GAFRD. During the event, H.E. Dr. Khaled Fahmy, Minister of Environment, emphasized the importance of coordination across the sectors in managing the coastal zone.

A decree was eventually signed on July 29, 2017, to confirm and adopt the proposed structure of the ICZM Plan and form the Alexandria ICZM Committee.

- *GEO-Indicator 7: Mechanism for ensuring financial viability and use of land area for pollution reduction interventions established*

58. Mechanism for ensuring financial viability and use of land area for pollution reduction interventions. In order to reflect aspects of sustainability of the project's interventions, the W-WWTP is committed to ensure the financial viability (commitment to be responsible for operation and maintenance (O&M) costs of EGP 950,000) and that land is available for the biofilm and wetland. The project signed a Memorandum of Understanding (MOU) between the Project Management Unit (PMU) and the Alexandria Drainage and Sanitation Company with the W-WWTP in April 2015.

- *GEO-Indicators 5 and 6: Direct project beneficiaries (including female beneficiaries)*

59. All the 66,613 people in targeted areas are benefitting from the project, including 48 percent of this population who are women. The population residing in or living off coastal ecosystems, primarily coastal communities engaged in sustainable use activities (e.g. fishing, tourism) are already benefitting from the project and will do so more, on the long term. Pollution reduction will allow the fishermen to catch less-contaminated fish and better-quality fish (*Mugil cephalus* instead of less-valuable fish such as *Tilapia*), including restoration of wetland and biodiversity conservation. Safeguarding healthy ecosystems and promoting sustainable use of natural resources will ensure that these populations are able to continue to enjoy their benefits in future. The people are now involved in ICZM and able to share information (for example, on management plans, interventions, mainstreaming opportunities, meetings, and training), including feedback loops for intersectoral, vertical, and international sharing of lessons and best practices related to ICZM and mainstreaming coastal biodiversity management into development planning.

- *IO-Indicator 2: Alexandria Integrated CZM plan prepared with stakeholder participation*

60. ICZM training and capacity building. A study tour was organized by the MedCoast Foundation in Turkey from May 13 to May 20, 2013, to study ICZM experiences of other Mediterranean countries. Ten representatives from different project stakeholders participated in the study tour, and they all found it useful to increase environmental awareness among all key target groups and facilitate ownership and full public participation in the ICZM of Alexandria. Water modeling and quality training was also conducted for all the partners including the 104 staff of the PMU, water quality department, and the central laboratory in the EEAA, Alexandria RBO, and DRI. A training on ICZM was conducted by the University of Alexandria from February 19 to February 28, 2017. It was attended by 20 technical staff representing the Governorate, EEAA, National Institute for Urban Planning in Alexandria, MWRI, and GAFRD. The training was able to introduce the Alexandria ICZM Plan and prepare all participants for its implementation. The training attempted to highlight the potential opportunities as well as obstacles that could hinder development efforts. A number of sub-objectives have been identified in the ICZM Plan, including natural resources management, renewing or rehabilitating damaged

resources, preserving and promoting social equity, providing a mechanism for capacity building and planning, and encouraging complementary rather than competitive activities. In addition, the environmental protection laws, oil spill contingency plan, and coastal area management legislations were discussed. The management tools to implement the strategic objectives of coastal zone management were introduced to the participants and included remote sensing, GIS, and spatial planning. The stakeholders now have a clear road map that will allow them to proceed in a systematic way once the ICZM Plan is implemented.

61. **The project has increased the capacity of the various relevant entities** to manage the coastal zones in and around Alexandria in an integrated, participatory, and sustainable manner, including planning, consensus building, and monitoring (before the project, the stakeholders did not have a platform/plan to discuss the management of the coastal zone, because they had competing interests on the use of the coastline). It has triggered awareness raising and institutional strengthening on sustainable coastal management through the process of developing an ICZM Plan using a multisectoral platform and training. It developed a specific training and capacity-building strategy and action plan targeting national and local governments, environmental and coastal development managers, communities, private sector, nongovernmental organizations in areas such as environmental education, community-based natural resources management, strategic environmental assessment, environmental impact assessment, GIS, law enforcement, and resource economics.

62. **Knowledge sharing.** The PMU participated in the 8th International Water Conference (IWC) and learning event conducted in Sri Lanka from May 9 to May 15, 2016, and a conference of Arab ministers responsible for environmental affairs in Hurghada from June 14 to June 17, 2014. IWC is an integral part of the GEF IW Program from which this project is benefitting. The PMU displayed the project during the event by putting out a banner and distributing project brochures. Visitors from Arab countries, especially from Saudi Arabia and Oman, were very interested in the ICZM components because they are currently working to develop similar plans. Other projects and organizations like Cairo Climatedtalks, a project developed by the German Embassy, and the Arab Federation for Youth and Environment were interested in the project activities and showed their willingness to invite the PMU for a presentation on ICZM soon. The PMU commented that the conference was a good chance to interact with experts from around the world, giving a better understanding of environmental and socioeconomic problems in international waters and large marine ecosystems (LMEs). The PMU learned best practices on LME assessment and natural science modules on fish productivity and fisheries management and how pollution affected LME productivity and health. These integrated analysis tools for LME gave a better understanding for better results and sustainability of natural resources. One of the important lessons learned from the conference was private sector involvement in natural resources management for sustainability and the importance of promoting private sector participation in the process of conservation, restoration, and sustainability of natural resources and LMEs.

- *IO-Indicators 10 and 14: Report on “Lake Mariout: Results and Lessons Learned” published and disseminated and replication strategy prepared and adopted by National CZM Committee*

63. **A replication strategy** to replicate the pilot and interventions developed by the project has also been prepared, as well as a brief (Indicator 11) on the lessons learned and experience of low-cost wastewater treatment technologies distributed at the inauguration event (October 30, 2016). The report was prepared using water quality data collected by the project (please see section 2.3 on M&E) and distributed to all the stakeholders. The participation of many stakeholders contributed to the success of the ICZM development, as seen through the participatory mechanism (interviews, focus groups, and workshops) presented in annex 2.

Objective 2: To reduce land-based pollution to the Mediterranean Sea

64. **The achievement of this objective is rated Substantial.**

This objective was achieved by an improved water quality monitoring system and water treatment and pollution reduction measures, thereby reducing the pollution load entering into the Mediterranean. The achievement of the objective can be measured using the following related Results Indicators:

- *GEO-Indicator 4: Pollution load (BOD) entering the Mediterranean Sea from El-Mex Pumping Station (mg/L)*
- *IO-Indicator 15: Water treated at West Wastewater Treatment Plant (m³)*

65. **Construction of pollution reduction measures at the W-WWTP has been completed and test operations have begun.**²² The pollution reduction measures consisted of a combination of SAF media biofilm system that treats 50,000 m³ per day of the W-WWTP and an engineered wetland consisting of two basins treating 25,000 m³ per day of the water from the biofilm system. The total cost of the system is about US\$4 million. According to the feasibility study, the unit cost for treating 1 m³ is around one-third of the cost of a conventional treatment system.²³

Figure 1. Pilot Intervention at the W-WWTP (source Google earth)

²² The inauguration ceremony to hand over the site was held on December 19, 2016, in the presence of H.E. the Minister of Environment, H.E. the Minister of Water Resources and Irrigation, and the Governor of Alexandria.

²³ See annex 3.



66. **At project closing, due to the 9N landfill closure (a force majeure situation), both the E-WWTP and W-WWTP did not provide full treatment.** This situation impacted water quality results and the BOD concentration at El-Mex further increased from 75 mg/L in November 2016 to 121 mg/L in February 2017. During the ICR period (in May 2017) the landfill was reopened. Therefore, the ICR deadline was extended to allow the team to capture the correct impacts of the interventions of the water quality at El-Mex Bay. The water quality results presented in annex 2, provides evidence that the intervention was successful in reducing pollution loads and, therefore, can inform a replication strategy to the National CZM Committee. Latest results indicate that the BOD target result of 47.25 mg/L is almost achieved with a 48 mg/L measured in October 2017. The latest water quality analysis presented in annex 2, measured at the outfall of the interventions, confirms the results.

67. **In response to the excess sludge generated at the treatment plant, during the 9N landfill closure,** the PMU and the W-WWTP agreed, as part of its existing MOU, to use excess project funds (from currency depreciation) to purchase a thermal dryer for the W-WWTP.²⁴ The thermal dryer helped reduce sludge from 45 tons per day to 7 tons per day. This allowed the plant operators to treat more effluent and reduce sludge production. The test operations confirmed that the moisture contents can be reduced to less than 20 percent, which opened up opportunities to reuse dried sludge as alternative fuel at the cement factories. An initial meeting with the cement company and the W-WWTP was held, and the EEAA conducted a quick feasibility study for potential reuse of the dried sludge.

68. **Improved water/oxygen circulation in the lake.** A mechanical reed harvester was purchased and started operating in the lake in July 2016. An additional harvester was purchased using the project savings (excess project funds from currency depreciation) and was delivered to the GAFRD for use in the lake on February 26, 2017. The reed removal will help with the aeration and circulation of oxygen inside the lake to allow nutrient removal and increase fish

²⁴ Although disposal of sludge was not a risk identified during preparation and most of the implementation period, the World Bank, at the request of the Government, agreed to the use of excess project funds to help address sludge disposal issues. In this regard, the project decided to purchase a thermal dryer using the project savings to address this emergency. The sludge drier reduces the volume of sludge and creates a product that can be used for other purposes, including potential reuse of dried sludge as an alternative fuel at cement factories and for agricultural purposes.

production (due to increase in oxygen mixing). The harvester can remove reeds at 153 m³ per hour, which is almost double the capacity of the old harvester. A report is being prepared summarizing the achievements from reed removal activity and including operational efficiency, areas where reeds removal is done, improvements in fish conditions, and implementation status of the ESMP.

- *IO-Indicator 9: Improved water quality monitoring system at El-Mex Bay in place*

69. **An effective water quality monitoring system was put in place to measure pollution levels in the lake and at the outflow to the Mediterranean Sea.**²⁵ The PMU hired an individual consultant to assess the capacity of each partner to conduct sampling and analysis of water quality parameters. Those partners were the EEAA Alexandria RBO, GAFRD-Alexandria Regional Office, MWRI-Water Quality Unit, and DRI. The consultant also determined the water quality training modules necessary for all project partners to implement water quality monitoring programs according to international standards. Finally, the consultant designed a monitoring program that specified the locations that best monitor the sources of pollution and water quality status in El-Mex Bay, Lake Mariout, and the outfalls of canals, drains, and W-WWTP. The monitoring program specified the frequency of measurements and the role of each project partner in this program. All project partners can now share the water quality data in a transparent way, which will help them in taking informed decisions pertaining to the ecosystem of Lake Mariout.

70. **The PMU procured the required water quality equipment, and implemented 10 water quality training modules for 150 trainees from different partners to learn about water quality standard processes (starting from samples collection and handling through standard methods for analysis to result analysis).** The water quality program has been implemented seven times and the PMU issued seven water quality reports. The Ministry of Environment has used the reports to evaluate the status of the lake and has sent the reports to the Ministry of Housing to give an indication about the effectiveness of the treatment in Alexandria. Recently, the demand for water quality testing has increased and priority sites were identified in and around Lake Mariout.

71. **The water quality monitoring system was helpful to compute and visualize the various pollution loads into the lake, since the volumes and concentrations were given.** The ICR team calculated the average and the range of pollution loads (minimum-maximum) in tons per year of BOD from nine measurements taken from 2014 to 2017 during the lifetime of the project. The pollution at the outflow of the W-WWTP contributes about 482,000 m³ per day, so 6 percent of the inflow volumes to the lake (see annex 2 for pollution loads in tons per year of BOD).

72. **A water quality model was successful and instrumental in leading the identification of pollution reduction interventions.** The model included different scenarios for interventions in Lake Mariout, including models with reed removal, different water input locations into the main basin, and the likely impact of the identified project investment in low-cost treatment on

²⁵ Many parameters are now being measured, including pH, BOD, chemical oxygen demand (COD), TSS, total nitrogen, total phosphorous, TDS, dissolved oxygen, turbidity, and temperature.

the grounds of the W-WWTP. The water quality model was transferred to the GAFRD, EEAA, and other relevant organizations and training was provided. Based on a request from the Prime Minister, the model was used to study the effects on the water quality in the event Lake Mariout was to be connected to the adjacent lakes.

- *GEO-Indicator 7: Mechanism for ensuring financial viability and use of land area for pollution reduction interventions established*

73. **To ensure sustainability of the project's pollution reduction interventions (biofilm unit and engineered wetland).** An MOU was signed in April 2015 with the PMU and the W-WWTP to allocate their own land for project interventions and to make a commitment to be responsible for O&M costs after the project ends. The Alexandria Drainage and Sanitation Company have taken over the responsibility of the O&M.

3.3 Efficiency

74. **The efficiency is rated Substantial.** Consistent with the requirements for stand-alone GEF projects, the project appraisal concluded that the project structure was not amenable to a full stand-alone financial or economic analysis. No economic rate of return was calculated, and no quantifications of the benefits were presented in the incremental cost analysis of the PAD. Annex 3 describes the expected economic outcomes of the project. This ex post analysis focused on (a) the outcomes of the ICZM Plan in Alexandria and (b) the efficiency at the outlet of the intervention and the resulting impacts on Lake Mariout, using cost comparisons.

75. **The project outcome, through the adoption of the ICZM Plan, yielded global environmental benefits** which, due to their nature, are not easily measurable in monetary terms. Such benefits came from training provided by the project that strengthened the stakeholder's capacity to participate in an ICZM plan:

- (a) Improving the sustainability of ICZM and the conservation of fish species and lake ecosystem of global significance;
- (b) Reinforcing the institutional framework for natural resources management, including oil spill contingency plan and coastal area management legislation; and
- (c) Reducing pressures on natural resources, such as encroachments on the coastal zone of Alexandria, by managing competing land uses due to the increase of population growth.

76. **Some expected local benefits identified in the PAD were updated and quantified; this concerned the sale of duckweeds and increase in fish production.** The reduction of COD, BOD, nutrient loads from the lake and the improved water circulation resulting from the reed removal are expected to improve the lake's biodiversity and ecosystem. Today, the price of duckweed in Egypt is about US\$735 per ton, meaning that the GAFRD will potentially be able to generate US\$441,000 per year. Since the start of reed removal operations, the fishing community experienced an increase in fish catch in Lake Mariout compared to the situation at the beginning of the project. Although not quantified in monetary terms, this increase is evidence of the success of reed removal and increase in oxygen circulation in the lake due to the GEF interventions.

77. **A cost comparison of the treatment facility with a conventional secondary treatment showed that the biofilm and wetland cost was almost one-third of the cost of conventional secondary treatment for wastewater treatment plants in Egypt (see annex 3).** A quick cost-effectiveness analysis (CEA) shows that SAF-wetland interventions are more cost-effective than conventional secondary wastewater treatment (with a cost of effluent treatment of US\$0.02 per m³ per year versus US\$0.07 per m³ per year—see annex 3).

78. **An updated CEA indicated that the unit cost per ton of nutrients removed was about US\$137 per ton, which falls well within the range of similar World Bank projects in Hungary (see annex 3).** The financial viability of the system is adequate because under the MOU signed between the PMU and the Alexandria Drainage and Sanitation Company, the latter is responsible for O&M costs after the project ends.

79. **Making use of the circular economy principle (waste reuse) and depreciation of currency allowed for the purchase of a thermal drier for sludge, an additional reed removal machine, and the initiation of discussions as to the selling of sludge to cement companies to potentially generate revenue that could be used to cover operation and management costs.** This was done efficiently with no additional transaction costs because all the institutional mechanisms, staff, and knowledge were already in place. The thermal dryer is expected to help reduce sludge from 45 tons per day to 7 tons per day. Therefore, by saving 38 tons per day of sludge, the plant could potentially save US\$117,200 per year, money that could be used to pay the O&M costs.

80. **Implementation efficiency.** The project managed to complete all activities despite initial delays, and thanks to a 20-month extension. Even though the project was cost-effective, the operational efficiency gains could have been further improved if there had been no exogenous factors, as political changes created significant uncertainty. Security conditions deteriorated in some parts of the country during the initial stages of project implementation, further adding to the delays. The Government declared a state of emergency in mid-2013, thereby limiting working hours and movement in project areas. The delays were unforeseen as explained earlier (political events, landfill closure) and resulted in adopting the ICZM plan and forming the Alexandria committee on July 29, 2017 during the ICR period. In spite of these, the benefits achieved outweighed the minor shortcomings.

3.4 Justification of Overall Outcome Rating

81. **As stated above, the relevance of objectives is rated High and relevance of design and implementation is rated Substantial, the achievement of the objectives is rated Substantial, and the efficiency is rated Substantial.** Consistent with these ratings, the overall outcome is rated Satisfactory. The project implemented all planned activities and PDO indicators were substantially achieved. In addition, the project objectives continue to be highly relevant to the country's priorities for coastal zone management and land-based pollution reduction. The project made major contributions in ICZM in a very challenging context of a volatile political situation and changes in leaders of government agencies. The project also demonstrated the effectiveness of a pilot low-cost treatment, the measurements of inflow/outflow at the intervention show that pollution is effectively reduced (70–80 percent) at the end of the intervention. The two key GEO indicators were clarified in the restructuring in April 2015 (see

section 1.2) but the changes were not substantial and were to fine-tune the indicators, nor did the project scope change; therefore, a split assessment is not necessary.

4. Assessment of Risk to Global Environment Outcome

82. The risk to the development outcome is Substantial for the following reasons:

- The first major outcome of the project is the creation of a framework for ICZM that aims at providing the forum, rules, and tools to mainstream the preservation of natural resources in coastal development planning. Since the decree has been adopted, the risk to long-term development outcome is mainly due to the pace of its implementation and additional delays that might jeopardize the transition and the financing of the committee, which is critical to the sustainability of project outcomes.
- Additionally, the Alexandria coastal zone is under considerable development pressure from encroachment and its continued sustainable management will require significant engagement from the different levels of government, as mentioned in the ICZM Plan. The Government recently displayed high commitment to sustain the project's outcome and protect the institutional and pollution reduction interventions. The sustainability of this commitment will be reinforced in the long run with the external nudge exerted by the World Bank. It is anticipated that the management of the coastal zone in Alexandria will be given adequate attention by technical and financial partners.
- Concerning the pollution reduction outcome, some risk remains that there may not be enough resources to continue and maintain some of the capacity building work, particularly the laboratory equipment, water quality models and training conducted for the PMU.

5. Assessment of Bank and Borrower Performance

5.1 Bank Performance

(a) Bank Performance in Ensuring Quality at Entry

Rating: Moderately Satisfactory

83. The World Bank performance in ensuring quality at entry is rated Moderately Satisfactory.

84. The World Bank relied on extensive consultations for the ICZM and tried to ensure buy-in from the different levels of government. Building such a common understanding was very important for the subsequent implementation of the project and helped create the commitment from various actors, necessary to prepare a successful ICZM framework. This framework/plan, albeit shared among the different stakeholders, is in the process of implementation after forming the ICZM Committee in July 2017. The World Bank also relied on the importance of capacity building, strong Government commitment, and coordinated support as key, and these elements were evident in the design of the project. Including background

analysis and previous lessons learned such as the EPAP I (completed at the time) and EPAP II (ongoing at the time). The most important lesson was that any investment needs to be accompanied by a significant institutional strengthening and capacity-building component, as well as public consultations to ensure success.

85. **The Bank and the Borrower prepared the project by: (a) evaluating lessons learned from previous similar operations and appropriate alternatives; and (b) designing a technically feasible project.** Nevertheless, the weaker aspect was the need to be more realistic in assessing risks and proposing timely effective mitigation measures, given the technical, financial and institutional challenges.

86. **The design allowed for an iterative, flexible, and adaptable process.** This was critical in ensuring institutional arrangements and high-level commitment including the mix of top-down and bottom-up approaches to coastal management. The Bank spent considerable time preparing the project, including the pre-appraisal missions, advising on the selection of pilot schemes, identifying the technical studies and holding a stakeholder meeting in the governorate of Alexandria.

(b) Quality of Supervision

Rating: Moderately Satisfactory

87. **The World Bank performance in ensuring quality of supervision is rated Moderately Satisfactory.** The World Bank conducted 13 missions in total, which comprised operational and technical meetings with a variety of national and local stakeholders, field visits, strategic consultations with technical and financial partners, and high-level discussions with government officials as needed. The World Bank team provided useful training on all fiduciary aspects to the PMU. During the implementation period, two Task Team Leaders succeeded each other, but the transitions were managed smoothly and it occurred earlier before the restructurings were approved. This stability in leadership helped cement strong relationships between the implementing agencies and the World Bank team. The strong relationship was evident in the rich discussions about issues regarding financial sustainability, operation and management of the intervention, and formation of the ICZM Committee, as can be observed in the project documents.

88. **The World Bank supervision team was timely in its responses to client requests and to the changing needs and opportunities** (that is, workshops and capacity building, water quality monitoring program, devaluation of the Egyptian pound, purchasing of a sludge drier and second reed removal machine, and so on) and threats (El Qalaa drain diversion, 9N landfill closure, Egyptian political instability, high turnover of leadership from the government agencies, conflicting objectives of the various stakeholders, and so on). The team was adaptive to changes, as seen when the location for the pollution reduction interventions was moved. The adaptive restructuring after the midterm review (December 2012) helped refine some indicators as mentioned earlier.

89. **The quality of reporting in the Implementation Status and Results Reports (ISRs) and Aide Memoires and other related project documents were good** in terms of the details provided, as well as their frank evaluation of weaknesses and shortcomings and concrete action

plans. A total of 14 ISRs were filed, between June 2010 and February 2017. Sustained efforts were made to address the challenges and delays throughout implementation which was communicated in the ISRs. Ratings were changed frequently according to progress or delay in project activities. The World Bank team was first informed about the 9N landfill issue in December 2015, which was functioning when the ESMP was prepared in 2014. The project ratings were not downgraded immediately because there were always reassurances from the Government that the issue will be quickly resolved. The 9N landfill issue was outside the scope and beyond the control of the project and efforts by the Government to resolve the issue were ongoing. For example, in June 2016, the World Bank team was informed (as they were leaving the country) that the Government officially announced the reopening of the landfill and this did not lead to the actual reopening. The parties agreed that actions will be taken, and the World Bank team gave the Government the opportunity to address the issue before downgrading the rating in the ISR. The Bank team knew that once reopened, and interventions fully operational, the targets could be reached within a few months.

90. As a workaround to the landfill issue, the Bank Team proactively worked with the W-WWTP, the Governorate and the EEAA to find solutions and ways to reduce the cost of sludge disposal. After careful consideration (including a formal feasibility study funded by the ACZMP), reducing the wet weight of sludge through drying was identified and funded.

91. **The team ensured continuous engagement with project stakeholders and continued support to the client.** The team took steps to extend the project following the Midterm Review (MTR) to account for the initial delays. However, the team could have used the opportunity presented by the MTR to discuss and agree with the PMU on further rationalizing the monitoring indicators. In addition, even though the closing of the 9N landfill was not part of the project, the team could have downgraded the ISR ratings sooner.

(c) Justification of Rating for Overall Bank Performance

Rating: Moderately Satisfactory

92. **The overall World Bank performance is rated Moderately Satisfactory.**

5.2 Borrower Performance

(a) Government Performance

Rating: Moderately Satisfactory

93. **The Government performance is rated Moderately Satisfactory.** The government's commitment to the project remained consistent over the project lifetime. Despite the various challenges and delays during implementation, the project reached almost 100% disbursement at completion. The project continued despite serious turmoil that began in early 2011, when the project was ongoing.

94. **During project preparation, the GOE provided necessary support for the preparatory studies** (such as the pre-feasibility study for pollution reduction, the preparation of the National Strategy for ICZM and the formation of a National Committee for ICZM); estimating the investment needs; and drawing on previous experience with Bank operations to recognize institutional weaknesses that could hinder implementation. The GOE demonstrated its

commitment during the midterm review by agreeing on the six-month action plan and the restructuring to put the project back on track. The GOE's performance was particularly effective in resolving differences between local stakeholders (diversion from El Qalaa drain), which led to the intervention to be moved.

95. The government helped in the preparation of consultations with the stakeholders and building consensus among the different participants. This included agreements signed between the key ministries (water and agriculture) and the EEAA at the beginning of the project. In addition, to donating a land to ensure the construction of the wetland and biofilm. GOE displayed reasonable commitment to the project by setting up a high-level Inter-Ministerial committee in December 2014, to help resolve the issue of the 9N landfill closing.

96. **However, political events and frequent shuffling in agencies and personnel resulted in uncertainties and delays.** These instabilities reflected the relatively standard difficulties in advancing cross-sectoral, and decision-making processes. For example, the following delays were observed:

- (a) The 9N landfill remained closed for two years and was reopened in May 2017 despite the commitments by all decision makers to reach an agreement with the settlements and reopen the landfill much earlier.
- (b) The Alexandria Governorate ICZM Committee was formed on July 29, 2017, five months after the end of the project.

(b) Implementing Agency or Agencies Performance

Rating: Satisfactory

97. **The implementing agency performance is rated Satisfactory.** The PMU played a critical role in coordinating the numerous preparatory studies and organizing extensive stakeholder consultations for the ICZM. The PMU was always staffed with technically sound specialist. The PMU faced difficulties during the first years of implementation, some of which were due to the political events and to the novelty of the World Bank processes to the staff (Egyptian procurement versus World Bank procedures).

98. **The complete replacement of the Project implementation team during the political events resulted in delays at the beginning of the project and delayed the hiring of specialists and individual consultants who were necessary to implement the six-month action plan.** At the beginning, few bottlenecks were quickly resolved by the PMU (delays in approving invoices by the Ministry of Finance, insufficient contract follow-up, and inadequate coordination with stakeholders). The situation improved after the midterm review (December 2012), with the progressive building of its capacity.

99. **The Procurement and Financial Management processes were sound and in compliance with Bank procedures.** Reporting on project progress and on financial management was always detailed and timely. Sufficient M&E capacities in terms of staff, laboratory equipment, and logistics were made available. In the last two years of the project, the PMU and the Ministry of Environment displayed good ownership of the project objectives, activities, and efficiency in coordinating its implementation.

(c) Justification of Rating for Overall Borrower Performance

Rating: Moderately Satisfactory

100. **The overall borrower performance is rated Moderately Satisfactory.**

6. Lessons Learned

101. **Public consultation and engagement are essential to building trust and sustaining an ICZM.** The project evidenced some key aspects of an effective ICZM and pilot water treatment interventions in Egypt: (a) continuous transparency and extensive stakeholder consultations; (b) a design that allowed for an iterative, flexible, and adaptable process; (c) special attention to strong institutional arrangements and high-level commitment; (d) a mix of top-down and bottom-up approaches to coastal management; (e) an emphasis on capacity building and awareness raising; and (f) solution-driven implementation and quick wins (sludge drier and potential reuse by cement factories) instead of the conventional approach of treatment and dumping of waste (sludge). The project opted for sludge reuse and recycling, thus contributing to sustainability (circular economy principle of reuse and recycle).²⁶

102. **Political commitment and ownership from central and local government are essential for the success of an ICZM Plan in Egypt.** Therefore, in the context of a high turnover of leadership from the government agencies, the use of a bottom-up and top-down approach can be adequate. Instead of coming up with major plans to manage the coastal zone in an integrated manner, design and implementation arrangements for future projects should start with small-scale concept/pilot interventions and build from there. These interventions should be guided by the communities living along the lake and the coast, who can then decide how they would manage their coastal zone given external pressures such as climate change, population settlements, encroachments, landfill issues, and fishermen diversions.

103. **ICZM adoption and implementation, as well as water treatment facilities, require time to yield results.** The experience from the project showed that it requires changing the mindsets of populations (fishermen of Lake Mariout and diversion of the El Qalaa drain), decision makers, and institutions, which itself requires evidence gathering, capacity building, awareness raising, and advocacy. It also involves policy formulation, extensive consultations, and political endorsement, which are time-consuming and dependent upon many external factors. Allocating sufficient time to project design and starting these processes as early as possible (given that, of course, a political event such as the one that occurred in Egypt could not be foreseen) are, therefore, important to avoid having to extend the project.

104. **High-quality and robust technical studies with well-defined and quantitative monitoring indicators are important to guide implementation.** A more systematic approach

²⁶ The PMU and World Bank's team held meetings with cement companies in Alexandria and a waste management company to better understand the requirements and their willingness to accept dried sludge as an alternative fuel source. The cement company believes that sludge can be used as an alternative fuel provided that (a) the sludge contains no more than 20 percent moisture, (b) the sludge was free of heavy metals, (c) the dried sludge was of consistent quality, and (d) an agreement between the Alexandria Drainage and Sanitation Company and the cement company could be worked out to ensure costs to all parties were affordable.

in designing and monitoring outcome indicators could further enhance project outcomes. A preliminary hydrodynamic and water quality model²⁷ can be very useful and could have helped quantify the effects on water quality at the outflow of the intervention (to measure the actual efficiency of the biofilm and wetland) instead of only the discharge point to the Mediterranean Sea, that is, an intermediate indicator could measure the pollution reduction after the intervention at the discharge point of the biofilm and wetland. In addition, since BOD measurements in mg/L are difficult to conduct in the field and results can fluctuate at the lake-sea interface (after rain events or prolonged dry periods), it is recommended to reframe the indicator²⁸ rather than setting a target in absolute values (such as the 5% reduction of BOD). Also, the project depended on other planned schemes implemented in parallel, a risk to reaching the pollution load reduction. The intermediate indicators could have measured the removal efficiency²⁹ of the intervention itself (pollution measured right at the point of discharge from the wetland to Lake Mariout) and only focused on the El-Mex Bay discharging into the Mediterranean Sea.

105. **To ensure sustainability beyond project closing,³⁰ the leadership provided by a strong implementing agency needs to be sustained.** The PMU was successful in the second half of its implementation period by involving stakeholders and beneficiaries, building trust among them, and convincing them about the usefulness of the project. It needed coordination and technical expertise necessary to implement the ICZM framework.

7. Comments on Issues Raised by Borrower/Implementing Agencies/Partners

(a) Borrower/Implementing Agencies

Not applicable

(b) Cofinanciers

Not applicable

(c) Other Partners and Stakeholders

Not applicable

²⁷ For future projects, an even more detailed model is recommended to have robust water quality analysis in a complex hydrodynamic setting such as that of Lake Mariout.

²⁸ For future projects, the following indicator is recommended: Number of days per year (or months depending on the frequency of samples) when the concentration (in mg/L) of a certain pollutant exceeds the ‘reference’ pollution load at El-Mex Bay.

²⁹ $Removal\ efficiency = \frac{Mass\ in\ (raw\ effluent) - Mass\ out\ (treated\ effluent)}{Mass\ in\ (raw\ effluent)} \times 100.$

³⁰ As of July 2017, the European Investment Bank is conducting a feasibility study for the secondary upgrade of the W-WWTP and pilot interventions are considered as one of the options for secondary treatment.

Annex 1. Project Costs and Financing

(a) Project Cost by Component (in US\$, Millions Equivalent)

Components	Appraisal Estimate (US\$, millions)	Actual/Latest Estimate (US\$, millions)	Percentage of Appraisal
Component 1	1.982	1.952	98.4
Component 2	4.625	4.620	99.8
Component 3	0.543	0.379	69.8
Total Baseline Cost	7.15	6.951	97.2
Physical Contingencies	0.00	0.000	—
Price Contingencies	0.00	0.000	—
Total Project Costs	7.15	6.951	—
Project Preparation Facility	0.00	0.000	—
Front-end fee IBRD	0.00	0.000	—
Total Financing Required	7.15	6.951	—

(b) Financing

Source of Funds	Type of Cofinancing	Appraisal Estimate (US\$, millions)	Actual/Latest Estimate (US\$, millions)	Percentage of Appraisal
GEF		7.15	6.951	97.2
BORROWER/RECIPIENT (including in-kind from borrower and O&M from Alexandria Drainage and Sanitation Company W-WWTP)		2.45	0.3	12.2
IBRD		0.00	5.00	N/A
EC: European Commission		1.00	0.00	0.00
EC: European Investment Bank		6.61	12.00	181.5
FRANCE: French Agency for Development		5.76	11.00	191
JAPAN: Japan Bank for International Cooperation (JBIC)/JICA		4.90	11.00	224.5
Local Sources of Borrowing Country (including Egyptian industries)		626.28	134.9	21.5
Total		654.15	181.2	27.7

As originally intended in the PAD, the GEF grant was supposed to be disbursed as a parallel financing to other activities implemented in the area and financed by other donors. Including (i) the Government on-going large scale infrastructure program to upgrade the treatment capacity of municipal wastewater treatment plants in Alexandria (the East and West Waste Water Treatment Plants) and (ii) the Government program to reduce industrial pollution in Alexandria and greater Cairo under the EPAP II.

Annex 2. Outputs by Component

1. Annex 2 provides a description of the different outputs organized by component. The original and revised PDOs and indicators are outlined in Table 2.5 and Table 2.6.

Table 2.1. Output by Components

Component 1: Planning, Institutional Capacity and Monitoring Strengthening	
<p>Description. 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. These agencies include all those responsible for the direct implementation of the project, that is, the EEAA, the Alexandria Governorate, the MWRI, the MALR, and the Lake Mariout Development Committee.</p>	<p>Outputs. Through this component, the project has applied a very ambitious plan to promote the ICZM as a management tool for all relevant stakeholders, and the PMU has carried out many meetings, workshops, training sessions, and even one study tour to Turkey. Principles of ICZM became a very common, well-understood, and applicable concept in Alexandria.</p> <ul style="list-style-type: none"> • ACZM Plan • Restructure of the management system in Alexandria according to the proposed structure in the ACZM Plan • Development of a water quality monitoring network to assess the impact of project interventions including a modeling activity for El-Mex Bay, which can be used to estimate the overall project impact on the Mediterranean Sea
Component 2: Pollution Reduction	
<p>Description. This component will entail the implementation of a package of pollution reduction measures to be implemented on a pilot basis to reduce the pollution load entering Lake Mariout, especially the nutrients (nitrogen and phosphorous), as well as the oxygen-depleting substances, measured by BOD and COD. This will, in turn, reduce the pollution load entering into the Mediterranean Sea from the lake water through El-Mex pumping station. It should be emphasized that the proposed project is complementary to other ongoing projects, each addressing a different source of pollution.</p>	<p>Outputs. Construction of pilot pollution reduction measures at the W-WWTP has been completed. Both E-WWTP and W-WWTP are now providing full treatment after the 9N landfill has been reopened. Because of the reopening of the landfill site and operating of both E-WWTP and W-WWTP, in addition to the pollution reduction measures installed and operating in the W-WWTP, improvement in water quality parameters being monitored in the lake and El-Mex Bay was detected, and achievement of pollution reduction indicators was 98% reached based on the pilot interventions reduction ratios.</p> <p>Pollution Reduction measures in W-WWTP include</p> <ul style="list-style-type: none"> • Submerged aerated biofilm units (50,000 m³ per day), • Aeration system and sedimentation tanks, • Wetland (25,000 m³ per day), and • Reed removal in the lake to improve water circulation and self-cleaning capacity of the lake.
Component 3: Project Management and Monitoring and Evaluation	
<p>Description. This component entails supporting the PMU currently associated with the EPAP II to carry out the various activities related to the project implementation. The monitoring function under Component 3 applies to all project interventions including evaluation and reporting, whereas the</p>	<p>Outputs. An integrated M&E program started with the main stakeholders responsible for management of the coastal area. The program was created to enhance the management tools, build the capacities, and implement an integrated program.</p>

<p>monitoring function in Component 1 is only intended to monitor the water quality of Lake Mariout and the Mediterranean Sea. In addition, the monitoring equipment are different for each component and require a different set of skills for their operation. This component includes hiring of local and/or international consultants to</p> <ul style="list-style-type: none"> (a) Support the PMU, especially as related to technical, financial management, and procurement, on a part-time basis; (b) Assist the PMU in the development and implementation of the necessary M&E framework, including data analysis and reporting as related to pollution loads to Lake Mariout and to El-Mex Bay and the publication of a final report on “Lake Mariout: Results and Lessons Learned” to be disseminated by the end of the project; and (c) Assist the PMU to develop the necessary information dissemination strategy to follow up on the project’s progress and to disseminate lessons learned. <p>The vehicle for the latter is likely to be national workshops; the publication of the project’s details and results on the website of EEAA, in line with the IW:LEARN template; and the participation in GEF’s IW:LEARN programs.</p>	<p>The project has increased capacity of the various relevant entities to manage the coastal zones in and around Alexandria in an integrated, participatory, and sustainable manner, including planning, consensus building, and monitoring. It has triggered awareness raising and institutional strengthening on sustainable coastal management through the process of developing an ICZM Plan using a multisectoral platform and training.</p> <ul style="list-style-type: none"> (a) The project prepared an ICZM Plan and developed an integrated water quality monitoring network for Lake Mariout and the Mediterranean Sea. The Alexandria ICZM Plan was prepared in a participatory manner with all stakeholders and handed over to the Alexandria Governorate in October 2016. As part of the ICZM Plan, a coordination mechanism (ICZM Committee) has been established by the Minister of Environment, decree number 196 for 2017, dated July 26, 2017, according to the ICZM Plan proposed structure, and based on the mutual agreement between the PMU and new assigned Alexandria Governor. This ICZM Committee will be the platform for implementation of the ICZM Plan. (b) A strategy to replicate the pilot and interventions developed by the project has also been prepared but is awaiting adoption by the ICZM Committee. (c) A project monitoring system is in place. (d) A replication strategy prepared in conformity with the GEF.
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2. The methodological approach and participatory mechanisms for the ICZM Plan are shown in figures 2.1 and 2.2:

Figure 2.1. Methodology of the ICZM Preparation

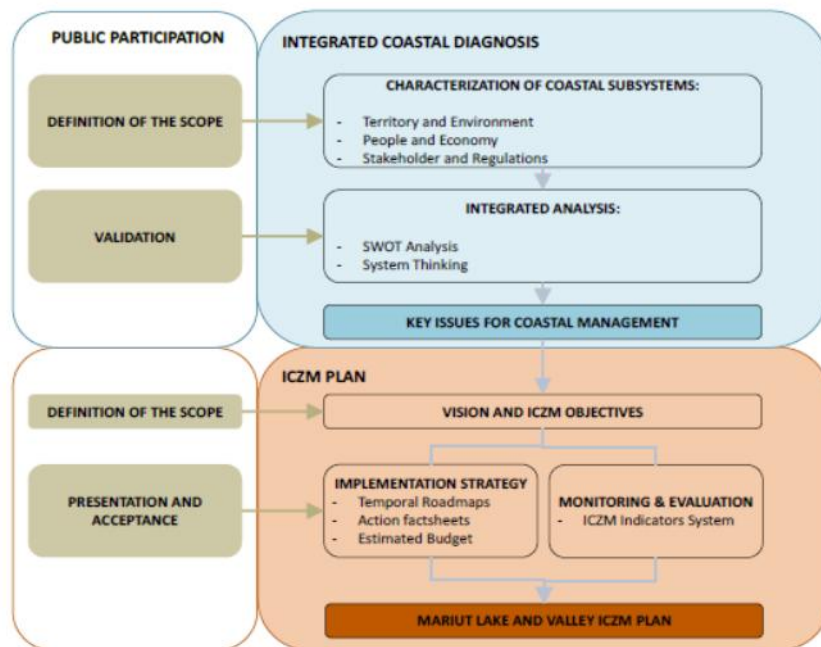
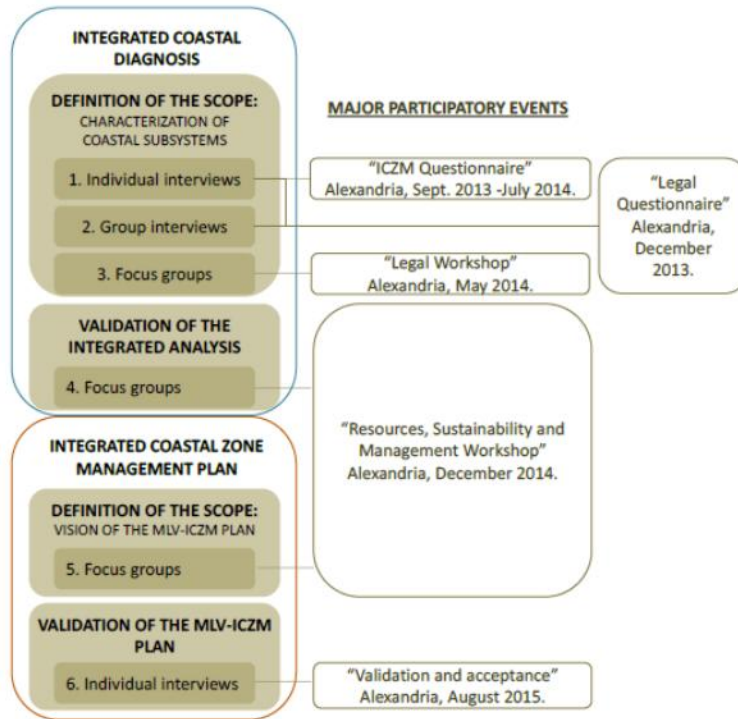


Figure 2.2. Participatory Mechanisms



3. The latest water quality analysis is presented in table 2.2:

Table 2.2. Water Quality Analysis at the Interventions (August, 2017)

Parameter mg/L	BOD			COD			Suspended Solid		
	Influent to SAF	Effluent from Wetland	% Removal	Influent to SAF	Effluent from Wetland	% Removal	Influent to SAF	Effluent from Wetland	% Removal
9/11/2016	330	90	72.7	1,300	400	69.3	436	88	79.8
21/11/2017	776	168	78.4	1,294	458	64.6	345	56	83.7
30/1/2017	—	—	—	1,165	335	71.2	—	—	—
23/3/2017	987	553	44.0	1,840	920	50.0	141	76	46.0

Table 2.3. Water Quality Analysis at the Interventions (October 7, 2017)

Parameter (mg/l)	Influent to W-WWTP	Effluent from W- WWRP/Influent to Biofilm	Effluent from SAF to Wetland	Ration removal in Biofilm	Effluent from wetland	Ration removal in Wetland
NH4	35.6	21.6	7	68%	2.9	59%
P	21.8	17.5	8.9	49%	7.1	20%
BOD	931	826	98	89%	65	34%
COD	1540	1270	170	86.6%	130	23.5%
TSS	1235	235	11	95%	6	45%

4. The following table shows the expected overall reduction in pollution to the Mediterranean Sea from the biofilm-wetland intervention.

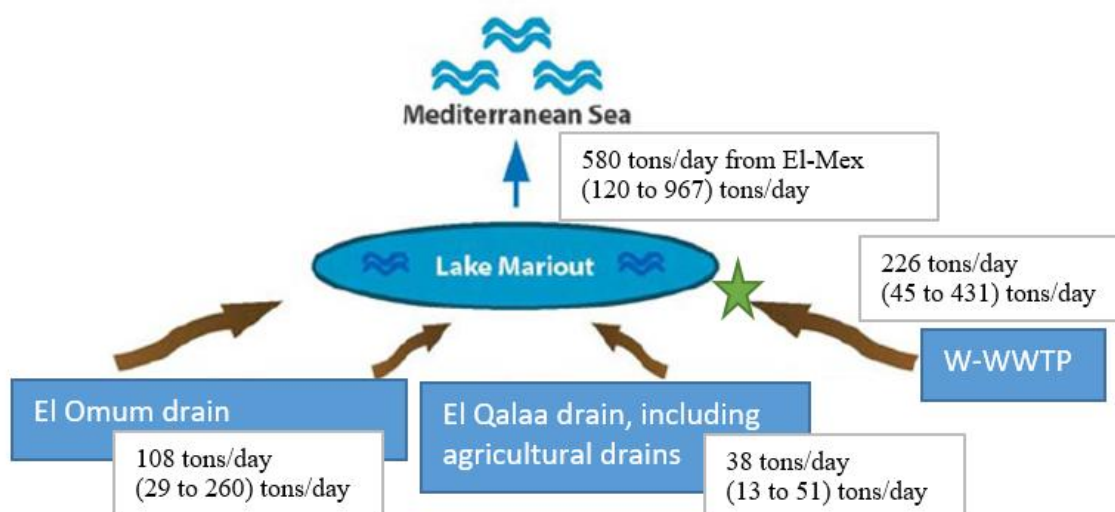
Table 2.4. Pollution Reduction Expected for Each Parameter at the Mediterranean Sea^a

Parameter	Treatment Capacity of Low-cost Facilities, 50,000 m ³ /day (in %)	Targeted Pollution Load Reduction to Mediterranean Sea (in %)
TN	10	5
TP	7.8	5
Indicator BOD	81	15
TSS	80	—

Note: a. Based on the consultant's design.

5. Figure 2.3 shows the pollution load entering the El-Mex Bay in tons per year and the location of the intervention relative to the lake-Mediterranean Sea interface.

Figure 2.3. Pollution Loads in Tons/Year of BOD



No data was obtained on BOD concentrations for E-WWTP and El Nubarria drain.

These two discharge about 3.1 m³/day (about 40% of inputs to the lake)

★ Biofilm + Wetland

Table 2.5. PDOs and Key Performance Indicators

Original PDOs	Key Indicators
(a) Improve the institutional mechanisms for sustainable coastal zone management in Alexandria	The ICZM Plan is officially adopted and the institutional mechanisms for implementation are successfully in operation.
(b) Reduce land-based pollution to the Mediterranean Sea	The pollution load entering the Mediterranean Sea through Lake Mariout is reduced by at least 5%.

Table 2.6. Revised PDOs and Key Performance Indicators

PDOs	Key Indicators
(a) Improve the institutional mechanisms for sustainable coastal zone management in Alexandria	<p>Outcome</p> <ul style="list-style-type: none"> Alexandria Integrated CZM adopted by the Alexandria Governorate

PDOs	Key Indicators
	<ul style="list-style-type: none"> • Direct project beneficiaries, of which female beneficiaries • Mechanism for ensuring financial viability and use of land area for pollution reduction interventions established <p>Intermediate outcome</p> <ul style="list-style-type: none"> • Report on “Lake Mariout: Results and Lessons Learned” published and disseminated • Replication strategy prepared and adopted by National CZM Committee • Alexandria Integrated CZM plan prepared with stakeholder participation • Project’s details and results published on the website of EEAA, in line with the IW:LEARN template
(b) Reduce land-based pollution to the Mediterranean Sea	<p>Outcome</p> <ul style="list-style-type: none"> • Pollution load (BOD) entering the Mediterranean Sea from El-Mex Pumping Station (mg/L) <p>Intermediate outcome</p> <ul style="list-style-type: none"> • Improved water quality monitoring system at El-Mex Bay in place • Water treated at west waste water treatment plant per day

Annex 3. Economic and Financial Analysis

1. This annex updates the economic and financial analyses conducted for the PAD. Ideally, the same type of analysis should be undertaken in the ICR, to allow direct comparison of results obtained in the two documents. However, scarce information related to some indicators (for example, total removal of nutrients) and addition of new investments compared to the ones at the PAD stage (that is, purchase of a thermal dryer) make such comparison possible only to a limited extent. Bearing in mind these considerations, the following paragraphs present the economic and the financial analyses of the project's investments covered by the GEF.

Economic Analysis

2. Overall, the following types of benefits were mentioned in the PAD: global benefits (reducing transboundary pollution and improving Lake Mariout's biodiversity) and local benefits (potential sales of duckweeds, improved air quality, increase in fish production, and increase in recreational activities). At the closing of the project, only two could be potentially attributed directly to the project after conducting interviews with the local stakeholders: sales of duckweeds and increase in fish production.

3. Concerning the sales of duckweeds, at the time of writing the ICR, duckweeds were removed and stored in two sites near Lake Mariout, which are owned by the GAFRD. Duckweeds are now being harvested and analyzed in the lab to check if they can be used as fodder for fish, chicken, and ducks or used for organic manure. Today, the price of duckweed in Egypt is about US\$735 per ton, and the total weight of duckweeds that will be collected by the reed removal machines (153 m² per hour) purchased under the project is about 600 tons per year. Therefore, the GAFRD will potentially be able to generate US\$441,000 per year; however, this benefit was not yet achieved at the closing of the project.

4. Concerning the fish catch, the manager of the GAFRD indicated during an interview in February 2017 that, since the start of reed removal operations, the fishermen community experienced an increase in fish catch in Lake Mariout compared to the situation at the beginning of the project. Although not quantified in monetary terms, this increase is an evidence of the success of reed removal and increase in oxygen circulation in the lake due to GEF interventions.

Cost-effectiveness of Water Treated

5. The lack of estimates concerning the global benefits and the partial estimates of local benefits (that is, US\$441,000 per year as potential sales of duckweeds) do not allow undertaking a cost-benefit analysis (CBA) of the GEF interventions or calculating the economic internal rate of return. However, a cost comparison of the treatment facility with a conventional secondary treatment is shown in Table 3.1. The biofilm and wetland cost was almost one-third of the cost of conventional secondary treatment for wastewater treatment plants in Egypt. A quick CEA shows that SAF-wetland interventions are more cost-effective than conventional secondary wastewater treatment (with a cost of effluent treatment of US\$0.02 per m³ per year versus US\$0.07 per m³

per year). The analysis considers a base discount rate of 6 percent,³¹ a period of 25 years, and an operating time of 365 days per year.

Table 3.1. CEA of the GEF Intervention versus the Conventional Secondary Treatment in Egypt (2016)

Costs	Notes	Wetland and Biofilm (50,000 m ³ /day)	Conventional Secondary (50,000 m ³ /day)
Construction cost (EGP)	(1)	33,000,000	90,000,000
Annualized construction cost (EGP)	(2)	2,581,482	7,040,405
O&M (EGP)	(3)	950,000	3,500,000
Total cost per year	(4)	3,531,482	10,540,405
Treatment capacity/year (m ³)	(5)	18,250,000	18,250,000
Unit cost (EGP/m ³)	(6)	0.19	0.58
Unit cost (US\$/m ³)	(7)	0.02	0.07

Source: (1) and (3) - PMU project pamphlet at the official inauguration.

Note: (2) estimated based on 6% discount rate and 25-year period; (4) = (2) + (3); (5) is estimated as 50,000 m³ × 365 days; (6) = (4) / (5); (7) is the unit cost expressed in 2016 US\$ (EGP 1 = US\$0.127).

Cost-effectiveness of Nutrient Removal

6. Another CEA was carried out for the engineered wetland, which is located just after the biofilm facility. Over a 25-year period, the annual cost of the wetland is estimated at US\$29,800 (6 percent discount rate, 25 years). The wetland is used to remove about 218 tons of nitrogen and phosphorous per year. Consequently, the cost per unit of nutrient removal by the wetland was computed to be US\$137 per ton. As seen from Table 3.2, the wetland appears cost-effective when compared to other interventions undertaken under the GEF-financed Nutrient Reduction Project in Hungary in 2006.

Table 3.2. Nutrients Reduction and Cost-effectiveness

Lake Mariout Wetland	Cost
Cost of the wetland (US\$)	381,000
Annualized cost of wetland (US\$/year)	29,800
Unit annual cost (US\$/ton of nutrients removed)	137
Similar Wetlands in Hungary	Cost
Unit annual cost for wetland restoration in Hungary (US\$/ton of nutrients removed)	288
Unit annual cost related to tertiary treatment at Budapest in Hungary (US\$/ton of nutrients removed)	1,264

Note: The cost per ton treated in Hungary was updated to reflect the change in inflation from 2006 to 2016.

Financial Analysis

7. One of the key objectives is to ensure the operational cost coverage of the system under the responsibility of the treatment plant. After the end of the project, the financial viability of the intervention will be achieved because an MOU was signed between the PMU and the Alexandria Drainage and Sanitation Company, guaranteeing the coverage of O&M costs. Table 3.3 shows the expected cost of the interventions over a 25-year period (the original PAD projected over 20 years). The GEF investment costs are US\$4.2 million, and the O&M costs will be about

³¹ Based on the guidelines: World Bank. 2016. *Discounting Costs and Benefits in Economic Analysis of World Bank Projects*.

US\$120,650 per year financed by the Alexandria Drainage and Sanitation Company in charge of the W-WWTP. The depreciation costs of the proposed interventions will be about US\$168,000 per year over 25 years. It will be important to ensure adequate maintenance of the systems to minimize the need for capital-intensive system rehabilitation.

Table 3.3. Estimated Costs of the Interventions over 25 Years in US\$, millions

Interventions (million US\$)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2041
INVESTMENT COSTS	4.20										
- Instream biofilm (min efficiency)	3.82										
- Wetland (in lake)	0.38										
O&M COSTS	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
DEPRECIATION	0.168	0.168	0.168	0.168	0.168	0.168	0.168	0.168	0.168	0.168	0.168
- Depreciation biofilms and aerators	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
- Depreciation in lake wetlands	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02

Source: PMU.

8. Due to the devaluation of the Egyptian pound, the project was able to save about US\$600,000, which helped the PMU purchase a thermal drier. This thermal drier is drying the excess sludge generated by the plant. This results in reduced disposal costs as well as potential revenues by selling the sludge to cement companies.

9. A CBA of this investment shows that, because the current sludge disposal to the 9N landfill is costly (US\$570 per day, or US\$12.7 per ton), just reducing the sludge volume through drying could be justified financially, even after considering the electricity costs for operating the dryer. The thermal dryer is expected to help reduce sludge from 45 tons per day to 7 tons per day. Therefore, by saving 38 tons per day of sludge, the plant could potentially save US\$117,200 per year (Table 3.4). This money could be used to pay the O&M costs. The net revenues would be even greater if the dried sludge could be sold to cement companies.³²

Table 3.4. CBA of Thermal Dryer (US\$, 2016)

Costs	Notes	Value (US\$)
Investment cost	(1)	600,000
Annualized investment cost	(2)	46,900
O&M cost	(3)	12,000
Total annual cost	(4)	58,900
Benefit		
Reduced quantity of sludge (ton/day)	(5)	38
Reduced quantity of sludge (ton)	(6)	13,870
Savings in terms of disposal costs	(7)	176,100
Net benefits (US\$/year)	(8)	117,200

Source: (1) and (5) - PMU.

Note: (2) Estimated based on 25-year period and 6% discount rate; (3) Estimated at 2% of the investment cost on average; (4) = (2) + (3); (6) Estimated as 38 tons × 365 days; (7) Estimated as 13,870 tons × US\$12.7 per ton; (8) = (7) – (4).

10. Finally, in terms of energy consumption, WWTPs often look for interventions to minimize energy consumption (a main operational cost factor), especially if there are electricity

³² Discussions with two cement companies have started.

cuts. Studies³³ have indicated that constructed wetlands have a cost advantage compared to the more energy-demanding systems like the activated sludge process or nitrification/denitrification.

11. Overall, the economic analysis indicates that the GEF interventions (construction of wetland and biofilm) are cost-effective, especially when compared with conventional secondary treatment plants. The package also appears financially viable, with the O&M costs being supported by the Alexandria Drainage and Sanitation Company, based on the MOU. To cover these costs, savings from thermal dryer functioning or revenues from selling duckweeds could be used.

³³ Economic Valuation of Wastewater-The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities. December 2015.

Annex 4. Bank Lending and Implementation Support/Supervision Processes

(a) Task Team Members

Names	Title	Unit	Responsibility/ Specialty
Lending			
Mohamed Yahia Ahmed Said Abd El Karim	Senior Financial Management Specialist	GGO23	
Nathalie E. Abu-Ata	Consultant	GENDR	
Lelia Croitoru	Consultant	GEN05	
Maged Mahmoud Hamed	Regional Safeguards Adviser	OPSPF	Task Team Leader
Marie A. F. How Yew Kin	Language Program Assistant	GEN05	
Dahlia Lotayef	Lead Environmental Specialist	GEN07	
Mikael Sehul Mengesha	Senior Procurement Specialist	MNAPC - HIS	
Knut Opsal	Lead Social Development Specialist	GSU07	
Banu Setlur	Senior Environmental Specialist	GEN05	
Supervision/ICR			
Nathalie E. Abu-Ata	Consultant	GENDR	
Sherif Kamel F. Arif	Consultant	GEN05	
Akram Abd El-Aziz Hussein El- Shorbagi	Sr Financial Management Specialist	GGO24	
Wael Ahmed Elshabrawy	Financial Management Analyst	GGO23	
Mikael Sehul Mengesha	Senior Procurement Specialist	MNAPC - HIS	
Knut Opsal	Lead Social Development Specialist	GSU07	
Banu Setlur	Senior Environmental Specialist	GEN05	
Suiko Yoshijima	Environmental Specialist	GEN06	Task Team Leader

(b) Staff Time and Cost

Stage of Project Cycle	Staff Time and Cost (Bank Budget Only) ^a	
	No. of Staff Weeks	US\$, Thousands (Including Travel and Consultant Costs)
Lending		
FY06	0.15	0.52
FY07	2.04	32.33
FY08	5.03	29.57
FY09	29.27	147.24
FY10	11.15	50.09
FY11	0.15	0.75
Total:	47.79	260.50
Supervision/ICR		
FY11	15.2	52.41
FY12	14.13	50.67
FY13	4.29	44.09
FY14	6.58	49.58
FY15	7.85	41.93
FY16	4.56	41.41
FY17	11.72	73.71
Total:	64.33	353.80^b

Note: a. The World Bank budget was mostly provided by the GEF as part of the agency fee; b. As of June 26, 2017.

Annex 5. Summary of Borrower's ICR and/or Comments on Draft ICR

**Alexandria Coastal Zone Management Project
(ACZM Project)**

TERMINAL EVALUATION

SUMMARY OF THE FINAL REPORT

Prepared by

Environmental and Sanitation Engineering Consultant Office (ESECO)

MAY 2017

1. The Project and Its Development Context

1. Degradation of water quality due to land-based pollution is a major problem in the Mediterranean coastal areas. The Strategic Action Plan for the Mediterranean has identified several ‘hot spots and sensitive areas’ on the northern coast of Egypt, which for decades have been experiencing a continuous increase in population, development, and environmental degradation. Two of these ‘hot spots’ are located in Alexandria, namely El-Mex Bay and Abu-Qir Bay.

2. Lake Mariout is one of the major sources of conveyance of land-based pollution to the El-Mex Bay.

3. The main sources of pollution are untreated or partially treated domestic and agricultural wastes rich in phosphorus and nitrogen and industrial wastewater. Eutrophication phenomena in the lakes and open sea have been reported and the lakes are losing their attraction as recreational resorts, which negatively affect the livelihood of the local population.

4. The project will allow the GOE to (a) strengthen the capacity of the various relevant entities to manage the coastal zones in and around Alexandria in an integrated, participatory, and sustainable manner; (b) reduce the load of land-based sources of pollution entering the Mediterranean, either directly or through Lake Mariout with the completion of low-cost pollution reduction measures; and (c) document and disseminate lessons learned from the project interventions, based on a M&E system, for the purpose of replication and upscaling along the coast of Egypt and in other Mediterranean countries.

5. Lake Mariout is a brackish lake that is one of five major coastal lagoons in Egypt. It forms the southern border of Alexandria City and is separated from the Mediterranean Sea by the narrow isthmus on which Alexandria is built. It is home to fisheries and salt works. As the city grows, some of the lake’s marshy areas have been reclaimed for new buildings. The lake’s environmental quality and area have deteriorated due to human pressure as well as land reclamation. In 1801, the lake’s original area was probably greater than 700 km²; today, it is less than 65 km² and ranges in depth from 1 m to 3 m.

6. The objective of the project is to improve the institutional mechanisms for sustainable CZM in Alexandria, in particular to reduce land-based pollution to the Mediterranean Sea.

7. The proposed key outcome indicators of success are the following:

- The ICZM Plan is officially adopted and the institutional mechanisms for implementation are successfully in operation.
- The pollution load entering the Mediterranean Sea through Lake Mariout is reduced by at least ‘5%’.

1.1 Project Relevance to National Development Objectives

8. From the above, it was clear that the ACZM Project was designed to address issues that were considered critical to the conservation and management of the northern coastal zone of

Alexandria. The project was therefore relevant to national priorities for biodiversity conservation in the northern coastal zone of Alexandria.

1.2 Project Beneficiaries

9. The project is consistent with one of the key objectives of the GOE, which is to reconcile economic development with environmental and social sustainability. In particular, the project complements the strategy of the Government to increase and improve the treatment of point sources of pollution in Alexandria through the upgrading of the E-WWTP and the W-WWTP.

10. Reducing the environmental pollution to Lake Mariout will lead to the reduction of pollution load to the Mediterranean Sea, which is an objective of the MSEA and also an obligation for the Government, which has signed and ratified the Convention for the Protection of the Mediterranean Sea against Pollution (the Barcelona Convention). The project will also support the development of an ICZM Plan for Alexandria—a concept that can be followed in the rest of coastal zones in Egypt, most notably in the other northern lakes in Egypt.

11. In addition, by focusing on non-point sources of pollution, including agricultural and rural wastewater, the project is in line with the Government's commitment to improve rural sanitation in the delta region, particularly in priority drainage basins within the Governorates of Beheira, Gharbeya, and Kafr El Sheikh.

1.3 Project Management Arrangements

PMU

- The Director of the nil' for EPAP II in the EEAA will serve as the PNIU Director for the project. However, given that the EPAP II is still under implementation, the PMI will be reinforced by hiring new staff: (a) Deputy Director with technical staff, including environmental specialists and technical CZM specialists; (b) a financial specialist, procurement specialist, M&E specialist, and social specialist; and (c) long-term technical expert (will be financed from project budget).
- The PMU will be responsible for preparing tender documents, receiving and evaluating bids, managing contracts, supervising works and consultants, preparing progress reports, preparing and carrying out of financial management, and reporting and evaluation of the project activities during the project implementation.
- The ongoing participation of the EEAA General Department for CZNI in the preparation of the National Strategy for IC/NI will facilitate the development of the Alexandria master plan and ensure coherence with the national priorities. The technical staff in the PNR will also include staff from the Alexandria EEAA RBO, who will have a significant role in overseeing the monitoring of the water quality in the El-Mex Bay as well as progress related to the project interventions.
- The technical staff will be responsible for implementation of the project components and following up on the consultant's work and preparation of the monthly, quarterly, and yearly progress report and the annual work plans for the project.

- The technical staff in the PMU will also include staff from the Alexandria EEAA RBO who will have a significant role in overseeing the monitoring of the water quality in the El-Mex Bay as well as progress related to the project interventions while physically located in Alexandria.
- The EPAP II PMU/EEAA staff will provide financial and procurement support to the PNIL of the project given the substantive expertise acquired throughout the implementation of EPAP II.

PMU Director

- Manage staff and oversee the day-to-day activities of the PMU in its management of the implementation of the project
- Undertake overall supervision of project activity
- Participate and represent the PMU as a non-decision-making member in the PSC and serve as secretary of the committee.
- Undertake external high-level communication
- Represent the PMU and the project in general to national and international audiences in Egypt and internationally.
- Report directly to the CEO of EEAA, which will facilitate resolution of any internal delays to implementation

PMU Deputy Director

- Support the PMU Director in managing staff and overseeing the day-to-day activities of the PMU in its management of the implementation of the project
- Prepare, or as appropriate, supervise the preparation of annual work plans and budgets and present same to the PSC for approval
- Prepare, or as appropriate, supervise the preparation of progress reports, annual reports, ICR, and other reports that may be required by the stakeholders
- Supervise the PML staff in the performance of their respective duties and ensure the efficient functioning of the unit
- Report directly to Project Director, which will facilitate the resolution of any internal delays to implementation

2. Evaluation Findings

2.1 Performance Reporting

12. Considerable progress has been made toward achieving the PDO. On the other hand, after trial operation of the plant, some samples were collected from influent to submerged aerated biofilm tanks and effluent from wetland. COD, BOD, and TSS were measured from these samples by the EEAA. Table 7.1 shows the result analysis. The performance of treatment achieved high efficiencies in COD, BOD, and TSS removal despite the primary treatment having low efficiencies. There are pollutants overloaded in the SAF influent, which is about five times the expected pollutants, and the treatment shows greater ability to maintain stability under maximum concentration of pollutants.

Table 7.1. Result Analysis

Parameter mg/L Date	BOD			COD			TSS		
	Influent to SAF	Effluent from Wetland	% Removal	Influent to SAF	Effluent from Wetland	% Removal	Influent to SAF	Effluent from Wetland	% Removal
9/11/2016	330	90	72.7	1,300	400	69.3	436	88	79.8
21/11/2017	776	168	78.4	1,294	458	64.6	345	56	83.7
30/1/2017	—	—	—	1,165	335	71.2	—	—	—
23/3/2017	987	553	44	1,840	920	50.0	141	76	46.0

13. Table 7.2 shows the overall load reduction to the Mediterranean Sea with uncertainty intervals for 50,000 m³ per day (biofilm-wetland facilities).

Table 7.2. Overall Load Reduction to the Mediterranean Sea with Uncertainty Intervals for 50,000 m³/day, Biofilm-Wetland Facilities

Parameter	Treatment Capacity of Low-cost Facilities, 50,000 m ³ /day (%)	Targeted Pollution Load Reduction to Mediterranean Sea (%)
TN	10.0	5
TP	7.8	5
Indicator BOD	81.0	15
TSS	80.0	—

14. It should be noted that the above reduction values do not include the fact that improving the lake's self-cleaning capacity (by removing reed vegetation) is expected to have a positive effect on its nutrient retention.

15. Progress at the project objective level was tracked through the use of the outcome indicators in table 7.3.

Table 7.3.

Project Outcome Indicators	Baseline	Target Values					Data Collection and Reporting		
		YR1	YR2	YR3	YR4	YR5	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
Component 1: Improved capacity to manage Alexandria coastal areas in a sustainable and participatory manner									
Adoption of ICZM Plan for Alexandria	No plan exists	TOR, RFP, and Selection of Consultant	Data collection and sectoral plans	Preparation of draft ICZM Plan	Adoption of ICZM Plan and institutional arrangements of ICZM Plan in place	Small subset of action items proposed by the plan is being implemented	Once every 6 months after project effectiveness	Periodic and annual reports from PMU, supervision	EEAA PMU
Stakeholder consultations held on a regular basis	Some initial consultations	Launch workshop, outreach, and communication activities	Annual workshop and meetings	Annual workshop and meetings	Annual workshop and meetings	Annual workshop and meetings	Consultations and workshops reports; minutes of meetings	Minutes of stakeholders consultation, supervision	EEAA PMU
Increased capacity for implementing ICZM through training/study tour; increased capacity to implement coastal zone management (CZM) principles reflected in the adoption of CZM principle in major investments overseen by concerned relevant	Limited capacity exists	Study tour	Training of trainers on ICZM/monitoring, and GIS	Training on ICZM, monitoring, and GIS	Training on ICZM, monitoring, and GIS; major agency investments apply CZM principles	Training on ICZM, monitoring, and GIS; major agency investments apply CZM principles	Annual progress reports; evaluations	Progress reports from PMU, evaluations of training, supervision	EEAA PMU

Project Outcome Indicators	Baseline	Target Values					Data Collection and Reporting		
		YR1	YR2	YR3	YR4	YR5	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
agencies									
Effective water monitoring network is in place on Lake Mariout and El-Mex Bay	Sporadic samples are collected currently for Lake Mariout, Periodic monitoring in El-Mex Bay	Tender documents, selection and contracting of firm	Monitoring and data collection	Monitoring and data collection	Monitoring and data collection	Monitoring and data collection	Monthly samplings	Quarterly reports	EEAA PMU, other partner agencies (MWRI, MALR)
Component 2: Improved quality of effluents entering the Mediterranean Sea through Lake Mariout									
Installation and effective operation of pollution reduction measures (in-stream, aeration, wetland, reed removal)	—	TOR, RFP, selection of consultant for feasibility study and final design	Tender documents, selection of firm, and start of equipment installation	Equipment installation	Construction is completed, handover to agencies and O&M	O&M	Once every 6 months	Periodic and annual reports from PMU, supervision, field visits reports	EEAA PMU, MWRI, MALR
Percentage of surveyed population noticing an improvement in daily lives	TBD	—	—	Target to be based on baseline	—	Target to be based on baseline	—	Surveys	Independent consultant not associated with the project
Component 3: Project Management and Monitoring and Evaluation									
Effective M&E system in place	No M&E system in place	M&E Plan prepared and approved	M&E Plan implemented (data collection, evaluation, and reporting)	M&E Plan implemented (data collection, evaluation, and reporting)	M&E Plan implemented (data collection, evaluation, and reporting)	M&E Plan implemented (data collection, evaluation, and reporting)	Progress report, annual reports, midterm review, and ICR	Minutes of PSC meetings	EEAA PMU

Project Outcome Indicators	Baseline	Target Values					Data Collection and Reporting		
		YR1	YR2	YR3	YR4	YR5	Frequency and Reports	Data Collection Instruments	Responsibility for Data Collection
Replication Strategy is prepared and implemented	No Replication Strategy in place	Communication and Replication Strategy prepared (including media strategy and dissemination workshop)	Communication and Replication Strategy completed and adopted by the PSC	Replication Strategy implemented	Replication Strategy implemented	Dissemination workshop including lessons learned and best practices	Periodic reports, annual reports	Brochures, project website, minutes of dissemination workshop	EEAA PMU

Note: RFP = Request for Proposal.

2.2 Financial Performance

16. The project consists of three components, to be implemented within a time frame of five years.

Component 1: Planning, Institutional Capacity and Monitoring Strengthening (US\$1.982 million)

17. The expected outcome is an increased capacity by the various relevant entities to manage the coastal zones in and around Alexandria in an integrated, participatory, and sustainable manner, including planning, consensus building, and monitoring. The outputs for this component include (a) a master plan for the management of the coastal zones of Alexandria including Lake Mariout (the ACZM Plan), which will be preceded by a legal and regulatory framework analysis, and (b) the development of an integrated water quality monitoring network for Lake Mariout and the Mediterranean Sea, including a modeling activity for El-Mex Bay, which can be used to estimate the overall project impact on the Mediterranean. Synergies with the Ministry of Housing and the GOPP will be sought as soon as the preparation of the Strategic Plan for Alexandria urban development is under way.

18. This component will include (a) the procurement of goods including water monitoring equipment and (b) the provision of consultancy services for the preparation of the Alexandria CZN1 master plan including public consultation workshops, study tour, training workshops on CZN1, and master plan dissemination.

Component 2: Pollution Reduction (US\$4.625 million)

19. The expected outcome is a reduction in the land-based source of pollution entering Lake Mariout and subsequently, the Mediterranean Sea through pilot pollution reduction measures. The outputs of this component include (a) in-stream treatment (set of biofilms) in the Qalaa drains, (b) set of aerators in the Qalaa drains, (c) a small-scale engineered in-lake wetland located at the outfall of the Qalaa drain, and (d) reed removal in the lake to improve water circulation and self-cleaning capacity of the lake. Financing for this component will go to (a) the provision of consultancy services for the preparation of the necessary feasibility studies for the pollution reduction measures and (b) the procurement of works and goods necessary for the implementation of those pollution reduction measures.

Component 3: Project Management and Monitoring and Evaluation (US\$0.543 million)

20. The expected outcome is the completion of an M&E system and the documentation of the project results for the purpose of upscaling and replication. The outputs of this component include (a) a project monitoring system with measurable indicators which are consistent with the Investment Fund for the Mediterranean Sea Large Marine Ecosystem and complying with the GEE, International Waters Tracking Tool, and (b) the documentation of project's progress and results, dissemination of lessons learned from the project, and adoption of a replication strategy in conformity with (1E1 IW:LEARN. Following the environmental disclosure example being piloted in I TAP II, it is expected that data on water quality will be progressively available to the public once improvements are recorded. Financing for this component will go toward the provision of consultancy services for developing an M&E system.

Project Financing

21. The financing instrument is a CFI grant in the amount of US\$7.5 million, including a project preparation grant of US\$350,000. The project has a cofinancing through in-kind contribution as the following:

- (a) Through the Government's five-year plan, the Ministry of Housing, Utilities, and Urban Development is committed to increase the treatment capacity of primary wastewater treatment plants in Alexandria and the upgrading to secondary-level treatment. The plan is to increase the total current treatment capacity from 1,190,000 m³ per day to 1,903,000 m³ per day in Alexandria through the construction and upgrading of a series of plants, including the E-WWTP and the West WWTP. A total of EGP 6 billion for the construction and upgrading of treatment plants have already been allocated by the Government in 2008.
- (b) There are ongoing activities of the industrial establishment located in Alexandria Governorate (Ameryia Petroleum Company) supported through Egyptian Pollution Abatement Project (EPAP II). The project will improve the wastewater discharged to Lake Marriott or El-Mex Bay and consequently, to prevent the pollution and to improve the water quality in the Mediterranean Sea. The total activity cost is equivalent to US\$20 million over the next three years.
- (c) EEAA—being the executing agency for the project—will provide in-kind contribution equivalent to US\$600,000 over the duration of the project. This includes the contributions of the Project Director and EEAA staff participating in the implementation of the project as well as venue and operational cost for the MID and so on.

Table 7.4.

Category	Amount of the Grant Allocated (Expressed in US\$)	Percentage of Expenditures to Be Financed (%)
(1) Goods	5,536,000	100
(2) Works	750,000	100
(3) Consultants' Services	564,000	100
(4) Unallocated	300,000	100
TOTAL AMOUNT	7,150,000	100

2.3 Project Implementation Effectiveness and Efficiency

22. Project implementation effectiveness is measured through an assessment of the outputs realized compared to the resources expended. As stated in section 2.2, the expenditure on each component at the end of the project was nearly 100 percent of the resources allocated. The overall assessment of the evaluation is that project implementation has been effective with the project making considerable progress toward realizing its objectives, as shown by the extent to which objective indicators have been realized.

23. The audit reports assessed during the evaluation do not record any issues with the implementation of the project or the financial management systems. As indicated earlier, expenditure levels per component of committed funds, which when taken together with the effective implementation process highlighted above, indicate a high level of implementation efficiency.

3. Lessons Learned

24. An important lesson learned from implementing the EPAP I (completed) and the ongoing EPAP II projects is that, any investment needs to be accompanied by a significant institutional strengthening and capacity-building component and public consultations to ensure success. This is reflected in the project design in terms of the activities included in Component 1 of the proposed project such as public consultations, training on CZM practices, study tour, and M&E system.

25. Furthermore, the M&E system constitutes one of the major features to be developed to monitor the project progress and ensures any needed correction in the project during implementation. In that respect, an M&E specialist will be contracted under the project funds to collect feedback from the beneficiaries during the entire project implementation and to build the M&E capacity of the EEAA PMU.

26. The experience gained with the Lake Manzala UNDP-GEF project, which demonstrated the viability of engineered wetlands and related innovative low-cost water treatment methods in Egypt under conditions very similar to those of Lake Mariout, was also considered. Therefore, clear arrangements have been made with the relevant implementing agencies for the O&M costs of the pollution reduction interventions in the case of Lake Mariout after project completion. These arrangements are key to ensure long-term sustainability after the project ends. Detailed interagency agreements have been prepared and signed between EEAA and other ministries (MWRI and MALR on October 26, 2009, and November 2, 2009, respectively) including handover of the project infrastructure. In addition, drawing from the experience of Lake Manzala, a communications specialist will be contracted from the start under the technical assistance of the project to raise awareness about the project objectives and develop a consultation strategy with all stakeholders.

27. Finally, the project draws on the experience from the ADP in terms of the significance of securing the support and ownership from key stakeholders in the early stages of project preparation.

4. Conclusions and Recommendations

4.1 Conclusions

28. The GOE, represented by the EEAA, is preparing the ACZM Project which has the following main objective:

- (a) To supply a strategic framework and immediate small-scale investment 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

- (b) To protect/restore globally significant coastal heritage and ecosystem processes by supporting the GOE's efforts to develop and implement a National CZM Plan

29. The project is developed with assistance from the World Bank (through a grant from the GEF) in the amount of US\$7.15 million, which continues to provide support to the GOE for improving its environmental management capabilities and to demonstrate the value added of an integrated and participatory approach to CZM for sustainable development.

4.2 Recommendations

- Develop a new national strategy for CZM with limited concrete implementation measures for Alexandria area and limited mainstreaming of coastal zones management considerations in urban planning at the local level and continue fragmented approach to CZM in and around Alexandria area.
- A CZM Strategy is being developed but incorporation of biodiversity conservation and ecosystem issues with consideration for downstream pollution is limited.
- Ongoing infrastructure investments mainly target industrial and municipal wastewater through conventional treatment plants. There will be very limited investments specifically targeting more diffuse upstream agricultural drainage water and rural domestic wastewater.
- M&E systems to be established that do not incorporate indicators of biodiversity conservation (fisheries, and so on).
- Capacity to monitor water quality in and around Alexandria on a regular basis area is limited.
- There is limited involvement and participation of local communities and relevant stakeholders in addressing CZM.

Annex 7. List of Supporting Documents

Project Documents

- Project Concept Note and Concept review 2008
- Grant agreement PDF-B November 2006 and extension Memorandum
- *Project Appraisal Document on a Proposed Grant from the Global Environment Facility (GEF) Trust Fund in the Amount of US\$7.15 Million to the Republic of Egypt for the Alexandria Coastal Zone Management Project (Under the Investment Fund for the Mediterranean Sea Large Marine Ecosystem)*, April 1, 2010
- Financing Agreement
- *Integrated Safeguards Datasheet*, World Bank, July 27, 2009
- *Restructuring Paper on a Proposed Project Restructuring of Alexandria Coastal Zone Management Project to the Arab Republic of Egypt*, September 19, 2011
- *Restructuring Paper on a Proposed Project Restructuring of Alexandria Coastal Zone Management Project to the Arab Republic of Egypt*, April 16, 2015

Aide Memoires:

- First Preparation Mission, August 2006
- Second Preparation Mission, September 2008
- Pre-Appraisal Mission, May 2009
- Implementation Support Mission, December 2010
- Implementation Support Mission, April 2011
- Implementation Support Mission, February 2012
- Mid-Term Review, December 2012
- Implementation Support Mission, June 2013
- Implementation Support Mission, December 2013
- Implementation Support Mission, June 2014
- Implementation Support Mission, May 2015
- Implementation Support Mission, December 2015
- Implementation Support Mission, May 2016
- Implementation Support Mission, November 2016
- Implementation Support and ICR Mission, February 2017

Implementation Status and Results (ISR) Reports:

- December 2010
- May 2011
- December 2011
- June 2012
- December 2012
- August 2013

- February 2014
- November 2014
- May 2015
- November 2015
- May 2016
- November 2016
- February 2017

Documents from Borrower/ Implementing Agency

- *Technical and Economic Feasibility Study for Different Scenarios to Improve the Circulation of Water in Lake Mariout and to Options for Increasing the Storage Capacity of the Lake*
- *Training Course on Integrated Coastal Zone Management, TOR and Agenda*
- *Alexandria Coastal Zone Management Project Knowledge Note*
- *Alexandria Coastal Zone Management Project-Replication Strategy for the Project-April 2016*
- *Water Quality Analysis from the continuous monitoring station in El-Mex Bay-Excel format*
- *Water Quality Monitoring Program and results-seven reports*
- *Water Quality Data Results from the Seven Sampling Locations in lake Mariout*

MAP

