Egypt

Country Environmental Analysis

Promoting Circular Economy and Blue Economy for Environmental Sustainability

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Acknowledgments

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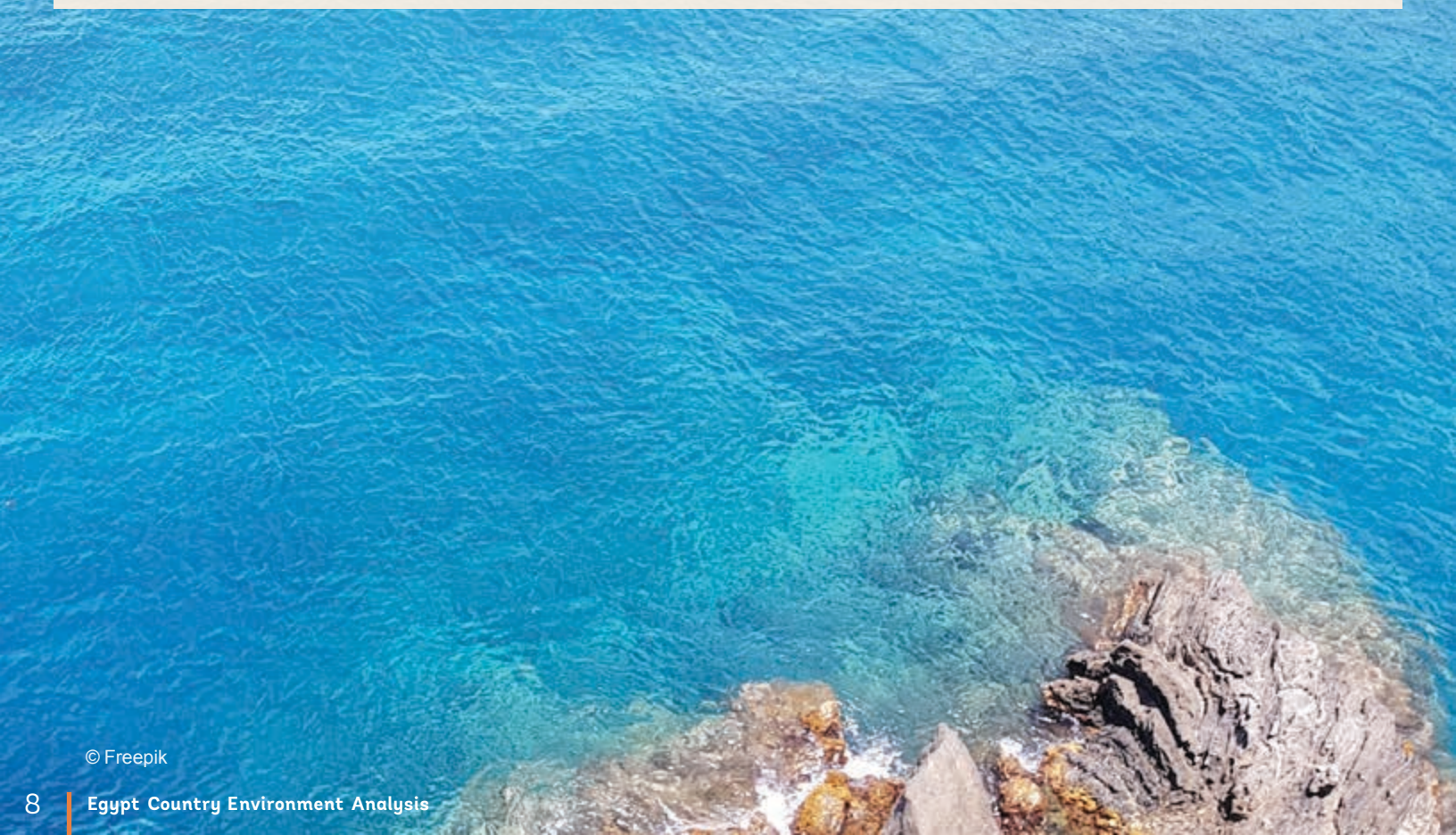

Acronyms and Abbreviations

AFD	Agence Française de Développement
BE	blue economy
BOE	barrel of oil equivalent
BTU	British thermal unit
C&D	construction and demolition
CAP	compliance action plan
CAPMAS	Central Agency for Public Mobilization and Statistics
CBE	Central Bank of Egypt
CCDR	*Country Climate Development Report*
CCZED	Cost of Coastal Zone Environmental Degradation
CE	circular economy
CEA	Country Environmental Analysis
CGC	Credit Guaranty Company
COED	Cost of Environmental Degradation
COP27	(United Nations Framework Convention on Climate Change) 27th Conference of the Parties
CSR	corporate social responsibility
DFI	development finance institution
EC	European Commission
EEAA	Egyptian Environmental Affairs Agency
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIP	eco-industrial park
EPAP	Environmental Pollution Abatement Project
EPR	extended producer responsibility
ESG	environmental, social, and governance
ESIA	Environmental Social Impact Assessment
EU	European Union
EWS	early warning system
F&B	food and beverage
FAO	Food and Agriculture Organization
FDI	foreign direct investment
FEDDG	Framework of the Environmental Sustainability Standards Guide
GAFRD	General Authority for Fish Resources Development
GCF	Green Climate Fund
GEF	Global Environmental Facility
GEFF	Green Economy Financing Facility
GHG	greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GOE	Government of Egypt
GSI	Green Sustainable Industry
ICT	information communications and technology
ICZM	Integrated Coastal Zone Management
IDA	Industrial Development Authority
IFI	*international financial institution*
IMF	International Monetary Fund
INDC	Intended Nationally Determined Contribution
ISO	International Organization for Standardization
IT	information technology
IUCN	International Union for Conservation of Nature
KFW	Kreditanstalt für Wiederaufbau (Germany)
LCA	life cycle assessment
LFRDA	Lakes and Fish Resources Development Agency
MBDT	Mainstreaming Biodiversity into Egypt's Tourism
MOALR	Ministry of Agriculture and Land Reclamation
MOCIT	Ministry of Communication and Information Technologies
MOE	Ministry of Environment
MOF	Ministry of Finance
MOFA	Ministry of Foreign Affairs
MOHP	Ministry of Health and Population

MOIC	Ministry of International Cooperation
MOLD	Ministry of Local Development
MOPED	Ministry of Planning and Economic Development
MOTA	Ministry of Tourism and Antiquities
MOTI	Ministry of Trade and Industry
MOU	memorandum of understanding
MOPMR	Ministry of Petroleum and Mineral Resources
MSME	micro, small, and medium enterprise
MSMEDA	Micro, Small, and Medium Enterprises Agency
MSP	marine spatial planning
MWRI	Ministry of Water Resources and Irrigation
NCCS	National Climate Change Strategy 2050 (Egypt)
NDC	Nationally Determined Contribution
NGO	nongovernmental organization
ODA	official development assistance
PA	protected area
PPP	public-private partnership
PRO	producer responsibility organization
PV	photovoltaic
SCZONE	Suez Canal Economic Zone
SDG	Sustainable Development Goal
SEA	strategic environmental assessment
SEFF	Sustainable Energy Financing Facility
SESA	Strategic Environmental and Social Assessment
SME	small and medium enterprise
TA	technical assistance
TSFE	The Sovereign Fund of Egypt
UN	United Nations
UNDP	United Nations Development Programme
UNIDO	United Nations Industrial Development Organization
USAID	U.S. Agency for International Development
WMRA	Waste Management Regulatory Authority

Executive Summary

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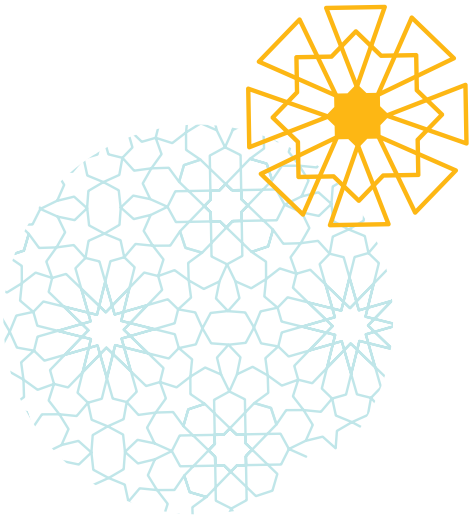
Background

Over the last two decades, the Government of Egypt (GOE) has pursued its sustainable and resilient development. The Ministry of Environment (MOE) has improved the governance framework and promoted new policy instruments to meet growing environmental challenges. Two primary reports articulate the country's sustainability strategy over the short/medium term and long term, respectively: in the updated Sustainable Development Strategy (SDS): Egypt Vision 2030 and the National Climate Change Strategy 2050. In complement, the World Bank is supporting Egypt through this Country Environmental Analysis (CEA), which is aligned with its regional flagship Blue Skies, Blue Seas: Air Pollution, Marine Plastics, and Coastal Erosion in the Middle East and North Africa and the 2022 Country Climate Development Report.

The purpose of this CEA is to help Egypt address some of these environmental challenges by providing strategic guidance to the GOE to achieve green, resilient, and inclusive growth while creating new jobs. This CEA has been developed in consultation with the GOE and has identified short- to medium-term priority areas in: (i) circular economy (CE) for industrial pollution and waste management; (ii) blue economy (BE) with a focus on sustainable coastal zone management; (iii) environmental governance; and (iv) innovative green financing mechanisms targeting the CE and BE. It was conducted by reviewing existing analytical work on environmental management in Egypt, current environmental regulations, strategies, reports, and public data. In addition, consultation workshops, meetings (with government representatives, nongovernmental organizations [NGOs], research institutions, private sector, and key experts), and focus group discussions were carried out to further modify or validate the findings.



Evolution of Egypt's Environmental Agenda and Governance

The Egyptian legal framework has progressively underpinned sustainable development, mainstreaming the environmental agenda into policy-making and sectoral policies. The current environmental law is one of the most significant legislative milestones to date, evolving a framework to match the sector's complexity and crystalizing actors' agency. The 2020 waste management law signaled the country's determination to valorize the waste value chain for circularity and investment, and the 2017 industrial licensing law streamlined industrial permitting in a one-stop-shop at the Industrial Development Authority. Prior to these laws, Egypt Vision 2030 laid out the social dimension of environmental justice, recognizing a legacy built on weak governance with limited transparency and accountability as a major challenge.

The Egyptian institutional framework for environmental governance has risen in prominence and strength. The Ministry of State for Environmental Affairs rose from a subordinate institutional status to the full-blown MOE in 2014, responsible for mainstreaming, organizing, policy planning, and creating special agencies such as the newly established Waste Management Regulatory Authority (WMRA). The MOE established 18 branch offices for 27 governorates and extended the number of monitoring stations. Although their human resources are insufficient (especially the WMRA) to meet their mandates, there are encouraging signs for undertaking institutional reforms in the organizational structure to include core functions. It is important to mainstream environmental management, green commitments, and BE goals into the whole-of-government and to include broader stakeholder voices, interests, and values.

Egypt has improved the efficiency of resource-reliant sectors to meet the Sustainable Development Goals (SDGs). However, the efficiency of pollution management still needs to be enhanced by implementing the following measures: operationalizing the polluters pay principle, the use of life cycle assessments, circular production technologies instead of end of pipe, the use of cost benefit analysis/strategic environmental studies and by reducing environmental damages by pollutants. Furthermore, the Environmental Impact Assessment (EIA) system still needs to be enhanced according to international standards to be robust and comprehensive. Certification of EIA consultants and reviewers is crucial. The use of strategic environmental and social assessments is critical for developing national visions, strategies, policies, and programs as well as strengthening impact assessments for social aspects.

Across the last three decades, Egypt has interwoven laws, policies, and instruments for more effective inspection and compliance. Yet the Egyptian Environmental Affairs Agency (EEAA) systems need enhancements for effectiveness, and the country's fiscal position needs reframing to make penalties more impactful. In the last few years, efforts have been made to improve the relation between environmental inspection and effective compliance to lower transaction costs and better coordinate the different rules and procedures. Moreover, consistency of data and its timeliness is crucial for improving the effectiveness of the inspection system. This could be achieved by digitalizing the reporting of the environmental register and EIA systems and mandating the self-reporting. Moreover, the continuous online monitoring of stack emissions, ambient air, water quality, and industrial wastewater discharge monitoring networks is important for collecting the information, but mainstreaming and integrating with other agency monitoring stations would have a greater impact on environmental management. Finally, more transparency and stakeholder engagement beyond environmental technical staff would be encouraged to make consultation process more inclusive and meaningful.

Environmental threats and climate change, however, are forcing Egypt to better preserve its natural capital stock. The country is seeking to employ sustainable approaches and policies to ensure natural assets are preserved and societal well-being is protected for generations to come while ensuring sustainable economic growth. Population growth, urbanization, industrialization, and coastal artificialization are putting pressure on the natural capital in Egypt. While the country has improved environmental management effectiveness, it still faces environmental challenges and environmental degradation that are impeding sustainable development. In 2016/2017, the Cost of Environmental Degradation (COED) related to the air in Greater Cairo was equivalent to 1.35 percent of gross domestic product (GDP) (US$3.35 billion).

Circular Economy and Pollution Management

The Egyptian industrial sector represents almost 17 percent of GDP and plans for new development and rapid industrialization over the next 25 years. The sector registered growth during the 2017–2018 macroeconomic reforms eliminating fuel, electricity, and water subsidies. It rebounded strongly from the global COVID-19 pandemic in 2022, registering 9.6 percent growth. Fast industrialization has led to higher demand of resources for production and generated environmental pollution. According to the State of the Environment Report 2020, Egyptian industry has improved environmental performance for air quality indicators—particulate matter, carbon monoxide, lead, nitrous oxide, ozone, and sulfur dioxide, yet it accounted for 37 percent of the country's total energy consumption, 12.5 percent of its total greenhouse gas (GHG) emissions. Industrial water use increased from 1.2 billion cubic meters in 2012 to 5.4 billion in 2018 with about 10 percent of total water consumption. The sector's heavy reliance on imported primary and secondary production inputs, representing 44 percent of total imports in 2019, also increases its vulnerability to external factors and impacts its competitiveness.

Egypt would avoid the irreversible, environmental degradation of fast industrialization and expand social inclusion by prioritizing CE strategies for sustainable economic growth. Industries have huge opportunities to improve resource efficiency where some industries in Egypt have circularity potential between 40 and 80 percent: plastics (polyethylene terephthalate packaging), glass, electric and electronic equipment (durable consumer goods), textiles, and construction. Waste management has significant potential to create new business opportunities, increase employment and resource efficiency, and reduce waste disposal, and eco-industrial parks (EIPs) offer solutions for efficiently managing waste. An integrated framework for green manufacturing practices across supply chains could facilitate uptake, technology transfer, and progressive expansion of this CE.

One of the oldest and most important pillars of the Egyptian economy—the food and beverage (F&B) sector—has strong circularity potential. The F&B sector represents 21 percent of manufacturing value-added in Egypt in 2019. In the Greater Cairo Region, F&B processing ranks first in water pollution load and second in industrial waste while generating dust and volatile organic compounds. Yet water- and energy-saving opportunities are significant: 25–90 percent and 10–70 percent, respectively. The agriculture sector consumes about 80 percent of the country's total water budget, and Egypt is close to the severe water scarcity threshold. In the F&B value chain specifically the upstream makes up almost 34 percent of the total global GHG emissions.

Blue Economy Opportunities and Challenges

In economies around the world, the definitions of and strategic approaches toward the BE vary. The World Bank defines the BE as "the sustainable use of ocean [and sea] resources for economic growth, improved livelihoods, and jobs while preserving the health of the ocean [and sea] ecosystem." A strategy building on this definition requires ascertaining the BE geographic scope and share of the economy to help shape efficient policies for preserving and even increasing the renewable coastal and marine natural capital while using the nonrenewable capital such as oil, gas, and mining for green and blue transitions. Here, the BE scope is restricted to the coastal area delimited by the coastal road in nonurban areas and the marine environment as well as coastal urban areas (Alexandria, Port Said, resorts, and tourist venues) and economic activities (ports, oil and gas hubs, industrial zones, fisheries, and aquaculture) where the land-sea coastal and marine interface represents about 19.6 percent of the economy in 2021. The natural capital stock of both Seas was conservatively estimated at US$233.4 billion in 2021.

Egypt has deployed integrated coastal zone management (ICZM), strategic environmental assessments (SEAs), and a BE strategy framework that have been executed by various stakeholders. The environmental law 4/94 has included Coastal Zone management, then the MOE has developed ICZM strategy, which helped to improve preparedness, build capacity, and enhance coastal resilience. For instance, an ICZM 2009–17 executed by the Ministry of Water Resources and Irrigation in coordination with the Coastal Research Institute and the Egyptian Shore Protection Authority sought to integrate the management of sea level rise risks into development planning. Conversely, a 2017–20 ICZM project in Alexandria executed by EEAA helped reduce land-based sources of pollution entering the Mediterranean Sea by identifying hot spots around the city, especially Lake Mariout. Subsequently, the 2022 SEA for the Red Sea tourism sector, supervised by several public actors having jurisdiction over the spatial area, helped inform decision makers on policy designs, plan formulations, and future programs to increase preservation and conservation of the targeted area (ecotourism). The BE strategy framework will guide the formulation of a BE strategy and will notably rely on developing marine spatial planning (MSP) central to the planning exercise that should be more inclusive, and integrative in its engagement of stakeholders. Building on all the ICZM and SEA efforts, the scope of MSP extends an estimated 263,451 square kilometers in Egypt and supports BE transitional concerns while forging society-wide partnerships and using advisory and analytical instruments to gauge economic synergies versus trade-offs in conjunction with resource preservation versus degradation.

Blue tourism needs to be nature positive, low impact, and low carbon while artisanal fisheries need continued GOE conservation support. Updated *Egypt Vision 2030* has triggered the Tourism Reform Program, creating green certification for protected area (PA), managing diving and snorkeling activities, and promoting PAs. At the 27th Conference of the Parties (COP27), the GOE committed to designating the Red Sea Fringing Reef as a PA. In lockstep, governorates are making tourism more sustainable, such as limiting the use of plastics to stem their flow into the country's waters. Ecotourism is on the rise and shows an increased knock-on effect on the local economy with less pressure on the commons. Conversely, the newly created Lakes and Fish Resources Development Agency (Law No.146/2021) has a clear mandate on the fishing sector that plays a vital role in food security by mainly relying on fish farming. Still, the agency needs to engage in better coordination with stakeholders to replenish the fish stock and stop ecosystem deterioration, preserving fish species and creating a template for other waters as well as for mariculture and nontraditional species.

Mobilizing Green Financing and Introducing Green Policy Instruments to Support the Transition

A green financing framework has been evolving and supporting green and, more recently, climate investments in Egypt over the last two decades. Presently, the framework aligns with the G20 Green Finance Study Group, which includes the de-risking of finance for climate change mitigation and adaptation—as a subcategory of green financing. The green financing effort started with a homegrown hybrid instrument to regulate and incentivize industrial pollution abatement initially developed with World Bank support—Egypt's Environmental Pollution Abatement Project (EPAP)—in 1996. Official development assistance (ODA), development finance institutions (DFIs), and international financial institutions (IFIs) introduced green financing by building on the EPAP positive experience to offer blended financing through the banking sector with or without a technical assistance grant. Recently, Egypt has issued green bonds that are gaining momentum in addition to creating the African voluntary carbon market for carbon trading, which is housed within the Egyptian Stock Exchange.

Four central actors have been shaping green financing in Egypt in coordination with the MOE. The Ministry of Planning and Economic Development (MOPED) formulated three green financing principles, and the MOPED-MOE developed a framework for environmental sustainability standards. The Central Bank of Egypt introduced guiding principles for sustainable financing and should expand the scope of credit guarantees together with ODAs, DFIs, and IFIs through the Egyptian Credit Guarantee Company to target entrepreneurs, including micro, small, and medium enterprises (MSMEs). The Financial Regulatory Authority mandated the Environment, Social and Governance (ESG) rating disclosure for companies listed on the Egyptian stock exchange. In parallel, ODAs, DFIs, and IFIs have been supporting the buildup of a climate change market and a social risk management system as COP27 advanced these measures into international discussions and programmatic lending.

The effectiveness of green financing is bound by maintaining the macroeconomic and exchange-rate stability. To attract climate funding, ODAs, DFIs, and IFIs have been helping the authorities and the financial sector to upgrade the green financial framework by: improving Egypt green predictive budgeting and planning; issuing green bonds; setting up a prudential framework, inclusive of green loan guarantees, and an export credit guarantee; and harnessing private equity investors and venture capitalists, including angel investors. CE and BE funding are being articulated along five main conduits: (i) introducing blended financing program targeting CE and BE adopters, enablers, beneficiaries, and business model innovators and providing blended financing, grants, and appropriate technical assistance to be initially cofinanced by ODAs, DFIs, IFIs, and the GOE, with funding being gradually fully assumed by local resources over time; (ii) opportunistically tapping climate funding by breaking down benefits between local benefits related to CE as well as BE and global benefits; (iii) updating the prudential framework to secure green loans and green credit export guarantees and expanding the scope of the insurance sector to cover environmental liabilities; (iv) issuing green bonds with specific targeting of CE and BE; and (v) channeling venture capital and private equity green funding toward both CE and BE innovation to boost the startup ecosystem scope for MSME entrepreneurs.

Toward Green and Resilient Growth for a Livable Planet

Moving forward, a fundamental shift toward the CE and BE with effective green financing conduits is necessary to achieve sustainable and resilient development. The uncontrolled use and consumption of natural resources for the sake of economic growth and material prosperity have proven highly unsustainable in the long term. Instead, green development envisions a world in which natural resources—including the coastal and marine environment—are sustainably managed and conserved to improve livelihoods, increase economic returns, create jobs, and ensure food security. This requires decoupling prosperity and resource use and, consequently, any associated carbon emissions. According to the MacArthur Foundation, transitioning to a CE entails adopting regenerative design principles and extending product lifespan to achieve zero waste, relocating waste from the end of the supply chain to the beginning. Similarly, the transition to a BE calls for the responsible use of marine natural resources, reducing conflict in the marine space through MSP, and enhancing blue investments, both public and private, in innovative, eco-smart technologies.

In sum, Egypt has improved its policy and systems for environmental and pollution management. However, more work remains, and based on the analysis in this CEA, priorities for reform and investment should include the following:

i. **Strengthen environmental governance.** The most important policy action is to finalize the revised environmental law. As for the institutional framework, MOE functions need to be decoupled from its two regulatory agencies, and the MOE organogram needs to reflect core functional areas related to major environmental priorities. In addition, local decision making, partnership promotion, and stakeholder participation need to be strengthened; for example, pilot reforms could be carried out at the local government level (Cairo or Alexandria governorates) based on SDGs. To strengthen environmental enforcement and accountability, it is highly recommended to develop a comprehensive management information system with automated self-monitoring, given its capacity to drive down costs and improve effectiveness. The environmental information, to the extent possible, should be accessible online and available to the public, thus increasing polluters' accountability, participation, and transparency. It is also critical to strengthen third-party certification for the private sector and/or polluting enterprises to improve data reliability. Regular inspections and monitoring can then be gradually outsourced to these institutions to support environmental clearance processes and to supplement EEAA staff capacity for compliance monitoring. Transparency and accountability should be addressed by engaging NGOs and the business community and providing open access to environmental data (particularly air and water), EIA executive summaries, and lists of noncompliant enterprises.

ii. **Apply CE principles to reconcile environmental performance with competitiveness.** A top priority is to integrate CE principles and practices into policy and sectoral strategies, and to develop CE guidelines starting with the high-priority industries (F&B, fertilizers, etc.). Clear national standards for green products should be defined and markets should be created by adopting incentive schemes such as green procurement. An Extended Producer Responsibility (EPR) should first target industrial zones, and where vertical and horizontal (e.g., agriculture waste to packaging waste) synergies and symbiosis exist. Several producer responsibility organizations (PROs) will have to be created to raise competition and performance, where industries could select the most efficient PRO to manage their waste chain. Upscaling the implementation of the CE in value chains and industrial zones could have a major impact on raising Egyptian industry's competitiveness and economic growth, with technology transfer platforms further facilitating access to innovative CE technologies. Waste exchange platforms need to be developed to facilitate industrial symbiosis. This must be carried out with the WMRA, as all industrial waste data are reported to the WMRA based on Waste Management Law 202/2020.

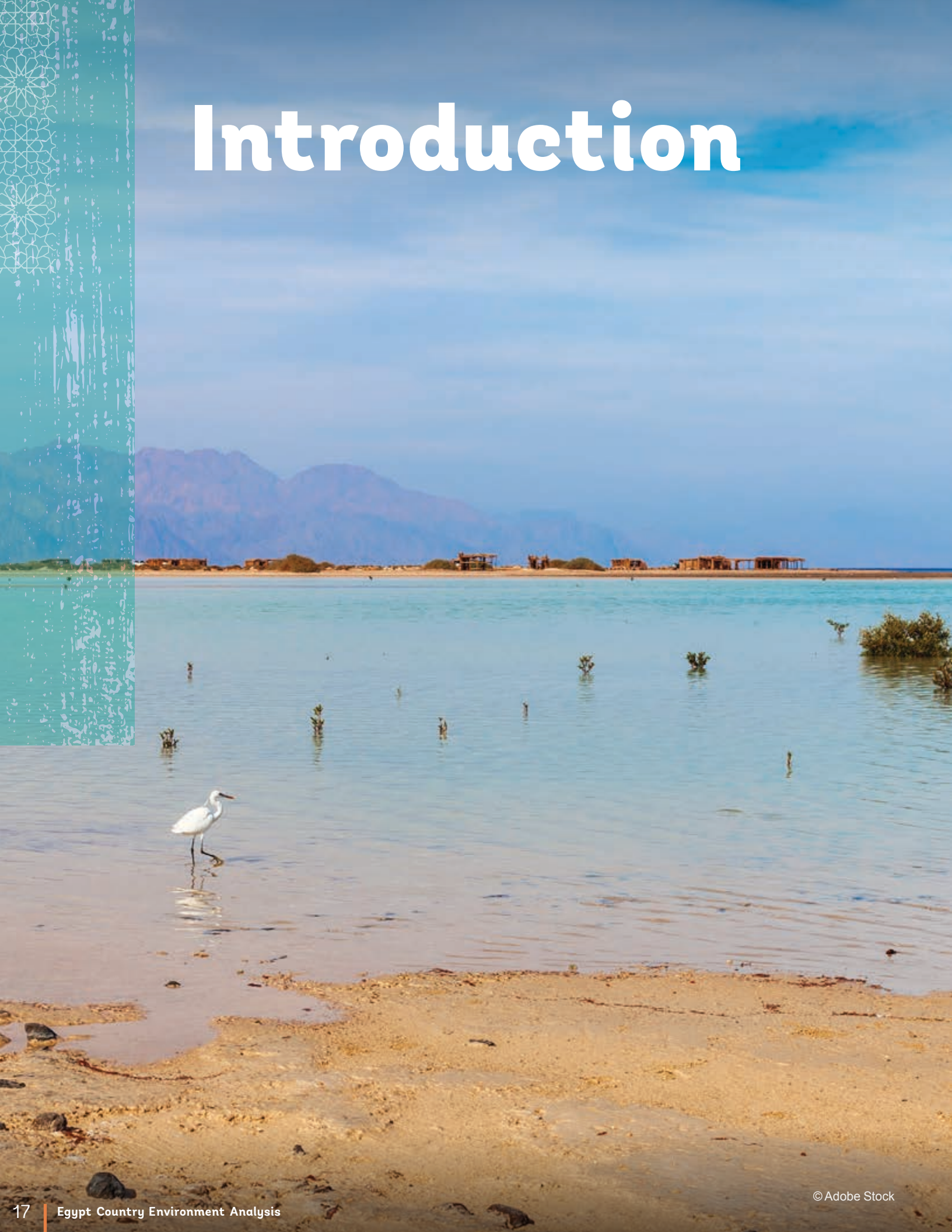
Finally, new entrepreneurs—focusing on youth and women—should be supported through incubator and accelerator programs to develop green and circular business models for deeper CE market penetration.

iii. **Harness the power of the BE.** Defining, institutionalizing, and gauging the BE is instrumental to determine the coastal and marine resource stocks, value-added, and environmental degradation, thus helping derive trade-offs and synergies. The complexity of sustainably managing the coastal and marine environment requires a holistic approach for planning, allocating rights and uses, and managing this fragile ecosystem to optimize the trade-offs and synergies that will increase the resilience of economic opportunities, livelihoods, and conservation of the commons. To initiate the transition to a BE and increase the BE sustainable and resilient growth, the coastal and marine governance system needs to be strengthened by introducing a legal (forthcoming revised environmental law), institutional, and policy framework supported by appropriate planning, management, and research tools. In parallel, it is urgent to integrate an Earth observation–based early warning system (EWS)/preparedness and response system with the other existing and planned meteorological and climate EWS to timely contain maritime pollution events. The GOE should also adopt the MSP building on the existing ICZM strategies, SEAs, and plans, whereas the EEAA should have a clear mandate across sectors and government tiers to coordinate the process with relevant stakeholders. Further, a PPP mechanism could be considered where the PAs and their environs could be managed by the ecotourism, artisanal fisheries, and communities where goods and services generate revenues while promoting conservation. Putting in place a strict MOE monitoring and verification regime in conjunction with the Convention on Biological Diversity's Aichi Biodiversity Target 11 and Kumming-Montreal- 2022 COP15 UN Biodiversity Conference is also recommended.

iv. **Promote green finance to protect the environment and ensure sustainable resource use.** With the improvement of Egypt's economic prospects, the GOE needs to build further international and national green investors' confidence and green finance growth by reaching the macroeconomic stabilization program targets set by the IMF. The MOE has gained invaluable experience implementing the EPAP Phase III and demonstrated its capacity to integrate the CE in industrial facilities. The MOE or CBE can gradually take over and expand the process to cover industrial zones, EIPs, green value chains, and tech start-ups and academia can channel efforts toward CE research and application. Climate financing is already transforming the financing sector in Egypt. De-risking climate investment tools could be used for de-risking CE and BE investments, while grants, low-interest loans, and credit guarantees can help target 90 percent of Egyptian MSMEs, which have no access to credit, and stimulate CE and BE growth. To improve the enabling environment, these are additional sources of green finance and green policies: venture capital and private equity green funding to support the CE and BE entrepreneurial ecosystem, adjusting concession and partnership responsibilities for PAs, debt-for-nature/climate swap agreements, issuing green and blue bonds targeted to the CE and BE, private trust funds, exploitation of coefficient rights in urban areas (based on the Italian *perequazione urbanistica*), and a prudential framework will need to be fine-tuned for the CE and BE, notably through credit guarantees, insurance to de-risk specific investments, and export credits guarantees.

v. **Build capacity and raise awareness.** Technical expertise is essential to promote the CE and BE, yet understanding of these concepts is at an early stage in Egypt. Capacity building at all levels is required to strengthen strategic planning, policies, and effective implementation. Establishing a national or regional center of excellence to promote the CE, environmental management policies and standards, and good international industry practices will facilitate technological transfer. Education also plays an important role in generating knowledge and growing a new generation of experts to introduce modern technologies and innovative solutions. Finally, pressure from the public has often been a key factor in pushing polluters and regulators to improve environmental management. Well-trained practitioners in environmental and social communication with the knowledge, perspective, and practice of Egyptian culture can help empower the public; thus, it is important to develop a communication strategy as well as raising awareness campaigns to address the major environmental and social issues.

Introduction



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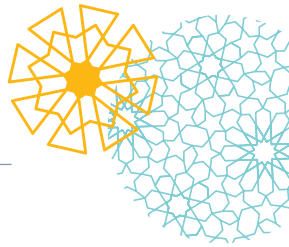
Egypt has made substantial efforts in introducing environmental policies, reforming the environmental sector, and improving the overall management of environmental issues. The first Country Environmental Analysis (CEA), published in 2005, identified air and water quality, solid waste management, integrated coastal zone management (ICZM), and environmental policies and institutions as the country's most critical focus areas. The Ministry of Environment (MOE) has since made great strides in reforming the sector. It has established an air quality monitoring system and reduced urban ambient air pollution, notably reducing enterprise air emissions and water effluent through the World Bank Egyptian Pollution Abatement Project (EPAP). It also has scaled up compressed natural gas–powered cars and taxis; introduced the country's first Waste Management Law 202/2020, Executive Regulations, and an oversight agency—the Waste Management Regulatory Authority (WMRA)—and has carried out and implemented ICZMs. Despite these improvements, environmental issues remain a serious problem. Climate change will put further significant pressure on the country's land and water resources, which are already strained by high population growth and rapid urbanization.[1] To this end, the World Bank Group's 2022 *Country Climate Development Report: Egypt (CCDR)* assesses the macrofiscal linkages with climate change.[2]

Globally, environmental sustainability has become central to the international development agenda. The external landscape has changed considerably since the last CEA. In 2015, the UN member states launched the 17 Sustainable Development Goals (SDGs) to end global poverty, advance health and education, reduce inequality, protect the environment, and accelerate economic growth. There is increasing realization among stakeholders of the importance of environmental and social sustainability and responsibility as cornerstones of development. The decentralization of decision-making powers from governments downward toward local institutions, nongovernmental organizations (NGOs), and communities is an important feature of environmental governance approaches, which aim to improve accountability and accessibility and provide a voice for local people and their representatives.[3] Environmental, social, and governance (ESG) has extended across many business organizations and emerged as a key metric for evaluating how an organization is led and how it manages risks and opportunities. ESG is no longer the sole responsibility of the public sector, nor only achieved through traditional regulatory means.

***Egypt Vision 2030* is the first official government document that provides a transparent self-assessment of the major challenges in each of the 10 pillars[4] and priority actions to address them.** Egypt not only endorsed but also shifted to align its policies and strategies to meet the SDGs. In 2016, Egypt formulated its own national *Sustainable Development Strategy (SDS): Egypt Vision 2030.* Subsequently, several ministries have developed their own sustainable development strategies in collaboration with the MOE. These include the National Water Resources Strategy 2017–37, the Sustainable Development Strategy for Tourism, the Integrated Sustainable Energy Strategy 2035, National Strategy for Women's Empowerment 2030,[5] and the Low Emission Development Strategy. At the local level, the Ministry of Planning and Economic Development (MOPED) and the UN Population Fund prepared 27 reports on localization of the SDGs in each governorate. Strategic documents were published in 2021 and 2022, including the *Guide to Environmental Sustainability Standards: The Strategic Framework for Green Recovery*; a report on Egypt's 2021 voluntary review of the SDGs; and *Egyptian National Climate Change Strategy 2050*[6] to continue supporting its sustainable development and growth amidst a changing climate.

Moving forward, a fundamental shift toward the green, circular, and blue economies is necessary to achieve sustainable development. The uncontrolled use and consumption of natural resources for the sake of economic growth and material prosperity have proven highly unsustainable in the long term. Instead, green development envisions a world in which natural resources—including oceans, land, and forests—are sustainably managed and conserved to improve livelihoods, increase economic returns, create jobs, and ensure food security. This requires decoupling prosperity and resource use and, consequently, any associated carbon emissions. The circular and blue economies are two frameworks that can significantly help achieve greener development patterns. Transitioning to a circular economy (CE) entails adopting regenerative design principles, extending product lifespan to achieve zero waste, and relocating waste from the end of the supply chain to the beginning.[7] Similarly, the transition to a blue economy (BE) calls for the responsible use of marine natural resources, reducing conflict in the marine space through marine spatial planning (MSP), and enhancing blue investments, both public and private, in innovative, eco-smart technologies.



1 WBG 2022a.
2 WBG 2022a.
3 See https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/environmental-governance.
4 The 10 pillars of *Egypt Vision 2030* are (i) Economic Development; (ii) Energy; (iii) Knowledge Innovation and Scientific Research; (iv) Transparency and Efficient Government Institutions; (v) Social Justice; (vi) Health; (vii) Education and Training; (viii) Culture; (ix) Environment; and (x) Urban Development.
5 National Council for Women 2018.
6 MOE 2022a.
7 Ellen MacArthur Foundation n.d.

PURPOSE AND METHODOLOGY

The CEA is a tool to better understand the status of key environmental challenges and provide strategic guidance to the Government of Egypt (GOE) to achieve green, resilient, and inclusive growth. It supports sustainable growth aspirations articulated in *Egypt Vision 2030*, assesses environmental sector priorities over the short and medium terms, identifies further policy reforms for sustainable growth, and explores options for increasing resilience and diversifying the economy by fostering innovative green financing mechanisms. The methodology for developing the report was based on a review of existing analytical work regarding environmental management in Egypt, current environmental regulations, strategies, reports, and public data. In addition, consultation workshops, interviews (with government representatives, NGOs, research institutions, the private sector, and key experts), and focus group discussions were carried out. The outcomes of the CEA have been validated through a verification workshop with the country's key stakeholders. The CEA was also carried out building on the *CCDR*, which covers climate change issues to complement natural resource management and environmental sustainability aspects.

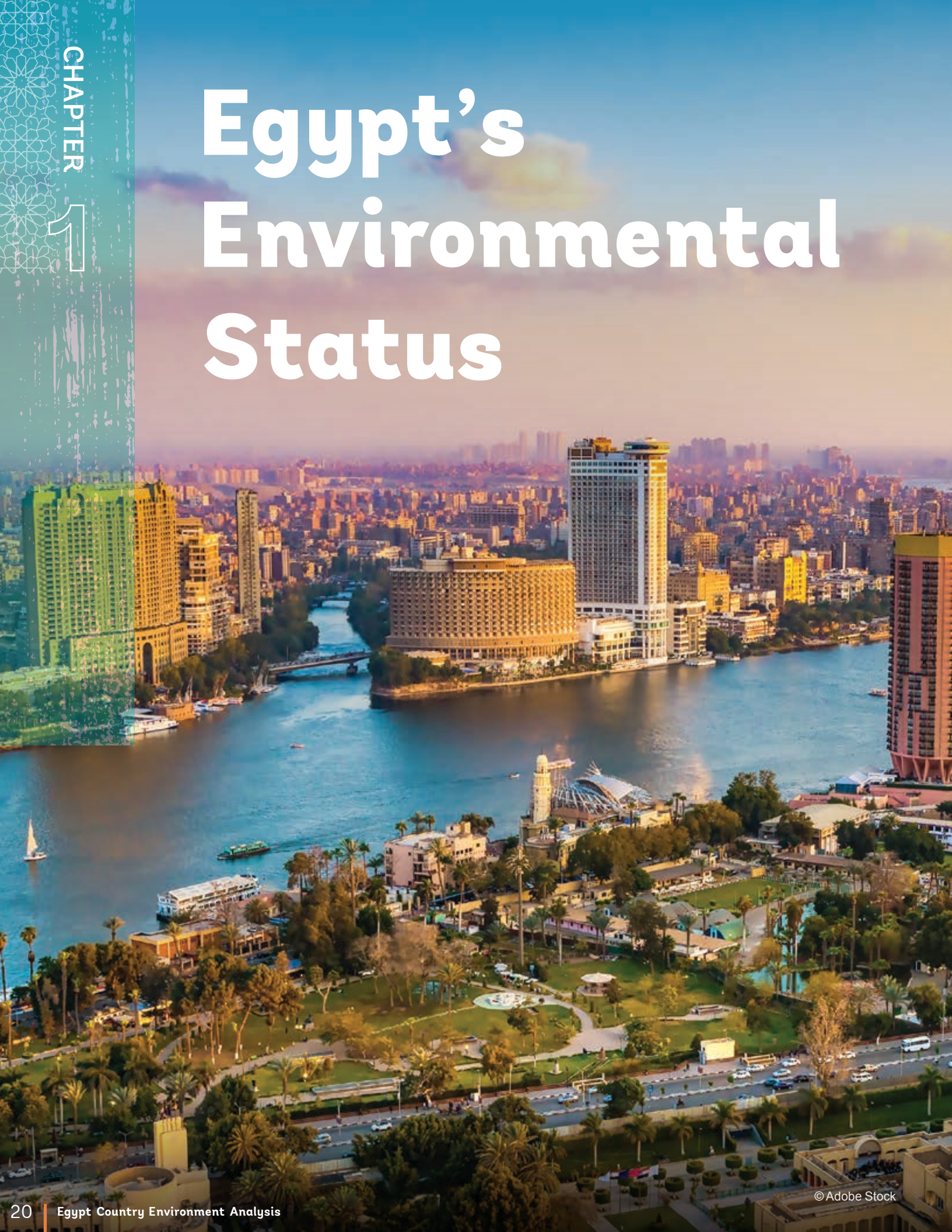
In consultation with the GOE, this CEA focuses on three priority areas in accordance with *Egypt Vision 2030* and the World Bank's regional flagship report, *Blue Skies, Blue Seas:* *Air Pollution, Marine Plastics, and Coastal Erosion in the Middle East and North Africa.* Priority pillars include the following: (i) CE for industrial pollution and waste management; (ii) BE, with a focus on sustainable coastal zone management; and (iii) green financing to address these two priority issues. These subjects are at the heart of the GOE's request to shed light on emerging but unattended issues and were identified as priority areas through dialogue with the MOE, in alignment with *Egypt Vision 2030*. Furthermore, these are consistent with the World Bank's regional framework approach developed under Blue Skies, Blue Seas in MENA, which calls for detailed analysis at the national level.

REPORT STRUCTURE

The report is structured as follows. Chapter 1 begins by setting the general economic and environment context in Egypt. Chapter 2 provides a general analysis of environmental management institutions and environmental governance. Chapters 3–5 are dedicated to the analysis of three priority issues identified above. Basic data and information for each of the sectors were obtained from the respective responsible ministries and agencies. Finally, chapter 6 summarizes recommendations to provide a way forward for Egypt, proposing actions to start improving environmental governance.

CHAPTER 1

Egypt's Environmental Status



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1.1.

Environmental Impacts, Challenges, and Trends

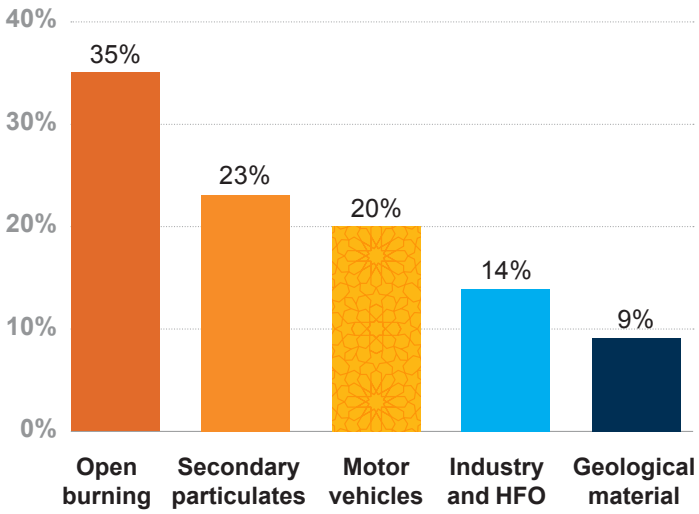
Although Egypt has made progress in its environmental status over the past two decades, it is projected to face significant water, ecological, agricultural, technological, and human health challenges. Notable progress includes (i) mainstreaming an environmental agenda into national strategies and increasing coordination across ministries; (ii) introducing the country's first Waste Management Law 202/2020 and its Executive Regulations; (iii) establishing the WMRA; (iv). Committing to halving its fine particulate matter (PM_{10}) emissions by 2030 and initiating significant steps to improve air quality; and (v) issuing national strategies for specific subjects (such as agricultural waste, climate change, and hazardous waste). However, air and water quality, solid waste management, and coastal and marine environmental management are notable concerns and are further exacerbated by a changing climate. Population growth, urbanization, and industrialization serve as the leading drivers of air and water pollution and waste generation in the country.

AIR QUALITY

Egypt has reduced air pollution over the past two decades, but air quality is still a critical environmental focus area,[8] and the GOE has taken action to prioritize it. *Egypt Vision 2030* sets targets to improve air quality by 2030,[9] and the Nationally Determined Contributions (NDCs) and the *National Climate Change Strategy (NCCS)* 2050 commit to reducing greenhouse gas (GHG) emissions by 2030 and 2050 respectively.[10] Egypt Takes Off, a program that aims to improve living standards, includes an air quality component. Greater Cairo Air Pollution Management and Climate Change Project (US$200 million), supported by the World Bank, aims to enhance the capacity for air quality management along with investing in clean transportation and solid waste infrastructure. Air quality has improved across all indicators: between 1999 and 2017, annual ambient $PM_{2.5}$ decreased from 90 to 76 micron per cubic meter (μg/m^3)), leading to the reduction of the burden of air pollution. Further, $PM_{2.5}$ and PM_{10} levels must still decline, especially in the Greater Cairo area, to comply with World Health Organization air quality guidelines.

The country's largest sources of air pollution ($PM_{2.5}$) are illegal open burning, including burning of agricultural waste in the Nile Delta; secondary particulates such as sulfates, nitrates, and chlorides; and motor vehicles (figure 1.1).[11] Industry also plays a significant role in polluting Egypt's air, especially in governorates with industrial zones.[12] In that respect, the MOE has established national ambient air monitoring stations (120 stations as of 2022) and national industrial emissions monitoring stations (467 stacks in 94 companies as of May 2023) in the cement, fertilizers, petrochemicals, electric power stations, iron and steel, ceramics, glass, oil refineries, and aluminum industries.[13] The Egyptian Environmental Affairs Agency (EEAA) established a four-site source apportionment network and has plans to deploy new monitoring stations across Greater Cairo to highlight transportation emissions, including the short-lived climate pollutant black carbon and carbon dioxide. Between September 2021 and February 2022, efforts to collect and recycle rice straw reduced pollution loads originating from its open burning by roughly 31,000 tons, with a reduction rate of 99 percent.[14]

Figure 1.1: Sources of Ambient Air Pollution at Six Sites in the Greater Cairo Region, 1999–2002



Source: Larsen 2019.
Note: HFO = heavy fuel oil. Total may not add up due to rounding.

8 World Bank 2005.
9 *Egypt Vision 2030* sets the target of reducing PM10 concentrations by 50 percent by 2030.
10 Includes quantifiable targets to mitigate 33 percent of emissions from the electricity sector, 65 percent from the oil and gas sectors, and 7 percent of emissions from the transportation sector by 2030, against a 2015 baseline.
11 Larsen 2019.
12 Shaltout et al. 2018.
13 MOE 2022b.
14 Note: Data provided from monitoring stations of the EEAA.

WATER QUALITY

Egypt's freshwater supply, agricultural production, tourism, industry, energy, and biodiversity are highly reliant on the country's main source of fresh water, the Nile River. This reliance on a single resource, shared by 11 countries, makes Egypt's economy and livelihoods increasingly vulnerable to climate-related disruptions. The MOE, in coordination with the Ministry of Water Resources and Irrigation (MWRI) and MOHP, regularly monitors water quality indicators (physical, chemical, and microbiological) through 458 monitoring sampling sites.

Industrial discharge and effluents pollute the Mediterranean Sea, Nile River, northern lakes, and their waterways.[15] Along the Nile River, more than three-quarters of all discharge is either treated or diverted to agricultural drains and sewage networks. The EEAA works in collaboration with concerned entities to conduct environmental inspections to hold polluters accountable legally and through time-bound environmental compliance action plans (CAP). While industry accounts for only 6.97 percent of the country's total water consumption,[16] it contributes to, on average, 33 percent of total water pollution in the Greater Cairo Region alone.[17] Of the 20 industrial facilities located on the Nile River, 11 release wastewater directly into the river (697 million m^3/year).[18] Although more than 78 percent of the volume has been treated and diverted to agricultural drains or the public sewage network, 145.5 million m^3 remain noncompliant. The public sugar and paper industries are key pollution sources along the river, whereas petroleum companies are key polluters in the Lake Mariout (northern Egypt near Alexandria governorate).

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15 MOE 2018.
16 MOE 2021.
17 PIP 2022.
18 Note: Data provided from monitoring stations of the EEAA.

WASTE

Rapid population increase, fast-growing urbanization, and higher consumption rates have increased the generation of waste. Egypt's total population reached about 110.9 million in 2022, with an annual growth of 1.6 percent.[19] According to the *State of the Environment Report,* solid waste generated in 2019 reached around 100 million tons.[20] The overall recovery rate of solid waste is not more than 12 percent, leading to serious public health and environmental impacts, as well as lost opportunities. Table 1.1 shows these upward trends in waste generation from 2001 to 2022.

Table 1.1: Waste Generation in Egypt, 2001–22

WASTE TYPE	Generated Quantity (million tons)					Source
	2001	2006	2012	2016	2022*	
Municipal solid waste	14.5	17	21	21	25.4	Master plans
Construction & demolition waste	3.5	4.6	4	5.8	123	Strategy
Agricultural waste	23.5	27.5	30	31	40–45	Strategy
Industrial waste	4.25	4.75	6	4.9	NA	Strategy
Medical waste	0.12	0.15	0.28	0.52	1	Guidelines
Sludge	1.75	2	3	2	2.5-3	WMRA
Drains and canal waste	20.0	30	25	25	4.6	Converted data from governorates from cubic meters to tons using average density of 0.5 ton per cubic meter
Hazardous waste	NA	NA	500	NA	NA	
Total	**67.62**	**86**	**89.28**	**90.22**	**>196**	

Source: MOE 2017.

**The 2022 data is considered the most accurate estimation, since it is based on recent field studies that were conducted during the preparation of the strategies, plans, and field surveys.*

MUNICIPAL WASTE

Despite Egyptian authorities' efforts to address the solid waste crisis since the 1990s, including the recent establishment of WMRA and issuance of Waste Law 202/2020, major challenges remain for existing solid waste management systems. Increasing levels of waste generation, changing waste characteristics, improper waste disposal practices, lack of sufficient infrastructure, and uncontrolled spread of urban development exacerbate the challenges to waste management processes. This has pushed local governments/municipalities beyond their technical, financial, and institutional capacities. Only about 30 percent of the collected waste is recycled/recovered, and 70 percent is landfilled. In fact, the solid waste sector represents 4.3 percent of total national GHG emissions due to disposal, incineration, illegal open burning, and biological treatment of solid waste.[21]

CONSTRUCTION AND DEMOLITION WASTE

A boom in construction is generating significant construction and demolition (C&D) waste. The construction sector experienced a real growth rate of 7.0 percent in 2022, representing 7.6 percent of GDP.[22] To address the challenge of increasing C&D waste, Egypt prepared a National Construction and Demolition Waste Management Action Plan 2021. It has six main objectives: (i) reduce the quantities of C&D waste generated; (ii) activate roles and responsibilities for the C&D waste management system per Waste Management Law 202/2020; (iii) establish C&D waste collection, transport, recycling/treatment (stationary and mobile units), and final disposal infrastructure; (iv) encourage private sector participation; (v) indicate specific targets for C&D waste recycling to reach 50 percent by the end of 2030; and (vi) establish categorization, monitoring, and follow-up measures for recycled materials. Supporting measures include drafting codes, specifications, and guidelines for the use of C&D recycled materials in construction, green public procurement, and green labels; establishing public-private partnerships (PPP) to operate integrated waste management systems; digitizing data collection; using geographic information systems; linking to the WMRA centralized database; and building capacity in the C&D waste management field.

19 Data on Egypt in 2022 can be found at: https://data.worldbank.org/country/EG.
20 MOE 2021.
21 UNFCCC 2019.
22 MOPED 2022.

AGRICULTURAL WASTE

Egypt is estimated to generate more than 40–45 million tons of agricultural residues (including animal waste) annually but to utilize less than half as animal fodder, compost, and fuel.[23] The inadequate management of agricultural waste in Egypt contributes to black cloud episodes and other pollution.[24,25] Agricultural waste recycling is difficult, as the agricultural lands in Egypt mainly belong to smallholders, and transportation expenses to centralized locations for aggregation is usually costly. The EEAA incentivized the collection and transformation of rice straw to profitable products, which reduced black cloud,[26] improved public health, and introduced circularity.[27] This was further addressed under Waste Management Law 202/2020 and the *National Agriculture Residue Management Strategy 2019* to develop an effective national system for the integrated management of agricultural residues, reduce health impacts, and maximize the use of natural resources through recycling projects to contribute to economic development.

NONHAZARDOUS INDUSTRIAL WASTE

The definition of nonhazardous industrial waste was introduced recently in Waste Management Law 202/2020 under Articles 47–52 and its Executive Regulations under Articles 24 and 41–45. This law defines nonhazardous industrial waste as waste generated from industrial activities, handicrafts, or other similar activities that do not contain hazardous materials.[28] The country generates an estimated 4.9 million tons per year of industrial waste,[29] and the largest producers are mainly concentrated in the Greater Cairo and Delta Regions. They include cement, chemicals and pharmaceutics, food, metallurgy, petrochemicals, and textiles.[30] Industrial waste mapping of 418 companies in the 10th Ramadan Industrial City indicates the top five materials as off-specification items and unused products (13 percent of total); other wastes not specified (12 percent of total); discarded molds (12 percent of total); dye stuffs and pigments (9 percent of total); and wastes from processed textiles (9 percent of total).[31]

HAZARDOUS WASTE

Hazardous waste management faces challenges and gaps in Egypt. Limited monitoring and tracking of waste movement has resulted in a lack of data on waste generation, transportation to final treatment, disposal, and exporting. The EEAA Central Department of Solid Waste estimates that 6 million tons of industrial hazardous solid waste was generated in 2012, but other estimates indicate 150,000–500,000 tons in 2018.[32] This broad range highlights the general lack of information. Further, the capacities of existing treatment facilities are not sufficient to treat the total volume of hazardous waste. Al-Nasriya Hazardous Waste Treatment Centre in Alexandria is the country's main disposal facility; EGP 45 million was spent to close its old burial basin, and EGP 17 million was spent to construct a new burial basin, measuring 150 x 100 meters (m). The new basin opened in 2021.

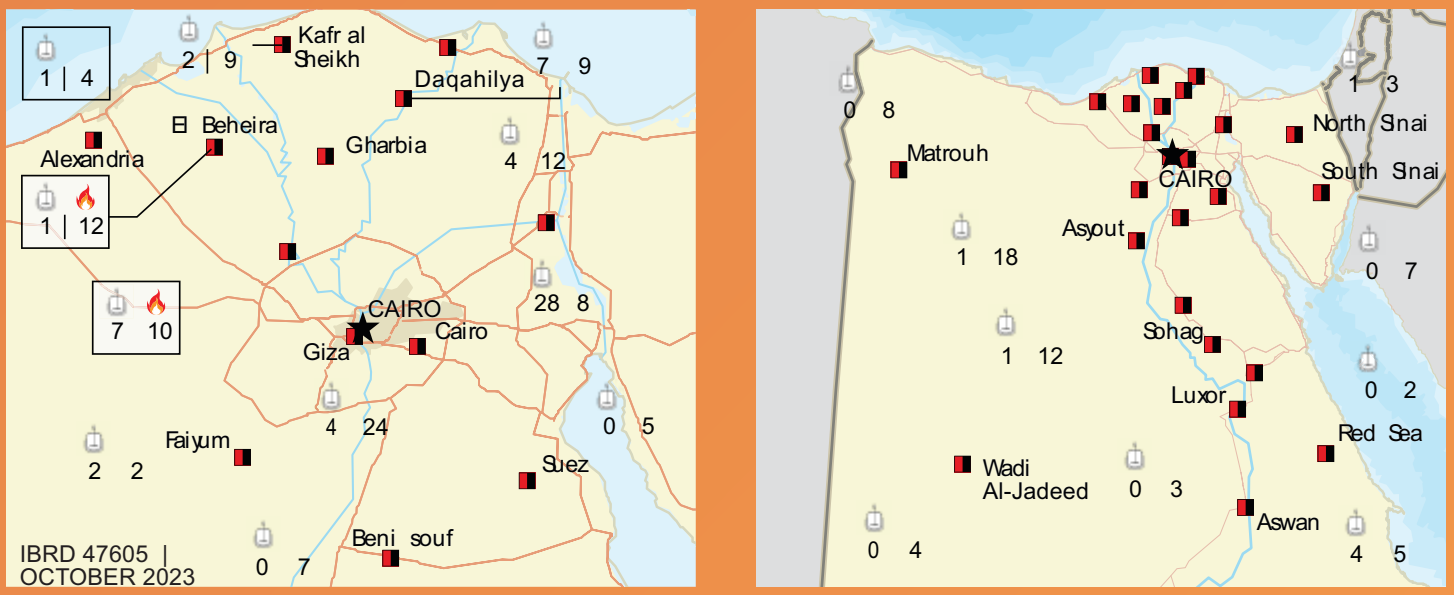
Similarly, laboratories lack the capacity to analyze waste samples, and trained specialists in the field of hazardous waste management are limited. There is little legal enforcement of penalties for violations of hazardous waste handling, leading to high noncompliance rates by hazardous waste generators. Additionally, providing capacity building and technical assistance to those in the hazardous waste management field, including the regulators and generators, can reduce challenges faced in the sector. Several of these issues have been addressed in Waste Management Law 202/2020 and its Executive Regulations, such as that WMRA in coordination with the competent administrative entities is designated to monitor the handling of hazardous waste as per the established requirements, and licensed contractors should submit an insurance policy to cover potential damages and losses in case an accident or pollution. The *National Hazardous Waste Strategy* includes among its key five objectives to build national capacities and expand knowledge transfer.

23 WMRA-NSWMP 2019.
24 Black cloud is a phenomenon of increased air pollution caused by the burning of rice straws during the period of temperature inversion. The phenomenon has occurred since 1999 in October and November.
25 El Saeidy 2004; Nakhla, Hassan, and El Haggar 2013.
26 See www.eeaa.gov.eg.
27 See www.eeaa.gov.eg.
28 This includes cardboard, oils, plastics, scrap metals, sludge, wastepaper, and wood.
29 MOE 2017.
30 NSWMP 2018.
31 Industrial waste mapping in the 10th Ramadan Industrial City in Egypt.
32 NSWMP 2018.

MEDICAL WASTE

Over the last two decades, medical waste in Egypt has steadily increased. Hazardous medical waste is generally treated through thermal incineration or autoclaving. While there are approximately 188 incinerators distributed across governorates (figure 1.2), most do not comply with health and environmental operation requirements.[33]

Figure 1.2: Distribution of Medical Waste Treatment Facilities in Egypt (Incinerators and Autoclaves)



Source: NSWMP 2020.

ELECTRONIC WASTE

Egypt is one of Africa's largest e-waste generators, according to the 2020 Global E-waste Monitor.[34] Waste from electrical and electronic equipment results from the assembly, manufacturing, and use of electrical and electronic device components. The WMRA estimates that e-waste generated annually in Egypt ranges between 66,000 and 73,000 (about 0.72-0.80 kg/capita/year), of which only 2 percent is treated and recycled. Further, Egypt represents a significant market for consumer electronics, with the information and communications technology (ICT) sector growing 15.2 percent in 2019/20.[35] The growth rate is not expected to decrease anytime soon, as there is still a need for ICT expansion and digital upgrading. Government programs such as Our Digital Opportunity, launched in 2020 to engage small and medium enterprises (SME) in the digital transformation process, are essential for economic growth but will also exacerbate Egypt's e-waste situation.

The government is supporting proper management of the e-waste through economic incentives for the environmentally sound collection of e-waste. The five-year project Protection of Human Health and Environment from Unintentional Release of Persistent Organic Pollutants (UPOP) originating from Incineration and open burning of medical and electronic waste was implemented between 2016 and 2021 as a collaboration between the EEAA, MOHP, and the Ministry of Communication and Information Technology (MOCIT). The project assisted the government to extend safe and suitable management of e-waste through: preventing the open burning of e-waste plastic residuals; applying the best environmental practices and the latest available technologies for handling e-waste; developing National Policy Framework for e-waste Management and amending national legislation to address issues of persistent organic pollutants and their unintended emissions; supporting formalization of eight informal recycling facilities; and establishing relevant capacity building and awareness raising programs. The MOCIT, in collaboration with the Swiss government, is executing the Sustainable Recycling Industries project as part of joint efforts with the MOE to manage e-waste effectively. Moreover, the MOE and the MOCIT launched E-Tadweer, an initiative to promote the safe recycling of outdated electronic items in collaboration with the private sector.[36]

34 Forti et al. 2020.
35 International Trade Administration 2021.
36 El Ghosbashy 2020.

25

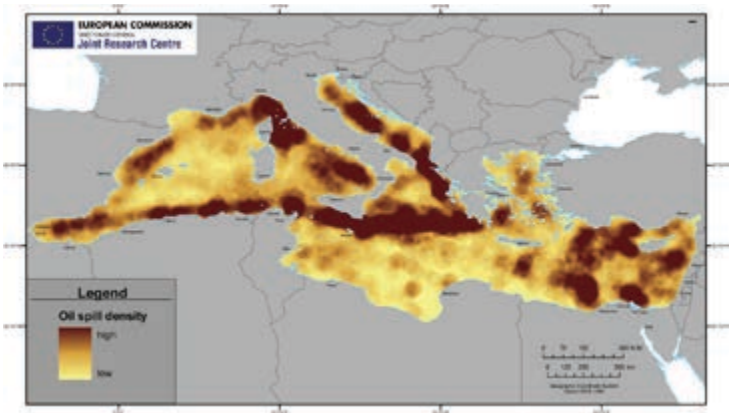
LAND-BASED MARINE POLLUTION

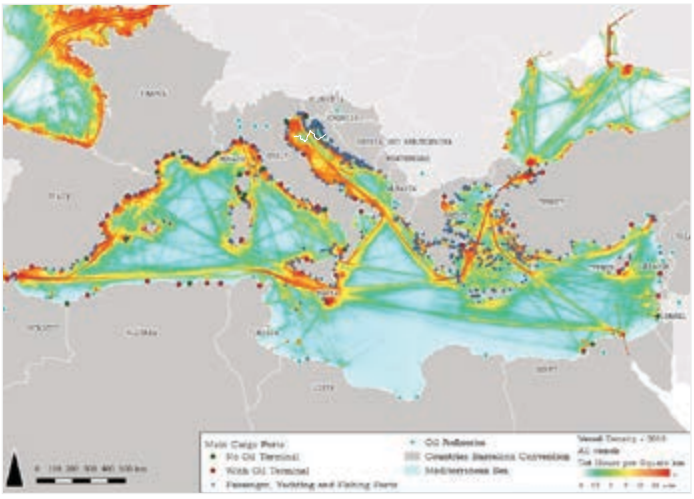
Across parameters and environmental indices, the Mediterranean Sea is considered a major hot spot for pollution, marine and coastal environmental degradation, biodiversity loss, and climate change vulnerability. The urban coastal area along the Mediterranean Sea is highly eutrophic due to direct discharges of wastewater, mainly from agricultural drainage water, treated[37] and untreated municipal wastewater, untreated industrial effluents, and brine discharge due to the multiplication of desalination plants along the coast.[38] Additional pressure comes from aquaculture located in coastal lakes and ponds that discharge nitrogen and phosphorus effluents, which increase algae blooms. The cooling of coastal power stations, oil refineries, and other industrial factories produce regular thermal shocks that can disrupt coastal habitats. Wastewater treatment level varies along the coast, with traces of organic chemicals causing potential persistence, toxicity, and bioaccumulation in the marine environment. This pollution can impact sustainable development tourism along the coasts. Desalination plants can impact marine life at both ends of the pipe via sea water intake and the discharge of brine back into the sea. Moreover, the Mediterranean Sea receives annually about 150,000–500,000 tons of macroplastics and 70,000–130,000 tons of microplastics from the contributing countries in the region, ranking it as one of the most plastic-polluted seas in the world.[39] Notably, plastic and microplastic pollution from Egypt stems from waste mismanagement and through wastewater treatment, as plastics and microplastics are not eliminated during treatment.[40]

MARINE-BASED MARINE POLLUTION

Marine traffic generates negative impacts on the marine environment in terms of air, noise, and liquid and garbage pollution. High traffic of vessels, tankers, and cargo ships increase the levels of critical air pollutants, including GHGs; the risk of collisions; oil and chemical spills (figure 1.3); and the release of illegal water ballast containing aquatic invasive species as well as wastewater and waste discharge. These pressures could significantly affect protected areas (PAs) and habitats, notably coral reefs. Shipping traffic in the Suez Canal and the exploration and production of crude oil increase the risk of oil spills.

Figure 1.3: Oil Spill Density and Maritime Traffic in the Mediterranean Sea





Source: El-Magd et al. 2021; Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea 2021.

37 Treated to secondary level.
38 Ismael 2014.
39 Heger et al. 2022.
40 Habib et al. 2020.

COASTAL EROSION

Urbanization, coastal structures, sand dune removal, and floodwater and sediment control are causing severe shoreline changes within the coastal zone that will be exacerbated by climate change (figure 1.4). Erosion along the Mediterranean coast of Egypt and migration of the sand spit inland along the Rosetta Nile branch show evidence of these shifts.[41] Shoreline instability along the Mediterranean coast increased due to the construction of hard structures, infrastructure, and building, as well as other human activities, which caused deterioration of sand dunes, fresh water leading to saltwater intrusion, and sediment sources in the coastal zone.[42] In the future, urban sprawl will spread along the coast while tourism, which is planned to grow exponentially as articulated in *Egypt Vision 2030*, will exacerbate coastal pressures. In both cases, dredging, diking, and artificialization of the coast that affect seabed and hatching areas will increase along with already serious coastal erosion occurring in these artificial lagoons[43] and growing flood-prone coastal areas. Protecting coastal lowland and implementing ICZM are two of the main directions of Egypt's *NCCS 2050 (figure 1.4).*

Figure 1.4: Physical Impacts of Climate Change on Egypt's Northern Coast under Representative Concentration Pathway 8.5

Source: https://iczmegypt.ihcantabria.com/

LOSS OF MARINE BIODIVERSITY

Overfishing in recent decades has affected the fish stock (between 25 and 50 percent of the fish stock is overexploited in Egypt),[44] with artisanal fishing gradually being replaced by large aquaculture investments along the coast. Recreational, artisanal, and (to a lesser extent) industrial fisheries coexist in Egypt, with artisanal fishing constituting the largest segment. The combined impact of marine pollution and overfishing has taken its toll on fish stocks, and the catch per unit of effort is decreasing for several species of fish. Moreover, bycatch is poorly studied (such as dolphins) and requires additional analysis. Several of these issues are tackled under the *Egyptian Biodiversity Strategy and Action Plan 2015–30*,[45] with the objective of promoting the implementation of good fishing practices in both the Mediterranean Sea and Red Sea, favorable to fish protection and their habitats by 2027.

The Red Sea has one of the most unique and resilient coral reef systems, which is home to over a thousand species of fish and coral, 10 percent of which are endemic.[46] This ecosystem has given Egypt the world's largest reef tourism industry and attracts millions of visitors annually.[47] Unsustainable tourism development, pollution, anchoring of ships, and coastal and underwater construction can diminish the value proposition and incur significant financial impacts.[48] Further, climate change poses a severe medium-term threat to the Red Sea's ecosystems and biodiversity and, consequently, to coastal tourism in Egypt. The expected loss of coral biodiversity will render the tourism sector in the Red Sea unattractive to activities such as scuba diving, snorkeling, and yachting. The reduction of yearly expenditure on coral reef recreation by tourists is estimated at US$3.3–US$4.5 million by 2030.[49] Losses in tourism revenues are estimated at US$1.8–US$2.3 billion by 2030 and up to US$10 billion in 2060.[50]

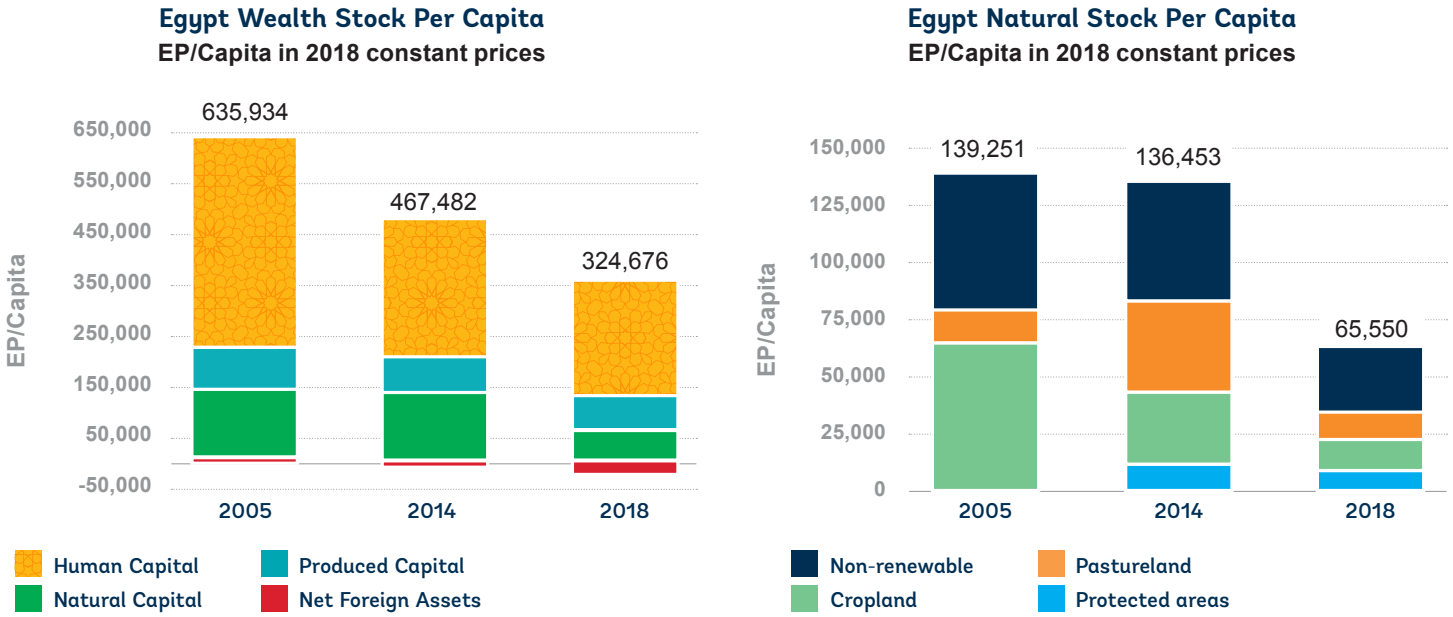
41 El-Sayed El-Mahdy et al. 2021.
42 Iskander 2021.
43 See https://www.ciheam.org/pressreview/coastal-erosion-shocks-egypts-north-coast-environment-ministry-investigates/.
44 Lam and Sumaila 2021.
45 https://faolex.fao.org/docs/pdf/egy156958.pdf.
46 Dhenin 2020.
47 Sarant 2020.
48 MOE 2016.
49 Smith et al. 2014.
50 Smith et al. 2014.

1.2.

Natural Capital and Cost of Environmental Degradation

Egypt's wealth per capita declined by half from 2014 to 2018, largely due to the depreciation of the Egyptian pound and the growing population as the wealth stock is valued in local currency by WAVES (figure 1.5). Wealth stock in 2018 constant prices decreased to US$18,271 (EGP 324,676) per capita for a population of 98.4 million comprising (per capita) US$12,958 human capital; US$3,501 produced capital; and US$1,945 natural capital, after adjustment.[51] As urbanization encroaches on the stock of cropland and pastureland, the values of PAs and forest ecosystem services are being deflated by the national currency's depreciation.[52] These changes in natural asset values indicate that significant progress is still needed to move Egypt toward macroeconomic stabilization, sustainable development, and growth while building up a resilient natural stock.

Figure 1.5: Egypt's wealth and natural stock per capita, 2005, 2014, and 2018



Sources: Lange et al. 2011; Lange et al. 2018; World Bank 2021b.

Note: Nonrenewable natural stocks include oil and gas. Protected areas valuation was introduced in 2014, mangroves and fisheries in 2018. Coral reefs and seagrass are not included in the natural capital calculations. The exchange rate of the Egyptian pound per U.S. dollar is as follows: 6.01 at the end of 2005; 6.97 at the end of 2014; and 17.77 at the end of 2018. A Pearson correlation between the natural capital and the exchange rate depreciation shows a very high R^2 coefficient of -0.97 from 2009 to 2018, which means that as the natural capital is calculated in local currency and then denominated in U.S. dollars, 97 percent of the variation of the natural capital is attributable to the depreciation of the Egyptian pound.

Air quality has improved in the Greater Cairo Region over the decades; however, it was outpaced by population growth, resulting in an increase in annual deaths from ambient $PM_{2.5}$. According to the 2019 World Bank report that partially updated the 2012 Cost of Environmental Degradation (COED) report, the air COED reached US$3.35 billion, equivalent to 1.35 percent of national GDP in 2016/17; the waterborne diseases associated with unimproved water and sanitation nationwide reached US$2.2 billion, equivalent to 1.15 percent of national GDP in 2017; and mismanagement of municipal waste reached US$1.3 billion equivalent to 0.68 percent of national GDP in 2017.[53]

While comparison of the 1999 COED and the 2017 COED is limited due to the difference in location coverage, the updated health risk factors associated with ambient $PM_{2.5}$ concentrations,[54] and valuation methodologies, it can be concluded that environmental health risk exposure levels in Egypt remain a concern, and aggregate health effects and their costs are substantial.

51 Wealth Accounting and Valuation of Ecosystem Services (WAVES) is a global partnership that aims to promote sustainable development by ensuring that natural resources are mainstreamed in development planning and national economic accounts. It includes buildings, manufactured assets such as the machinery used in factories, infrastructure such as highways and ports, and natural assets such as land, forests, fish, wetlands, minerals, and energy although archaeological, cultural, and religious assets are often not considered. WAVES is regrouped around three main categories: natural capital, produced capital, and human capital. Adjustments made include net foreign assets of US$1,708.

52 Change in the value of fisheries and mangroves is not included here, as these were only added to WAVES in 2018 and could not be compared to previous years.

The 2021 Cost of Coastal Zone Environmental Degradation (CCZED) was calculated for the Mediterranean and Red Seas and reached US$5.9 billion in 2021, equivalent to a mean estimate of 1.48 percent of GDP, ranging between 1.2 percent and 3.0 percent. The Mediterranean Sea bears the brunt of the degradation, equivalent to 1.31 percent of GDP versus 0.17 percent of GDP for the Red Sea. The main consequences are: (i) substantial negative impacts to health from mainly ambient air pollution in the major coastal cities; (ii) waterborne diseases associated with poor water and sanitation provision, water quality degradation, and water quantity losses; (iii) waste, the management of which remains a problem, only accounting for the opportunity cost of treatment of organic and recyclable materials, notably plastic; and (iv) coastal zone degradation, including coastal ecosystem services and area losses due to increased pressures on the marine environment (table 1.2 and figure 1.6).

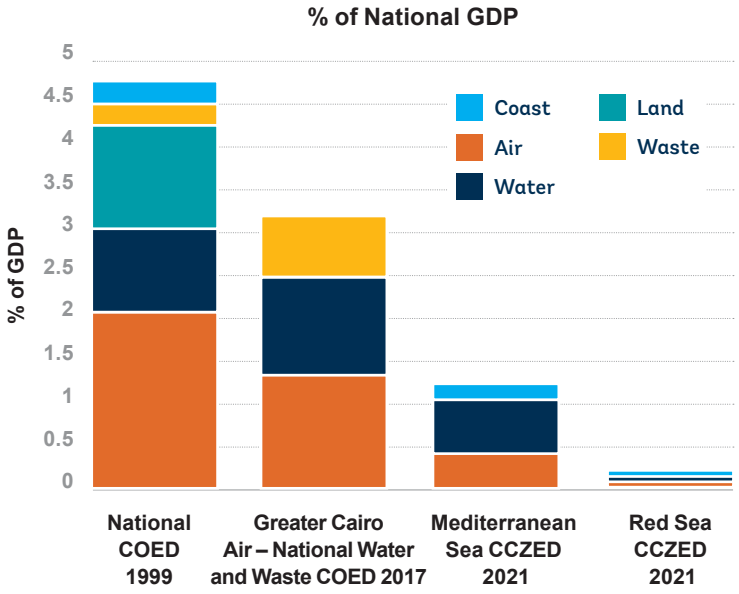
Table 1.2: Selected National, Local, and Coastal Cost of Environmental Degradation as a Percentage of GDP

CATEGORY	National COED 1999	Greater Cairo Air - National Water & Waste COED 2017	Mediterranean Sea CCZED 2021	Red Sea CCZED 2021	Total CCZED 2021
Air	2.1%	1.4%	0.37%	0.08%	0.45%
Water	1.0%	1.15%	0.60%	0.06%	0.67%
Land	1.2%				
Waste	0.2%	0.68%	0.18%	0.00%	0.18%
Coast	0.3%		0.16%	0.03%	0.19%
Total Equivalent to GDP	**4.8%**	**3.2%**	**1.31%**	**0.17%**	**1.48%**

Source: World Bank 2002; Larsen 2019; Annex 2.

Note: The National 1999 COED Air includes the Greater Cairo Region and Alexandria. The Egyptian July 1–June 30 fiscal year is considered for the 2017 COED calculations in Egyptian pounds that are denominated in U.S. dollars in the figure where the June 30, 2017, exchange rate of EGP 18.125 to the U.S. dollar is used. The CCZED waste category only accounts for the opportunity cost of not treating organic and recyclable materials.

Figure 1.6: Selected national, local and coastal cost of environmental degradation valuation



Quantitative assessments of health impacts from environmental pollution can help identify environmental priorities, mobilize support to implement the priorities, and, more broadly, advance environmental objectives. The 1999 COED, conducted as part of the 2005 CEA, was effective in mainstreaming an environmental agenda into a national development strategy.[55] Policy reforms and strategic actions have been taken, as described in chapter 2. Further, the updated 2017 COED identified the serious economic burden caused by air pollution, which has led to the development of a World Bank–financed project focusing on Greater Cairo Region air quality management and climate change.[56]

53 Larsen 2019.
54 Stanaway and GBD 2017 Risk Factor Collaborators 2018.
55 World Bank 2005.
56 More details available at https://projects.worldbank.org/en/projects-operations/project-detail/P172548.

CHAPTER 2

Evolution of Egypt's Environmental Agenda and Governance

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***Egypt Vision 2030* considers governance, transparency, and accountability as the most important priorities for the country's economy.** The three focus CEA pillars call for good governance as a prerequisite for restoring Egypt's ecological imbalance, controlling pollution, maximizing the use of its natural resources, and improving its economic and job growth. Environmental governance, which refers to the processes of decision making involved in the control and management of the environment and natural resources, has evolved toward attaining environmentally sustainable development. The fundamental parameters of good environmental governance that will be assessed are (i) the legal framework and justice of environmental management; (ii) institutional setup; (iii) effectiveness; (iv) efficiency; (v) participation, responsiveness, and consensus among stakeholders; and (vi) transparency.

2.1.

Legal Framework and Justice of Environmental Management

ENVIRONMENTAL LEGAL FRAMEWORK

Environmental policy formulation in Egypt is an evolving process that has gradually aligned with the concept of sustainable development and climate change. Many of the 2005 CEA recommendations have been implemented. Important achievements include (i) owning sustainable development, as opposed to environmental protection, evidenced by collaboration with other line ministries and the establishment of a sustainable development unit in the office of the Minister of Environment; (ii) mainstreaming environmental concerns into sector policies; (iii) adopting an integrated approach to municipal solid waste and agricultural waste management systems; (iv) environmental monitoring by the EEAA Environment Quality Unit using its central laboratories and online monitoring system; and (v) following up on all conventions in which the environment is a focal point.

Good progress was made in the last two decades to strengthen environmental policies and mainstream the environmental agenda into sectoral policies. The most important of these are (i) the Environmental Protection Law (4/1994, amended by 9/2009 and 105/2015); (ii) Industrial Licensing Law (15/2017); and (iii) Waste Management Law (202/2020). Figure 2.1 summarizes the chronological development of environmental policies and regulations.

Figure 2.1: Chronological Development of Egypt's Environmental Policies and Regulations

Until 1994

Protection, Treatment and Safe Disposal of Sewage Waste Law No. 93/1962
General Public Cleaning Law 38 /1967
Potable water Law No. 27/1978
Protection of the River Nile and Waterways from Pollution Law No. 48/1982
Irrigation and Drainage Law No. 12/1984
Protected Areas law No. 102/1983
Fisheries Law No. 124/1983
Environmental Protection Law No 4/1994

1995-2000

2000-2005

National Strategy for Integrated Municipal Solid Waste Management (IMSWM) -2002
Economic Zones of special Nature 83/2002
Labour Forces No. 12/2003

2005-2010

Environmental Protection Law amendment 1 No. 9/2009

2010-2015

Protection of Workers and Vocational Health and Safety Law No. 12/2003
General Public Cleaning amendment 1 Law No. 106 of 2012
Industrial Energy Efficiency Policy and Strategy - 2015
Egypt Integrated Sustainable Strategy 2035
Environmental Protection law amendment 2 No. 105/2015
Electricity Law 87/2015

2015-2020

Sustainable Development Strategy Egypt Vision 2030 -2016
Industrial Development Strategy (2016-2020) - 2016
Egyptian Biodiversity Strategy and Action Plan (2015-2030) - 2016
Egypt Sustainable Energy Strategy 2035/2016
Industrial Licensing Law (No. 15/2017
Investment law No. 72/2017
Public Procurement Law No. 182/ 2018
Egypt National Energy Efficiency Action Plan 2018/2019 and 2021/2022
Egypt Renewable Energy Outlook - 2018
Egypt National Strategy for Agricultural Residues Management - 2019
Suez Canal Economic Zone No. 11/2019
Low-Emission Development Strategy (LEDS) - 2019
MSMEs Law No. 152/2020
National Hazardous Waste Management Strategy HWS -2020
Waste Management Regulation Law 202/2020
Egypt's National Strategy for Construction and Demolition Waste Management, Action Plan 2020
Guidance Strategy – Reducing Single Use Plastic Bags Consumption in Egypt (2021-2030) - 2020

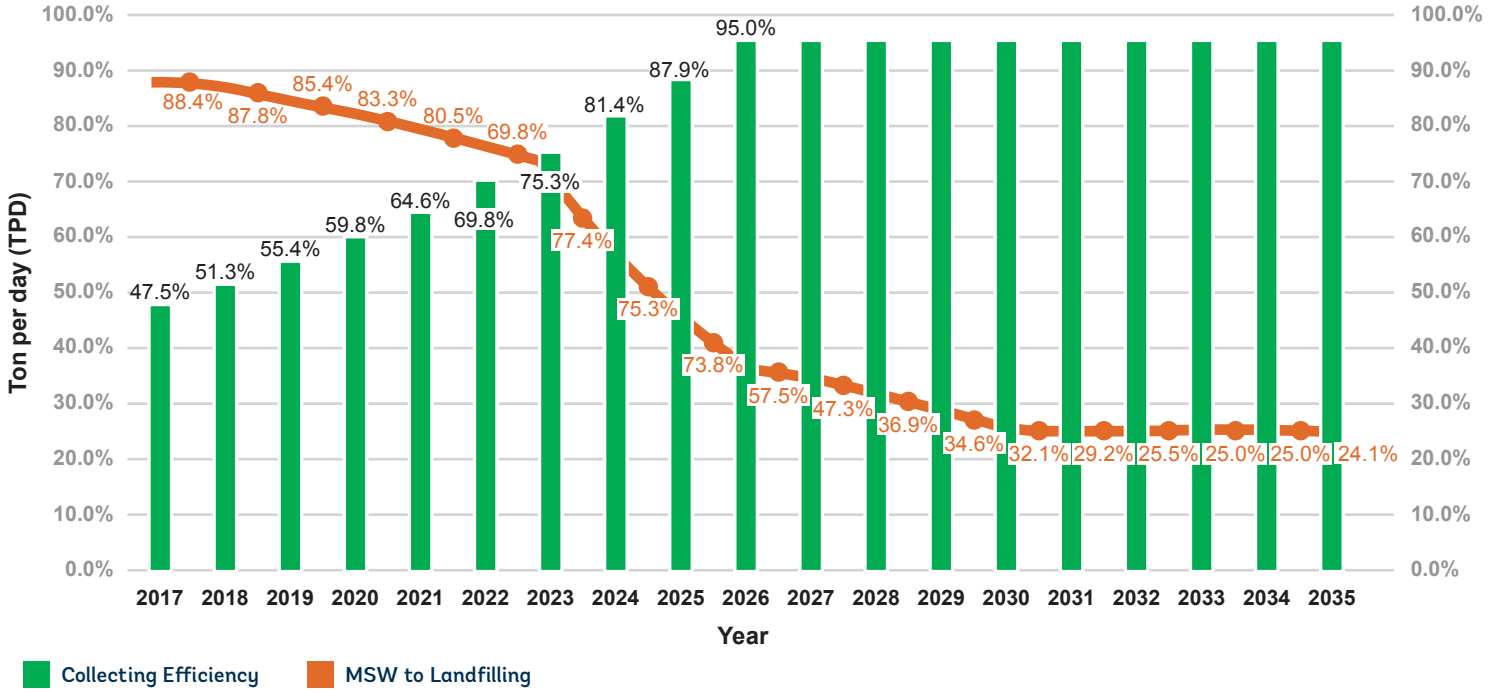
2020-2023

Water Resources and Irrigation Law 147/2021
Lakes and Fisheries protection development 146/2021
Hotels and Touristic Resorts Law 8/2022
Prime Minister decree 1775-983-982/2022 Investment incentives
Capital Market Law 4664/2022
Waste Management Executive Regulation for waste Law 722/2022
Egypt National Climate Change Strategy 2050-2022

Source: World Bank staff 2023.

The promulgation of the Waste Management Law 202/2022 and its Executive Regulations is an important step toward integrated solid waste management and could be a game changer if implemented. The law designates the WMRA as the national regulatory authority to oversee waste management planning, monitoring, evaluation, and improvement of everything related to integrated waste management, in collaboration with other governmental entities and with local and international stakeholders. The law also aims to attract investment in the collection, transfer, treatment, and disposal of waste. It has introduced incentives for investors in the waste sector and seeks to integrate formal and informal workers in the waste management system. The law brings new reforms into the waste management sector and introduces the use of a mitigation hierarchy that was not required by the Environment Protection Law 4/1994. It also requires the industrial waste generator to keep a record of waste, called the industrial waste registry, which includes the actions taken in accordance with the mitigation hierarchy of waste management, the classification of nonhazardous wastes, their quantities, and types, and how to dispose of them. In general, the waste law is expected to improve the efficiency of the system across the waste value chain and valorization of waste through materials and energy recovery to decrease the amount of waste directed to the landfill (figure 2.2). However, to date, recycling rates have fallen short of the target. Article 40 of the Investment Law 72/2017 was amended based on a dialogue between the MOE and the General Authority of Investment and Free Zones to compel facilities operating in free zones to properly treat, manage, and discharge their effluents and wastes within the country.

Figure 2.2: Targeted Collection Efficiency and Municipal Solid Waste to Sanitary Landfill, 2017–35



Source: WMRA 2023.

The new Industrial Licensing Law 15/2017 and its Executive Regulations issued by Decree 1082/2017 streamlined industrial permitting and established the Industrial Development Authority (IDA) within the Ministry of Trade and Industry (MOTI) as a one-stop-shop for licensing. The law states that the IDA is the competent administrative authority solely responsible for permitting the establishment, management, operation, expansion, change of activity, or relocation of industrial establishments. The new processes establish the licensing of industrial facilities either through (i) simple notification, which applies to industries of limited hazards, or (ii) prior approval for industries that pose significant health, security, safety, or environmental hazards. A listing of the industries that require permits, namely Category C (high-risk) projects, is included in the law's executive regulations. More activities were added in the high-risk category by the MOTI Decree 30/2018. According to the law, low-risk facilities are inspected by the IDA for violation of licensing requirements that include environmental compliance. High-risk facilities are inspected by a team of inspectors from the IDA and EEAA. The IDA also receives CAPs from noncomplying facilities and sends those related to high-risk facilities to the EEAA for technical advice.

Although increasingly stringent laws, rules, procedures, and regulatory measures are introduced over time, their enforcement faces limitations and constraints. Some overlapping functions and responsibilities exist between the Environmental Law 4/1994 and other laws. For example, Articles 42, 43, and 44 of Law 4/1994 overlap with Law 12/2003 of Protection of Workers and Vocational Health and Safety in limits and standards for work environment and safety measures. However, in principle, the new law supersedes former legislation and cancellation of articles, in particular laws that govern specific subject matters prevail over older general laws.

Within this context, the MOE is preparing a revised environmental law, and it is essential that this law remove overlaps with other sectoral laws and interinstitutional divergence to further improve effectiveness. The revised law will reform the current environmental governance at the national level; update existing Environmental Protection Laws 4/1994, 9/2009, and 105/2015; integrate Law 102/1983 for PAs; incorporate sustainable and improved approaches for better environmental management; and harmonize environment-related activities with other recent laws to avoid overlap of environmental responsibilities.[58] It will also support the development of a verifiable baseline, including assessments of socioeconomic conditions and the development of an environmental permitting system, under which upgrades to inspection, laboratories, monitoring, compliance, and enforcement are integral to its implementation. In line with international good practice, the Environmental Impact Assessment (EIA) system will be upgraded based on risks and impacts consistent with international organizations.

ENVIRONMENTAL JUSTICE

Environmental justice is integrated into *Egypt Vision 2030*, which states, "Environment is integrated in all economic sectors to preserve natural resources and support their efficient use and investment while ensuring the next generations' rights. A clean, safe, and healthy environment leading to diversified production resources and economic activities supporting competitiveness, providing new jobs, eliminating poverty, and achieving social justice."[59] *Egypt Vision 2030* includes justice as a social dimension and recognizes a governance challenge. *Egypt Vision 2030* requested collaboration with the MOE to review and develop laws and legislation related to social justice and integration and to institutionalize the partnership between the state and civil society.

Egypt has achieved near-universal access to electricity and basic water services yet has urban–rural divergences. Since 2020, 99 percent of the urban and rural population has had access to electricity and basic water services. The Hayat Karima (Decent Life) Presidential Initiative aims to increase the quality of life in 4,658 of the poorest villages through improvements to water and sanitation access, education and health services, decent employment, and women's empowerment. Currently, an estimated 90 percent of urban households have public sewage access, compared to 18 percent in rural areas. However, in rural areas, 70 percent of the collected wastewater is treated, though much of the treatment falls below Egyptian effluent standards.[60]

Environmental litigation struggles to enforce the environmental law in a timely and effective manner calling for the need for more experience with complex environmental issues. In accordance with Law 4/1994, the Minister of Environment, as the Chair of the EEAA Board of Directors, represents the EEAA before third parties and the judiciary for civil and administrative cases. In case of violations, the law forces the violator to remedy such violations and submit a time-bound CAP but does not clear him from responsibility and legal action. Furthermore, Article 18 of the Code of Criminal Procedure regulates reconciliation in environmental crimes as it is not included in the environmental law. It is a discretionary system left to the competent judicial authority represented by the public prosecution and the competent administrative authority but still governed by regulations. The collected fines are deposited in the account of the Environment Protection Fund. Environmental litigation needs to be enhanced to better protect the environmental and health rights of the Egyptian population, including reconstituting articles (under Law 4/1994 that were amended by 9/2009) to guarantee the public right to be compensated for environmental harm.

57 Prasad 2020.
58 EIB 2014; Guelil 2020.
59 See http://sdsegypt2030.com/environmental-dimension/environment-axis/?lang=en.
60 World Bank n.d.a.

2.2.

Institutional Setup

Egypt has gradually strengthened its institutional framework for environmental governance. The Ministry of State for Environmental Affairs became the MOE in 2014, responsible for climate and environmental mainstreaming, organization, policy planning, and creating specialized regulatory agencies (such as the WMRA). The MOE increased the regional branch offices of the EEAA (18 total offices) to cover all 27 governorates and a number of its air and water quality monitoring stations. Prime Ministerial Decree 1912/2015 established the National Council for Climate Change chaired by MOE, which was reformulated to be chaired by the Prime Minister by the decree 1129 for 2019.

Inadequate manpower and physical resources in the field curtail MOE, EEAA, and WMRA activities at decentralized levels. In 2020, the WMRA was established based on a modification of Law 38 for 1967. The WMRA is still in its early phase of hiring its manpower to complete its organizational structure. It relies mainly on the EEAA and its reginal branch offices for implementation of some activities such as inspection. Furthermore, the EEAA with its departments has insufficient employees with respect to the environmental challenges and the increased responsibility. Therefore, the GOE needs to quickly ramp up human resources in the EEAA and WMRA. The EEAA had success utilizing university experts to inspect the performance reports of cement industries and shipping companies with the participation of NGOs. The MOE, EEAA, and WMRA should increasingly consider shifting to subcontracting service providers.

The MOE needs to ensure the core functional areas related to major environmental priorities are clearly reflected in its organogram. There are encouraging signs for undertaking institutional restructuring for the MOE, EEAA, and WMRA, for which the MOE is in the process of modifying its organizational structure to include (i) financing and investments; (ii) international cooperation and international agreements; (iii) research, development, and environmental awareness; and (iv) strategy. Such departments will allow the Office of the Minister to focus primarily on policies, planning, and innovation rather than on the day-to-day operation, management, and regulatory functions of the ministry, which should be carried out by its two regulatory agencies.

Beyond the MOE, it is essential to mainstream environmental management as well as green and BE development objectives across all ministries and agencies to create an enabling environment. Ownership of the environmental agenda should be encompassed by all ministries, notably the MOPED, Ministry of Finance (MOF), Ministry of Foreign Affairs (MOFA), MOTI, Ministry of International Cooperation (MOIC), MWRI, and Ministry of Agriculture and Land Reclamation (MOALR). It is important to note that environmental governance cannot be achieved by enforcement alone; it requires all ministries and departments beyond the MOE to act. MOE collaborated with the MOPED to establish environmental sustainability standards, with the aim of incorporating sustainable development standards into development plans and tripling green public investments to 30% in 2022 and planned to reach 100% by 2030. As a result, the updated version of Egypt vision 2030 include the establishment of an integrated and sustainable ecosystem as one of its main strategic goal.

2.3.

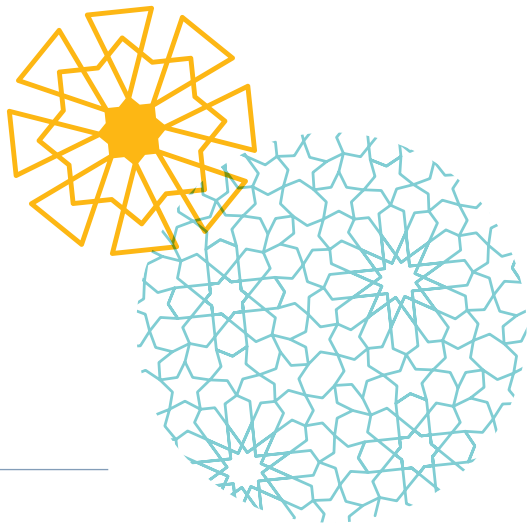
Effectiveness

The effectiveness of policy/governance refers to the extent to which a given goal is reached. More specifically, environmental effectiveness refers to the extent to which a policy is likely to achieve environmental improvements in the sense of sustainable use of resources, protection of ecosystems and human health, and prevention of environmental degradation.

Although MOE and EEAA policies require the protection of human health and prevention of environmental degradation, the impact of these policies was not reflected in the actual environmental status. The COED remains a concern, as illustrated in table 1.2 and figure 1.6. Within the MOE, the EEAA inspection system faces implementation barriers mainly related to poor quality of legal inspection documents and the EIA capacity at the regional level. In addition, gaps persist in cooperation and coordination between EEAA departments (inspection, monitoring, and EIA).[61] Lastly, the depreciation of the Egyptian pound has, in part, impacted the effectiveness of environmental legal and regulatory framework. Penalties for not maintaining an environmental register or not complying with standards are listed as imprisonment for a period not exceeding one year and/or a fine of EGP 5,000–100,000 in 2023. However, the law permits reconciliation in specific violations by paying one third of maximum fine and comply with the law.

Efforts have been made to improve the correlation between environmental inspection and effective compliance to reduce transaction costs and better coordinate different rules and procedures. In June 2020, the EEAA (MOE) and IDA (MOTI) signed a memorandum of understanding (MoU), under Law 15/2017, to streamline industrial licensing procedures and determine industry's compliance with licensing requirements. The June 2020 MoU articulates the tasks and responsibilities of both entities for implementing the law's provisions. It clearly states that high risk (prior approval) inspection is conducted by a committee headed by the IDA with a member of the EEAA carrying out tests and analysis using EEAA laboratories. As for the ambient monitoring, the EEAA informs the IDA of deviations. Accordingly, there is high-level coordination between the EEAA and IDA regarding inspection and EIA approval through a committee formed of members of concerned parties and consultants. Further, the Ministry of Housing, Utilities and Urban Communities, in collaboration with the EEAA, enforces Law 93/62 (Decree 44/200) regarding discharge of industrial effluent to the sewer network, and in the event of serious environmental risks, its sources must be stopped by all necessary means.

Reliable data and its timeliness are crucial for strengthening effectiveness of the inspection system. Article 22 of Law 4/1994 requires all industrial facilities to maintain an annually updated environmental register. The register includes production data, pollutants concentrations and loads in stack emissions and wastewater, waste generation, and occupational health and safety. A separate register for hazardous substances and wastes is also required according to Law 202/2020. An additional legal requirement applies to industrial facilities that use coal as fuel to submit their performance reports with environmental measurements. This is mandatory for renewing the license every two years. Currently, the EEAA is in the process of establishing a digitalized system to facilitate the reporting of the environmental register and EIA studies. The new law is recommended to consider mandating the industries to perform self-reporting. Moreover, the online monitoring system for stack emissions connected to the EEAA, referred to as the Continuous Emission Monitoring System, enabled the continuous monitoring of pollutants. This network extended to other large industries and reached 93 industrial establishments in 2022 and the Decree 1095/2011 mandated these industries to connect to the online network as a condition for EIA approval.[62] Finally, the monitoring networks established by the MOE for ambient air, industrial emissions, and marine and coastal water quality have extended to include industrial wastewater discharge. However, there is a need to mainstream and integrate all monitoring data produced with other agencies conducting monitoring, such as the MWRI and MOHP. This will lead to more effective environmental performance in Egypt. Furthermore, implementing environmental management systems in industries and obtaining International Organization for Standardization (ISO) certification have improved the quality, efficiency, and international recognition of the companies.



61 Environics n.d.
62 Environics 2020.

2.4.

Efficiency

Efficiency refers to the extent to which an intervention delivers in an economic and timely manner. Egypt Vision 2030 aims to improve efficiency in all its pillars and programs to meet the UN SDG indicators. At the national level, policies and programs have improved the efficiency of natural resource-reliant sectors. The gradual removal of price subsidies from energy and water resources since 2016 has reduced fiscal pressure on the Treasury and enabled the government to invest in basic services and key infrastructure like water and wastewater treatment plants, highways, bridges, and roads, and to complete a third metro line, a new monorail, and an electric train network.

There is still considerable work to be done to make pollution management more efficient in Egypt. The following measures have not been integrated into a pollution control strategy: (i) operationalizing the user- and polluter-pays principles to define prices of water and energy resources, reflecting not only the inclusive value of the resource but internalizing nonfinancial depletion and/or pollution costs and feed-in tariffs; (ii) using LCA[63] in products (ISO 14040) to allow resource consumption to be tracked (for example, water, energy, and materials (chemicals)) to establish resource efficiency-related benchmarks; (iii) applying cleaner production technologies instead of end-of-pipe treatment; (iv) including "soft domains" in terms of analytical capabilities, such as cost/benefit analysis, prospective and strategic environmental studies; and (v) reducing the environmental damages caused by local and global pollutants, which should be addressed simultaneously as reducing the pollutants of air pollution (PM_{10}), nitrous oxides (NO_x), and sulfur oxides (SO_x) to improve energy efficiency.

Furthermore, the EIA system still needs to be reformed based on international best practices to be robust and objective, which should be tackled in the new environmental law. The accreditation of EIA consultants and EIA reviewers plays an important role in the effectiveness of the EIA. At present, accreditation is based on past professional experience conducting/reviewing EIAs and personal interviews. The current system needs to be strengthened. A Strategic Environmental and Social Assessment (SESA) is a powerful tool that needs to be utilized whenever national visions, strategies, policies, and programs are developed. Moreover, it is recommended to widen the scope of the EIA to include social aspects and to become the Environmental Social Impact Assessment (ESIA). It is also recommended to mandate the SESA for urban planning, new communities, industrial cities, special economic zones, road networks, railway networks, and mega agriculture projects to comply with the international standards.

Building the capacity of technical staff in green accounting, environmental economics, social sciences, and policy, as well as using automated software, can expedite decision making and improve operational efficiencies. Filling expertise gaps in the MOE/EEEA/WMRA and the MOTI/IDA and increasing the number of professionals can considerably improve efficiency by delegating key activities (such as inspection visits) to a broader range of professionals. Five Egyptian universities offer bachelor's degrees in environmental sciences and engineering,[64] and 10 universities offer postgraduate degrees.[65] These education centers can provide training for government and agency staff. Moreover, the use of ICT can stimulate cooperation between departments by standardizing criteria among inspection, compliance, and auditing. ICT can also improve monitoring and evaluation capacity across governmental bodies, unifying compliance goals and objectives and the development of performance indicators, which are key for better management, transparency, and increased participation. Improved efficiency in operations would also reduce management costs, conserve resources, and benefit the productivity of industries.

63 A life cycle is generally understood as starting at the growing and harvesting or mining of raw materials and ends when a product is disposed of as waste.

64 King Salman International University, Zagazig University, Tanta University, Port Said University, and Zewail City of Science and Technology; private communication from Dr. Mohamed Hasan Khalil.

65 Cairo University, Ain Shams University, American University in Cairo, University of Alexandria, Sadat City University, Suez Canal University, Egypt-Japan University, Assiut University, Beni-Suef University, and the Arab Academy of Science Technology and Maritime Transport; private communication from Dr. Mohamed Hasan Khalil.

2.5.

Participation, Responsiveness, and Consensus among Stakeholders

Participatory processes are prescribed by law, yet more diverse stakeholders need to be included in the formulation of environmental policies.[66] Although the EEAA Board of Directors includes two environmental experts, representatives of three NGOs, and academics from two universities, the perspectives of stakeholders need to be better reflected in pollution management and industrial licensing inspection. Environmental NGOs participated in working groups to review the first National Energy Efficiency Action Plan 2002–17, Egypt Vision 2030, and the NCCS 2050; however, the decision-making process should be more inclusive, and inputs provided by different stakeholders, particularly those who could be negatively affected and who are more vulnerable, should be systematically considered and incorporated, as appropriate. A mechanism should be introduced to ensure that stakeholders are getting regular feedback on the process, including on how their views and contributions are integrated.

Egypt can look at good practice for workable examples of robust stakeholder engagement. The donor funded programs[67] introduced participatory approaches and were successful in engaging with citizens and NGOs in developing environmental action plans and in implementing community-based environmental projects. Benefiting from those helpful models and best international practices, participation should be designed as an ongoing process that engages systematically with affected communities and other stakeholders. So far, the involvement of affected communities has been limited to a specific task for which they were required to advise.

Stakeholder participation is presented to the public as a validation step instead of active stakeholder involvement in the formulation of strategies. There is also a need to tackle the widespread misconception that the EIA is a technical process to be entrusted entirely to professionals. Irrespective of the limitations that it places on decision-making processes, the lack of openness in the Egyptian EIA limits its own effectiveness by restricting coordination between government departments, the awareness of public concerns, the use of public knowledge, and actions to improve EIA quality.[68] The EEAA has recently started to publish the executive summary of the type C EIA on its website, however, the full disclosure of EIA needs to be encouraged as required in the EEAA environmental guidelines of 2009.

66 The Environmental Laws (4/1994 and 9/2009), Waste Management Law (202/2020), and Industrial Licensing Law (15/2017).
67 Examples include the Egyptian Italian Environmental Cooperation Project Phase III and the Support for Environmental Assessment and Management Programme financed by the UK Department for International Development in 1994–2004.
68 Prasad 2020.

2.6.

Transparency

Transparency is a core principle in environmental governance. Information quality and availability are key to increasing accountability and enhancing the commitments made by *Egypt Vision 2030* in which the MOE is requested to "develop efficient, transparent, and accountable monitoring and environmental performance assessment systems for the various ministries."[69] Transparency in the field of environment needs strengthening through measurement, reporting, and verification. The MOE has taken steps to enhance environmental transparency by developing different public outreach and communication tools, and regularly publishing environmental reports.[70] These reports, however, focus more on disclosing data in a statistical format to show the government's efforts to achieve its goals and targets, rather than providing the public with information needed to support certain decisions related to environmental concerns. As part of the requirements of the EIA process, the high-risk projects are mandated to conduct public hearings and disclose the EIA executive summary to seek feedback from key stakeholders. The EIA executive summaries and public hearing session minutes should be disclosed on the EEAA website well in advance, as per the environmental guidelines of 2009.

The EEAA has a public grievance system that allows affected persons to express complaints regarding any pollution issues and that mandates the EEAA to take action in coordination with the relevant entities. The national unified electronic complaint portal was established through Presidential Decree 314 of 2017 to receive, examine, direct, and respond to all complaints electronically, as hosted by the Office of the Prime Minister. Its scope of work extends to all ministries, departments, government agencies, local administration units, public bodies, and other government agencies. The portal has a clear referral system to the concerned entities who receive their relevant complaints, address them, and either respond directly to the complainants or through the unified system. The EEAA also has its own hotline, phone number, and WhatsApp number to receive complaints from the public, particularly on pollution issues. Good international practices mandate more transparent sharing of information to ensure that stakeholders' concerns are adequately addressed and incorporated in project design and implementation. An inclusive, transparent, information-disclosure process also calls for sharing all relevant information in a timely, understandable, accessible, and appropriate manner and format to various groups of stakeholders. More openness beyond environmental technical staff will support the EEAA in its efforts to advance an ESIA system using a transparent consultation and disclosure process, which incorporates general public concerns, stakeholder interests, and technical environmental aspects into more inclusive and integrated process.[71]

69 MOPED 2020.
70 These include annual *State of the Environment* reports (since 2008), Egypt's biennial update report, the annual report for solid waste management in Egypt, and other thematic reports.
71 Prasad 2020.

CHAPTER 3

Circular Economy and Pollution Management

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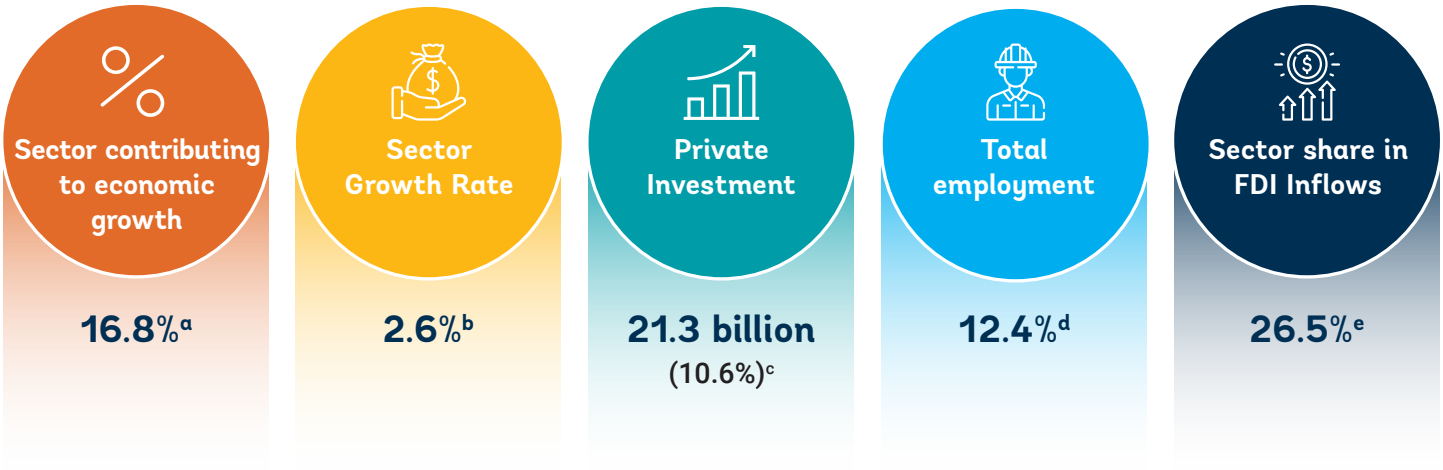
3.1.

Overview of Egypt's Industry and Pollution Issues

The industrial sector in Egypt is an important contributor to the country's economic growth, composing 16.8 percent of GDP in fiscal 2022.[72] The sector employed 12.4 percent of Egypt's total employment, equivalent to 3.8 million citizens in fiscal 2022.[73] The sector's growth averaged at 2.6 percent during fiscal 2017–20, which overlaps with the first phase of the macroeconomic reforms that enabled Egypt's economic resilience in the face of the pandemic shock. In fiscal 2021, the sector recorded negative real growth of 5.9 percent due to the impact of the COVID-19 pandemic before rebounding in fiscal 2022 and recording 9.6 percent growth (figure 3.1). Leading indicators are reflecting early signs of a slowdown in Egypt's economic activity. In April 2022 the Industrial Production Index contracted on a monthly and annual basis by 8.7 percent and 0.1 percent, respectively, according to the Central Agency for Public Mobilization and Statistics (CAPMAS).

Figure 3.1: Key Indicators for the Manufacturing Sector



Source: World Bank staff 2023.
a. MOPED 2022.
b. MOPED 2022.
c. CBE 2021.
d. CAPMAS 2022.
e. CBE 2022.

Rapid industrialization could generate environmental pollution, further adding pressure to limited resources. There are currently more than 159 industrial zones that vary greatly in scale, characteristics, and governance structure. In 2020, Egypt earmarked EGP 8.5 billion (nearly US$541 million) for the creation of 13 new industrial parks. Several informal industrial areas are considered pollution hot spots, mainly concentrated in the Greater Cairo Region and consisting of micro-medium workshop aggregations, such as Akrasha in Qalyoubeya, Al-Basatein, Mansheyet Nasser, Osim (Giza), and Al-Kom Al-Ahmar.

The latest *State of the Environment Report* issued by the MOE in 2020 indicates improvement in industrial environmental performance through compliance with the country's thresholds for air quality indicators. Yet manufacturing is a resource-intensive sector with a heavy environmental and carbon footprint. In 2015, the sector accounted for 37 percent of the country's total energy consumption and 12.5 percent of its national GHG emissions (40,664 gigagrams of carbon dioxide equivalent (Gg CO_2e)).[74] The Industrial water use increased from 1.2 billion cubic meters in 2012 to 5.4 billion in 2018 with about 10% of total water consumption.

72 MOPED 2022.
73 CAPMAS 2022.
74 UNFCCC 2019.

3.2.

The Circular Economy and its Importance for Egypt

The CE promotes sustainability and competitiveness while decoupling economic growth from natural resource consumption. A CE is regenerative by design, aiming to retain as much value as possible and to extend product lifespan through improved design of materials, products, systems, and business models while striving to achieve zero loss (of energy, water, and material) by relocating waste from the end of the supply chain to the beginning.[75] The CE comprises biological and technical materials flows and extends beyond pollution abatement and law compliance, though the latter are also typically achieved as an aftereffect. Technical materials could be converted into a closed loop system through sharing, maintaining, reusing, remanufacturing, and recycling of products. Biological materials are cascaded through extraction, production of bio-based materials, energy recovery, and returning nutrients to the biosphere.

Circular design is one of the most promising approaches to meet sustainability goals. Such design is characterized by its process and strategic approaches. These include extending the technical service of a product, using circular material choices to recycle material, dematerializing/reducing the use of materials and energy in manufacturing, and improving modularity to optimize individual components to form a complete product.[76]

Scarce resources, competition for natural resources, accelerating effects of climate change, and repercussions from geopolitical and economic crises have countries rethinking their strategies to meet fundamental water, food, energy, and habitat needs. In recent years, European Union (EU) countries, Japan, South Korea, and China have adopted CE practices as a strategy to achieve climate neutrality under the Paris Agreement while simultaneously achieving the SDGs (box 3.1). For instance, the Ellen MacArthur Foundation estimates that the circularity scenario could reduce annual net European resources spent in 2030 by as much as 32 percent, not to mention the economic multiplier effect, the reduction in externalities, and the creation of new jobs.[77] Further, in the Arab region, Jordan, Qatar, and United Arab Emirates are members of the Global Green Growth Institute and are exploring or currently integrating the CE into their national policies. To avoid irreversible and costly environmental degradation of fast industrialization, Egypt should prioritize CE strategies to achieve sustainable economic growth.

BOX 3.1: EU CIRCULAR ECONOMY INITIATIVE

In late 2015, the European Union (EU) adopted an ambitious Circular Economy Action Plan, including goals for food, water, and plastics reuse. In March 2020, the European Commission approved a new Circular Economy Action Plan—one of the main building blocks of the European Green Deal, Europe's new agenda for sustainable growth and climate neutrality by 2050.

According to the Ellen MacArthur Foundation, circular economy (CE) activities generated almost €147 billion in value-added in 2016 in the EU while accounting for around €17.5 billion worth of investments.[a] This led to a 6 percent increase in jobs in the recycling sector, repair and reuse sector, and rental and leasing sector between 2012 and 2016.

The Dutch government, as one of the most ambitious European countries in terms of striving to establish a 100 percent CE, adopted a strategy—CE in the Netherlands by 2050—to achieve the latter goal.

Source: a. Ellen MacArthur Foundation n.d.

75 Ellen MacArthur Foundation n.d.
76 See https://peschke.at/blog/circular-design/?lang=en.
77 Ekins et al. 2009.

A CE not only tackles economic and environmental benefits but also adheres to social inclusivity by establishing new business opportunities, income, and jobs and creates a safe and equitable work environment for employees and the community. Circularity could provide a competitive edge to Egypt's export-oriented manufacturing sectors and boost opportunities to meet growing consumer demand for environmentally friendly products worldwide. Europe is an important market for these products, as about 30 percent of Egypt's exports are directed to the EU. The sources of foreign direct investment for Egypt with high CE potential are tourism, agriculture, and manufacturing.[78] According to an EU-led study,[79] the anticipated economic and social benefits to Egypt from adopting CE approaches are substantial, as this helps to save energy, expand export opportunities, create jobs, and strengthen inclusive society by engaging informal workers, especially in waste collection and recycling, in the transition to a CE (figure 3.2).

Figure 3.2: Benefits of a Circular Economy

Egypt's society, economy and environment can greatly benefit from this transition

23% energy savings

Improved ecosystem resilience

Decreased GHG emissions

- **1.0% increase** of GDP (+$5.94bn) compared to business as usual
- An **improvement of the trade balance**, through a reduction in imports worth $782M and an increase in exports $242M;
- **101,000 additional jobs** would be created compared to business as usual, which is equivalent to an increase of 0.3%
- **Stronger economic position** of (informal) waste workers

Source: World Bank staff 2023.
a. Maamoun 2021.
b. Mahmoud et al. 2020.

3.3.

Industrial Green Policies and Programs

Egypt's *Industrial Development Strategy 2016–20* highlights the need for a "green economy development project that aims to support industries" under its Industrial Development Pillar. The circularity concept also has been indirectly embedded in different national policies and strategies (figure 2.1). The Egypt National Cleaner Production Center was established in 2005. It has implemented projects to promote green industries, resource efficiency, energy efficiency, renewable energy, and industrial waste reduction with donor support, however, without specific targets or action plans for implementation.

Waste Management Law 202/2020 has extended producer responsibility (EPR) provisions, whereby the producers of certain goods and products are responsible (financially and/or physically) for the treatment and disposal of such goods and products post consumption. Assigning such responsibility will provide incentives to prevent wastes at the source, promote environmentally friendly product design, and support the achievement of public recycling and waste management goals. Green or eco-labeling is another provision issued in the executive regulations of the law that is expected to address the challenge of the increasing quantities of industrial waste by clearly marking environmentally friendly industrial products and goods with a green label. However, the incentives to promote green manufacturing are still fragmented and need to follow an integrated framework.

78 Smith and McGovern 2020.
79 Smith and McGovern 2020.

Egypt has been working with the support of international partners to pave the way for mainstreaming a green economy and sustainable consumption and production-related policies as tools to achieve sustainable development. The promotion of cleaner production was initiated through the Support for Environmental Assessment and Management (SEAM) Programme, Transfer of Environmental Sound Technology in the South Mediterranean Region (MEDTest) I and II, and SwitchMed I and II. The EPAP has been implemented through three phases, starting in 1997 and closing in 2025 (box 5.1). A total of 100 subprojects have been supported through the three phases to control air and water pollution. In the third phase, additional funding has been added to support SMEs and to finance subprojects in energy efficiency and CE (box 3.2). Since 2015, the European Bank for Reconstruction and Development (EBRD) provided financing for small- and medium-sized green projects in different sectors through Sustainable Energy Financing Facilities, Green Economy Financing Facility I and II, and the Green Value Chain. However, innovative policies and strategies to upscale the CE are needed, especially to support recycling projects.

BOX 3.2: ENVIRONMENTAL POLLUTION ABATEMENT PROJECT PHASE III FINANCING OF CIRCULAR ECONOMY INITIATIVES

The Environmental Pollution Abatement Project, an initiative of the Ministry of Environment, has financed circular economy projects in industry, including the following:

- Solvent recovery and reuse in rotogravure printed flexible packaging companies
- Ammonia recovery from wastewater to produce ammonia sulphate fertilizer
- Fiber recovery from wastewater in pulp and paper companies for reuse as feedstock
- Treatment and recycling of industrial wastewater
- Treatment of municipal sewage for reuse in industry
- Recycling of postconsumer plastic, such as polyethylene terephthalate waste, for use in the production of food-grade packaging
- Waste reuse as refuse-derived fuels in cement plants

3.4.

Circulatory Potential

Egyptian industries have significant room to improve resource efficiency. Industrial activity consumed 28.6 percent[80] of Egypt's total energy in 2018. For most Egyptian industries, the final energy consumption per unit of output is typically estimated at 10–50 percent higher than the international average.[81] A study[82] prioritized five industries in Egypt for circularity potential (40–80 percent): (i) plastics (polyethylene terephthalate packaging); (ii) glass; (iii) electric and electronic equipment (durable consumer goods); (iv) textiles; and (v) construction. The time frame is 5–10 years, and the evaluation parameters include the relative size of the sector within the national economy (market size), expansion rate of the sector (sector growth), material and input consumption of the sector and volume of output (resource intensity), investment required to make an impact on the sector (CE investment), and potential of the sector to impact waste output (CE potential). Table 3.1 summarizes the energy-saving and circularity potential for various industrial sectors.

Table 3.1: Energy saving and circularity potential for selected industrial sectors in Egypt in comparison to international benchmarks

No.	Sector	International benchmark	Average Energy consumption in Egypt (2012)	Energy-saving potential for all the sector in Egypt	Circularity potential	Data source
1	Textile	129 MJ/kg virgin yarn	204 MJ/ kg virgin yarn	75 MJ/ kg virgin yarn (37%)	40 - 42%	UNIDO Egypt Cotton Project
2	Cement	3,020 MJ/t cement	4,040 MJ/t Cement (total = 187.9 PJ)	52 PJ[83] annually (28%)	Construction sector = 43–47%	WBCSD-CSI Getting the Numbers Right (GNR), UNIDO Egypt BAT Cement Benchmark
3	Iron & Steel	2,600–17,800* MJ/t liquid steel	(total = 40 PJ)	11 PJ annually (28%)		UNIDO Egypt BAT Steel Benchmark
4	Aluminum	13,260 MJ/t Alumina				https://www.iea.org/data-and-statistics/charts/energy-intensity-of-alumina-refining-by-region-2000-2020
5	Fertilizers (ammonia)	23,800 MJ/t ammonia	38,200 MJ/t ammonia (total = 96.7 PJ)	37 PJ annually (38% savings)		UNIDO Egypt BAT Fertilizers Benchmark
6	Glass (flat)	6,000 MJ/t melt			60–63%	Benchmarks are provided for flat glass regenerative furnaces
7	Ceramics	3,310 MJ/t ceramic tiles	6,760 MJ/t ceramic tiles (total = 44.5 PJ)	23 PJ annually (52%)		UNIDO Egypt BAT Ceramics Benchmark
8	Plastics					Polyethylene terephthalate packaging = 58–70%

Source: *World Bank consultant background report 2022b*

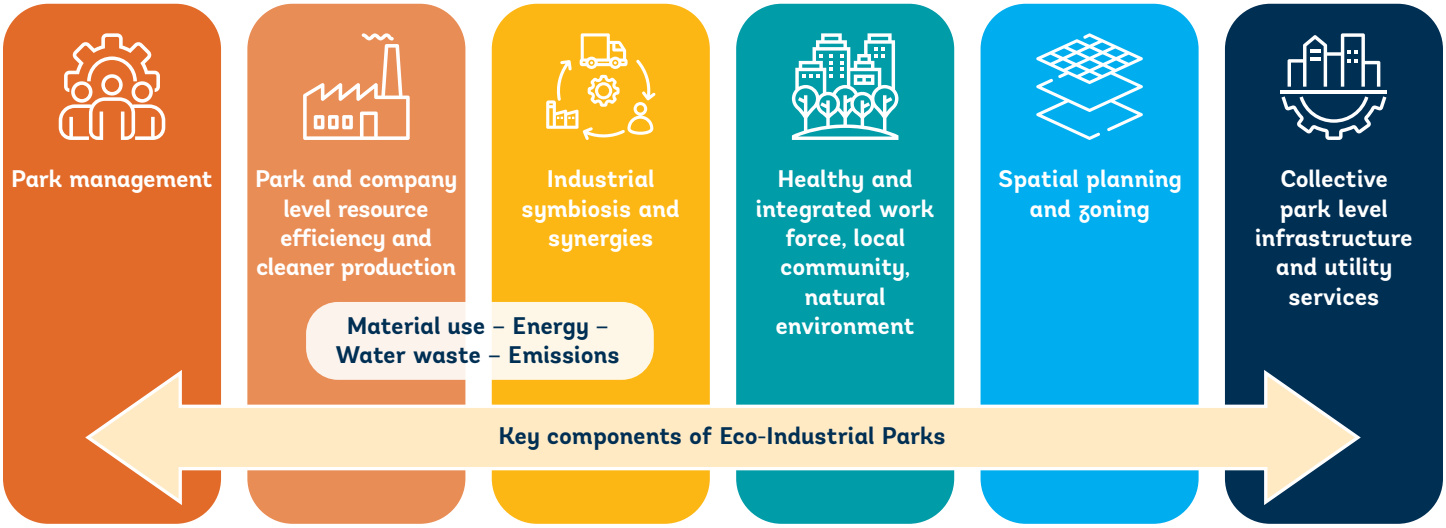
Note: *UNIDO = United Nations Industrial Development Organization. *Depends on the technology of the furnace. MJ/kg = megajoules per kilogram; MJ/t = megajoules per (metric) ton; PJ = petajoules.*

80 As per the Statistical Portal for Market Data, Consumer, Company, and Ecommerce Insights; see https://www.statista.com/.
81 MOE and EU SwitchMed 2016.
82 Note: Based on a background note prepared for the International Finance Corporation.
83 1 petajoule (PJ) = 1,000,000,000 MJ (megajoules).

There is great potential to leverage waste management and symbiosis in industrial waste to create new business opportunities, increase employment and resource efficiency, and reduce waste disposal. Within this context, the Egyptian National Cleaner Production Center piloted a sustainable and integrated industrial waste exchange system in the industrial sections of the 10th of Ramadan City and 6th October City. This pilot was positioned as a Green Entrepreneurship Hub, linking industrial wastes generators with potential users and recyclers to improve cross-industry resource efficiency, promote the development of new innovative SMEs, create green job opportunities, reduce environmental impacts of industrial waste, and improve the lives of Egyptian citizens.

Eco-industrial parks (EIPs) offer solutions for efficient management of industrial waste. Estimates show that unutilized waste presents 25–30 percent of total generated industrial waste, with still-wider opportunities for beneficial use.[84] The EIPs are manufacturing communities and service businesses located together on a common property, where members collaborate for collective environmental, economic, and social impacts that are greater than the sum of the individual benefits each company would realize on its own.[85] The EIP approach decreases potential impacts on the environment and enhances the well-being of workers inside a park as well as surrounding communities. In December 2017, the first version of the International Framework for Eco-Industrial Parks was launched as a result of collaboration between the World Bank Group, the United Nations Industrial Development Organization (UNIDO), and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ). A second version in January 2021[86] improved the practicality of the framework and fine-tuned EIP performance requirements and indicators. Since its first release, many industrial park practitioners have used it as the definitive reference for EIP development (figure 3.3).

Figure 3.3: Key Components of EIPs



Source: UNIDO 2021.

There have been several attempts to establish sustainable industrial zones compatible with *Egypt Vision 2030* that focus on compliance with environmental laws, yet more needs to be done. The GIZ and UNIDO have conducted EIP assessments according to the EIP requirements set by the International EIP Framework for over 12 zones in Egypt. Various industrial parks in Egypt have shown success according to the benchmarking, as they have EIP road maps. Ten industrial zones were preselected because they fulfilled the minimum criteria.[87]

The UNIDO Global Eco-Industrial Parks Programme (GEIPP),[88] launched in 2021, aims to scale up resource efficient and cleaner production approaches to EIPs in 12 countries, including in Egypt. UNIDO recently documented 33 examples of industrial park development and noted that environmental and resource conservation benefits were largely achieved in all, confirming the viability of the EIP concept in developing and emerging economies to scale up and mainstream resource efficient and cleaner production.

84 NSWMP 2018.
85 Lowe 2001.
86 World Bank 2021a.
87 UNIDO 2021.
88 The objective of the project is to demonstrate the viability and benefits of scaling up resource productivity and improving economic, environmental, and social performances of businesses, thereby contributing to inclusive and sustainable industrial development in Egypt. The project will target three industrial parks as demonstration: Robbiki Leather City in Cairo, Orascom Industrial Park in Sokhna, and Polaris Industrial Park in Giza.

An integrated framework for green manufacturing practices across supply chains would facilitate uptake and progressive expansion of the CE. This includes eco-design, alternative materials, renewable energy sources, and resource efficiency throughout manufacturing operations, notably by leveraging new technologies. Crucial to this strategy is the promotion of new business models that drive the CE, shifting focus from manufacturing processes and traditional linear supply chain approaches to product life cycle approaches that would build sustainable synergies into supply chains. This means moving beyond the simple promotion of renewable energy use and including CE promotion (both through regulation and waste management strategies), green manufacturing, and eco-innovation support (through regulation, financing, green investment, and sustainable procurement). It also requires linking more effective environmental policies and other policy areas, such as education (by focusing on jobs and skills needed for green transitions) or SME support (by providing targeted support to overcome constraints in terms of access to information and financing, among others, to meet environmental requirements).

3.5.

A Closer Look: The Food and Beverage Sector

The food and beverage (F&B) industrial sector[89] is one of the oldest and most important pillars of the Egyptian economy. The F&B sector (including tobacco) represented 21 percent of the value added in the manufacturing sector in Egypt in 2019.[90] The sector is characterized by private ownership and dominated by microenterprises, which are largely informal and constitute around 94 percent of total companies.[91] Within the country's manufacturing export sector, F&B is ranked fourth.[92] It is concentrated in the "downstream" segments of the supply chain (that is, assembly of imported inputs into final goods), mainly due to the country's reliance on imported intermediate manufactured goods (which constituted 44.1 percent of Egypt's F&B imports in 2020, compared to the world average of 24.6 percent). Only 29.8 percent of F&B intermediate manufactured goods are exported, indicating that Egypt's capacity to provide inputs for F&B production to foreign economies is limited and that the desired upscale to the Ministry of Trade and Investment's export target set under the second phase of the National Structural Reform Program 2021–23[93] is constrained.

The F&B industry is a substantial contributor to environmental pollution across the value chain, from crop production to processing, retailers, consumption, and waste. Water consumption and wastewater generation are critical environmental issues, as F&B processing ranks first in water pollution load and second in industrial waste in the Greater Cairo Region.[94] Untreated wastewater is usually high in both chemical oxygen demand and biological oxygen demand content, and could reach 10–500 times higher than in domestic wastewater.[95] Moreover, high concentrations of fats, oils, and greases could be an issue from the untreated effluents of meat, fish, dairy, and vegetable oil production. In terms of air pollution, the key pollutants from the F&B industrial processes are dust and volatile organic compounds. In terms of resource consumption intensity, water-saving opportunities in F&B companies were significant mostly above 25 percent up to 90 percent and energy savings above 10 percent up to 70 percent (figure 3.4). Waste that is generated from postharvest losses, organic waste, and packaging materials is another critical concern.

89 The F&B sector is composed mainly of nine product groups under the Chamber of Food Industries in the Federation of Egyptian Industries. They are (i) milk and dairy products; (ii) oils and vegetable fats; (iii) juice, beverages, and water; (iv) fruits and vegetables products; (v) sugar, confectionary, and chocolates; (vi) meats, poultries, and fish; (vii) specialty food, yeast, and food additives; (viii) various food products (that is, grinding and flour, rice polishing, and pasta); and (ix) tobacco and cigarettes.

90 World Bank n.d.b.

91 Said and Mamdouh 2018.

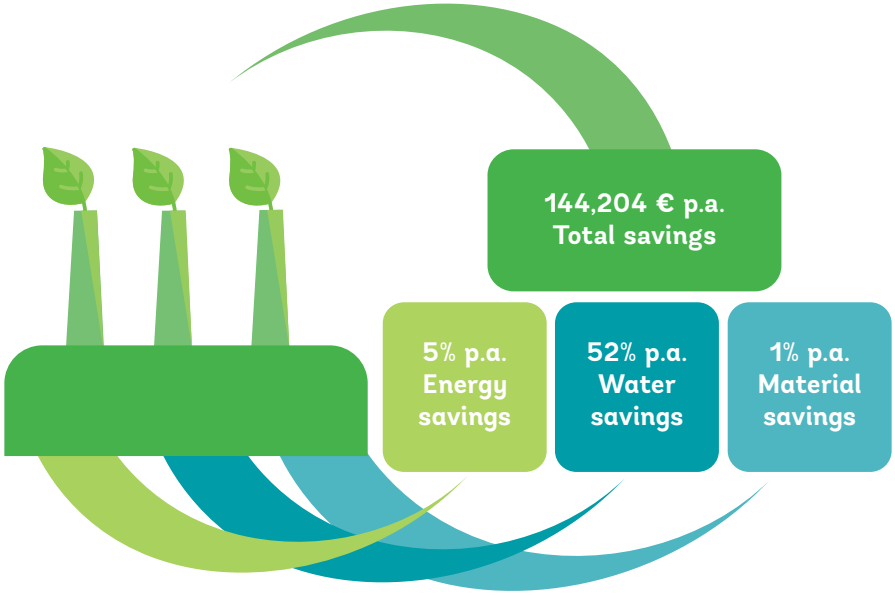
92 UNIDO n.d.

93 The National Structural Reform Program 2021–23 focuses on addressing the root causes of imbalances in the real sector to achieve a well-balanced, green, and inclusive growth under the Fourth Industrial Revolution. The priority sectors selected are manufacturing, agriculture, and ICT. The reforms include higher integration in value chains, deepening local production, and increases in the share of industrial exports through improved competitiveness and linking up with global supply chains.

94 PIP 2022.

95 Santonja et al. 2019.

Figure 3.4: MEDTEST II Case Study, El Marwa for Food Industries Company, Potential Savings



Saving opportunities[1]						
Action	**Economic key figures**			**Resource savings & enviromental impacts per year**		
	Investment euros	**Savings euros/yr.**	**PBP years**	**Water and raw materials**	**Energy MwH**	**Pollution reduction**
Steam optimization	10,270	21,945	0.5	13,992m³ of water	1,171	Total: 430t of $C0_2$
Optimization of water use	5,500	41,539	0.15	145,752 m³ of water	-	
Utilization of process heat	50,000	14,720	3.4		960	
Product push techniques	267,500	66,000	4	1,200m³ of water 66 t of product	-	
Total	**333,270 €**	**144,204 €**	**2.3**	**160,944 m³ of water 66 t of recovered products**	**2,131MWh**	

[1]Numbers based on production value from 2016.

Source: EU SwitchMed 2019.

The GHG emissions of F&B upstream activities constitutes 71.5 percent of the total impact of the F&B supply chain, contributing to 34 percent of the total global GHG emissions.[96] These emissions largely represent methane and nitrous oxide from livestock production, manure management, agricultural waste disposal practices, rice production, fertilizer use, and nutrient mismanagement. Additionally, upstream activities strain natural resources such as fresh water. In Egypt, the agricultural sector consumes about 80 percent of the country's total water budget. With the sharp decline in the annual freshwater resources available per capita (1,972m^3 in 1970, 570m^3 in 2018, and an expected 390m3 by 2050), the country is quickly approaching the severe water scarcity threshold.

The transition from a linear to a CE can reduce environmental impacts while strengthening competitiveness. The MOE launched its *Bio-based Economy Strategy* during COP27. According to the United Nations Food and Agriculture Organization, food loss and waste in the fruit and vegetable industries amount to 60 percent of total production. This is due to lack of modern logistics infrastructure with integrated cold chain solutions and customized fast-track transportation. The organic waste produced in factories is also underutilized and disposed of in ways that risk fire by self-ignition, GHG emissions, and water and land contamination. Additionally, food packaging has become an essential component of the modern F&B value chain, and it is easy to overlook its harmful impacts. This applies particularly to plastic packaging, which requires natural resource extraction, energy consumption, and polluting manufacturing processes, used only once and then disposed in landfills or the marine environment. Minimizing waste and using its by-products in other industries (such as pharmaceuticals and chemicals) is important for the F&B sector's CE. Reducing the use of natural resources and reusing by-products enhances the economic growth of industries through saving operational costs and complying with environmental standards that are essential for export competitiveness.

3.6.

Circularity Opportunities in the F&B Sector and Its Value Chain

Egypt's F&B sector faces growth challenges, and recent crises have magnified preexisting weaknesses across its value chain. Focused attention and dedicated response measures to structure the market are vital for the transformation of Egypt's food system in the medium and long terms, making it more inclusive, sustainable, and resilient. Cost savings are the main force for the food industry to implement resource efficiency measures to enhance their competitiveness. Circular opportunities across the food value chain are discussed below.

Water conservation, reuse, and recycling. Water consumption in the F&B sector typically occurs in food processing, equipment and floor cleaning, washing of raw materials and packaged goods, firefighting, and feed-in water for equipment (that is, boilers, cooling circuits, refrigeration, and chillers). It is best practice to treat wastewater after process-integrated operations have minimized the consumption and contamination of water (that is, chemicals). Water efficiency measures include good housekeeping, preventive maintenance programs, reuse of water in industrial processes or other applications, implementation of monitoring and control systems for water consumption, dry cleaning of floors, and improved techniques for washing equipment. The use of treated wastewater is limited in Egypt, compared with its use as an alternative source of water supply as guided by European and national strategies.[97] There are several issues to consider in this sphere, including legal requirements related to food safety and hygiene, customer requirements, and product-specific constraints. Additionally, water prices have been generally low in Egypt, which has not incentivized water conservation measures. This has begun to change with the increase of water consumption tariff for industries (EGP 4.55/m^3) according to Prime Minister's Decree 1012/2018.

Waste valorization. Companies often underestimate expenses resulting from material losses and saving opportunities. Organic waste could be utilized as feedstock for manufacturing other products and as a waste-to-energy input. For example, orange peels can be used to produce pectin, which is currently imported by Egypt.[98] Another promising technology is anaerobic digestion, a process in which biodegradable material is broken down by micro-organisms, in the absence of oxygen, to yield biogas for energy and slurry for soil nutrient improvement. The quantities of organic waste produced by the F&B industry would not generally be sufficient at a factory level to be economically viable for biogas technology. Additionally, there is a lack of organic waste aggregators or dedicated locations in the industrial areas for centralized anaerobic digesters. There is also an absence of databases or platforms on industrial waste, with detailed information on types of waste, quantities, and specifications to allow exchanges between companies and attract investors for waste valorization.

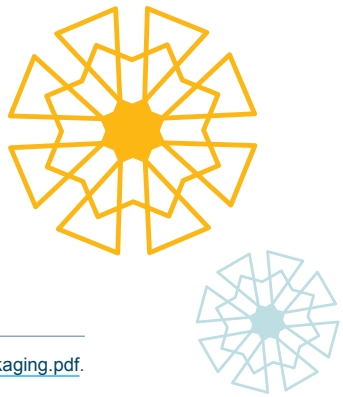
96 Nako Kobayashi and Richards 2021.
97 Santonja et al. 2019.
98 Smith and McGovern 2020.

Packaging. CE leaders are rethinking F&B packaging by designing for reuse and recyclability, incorporating renewable materials, eliminating harmful materials, reducing overpackaging and packaging waste, and avoiding packaging when possible. The WMRA is developing an EPR system for packaging to reduce the use of packaging materials. For Egyptian products to be sold in the EU market, EU Directive 94/62/EC[99] on mandatory essential requirements includes preventing the production of packaging waste, reuse and recycling, and recovery of packaging waste.[100] Corporate initiatives for plastic packing recycling, such as Dawar for Tomorrow by PepsiCo, Dawarna for Nestlé in collaboration with the EEAA, and Plastic Bank, incentivize plastic waste collectors. However, Egypt still lacks a holistic strategy to address circularity in packaging in general and the use of specific types of materials in particular plastics and foam.

Energy efficiency and waste heat recovery. The F&B sector consumes both electrical and thermal energy for driving machinery, heating, refrigeration, lighting, and each step of the manufacturing process. In parallel, there is significant loss of heat from the various processes and exhaust gases. Onsite combined generation of heat and power is a valuable alternative that balances heat and power loads. Their overall fuel utilization factor is typically about 85 percent, and energy efficiency could reach up to 90–95 percent when the exhaust gases from a waste heat recovery system, such as a steam boiler, are used for other drying purposes.[101] Combined generation of heat and power is a convenient and competitive source of energy given concern for rising fossil fuel prices and could generate additional revenue streams if surplus electricity/heat can be sold to other neighboring users. Other energy efficiency opportunities could include reducing heat loads, reducing head pressure, improving part load performance, and reducing power consumed by motors, pumps, and fans. On this last energy efficiency measure, the MOTI Ministerial Decree 463/2020 mandates producers and importers of electric motors comply with the Egyptian specification for minimum energy performance standard.

Renewable energy (photovoltaic [PV] and solar thermal). SMEs account for 11 percent of the country's total electricity consumption,[102] and a significant portion are in the F&B sector. In addition to energy efficiency measures, solar PV systems under a net-metering scheme could replace part of the electricity purchased from the grid and/or be exported in the case of surplus generation. Renewable energy potential from solar thermal systems is also critical as industrial process heat represents 33 percent of the energy consumption in the food industry.[103] Egypt's second NDC update (2023) mentions plans to increase the share of solar heating in the industrial processes of relevant sectors and to promote rooftop PV systems. However, solar thermal applications for industry face barriers indicated by the UNIDO Solar Heat for Industrial Processes Systems Project.[104] These include the project's relatively high costs and the absence of economic incentives to make this technology competitive compared to its fossil alternatives, low awareness of decision and policy makers, mistrust of industrial investors in this new technology, and lack of education and training programs.

The CE in the F&B value chain. Most of the F&B industry's environmental impact occurs outside of manufacturing and is spread across the value chain. Agricultural waste, for instance, is a major cause of air pollution, despite being considered latent national wealth of materials that could generate useful products. The F&B industry could strongly influence other players through partnerships with farmers and cooperatives, collaboration with traders and aggregators of agricultural commodities, cooperation with suppliers (that is, packaging), and alignment with the government to act together toward the common goal of a circular food system. This could include supporting regenerative agriculture practices that prioritize closing the nutrient cycle, encouraging circular approaches to water reuse in agriculture, reducing food loss and waste, increasing investments and incentives for waste reduction, reframing waste as valuable resources, reusing by-products in other industries, and increasing information accessibility and data analysis to ensure traceable and transparent supply chains.[105]



99 See https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/734698/EPRS_BRIE_734698_Revision_Directive_Packaging.pdf.
100 EC 2023.
101 Santonja et al. 2019.
102 Sustainable Energy Egypt 2020.
103 See https://open.unido.org/projects/EG/projects/120073.
104 OME 2010.
105 See https://pacecircular.org/action-agenda/food.

The CE of fertilizer. The circularity and efficient use of fertilizer are crucial to reduce the cost of production, particularly given price volatility. The President has directed the Ministries of Agriculture and Industry, as well as specialized research entities, to assess the fertilizer production process to guarantee availability in the domestic market. The utilization of agricultural wastes and food wastes to develop organic fertilizer should be considered, as it is a transition from fossil fuel–based to bio-based products. Other considerations to close the nutrient cycle include rationalizing the fertilizer consumption in agricultural land through modern fertilization and irrigation. Finally, use of fully water-soluble fertilizer combined with irrigation water, which provides plants with nutrients and water, conserves both fertilizer and water, and mitigates the pollution, nutrient loss, and soil deterioration associated with fossil fuel–based fertilizer. This will prevent the dissipation (and thus waste) of nutrients into the environment; however, it requires the government to set incentives to encourage farmers to rationalize fertilizer consumptions. The EU fertilizer regulation has set a goal of 30 percent reduction of nonrenewable resources in fertilizer production to be produced from bio-based (agriculture waste and food processing).

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3.7.

Role of Green Entrepreneurship

Transitioning to a CE creates demand for green products and services that can be launched by entrepreneurs because the start-up ecosystem is very active in Egypt (see Supply-Side Green Financing in chapter 5). The International Labour Organization estimates that global employment could add 6 million jobs by transitioning to a CE that includes reducing, reusing, repairing, recycling, renting, and remanufacturing, replacing the traditional economic model of "extracting, making, using, and disposing." In terms of policy, the commercialization of green technology and green entrepreneurship are beginning to receive more attention, shifting the dialogue away from green growth policies that focused on identifying technological innovations to reduce human impacts on the environment, climate change, and biodiversity loss.

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CHAPTER 4

Blue Economy Opportunities and Challenges

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4.1.

Overview

Egypt's coastal and marine economic activities are diverse, with the bulk being concentrated along the Delta, the Suez Canal, and offshore. Coastal and offshore oil and gas extraction provides 80 percent of the country's energy needs.[106] Egyptian ports facilitate international commerce and offer routes for imports/exports of commodities, while the revenue-generating Suez Canal is a global strategic route for international maritime transport and transit as well as 22 underwater telecommunication cables linking Southeast Asia to North Africa, Europe, and North America.[107] Coastal mass and ecotourism is an important source of income, where the Red Sea coral reefs attract year-round visitors from all over the world. Offshore fishing activities are gradually being replaced by aquaculture, as seafood is a key component in food security and an important source of protein for the population in the coastal governorates.

Such economic potential mainly relies on resources and ecosystem services provided in the coastal and marine environment. The ecotourism and PAs cannot be considered in isolation: competing uses of direct consumptive and nonconsumptive resources and their ecosystem support in the coastal and marine environment are dynamic but not always properly regulated and managed. If unchecked, they could cause negative externalities and infringe on resource rights, as these pressures will also be exacerbated by future hazards and climate change. In parallel, Egypt plans to increase its reliance on coastal and offshore oil, gas, and mineral extraction and export, and vessel and tanker traffic through the Suez Canal and port hub and its development of coastal mega-industrial zones, aquaculture, ecotourism, and private, public, or public-private participation in utility services by promoting renewable and nuclear energy and relying on more effective water supply, wastewater treatment, desalination, and waste management services, among others.

The BE is neither explicitly articulated in *Egypt Vision 2030*[108] nor mentioned in other sectoral strategies. Still, in 2011, Egypt's *National Strategy for Adaptation to Climate Change and Disaster Risk Reduction* recognized the vulnerability of the Mediterranean coastal zone due to sea level rise.[109,110] This issue is reemphasized in the *NCCS 2050*,[111] which calls for, under Objective (2.d), resilient infrastructure and services in the face of climate change impacts, the protection of coastal lowlands, and the implementation of an ICZM. Egypt's first (2022) and second (2023) updated NDC expand on the issue by calling for the development of a climate resilient ICZM plan for the Mediterranean coast that links land-use development plans with the costly coastal protection works over the next 10–15 years.

The MOE launched the Enhancing Nature-based Solutions for an Accelerated Climate Transformation initiative with the Government of Germany and International Union for Conservation of Nature (IUCN) during COP27.[112] The initiative recognizes coastal and BE exposure to climate change and recommends a comprehensive ICZM to coordinate planning and management, budgetary savings, and the enhanced resilience of coastal infrastructure to climate risk. It also recommends the coordination of marine activities using key MSP advisory and analytical tools that could help formulate the new Egypt Blue Economy Strategy based on the GOE 2023 draft framework.

The World Bank defines BE as "the sustainable use of ocean [and sea] resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean [and sea] ecosystem."[113] The latter is fully aligned with SDG 1, on poverty; SDG 8, on decent work and economic growth; and SDG 14, on life below water, and the World Bank's goals of ending extreme poverty and boosting shared prosperity on a livable planet. The BE transitional process usually calls for responsible use of marine natural resources; reducing carbon emissions and carbon footprints; adopting a CE model; easing conflicts in the coastal and marine environment through ICZM and MSP to coordinate and balance the needs of different activities by gauging economic synergies versus trade-offs in conjunction with resource preservation versus degradation; enhancing blue investments, both public and private; and promoting innovative eco-smart technologies (figure 4.1).[114]

106 MPMR 2022.
107 See https://www.submarinecablemap.com/country/egypt.
108 More information can be found at https://www.mped.gov.eg/EgyptVision?lang=en.
109 UNDP and Egyptian Cabinet Information and Decision Support Center 2011.
110 See https://www.preventionweb.net/files/57333_egyptiannationalstrategyfordrrengli.pdf.
111 World Bank 2022a.
112 IUCN 2022.
113 World Bank and UNDESA 2017.
114 EC 2021.

Figure 4.1: The Blue Economy

Blue Economy

The Blue Economy is sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health. **The Blue Economy encompasses many activities.**

Ecotourism

Ocean, sea and coastal tourism can bring jobs and economic growth. Coastal, less developed countries and small island developing states receive more than **41 million visitors** per year.

Fisheries

Marine fisheries contribute more than **US$270 Billion** annually to global GDP. More sustainable fisheries can generate more revenue, more fish and help restore fish stocks.

Maritime Transport

Over 80% of international goods traded are transported by sea, and the volume of seaborne trade is expected to double by 2030 and quadruple by 2050.

Protected Areas

Safeguard and foster the biodiversity of coastal and marine ecosystems to preserve natural heritage, wildlife, and culture, e.g., **coastal dunes, mangroves, seagrass, coral reefs, etc.**

Climate Change

The impacts of climate change on oceans and seas — rising sea-levels, coastal erosion, changing ocean current patterns and acidification — are staggering. At the same time, **oceans and seas are an important carbon sink** and help mitigate climate change.

Waste Management

80% of litter in oceans and seas from land-based sources. Better waste management on land can help oceans recover.

Source: World Bank, www.worldbank.org/oceans.

Six principles were recognized to help deliver a prosperous, sustainable, resilient, and equitable BE. It should be gauged to derive cumulative effects, ecosystem health, future potential, equitable opportunity distribution with different-sized sectors, equitable opportunity distribution with different historical claims, and equitable distribution of public resources (figure 4.2). The first three principles require assessing coastal and marine conservation versus pollution, drawing natural capital stock baselines, calculating the BE value-added, and identifying opportunities, respectively. The second three lean into the BE governance framework that includes instruments such as ICZM and MSP for efficient and equitable planning as well as judicious green financing, implementation, and management to secure a prosperous, sustainable, and equitable coastal and marine environment.

Figure 4.2: Six principles of the Blue Economy

Source: Crona et al. 2021

Coastal and marine resources could contribute to what is needed to diversify and transition to a BE. Looking at the BE synergies and trade-offs is necessary to secure the quality and resilience of coastal inclusive growth, livelihoods, and the commons in the future. This chapter complements the *Egypt Vision 2030* strategy with its economic, social, and environmental pillars and the World Bank Group's *CCDR* by bringing about and expanding the scope of Egypt's BE to help increase efficient blue opportunities while preserving coastal and marine PA, pristine areas, and the commons. The GOE is planning to strengthen the engagement of different stakeholders in the stewardship of PAs and their environs. Moreover, synergies and trade-offs of key sectors are analyzed to promote Egypt's BE; green financing of GOE priorities for the BE will be covered in the next chapter.

The BE scope in this chapter is restricted to the coastal area delimited by the coastal road in nonurban areas and the marine environment as well as coastal urban areas (such as Alexandria, Port Said, resorts, and tourist venues) and economic activities (such as ports, oil and gas hubs, industrial zones, fisheries, and aquaculture).[115] The prerequisites for developing Egypt's BE strategy lie with determining its geographic scope and its share in the economy and valuing coastal and marine natural capital. The former helps determine the BE pathway and set goals for the future, while the latter allows to help shape GOE policies to preserve and even increase the renewable natural capital while using the nonrenewable capital such as oil, gas, and mining for the green and blue transitions. The coastal and maritime capital is vulnerable to short- to long-term pressures, as evidenced by the CCZED results (see chapter 1), which could erode over time, hence reducing resources, ecosystem services, and economic rents provided by this natural stock, leading to knock-on effects on the tourism and seawater fishery sectors.

With a coastal population that includes the administrative coastal urban areas that account for 7.3 percent of the total population, Egypt's BE value-added is conservatively estimated at 19.6 percent of GDP in 2021.[116] Conversely, the official GDP of the entire coastal governorates ranges between 24 and 28 percent in 2021.[117] This BE value-added is preliminary and based on the available value-added of some coastal and marine activities: Suez Canal maritime traffic; port traffic; oil and gas extracted, pipelined, and refined; coastal tourism; coastal utility production and services; coastal economic activities such as aquaculture; and fisheries. Data on industrial zones, coastal agriculture, coastal mineral extraction, underwater telecommunication cables, and PA value-added are not readily available and should be considered in the future. These results distribution among both seas mainly show that the oil and gas activities represent the major share of the blue GDP (43.5 percent), and oil production is tilting the overall blue GDP weight toward the Red Sea: 10.9 percent with a population of 1.49 million against 8.7 percent for the Mediterranean Sea with a population of 5.92 million.

115 Environmental Law 4/1994 (Article 39) and the amended Law 9/2009 (Article 1, paragraph 39) clarify the spatial extent of the coast, continental shelf, and the exclusive economic zone, and shoreline of up to 10 km inland in densely populated areas and up to 30 km inland in the desert.

116 World Bank staff estimates based on official published data on coastal economic activities.

117 See GDP data provided by MOPED at https://mped.gov.eg/Governorate/Index?lang=en).

4.2.

Strategic Marine and Coastal Management

There is no overall framework that governs the marine environment in Egypt, although Environmental Law 4/1994 regulates ICZM and an ICZM strategy was formulated in 2010. Although ICZM programs in Egypt have been fragmented and driven by the international development community and academic institutions (in coordination with the MOE and EEAA), they have helped to inform an ICZM strategy, improve preparedness, build capacity, and enhance coastal resilience. In terms of strategy, several ICZM processes have been launched since the early 2000s[118] covering the Mediterranean Sea and the Sinai Peninsula, and the European Union funded a National Integrated Coastal Zone Management Strategy for Egypt 2008–10 with the aim of Egypt ratifying and signing the Barcelona Convention ICZM Protocol. However, Egypt did not ratify or sign it.[119] In terms of international development and academic implementation of ICZMs in coordination with the EEAA, the examples are numerous. For instance, a Framework for ICZM Plan for Fuka-Matrouh to rationalize land use was prepared under the MAP Coastal Area Management Programme and the University of Alexandria.[120] An Adaptation to Climate Change in the Nile Delta through ICZM 2009–17, funded by the GEF, was implemented by the UNDP and executed by the MWRI in coordination with the Coastal Research Institute and the Egyptian Shore Protection Authority to integrate the management of sea level rise risks into the development of Egypt's Low Elevation Coastal Zone in the Nile Delta.[121] Moreover, the Alexandria ICZM Project 2010–17, funded by the GEF, implemented by the World Bank, and executed by the EEAA was meant to contribute to the reduction of land-based sources of pollution entering the Mediterranean Sea through the identified hot spots in the Alexandria area, especially Lake Mariout.[122] Enhancing Climate Change Adaptation on the North Coast and the Nile Delta, initiated in 2018 and funded by the Green Climate Fund, implemented by UNDP, and executed by the MWRI in coordination with the MOE, has a critical objective to implement the coastal protection measures in five governorates of the North Delta that are vulnerable to sea level rise.[123]

Environmental Law 4/1994 does not include strategic environmental assessments (SEAs) as a process of evaluating the effects of certain plans and programs on the environment. However, they have been carried out in Egypt as a prerequisite for the ICZM Plan for Matrouh-Sallum. More recently, a SEA study was conducted in the Southern Red Sea, the North Coast and Siwa regions with a specific focus on the tourism sector's plans and strategies. This effort was led by the Mainstreaming Biodiversity into Egypt's Tourism (MBDT) project, funded by the GEF and implemented by UNDP and EEAA.[124]

MSP analyzes and allocates the spatial and temporal distribution of human activities in marine areas.[125] Its approach is similar to, but wider than, an ICZM. In Egypt, its scope extends from the coastal zone to the exclusive economic zone, an area estimated at 263,451 square kilometers (km2). The process supports all important concerns in the transition to a BE, such as citizen engagement, climate change mitigation, and biodiversity. The process also forges partnerships between the public and private sectors, civil society, and academia and relies on financial and advisory and analytical instruments that help gauge synergies and trade-offs by bringing clarity to societal (such as vulnerable communities and gender), economic (such as efficiency and shared prosperity), and environmental (such as biodiversity and ecosystem services loss and climate change) challenges. As illustrated in figure 4.3, designing and implementing an MSP entails four steps: (i) making the case by justifying the benefits; (ii) reviewing the enabling conditions that increase the chances of success; (iii) formulating an integrated plan with goals and objectives; and (iv) implementing, monitoring, and evaluating the MSP to allow for the calibration of the process.[126]

118 Borhan, Farouk, and Hamdy 2003.
119 See https://www.unep.org/unepmap/who-we-are/barcelona-convention-and-protocols.
120 UNEP and MAP n.d.
121 See https://www.thegef.org/projects-operations/projects/3242.
122 See https://iwlearn.net/iw-projects/2602.
123 See https://www.undp.org/egypt/projects/enhancing-climate-change-adaptation-north-coast-and-nile-delta-egypt.
124 UNDP and Environics 2022.
125 See https://ioc.unesco.org/index.php/topics/marine-spatial-planning.
126 Alder and Castaño-Isaza 2022.

Figure 4.3: MSP Process

Source: Alder and Castaño-Isaza 2022.

4.3.

Coastal and Marine Resources Natural Stock and Status

The Egyptian land-sea coastal and marine environment interface provides a rich array of natural resources with varying ecosystems and habitats, notably coastal dunes, sandy beaches, coastal lagoons, mudflats, and seagrass beds in the Mediterranean that are complemented by mangroves and coral reefs in the Red Sea. Moreover, at the end of 2022, Egypt's 2,800 km coastline hosted about 22 percent of its 104.4 million population,[127] contributing to coastal and offshore economic activities as well as the preservation of the commons in terms of ports and maritime transport; oil and gas activities; industrial zones; electricity production; mangroves; wastewater plants; desalination plants mainly associated with resorts, tourism venues, hotels, and ecotourism lodges; PAs; groves; aquaculture; and offshore and coastal lake fisheries.

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127 S ee www.capmas.gov.eg.

GEOMORPHOLOGY

The geomorphology of the Mediterranean Sea coast, which extends about 1,100 km, has been changing. The coast boasts a highly diversified coastal clastic morphology interspersed with the open-coast Nile Delta and coastal lagoons, thanks to a sediment-supply regime.[128] While a rocky coastline from the Libyan border to Marsa Matrouh remains pristine, the recent development of ports, marinas, resorts, artificial lagoons, desalination plants, and the construction of a nuclear power plant in Debaa along the partially sandy coastline from Marsa Matrouh to Alexandria is affecting the coastal dunes and creating coastal erosion. Substantial dredging and diking to build coastal infrastructure and black sand mining are altering the geomorphology of this coastal stretch. Similarly, the Alexandria Sinai coastal ongoing artificialization is being exacerbated by the enlargement of ports due to increasing maritime transit through the Suez Canal; the development of oil and gas terminals, refineries, and pipelines; the extension of coastal aquaculture to the detriment of offshore fishing; and the establishment of industrial zones. Conversely, the geomorphology of the Red Sea coast, which extends about 1,700 km, including the coasts of the Suez Gulf, the Aqaba Gulf, and islands, is twinned with a mainland coastal plain constituting the edge of the Eastern Desert. The water and sediments brought down by wadis during the rainy season nourish the coastal habitat, mangroves, and coral reefs. The coral reefs constitute an offshore strip that is 50 m and 100 m wide that protects coastal areas against wave action, storms, and erosion, and contributes to the formation of the sandy beaches and sheltered harbors.[129] The coast also harbors Egypt's main tourism and ecotourism infrastructure, while areas along the southern coast as well as parts of the Sinai Peninsula are protected.

FISHERIES

Mediterranean marine pollution and overfishing is gradually reducing the fish catch in sea waters and is exacerbated by Red Sea invasive nonindigenous species that directly impact the marine ecosystem.[130] Conversely, the Red Sea's naturally nutrient-enriched waters in the south have a higher productivity than those of the north, although the sea is not a very productive system; the impact on the stock is not negligible, and the catch per unit of effort is decreasing for several fishes. Oil spills most affect sediments, including reefs, crawling species (such as lobsters), and hatching areas.

CORAL REEFS IN THE RED SEA

The reef flats of the fringing reefs comprise some 1,760 km² of the Egyptian Red Sea coastline, with an average width of 250 m. Seaward reef walls or faces have an average depth of 30 m, which equates to a total area of 492 km² of fringing reef in the Egyptian Red Sea. Its tropical coral reefs represent 1.247 percent of the world's reefs.[131] Coral diversity varies quite considerably in the Egyptian Red Sea due to changes in water temperatures, salinity, sediment load, and light and anthropogenic impacts.[132] Patchy form reefs around the islands total 156 km², making for a total reef area of 733 km². Red Sea coral reefs are home to approximately 120–125 soft coral species and 209 hard coral species, whose cover declined by 13.6 percent on average between 2005 and 2019 at the 10 most affected sites.[133] On average, coral diversity is greater in the northern part of the Egyptian Red Sea than in the south, with nearly double the number of coral species. In Marsa Abu Dabab, which is a popular diving site in Egypt's southern Red Sea coast, 162 fish species including the dugong were recorded, with the highest abundance reaching 1,119 fish per 1,000 square meters (m²) (box 4.1).[134] Still, some coral reef communities are deteriorating due to a combination of land-based and natural pressures (such as temperature, pH, and change in salinity due to release of desalination brine) resulting in the increase of bleaching, algae overgrowth, higher incidence of crown-of-thorns starfish and snails, homogenization of the coral reef community due to coastal development, in addition to recreation-prone damages (such as anchors and scuba diving) when enforcement is relaxed.

128 Anthony, Marriner, and Morhange 2014.
129 Shaltout, Allah, and Banna 2005.
130 FAO 2018.
131 Souter et al. 2021.
132 Pilcher and Zaid 2000.
133 Souter et al. 2021.
134 Alwany 2011.

BOX 4.1: THE ZAKI REEF RESILIENCE

The Zaki Reef, which is a small, shallow, fringing reef 55 kilometers south of the Suez Canal in the Red Sea, is under local pressure from fishing, shipping, and coastal development. Local fishermen cross the reef daily and anchor directly on the beach behind the reef, causing noticeable coral damage. After a major oil spill and bleaching event in 2005, there was a marked increase in coral disease, water turbidity, organic nutrients, and sedimentation levels, all signifying a decrease in reef health. Between 2004 and 2007, dead coral cover increased by 50 percent. However, data from 2008 point to signs of improved reef health, possibly indicating that the reef is rebounding from the 2005 oil spill and bleaching event. Incidences of coral disease decreased in 2008, and the growth of new corals was documented over major portions of the reef. Recent data from Zaki Reef suggest that this ecosystem may be adapting to new stressors by shifting dominant corals and accessory reef populations. Determining the reasons this ecosystem manages to survive despite extreme environmental conditions and additional stressors may hold the key to the preservation of reefs elsewhere.

Source: Moustafa n.d.

MANGROVES

These important trees help stabilize and protect beaches from erosion during fluctuating tides through their intertwined roots that clamp the ground together. They also filter the waters, help reduce the excess salt of the surrounding area, provide natural homes to birds and other animals, and act as fish, mollusk, and crustacean habitats (e.g., crabs) or nurseries (e.g., grouper and lobster). They also store carbon and can support the bee population.[135] Twenty-eight mangrove sites exist and covered a 700 hectare (ha) area in 2007, compared to 525 ha area in 2002.[136] There are both gray (*Avicennia marina*) and red (*Rhizophora mucronata*) mangroves, with the latter considerably less common and found only in areas south of Shalateen. Red Sea mangroves were declared protected in 1986 before the start of unsustainable and intensive development along the shoreline. However, threats to their existence persist despite efforts to create nurseries to implement reforestation programs since 2002, due to the understaffing of these PAs, mangrove deforestation due to development and pollution.[137] Indigenous mangroves also exist in small areas in Marsa Matrouh on the Mediterranean Sea.

SEAGRASS

In the Mediterranean, among the 64 species of seagrass, Posidonia oceanica is an endemic species that can only grow in clean, unpolluted waters. It (i) covers the sea bottom at a depth between 0 m and 40 m; (ii) stabilizes seabeds; (iii) breaks swells and waves; (iv) encourages the deposit of sedimentary particles; (v) ends up on shore during wintertime, acting as a beach dune system that protects the coastline; (vi) supports a wide variety of animal species (about 20 percent) that use these habitats for breeding, feeding, and sheltering; (vii) is more efficient at producing oxygen (14–20 liters of oxygen/m^2 /day) than the Amazon rainforest; and (viii) is most effective in carbon fixation and storage (average rate of 83 grams of carbon/m^2/year), where *Posidonia* meadows store 11–42 percent of carbon dioxide emissions from Mediterranean countries.[138] *Posidonia oceanica* and a few other meadows are present along the western Egyptian Mediterranean coast down to the Abu-Qir Bay, as the eastern part is free from the meadows due to a decrease in water salinity and freshwater input from the Nile Delta. Although the mapping of the meadows has so far been neglected, a very high probability of Posidonia oceanica occurrence was suggested in open deeper waters between Marsa Matroush and Alexandria in 2016.[139] However, between 1959 and 2009 (a 50-year period) there has been a 34 percent decline or degradation in the plant distribution area all over the Mediterranean.[140] Conversely, in the central and northern Red Sea, of eight species of seagrass, all but one originated from the Indian Ocean are observed. These flowering perennials tend to grow on sandy or muddy bottoms, usually between 2.5 m and 10 m depth, primarily in sheltered areas. A few species are also found on the reef. Endangered species (such as turtles and dugong)[141] as well as fish, crustaceans, and birds depend on seagrass. However, the shallow location of seabed makes them susceptible to pressures from urban, industrial, tourism, fishing, and existing and planned desalination activities, as well as water quality, dredging, diking, boating, tourism, and so forth.[142] Conversely, the substrates seem rich and diverse, and it is important to provide food for humans, fish, and birds, while they are very important for carbon sequestration and chemical cycles. Indeed, algae communities are highly diverse, consisting of over 500 described species and many new species, where in the northern and central Red Sea, algae consist primarily of filamentous green algae and small brown algae species. Still, scientific gaps need to be bridged to better capture all the functions of substrates.

135 Abo-Taleb 2019.
136 Shaltout and Eid 2017.
137 Tamraz 2017.
138 See https://medwet.org/2017/10/mediterranean-posidonia/.
139 Chefaoui, Duarte, and Serrão. 2017.
140 Marbà, Díaz-Almela, and Duarte 2014.
141 El Kafrawy et al. 2020.
142 Nour et al. 2018.

COASTAL AND MARINE PROTECTED AREAS

While keen in fulfilling its international commitments, Egypt is falling short of meeting the Convention on Biological Diversity's Aichi Biodiversity Target 11: "at least 17 percent of terrestrial and inland water areas and 10 percent of coastal and marine areas." Under ministerial mandates and managed by the EEAA, 11,715.8 km^2 or 4.9 percent of Egyptian territorial waters include 12 marine PAs[143] recognized by the Aichi Biodiversity Target 11, although less than 1 percent are implemented and highly/fully protected from fishing.[144] Moreover, 48 percent of all PAs are governed by national ministry or agency with no reported private PAs. Marine PAs mainly comprise areas with coral reefs, mangroves, and breeding and nursing grounds of sensitive species, making them intrinsically valuable as providers of ecosystem services as well as economically valuable in the short term as tourist attractions. Most coastal and marine PAs fall under the Red Sea with 50,780 km^2 (when considering the land area extension not accounted for under the Aichi guidelines to avoid double counting under the terrestrial areas) as compared to only 1,959 km^2 (including the coastal lakes) under the Mediterranean Sea.

4.4.

Coastal and Marine Resources Natural Stock and Status

Egypt's coastal and marine natural resource capital stock was estimated at US$233.4 billion in 2021 (table 4.1 and figure 4.4). The coastal and marine capital stock, which is calculated for the Mediterranean and Red Sea, is equivalent to the sum of active crude oil extraction, active natural gas extraction, fish catch, existing coral reefs, existing mangroves, and existing seagrass over 25 years (equivalent to one generation) and discounted at 3 percent. Although salt, pearls, black sand, and other minerals extraction occur, they are not considered in the analysis due to a lack of data. The nonrenewable fossil fuels dwarf renewable natural resources, with US$209.7 billion for the former and US$23.7 billion for the latter, or almost ninefold. Interestingly, the Red Sea is more endowed with nonrenewable (US$133.6 billion) and renewable (US$21.9 billion) resources than the Mediterranean Sea, as the Red Sea's active oil and gas fields and the coral reefs represent most of this natural capital stock (98 percent). Hence, this preliminary analysis allows for a quantitative estimate of the marine stock of wealth and provides a disaggregation of this wealth by asset and by sea over 25 years. These preliminary results need to be expanded and constantly updated to help decision makers identify priorities and eventually simulate the use of each asset that will help decision makers design, prioritize, and implement efficient, judicious, and transitional policies in the future to preserve these assets.[145] Still, when looking at the coastal and marine resource CCZED results, the flows of natural resources and ecosystem services derived from these stocks are all negative (see chapter 1) and equivalent to 0.3 percent of the GDP in 2021. Although this figure is very conservative, the fisheries, coral reefs, and seagrass degradation and depletion trend is also evidenced in the literature reviewed. The resources and ecosystem services derived from these stocks are therefore being eroded, leading to diminishing flows in the future. To this end, the natural capital stock tool could be an important decision support system that allows for the simulation and calibration of the value of future stocks while considering climate change models.

143 CBD and UNDP 2021.
144 See https://mpatlas.org/countries/EGY/map.
145 For a detailed description of the methodology, see Lange et al. (2011).

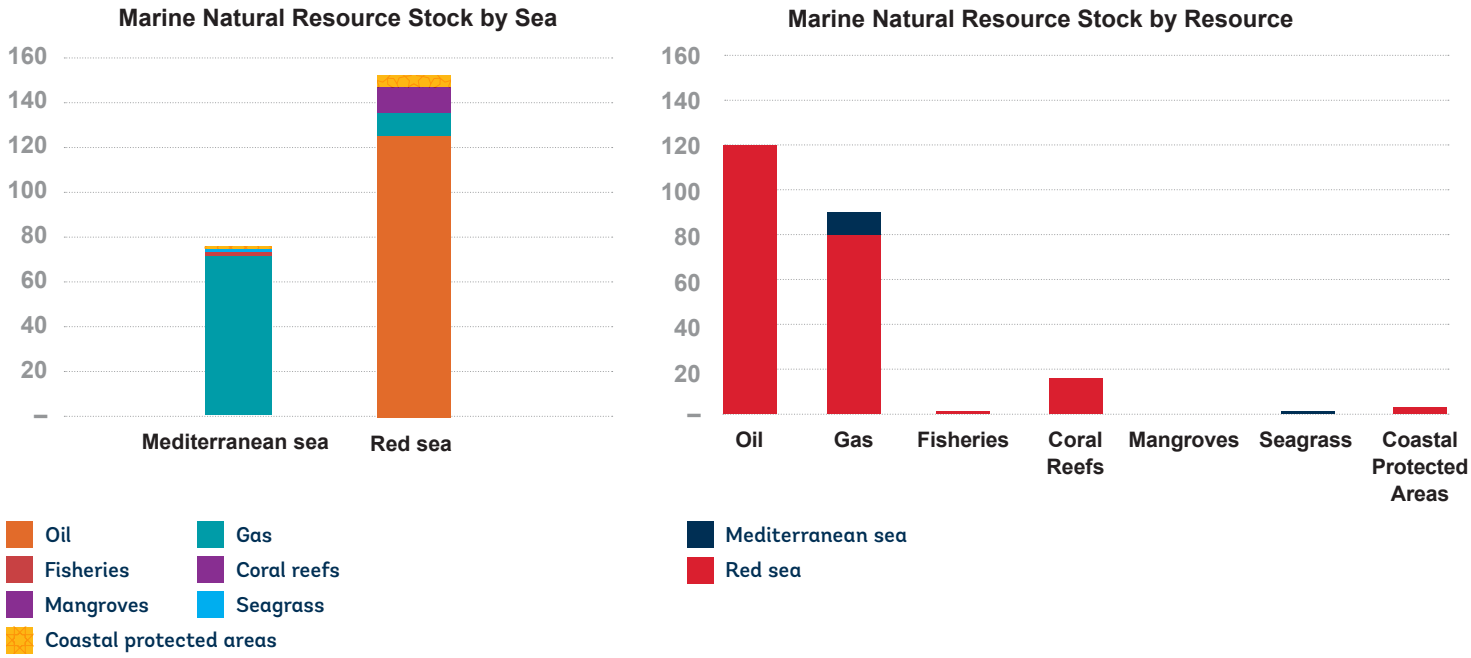
Table 4.1: Egypt Marine Natural Resource Capital Stock 2021–45, in 2021 Prices

Marine Natural Resource Stock	Mediterranean Sea	Red Sea	Total
	US$ billions	US$ billions	US$ billions
Nonrenewable Resources	**76.1**	**133.6**	**209.7**
Active offshore oil fields	3.2	119.9	123.1
Active offshore gas fields	72.9	13.7	86.6
Other extraction (e.g., black sand)	Not Calculated	Not Calculated	Not Calculated
Renewable Resources	**1.83**	**21.88**	**23.71**
Fisheries	0.43	0.19	0.62
Coral reefs	Not Applicable	18.70	18.70
Mangroves	Not Applicable	0.01	0.01
Seagrass	0.80	Covered Under Reefs	0.80
Coastal protected areas	0.60	2.98	3.57
Total	**77.93**	**155.48**	**233.41**

Note: Coastal protected areas and fisheries are based on the 2021 *Wealth of Nations'* protected area and fisheries that are broken down by land and coastal/marine seas for the former and seas for the latter. Instead of the *Wealth of Nations'* 4 percent discount rate over 100 years, 3 percent is applied over 25 years due to shorter timescales after deflating the amounts. *Wealth of Nations'* fisheries calculation is based on the Sea Around Us and does not include land-based aquaculture and freshwater fish.

Source: Preliminary results and calculations are available in Annex 2.

Figure 4.4: Egypt Marine Natural Resource Capital Stock 2021–45, in 2021 Prices



Source: Preliminary results and calculations are available in Annex 2.

4.5.

Potential Conflicts and Opportunities for Stimulating Ecotourism and Fisheries

TOURISM

Coastal tourism is estimated to account for about half of Egypt's tourism, which attracted a total of 13.6 million tourists and constituted about 12 percent of Egypt's GDP in 2019.[146] After a sharp decline in the number of tourists to 3.7 million in 2020 following the COVID-19 pandemic, 11.7 million tourists visited Egypt in 2022, and tourism revenues bounced back from US$4.9 billion in fiscal 2021 to US$10.7 billion in fiscal 2022, equivalent to 2.3 percent of GDP.[147] The tourism sector value-added contribution to the BE is estimated at US$7 billion in 2021 thanks notably to the quality of the coral aesthetic. However, pressures on coral reefs—such as diving rates exceeding the optimal globally recognized capacity levels, boating (anchors), sunscreen released during bathing, and site carrying capacity for diving and illegal mining reefs—have affected the state of the coral reefs,[148] not to mention effects from solid and liquid waste pollution. Sustained deterioration of these resources and ecosystem services could affect both the tourism and seawater fishing sectors, especially since the regional competition could increase as the Kingdom of Saudi Arabia started promoting tourism, especially along the Red Sea coast.

Still, Egypt has a geographical advantage in terms of the opportunities it may harness for blue ecotourism. A fast-emerging alternative to mass tourism is ecotourism, which places special emphasis on environmental management, reduction of environmental degradation, a skilled workforce, and community engagement. However, Egypt has been promoting private investment to develop tourism projects and resorts across the Mediterranean coast,[11] where the degradation of coastal dunes and erosion were evidenced due to encroachment as well as substantial dredging and diking, as thoroughly illustrated and mapped in the 2017 ICZM in the Northern Coast of Egypt[149] scoping study. In the Red Sea, some coral reef communities have deteriorated due to a combination of land-based and natural pressures.[150]

The SEA prepared in 2022 to help define a strategic policy for sustainable tourism development for the Southern Red Sea Coastal Belt[151] articulated clear trade-offs between mass tourism versus ecotourism: ecotourism not only preserves the commons but also improves the livelihoods of local communities (box 4.2). Moreover, Egypt already has experience securing community engagement for mangrove reforestation[152] and developing PAs for tourism purposes, especially in the Red Sea: the Ras Mohamed National Park and the Wadi Rayan Protectorate are prime examples. In addition, Egypt has several destinations that participate in environmental protection programs, with the goal of calculating their footprint and increasing sustainability, such as the Egyptian Sustainable Tourism Portal,[153] while the Green Globe Certification has members across Egypt.[154] The MBDT is a multisectoral project funded by the GEF and executed by the UNDP, where guidelines for best environmental practices in tourist restaurants and eco-hotels as well as tourist facilities bearing eco-labels, are some of the actions that will boost development of the ecotourism market in Egypt and increase investments in and outside nature reserves.[155] Also, a homegrown Coral Damage Index was developed to monitor diving sites that could be monitored by hospitality managers.[156] The promotion of ecotourism coupled with the acquired knowledge in managing fragile coastal areas are essential ingredients for the transition toward a BE. Yet ecotourism is self-designated in Egypt and often exerts some pressures on resources and ecosystem services.[157]

146 EEAA 2016.
147 CBE 2023; CAPMAS 2022; GOE 2023.
148 Gladstone, Curley, and Shokri 2013.
149 IH Cantabri and Environics mimeo.
150 MOE 2016.
151 UNDP and Environics 2022.
152 Temraz 2017.
153 See https://estportal.org/.
154 See https://www.egyptgbc.org/.
155 SIS 2022.
156 Jameson et al. 1999.
157 Gohar and Kondolf 2020.

The GOE has clear goals to promote ecotourism. *Egypt Vision 2030* states goals to create eco-friendly resorts and transform the tourism sector to a green economy. By embracing ecotourism, the blue tourism industry must become nature positive, low impact, and low carbon. In 2018, Egypt's Ministry of Tourism and Antiquities (MOTA) launched the *Tourism Reform Program*, which seeks to create a sustainable tourism sector through structural reforms. In partnership with the MOE and MBDT project, notable programs that have emerged from these policy initiatives include a green certification system for hotels (Green Star Certification), the Green Fins Program to improve management of diving and snorkeling activities, and the ECO EGYPT campaign to promote PAs.[158] Still, a national certification for ecotourism needs to be introduced and should be compatible with international certification, such as The International Ecotourism Society.[159] In addition, the GOE seeks to create new and expand existing PAs under the Egyptian Biodiversity Strategies and Action Plan 2015–30[160] in line with the Convention on Biological Diversity's Aichi Biodiversity Target 11 commitment. Indeed, at COP27 in November 2022, the GOE committed to designating the entire Red Sea Great Fringing Reef as a PA. Beyond the central government initiatives, governorates play an important role in making tourism more sustainable. For example, in 2019, the governor of the Red Sea Governate banned the production and use of single-use plastics to reduce plastic pollution from the tourism industry.[161]

BOX 4.2: RED SEA MASS TOURISM VERSUS ECOTOURISM, TRADE-OFFS

The current traditional market resort development model has very little positive economic impact on Red Sea communities. Hotels in the region operate on very thin profit margins, and a significant share of profits are retained in source markets, by the foreign tour operators.

Ecotourism models can promote local economic development that will require much less significant investment in infrastructure and help the Red Sea region and Egypt retain more of the benefits of tourism investment and spending. Roughly 27,000 eco-resort guests per year would produce the same level of direct spending, and significantly more local jobs and economic impacts than 180,000 traditional-market resort guests (2,000 rooms, five-night stay).

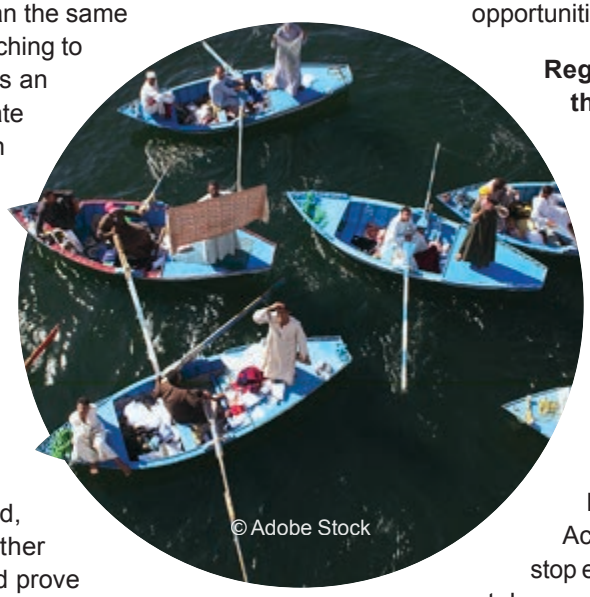
Source: UNDP and Environics 2022.

158 UNDP 2020.
159 See The International Ecotourism Society, https://ecotourism.org/.
160 MOE 2016.
161 Dhenin 2020.

FISHERIES

Aquaculture production is overtaking artisanal fishing. Total fish production in 2021 is estimated at 2.2 million tons, with the aquaculture share reaching 77.3 percent (1.7 million tons of total production) and steadily increasing over the years, while the remaining share includes freshwater fish catch, lake fish catch, and seawater fish catch whose share is constantly shrinking. Egypt has a promising plan to raise fish production to 3 million tons by 2025,[162] almost reaching self-sufficiency. Overfishing and degradation of the coastal environment were gradually depleting the fish stock in both seas and in the northern lakes. As a result, the GOE cleaned and developed the lakes of Manzala, Burulus, Mariout, and Bardawil, which led to the increase in fish landings in the lakes. Moreover, about nine aquaculture plants were constructed along the coast, and more are planned to raise food security and improve nutrition.

As fish farming is more productive than the same area of land farming, farmers are switching to fish farming that is also considered as an efficient alternative adaptation to climate change. Still, seawater fish production suffered not only from overfishing but also from the water quality, a reduction in phytoplankton, an alteration of hatching grounds due to coastal artificialization, diking and dredging, land- and marine-based solid and liquid waste pollution, including microplastics, oil spills, harmful algae bloom events, ballast water, and more. These pressures are reducing and contaminating seafood, which prompts fishermen to sail further from the coast to catch fish that could prove unprofitable and eventually not competitive with fish farms, as it translates into more time, effort, and variable costs such as fuel costs.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The newly established Lakes and Fish Resources Development Agency (LFRDA), formerly known as General Authority for Fish Resources Development (GAFRD), is responsible for managing fish resources in Egypt. The transformation of GAFRD to LFRDA has brought about significant changes: under the tutelage of the Prime Minister, LFRDA is an economic agency that must rely on mobilizing financial resources to fulfill its extended attributes. The main objective of the agency is to (i) protect, develop, and exploit the lakes, their streams, tourism, beaches and sanctuaries; and (ii) protect and develop fisheries and aquatic life with a view to developing the national economy. Yet the MOALR formulated strategic objectives and a developmental plan for fisheries and aquaculture sectors over the 2020–30 period that needs to be harmonized with Law No. 146 of 2021 for the Protection and Development of Lakes and Fisheries and with the Prime Minister's Decision No. 706 of 2023 regarding its executive regulations.[163] For instance, MOALR strategic objectives overlooked important issues of the law that defines the role and responsibility of the private sector, private financing, and especially microcredits targeting artisanal fishermen, as the development of the new aquaculture farms is mainly led by the GOE.[164] Conversely, important sustainable development issues, such as protecting shores from erosion and reducing land-based and marine-based pollution sources, are not under the purview of the MOALR. Yet a sector-wide approach such as the ICZM has been considered as an entry point for the BE multisectoral planning and monitoring to help revive and promote these coastal activities that could show clear opportunities again.

Regarding the northern Red Sea and the Gulf of Suez and Aqaba, the MOE is leading an effort to preserve the natural heritage and the artisanal fisheries in the areas that could be replicated in the Mediterranean Sea. The MOE is coordinating this effort with all the relevant authorities (MOE, MOALR, MOTA, Ministry of Petroleum and Mineral Resources [MOPMR], South Sinai Governorate, LFRDA, Cooperative Union for Aquatic Resources, Chamber of Diving and Watersports, and Marine Activities). To replenish the fish stock and stop ecosystem deterioration, measures were taken, such as banning fishing during the fish breeding periods to ensure the preservation of species. This effort could eventually be extended to the mariculture of nontraditional species such as bivalves, oysters, clams, seaweeds, and multitrophic culture systems that could also be upscaled for habitat restoration as well as for targeting export markets. The fishermen were to be compensated through the establishment of an account (Sustainable Development Fund for Fish Resources in the Red Sea, Gulf of Suez, and Gulf of Aqaba) opened under the Cooperative Union for Water Resources that is provisioned by all relevant authorities. Roles and responsibilities for all the relevant authorities were well-defined in terms of bringing awareness, building consensus, securing funds to fishermen during the ban, buying new gear, and for supervision. Yet this effort requires fish stock and ecosystem monitoring, and the National Institute for Oceanography and Fisheries could be an ideal partner to carry out these tasks.[165]

162 USDA 2022.
163 FAO 2021.
164 Aly 2019.
165 See https://niof-eg.com/enodc/.

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CHAPTER 07

Mobilizing Green Financing to Support the Transition

5.1.

General Definition and Specific Scope of Green Finance

Typically, the definition of green finance set by financial institutions, governments, and international organizations is influenced by their underlying motivations. The G20 Green Finance Study Group[166] provides a general definition of green finance which is the financing of investments that "provide environmental benefits in the broader context of sustainable development" over different timescales. In this general definition, climate finance is a subset of green finance that focuses on de-risking financing for climate change mitigation and adaptation. Conversely, in this specific context, the scope of green finance complements the World Bank Group's 2022 *CCDR* objectives[167] by focusing on relevant policies as well as financial flows. The latter include flows to support Egypt's CE and the BE environmental priorities over short to medium timescales, such as official development assistance (ODA), development finance institutions (DFIs), international financial institutions (IFIs), the Egyptian public sector, and the private sector.

Some of Egypt's CE and BE environmental priorities could tap into existing or planned climate finance and dedicated green finance: (i) in the former case, these priorities could reap both local and global environmental benefits, such as CE industrial energy efficiency and reduction of local and global pollutants; and (ii) in the latter case, other priorities will require existing or suggested policies and dedicated green finance mechanisms, as they will only reap local environmental benefits, such as hazardous waste treatment. Hence, tapping existing green finance in this context should be opportunistic when CE and BE mutual local and global benefits accrue. Alternatively, existing or new policies and dedicated green finance conduits should be considered for Egypt's CE and BE local benefits.

166 The group aims to identify institutional and market barriers to green finance and, based on the experiences of countries, develop ways to enhance the ability of the financial system to mobilize private capital for green investment.

167 WBG 2022a.

5.2.

Egypt Green Finance Architecture

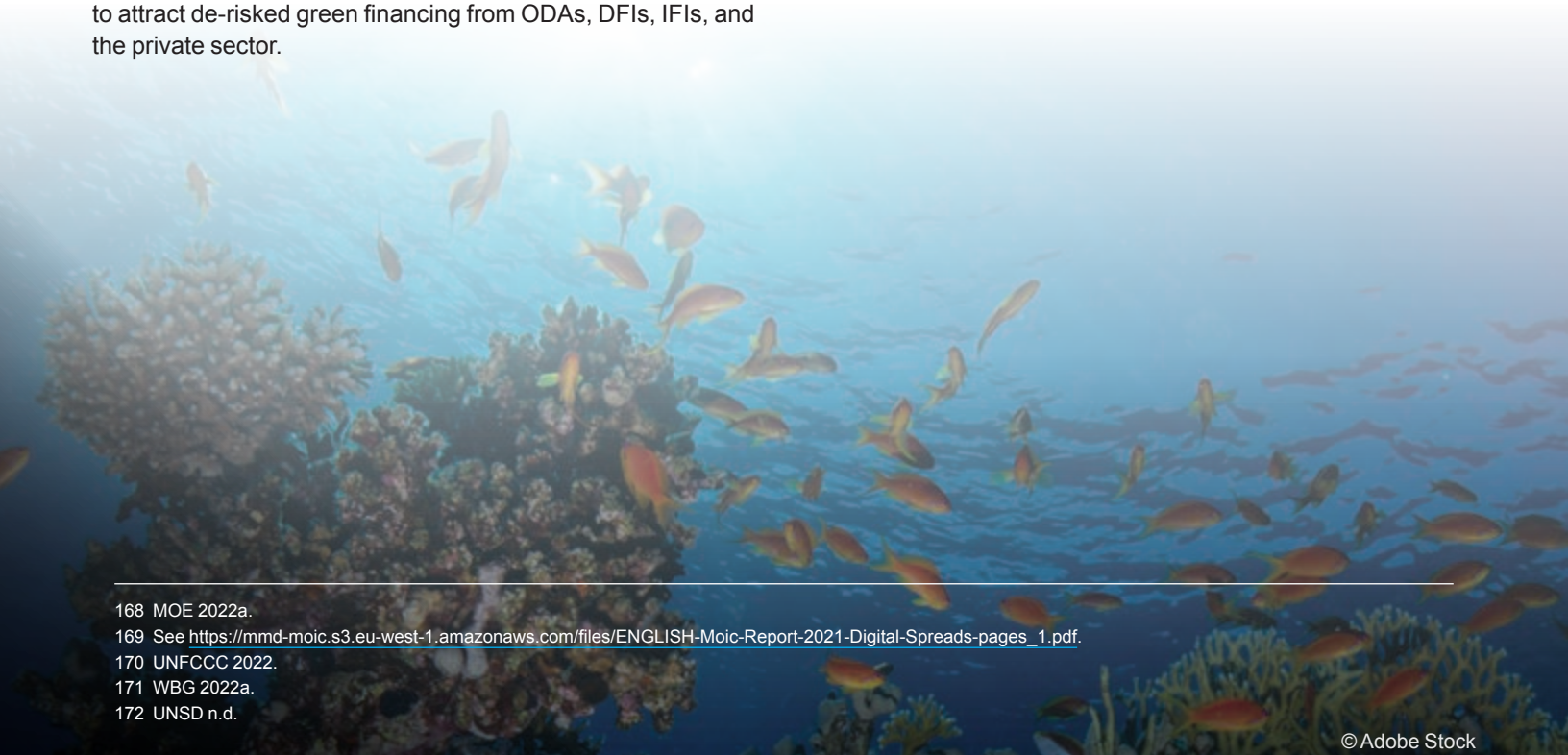
Egypt has been developing a green finance architecture for climate action, *Egypt Vision 2030*, and the SDGs. The MOPED, MOE, Central Bank of Egypt (CBE), and Financial Regulatory Authority, among others, have targeted the public sector, the banking sector, and the financial sector by spearheading the effort covering green financing supply, demand, gaps, and leveraging. Moreover, a series of initiatives were launched at COP27 to bolster the green financing drive.

MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT

In line with the *NCCS 2050,*[168] the MOPED has formulated three Green Financing Principles. These cover (i) mobilizing green finance through **multistakeholder platforms** to cover the environment-carbon spectrum of green financing; (ii) **ODA SDGs mapping** by fostering transparency and embedding a long-term approach to address financing gaps; and (iii) **global partnerships narrative** by establishing a common narrative to ensure that environmental factors are mainstreamed into financial decision making and that banks offer a range of green financing products and incentives for their corporates to increase sustainable activities.[169]

The three Green Financing Principles apply to both environmental sustainability (achieving *Egypt Vision 2030* and the SDGs targets) and climate adaptation and mitigation with a transitional decarbonization stance: achieving Egypt's first (2022) and second (2023) updated[170] NDCs and the *NCCS 2050.* The World Bank Group's 2022 *CCDR*[171] provides a road map that goes beyond 2030 to boost public climate investment, which consists of improving government tiers coordination; greening and streamlining public finance; seeking PPP opportunities; and providing a clear and predictable regulatory framework to build the needed confidence to attract de-risked green financing from ODAs, DFIs, IFIs, and the private sector.

In line with the GOE's *Green Financing Strategy* and the 12 climate action initiatives in Africa launched at COP27, mobilizing green financing within the scope of CE and BE environmental priorities complements the World Bank Group's 2022 *CCDR.* It focuses on fine-tuning policies and harnessing green financing to achieve the CE's prioritized industrial and waste sectors as well as the BE's PAs, tourism, and fisheries that fall under SDGs 1, 8, 9, 10, 11, 12, 13, 14, and 15.[172] Of these, the most notable are SDG 12 on sustainable production and consumption and SDG 14 on life below water as well as the GOE's associated objectives in *Egypt Vision 2030* (figure 5.1).



© Adobe Stock

168 MOE 2022a.
169 See https://mmd-moic.s3.eu-west-1.amazonaws.com/files/ENGLISH-Moic-Report-2021-Digital-Spreads-pages_1.pdf.
170 UNFCCC 2022.
171 WBG 2022a.
172 UNSD n.d.

Figure 5.1: The CE and BE in SDGs and *Egypt Vision 2030*

UN Sustainable Development Goals				Egypt Vision 2030			
Principles	**Pillars**	**Strategic Objectives**	**Sub-objectives Targets**	**Principles**	**Pillars**	**Strategic Objectives**	**Sub-objectives Targets and/or Indicators**
Universality; Inclusiveness; Participatory; Integration; and Transparency and Accountability	For the People	SDG1 No Poverty	7	Embodiment of the new Constitution (setting welfare and prosperity as the main economic objectives, to be achieved via sustainable development, social justice and a balanced, geographical and sectoral growth) Participatory In line with UN SDGs 2015-30 and Africa Union Agenda 2063 Meets our own needs without compromising the ability of future generations to meet their needs	Social Dimension	Social Justice	3
		SDG2 No Hunger	8				
		SDG3 Good Health	13			Health	12
		SDG4 Quality Education	10			Education and Training	7
		SDG5 Gender Equality	9			Culture	1 (Tourism)
	For the Planet	SDG6 Clean Water & Sanitation	8		Environmental Dimension	Environment (sectoral integration); and	8: Water use; Water available; PM reduction; Waste collection and Management; Hazardous Waste Disposal; Biodiversity in terms of Protected Areas; Ozone Depletion Substances; and GHG (but no targets)
		SDG12 Responsible Consumption and Production	11				
		SDG13 Climate Action	5			Urban Development (spatial land and resource development management to ensure quality of life)	12
		SDG14 Life Below Water	10				
		SDG15 Life on Land	12				
	For Prosperity	SDG7 Affordable Energy	5		Economic Dimension	Energy	4
		SDG8 Work & Economic Growth	12			Economic Development	16
		SDG9 Industry, Innovation & Infrastructure	8			Knowledge, Innovation & Scientific Research	6
		SDG10 Reduced Inequalities	10				
		SDG11 Sustainable Cities & Communities	10			Transparency & Efficient Government Institutions	5
	For Peace	SDG16 Peace, Justice & Strong Institutions	12				
	For Partnership	SDG17 Partnerships for the Goals	19				

Source: World Bank staff.
Note: Based on UNSD (n.d.) and MOPED (2016).

MINISTRY OF PLANNING AND ECONOMIC DEVELOPMENT AND MINISTRY OF ENVIRONMENT

In 2021, the MOPED-MOE developed the Framework of the Environmental Sustainability Standards Guide (FEDDG) or the Strategic Framework for Green Recovery. The framework charts down the Legislative and Regulatory Framework for Environmental Sustainability Standards and articulates the mechanisms for integrating environmental sustainability standards into the *Sustainable Development Plan* for each sector, from planning to operations. This guide is retained as a common thread since it covers the CE and BE prioritized categories: (i) eco-friendly industrial clusters and sustainable industrial cities, (ii) proper management and treatment of waste, (iii) marine reserves, (iv) green tourism and environmental tourism, (v) sustainable fishery management, and (vi) public and private green financing. The latter notably prioritizes (a) granting priority to green projects, (b) integrating green approach into the Sovereign Fund of Egypt (TSFE) projects, (c) observing green purchases in the allocations of Procurement of Goods and Services in the state's general budget, (d) granting tax incentives for private sector green projects, (e) granting funding incentives for small and medium-sized green projects, and (f) relying on green bonds in funding eco-friendly development projects. Moreover, the framework provides environmental sustainability practices for the private sector, notably: (i) preparing sustainability reports and disclosure forms for the Framework of Environmental, Social, and Corporate Governance (ESG)/ Corporate Social Responsibility (CSR), as well as CSR programs to achieve SDGs; (ii) sustainable consumption plans and procedures; (iii) waste management (separation/recycling) and reduce the use of plastics; and (iv) rating suppliers' compliance with environmental sustainability standards.

CENTRAL BANK OF EGYPT AND FINANCIAL SYSTEMS

The Central Bank of Egypt (CBE) mandated Egypt's banks to support the UN SDGs by channeling funds to more sustainable economic activities through sustainable finance. In light of *Egypt Vision 2030* towards achieving the UN SDGs and the conviction in the pivotal role of sustainable finance in supporting financial and banking stability, the CBE introduced the *Guiding Principles for Sustainable Finance* through the Circular of July 2021, which sets the foundation for sustainability and sustainable finance concepts among Egyptian banks. It is anchored on six main pillars: (i) building and developing the capabilities of all the bank employees on sustainable finance; (ii) applying the concept of sustainable finance and working to integrate environmental and social elements and governance rules in the banks' financing activities; (iii) enhancing cooperation with the ministries, government bodies, and all stakeholders on the national and international level; (iv) laying the foundation for identifying and managing climate change risks, in addition to encouraging financing projects that contribute to addressing the issue of climate change; (v) applying sustainability principles on the bank's internal procedures and activities; and (vi) preparing periodic reports on the bank's sustainable finance activities.[173] Timed before COP27, the *Guiding Principles for Sustainable Finance* was followed by the issuance of binding sustainable finance regulations through first the Circular of June 2022 on carbon footprint reporting for bank's headquarter building and branches. Then the Circular of November 2022 which encompass several pillars, including the establishment of an independent department for sustainability and sustainable finance within each bank, as well as binding banks to integrate policies and procedures for sustainable finance within their credit and investment policies. This is in addition to preparing periodical reports including a quarterly report on sustainable finance activities, and a yearly sustainability report and finally consulting an environmental expert to assess the large corporate projects from an environmental perspective.

In parallel, financial systems are being targeted by IFIs/ DFIs/ODAs to develop market for climate finance and Environmental and Social Risk Management System in Egypt. For instance, the "Transforming Financial Systems for Climate" (TFSC) program was launched by Agence Française de Développement (AfD) in 2018. This project is an Egypt-wide implementation of a multi-country program set up in 17 countries in Africa and Latin America and co-financed by AfD Group (€413 million) and the Green Climate Fund (€240 million). The specific objectives of the TFSC in Egypt are to: (i) Support Egyptian financial institutions in adopting a climate finance strategy and tools; (ii) Provide support for the promotion of green sustainable growth in different sectors, leveraging both public and private financing; (iii) Consolidate the application of market-based instruments for environmental/climate-smart investments; and (iv) Improve the competitiveness and growth of cleaner business opportunities that lead to job creation.[174]

173 See https://mmd-moic.s3.eu-west-1.amazonaws.com/files/ENGLISH-Moic-Report-2021-Digital-Spreads-pages_1.pdf.
174 See FP095: Transforming Financial Systems for Climate | Green Climate Fund.

FINANCIAL REGULATORY AUTHORITY

The Financial Regulatory Authority has been proactive in mandating sustainability disclosures. In July 2021, Egypt's Financial Regulatory Authority introduced Decrees 107 and 108 requiring companies listed on the Egyptian Stock Exchange and companies in the nonbanking financial sector with minimum issued capital or net shareholder equity of EGP 100 million to report on ESG disclosures. Companies with minimum issued capital or a net equity of EGP 500 million and above should additionally report climate-related risks and opportunities, in line with the recommendations of the Task Force on Climate-Related Financial Disclosures (TFCD). The ESG and TFCD disclosures were first included in the companies' annual *Board of Directors Report* at the end of the 2022 financial year. Additionally, quarterly reports have been required since January 2022 to outline the procedures that each company has taken or will take in relation to the required disclosures.

The first African voluntary carbon market[175] within the Egyptian Stock Exchange for carbon trading was launched in the context of COP27. Under the voluntary carbon market platform enacted by Prime Ministerial Decree 4664/2022, emissions reduction certificates are to be issued and registered by the Financial Regulatory Authority.

SELECTED INITIATIVES LAUNCHED AT COP27

Other green financing efforts launched at COP27 could support Egypt's CE and BE environmental priorities.[176] Friends of Greening National Investment Plans in Africa and Developing Countries Initiative seeks to improve the process of planning and designing economic policies related to climate change. Reducing the Cost of Green and Sustainable Borrowing intends to attract private sector financing in Africa through green social and sustainable bonds. Enhancing Nature-based Solutions for Climate Transformation promotes nature-based solutions in sync with the Rio Conventions. Finally, the Sharm El Sheikh Guidebook for Just Financing[177] supports the maximization of the effectiveness and efficiency of the existing climate finance system in the short term.

5.3.

Green Finance Policy Instruments and Programs in Egypt: Stocktaking, Opportunities, and Weaknesses

Green policy instruments have been used and fine-tuned over time by the GOE, and new ones could be considered to improve the regulatory and policy framework for CE and BE green financing priorities. In this section, existing and suggested green instruments are mapped and broken down between regulatory, fiscal/budget, incentive, and moral suasion-based, with the most relevant ones analyzed. The policy framework of green instruments to target the prioritized CE and BE categories is unpacked in Annex 3, which complements governance aspects covered in chapter 2.

175 See Africa Carbon Markets Initiative announces 13 action programs - Climate Champions (unfccc.int). https://climatechampions.unfccc.int/africa-carbon-markets-initiative-announces-13-action-programs/.

176 See COP 27 : The 12 initiatives to follow for climate action in Africa | Climate Chance (climate-chance.org). https://www.climate-chance.org/en/comprehend/blog-observatory-global/cop27-12-initiatives-climate-action-africa/.

177 See https://guidebookforjustfinancing.com/wp-content/uploads/2022/11/Sharm-El-Sheikh-Guidebook-for-Just-Financing.pdf.

REGULATORY AND INCENTIVE POLICY INSTRUMENTS FOR THE CIRCULAR ECONOMY

In 1997, a hybrid regulatory/incentive instrument was devised under the World Bank EPAP Phase I to support large enterprises to comply with industrial emissions, effluents, and/or waste generation standards. Under this compliance system, a CAP was introduced to help enterprises phase their compliance. Backed by appropriate use of financial incentives (soft loans) as well as by complementary administrative/legal technical advice (environmental enforcement actions), the approach was internalized by the EEAA and scaled up under EPAP II and III to work beyond compliance into cleaner production and resource efficiency. The EPAP approach became the standard in programs funded by ODAs, DFIs, and IFIs. Indeed, the European Investment Bank (EIB)'s new Green Sustainable Industry (GSI) is EPAP's next generation of green financing that is managed by the EEAA; it supports Egypt's industry transition by focusing on local and/or global environmental impact to reap mutual benefits. Modeled after EPAP, GSI provides soft loans through the intermediary banks with a technical assistance and a nonsovereign guarantee where the CE is one of the categories considered for green financing (box 5.1). Still, EPAP-like schemes through a long-term concessional line of credit provided by ODAs, DFIs, and IFIs through the banking sector should gradually be taken over by the banking sector under the purview of MOF or CBE when the macroeconomic stabilization policies that are underway with the International Monetary Fund (IMF) support will reach their targets.

BOX 5.1: ENVIRONMENTAL POLLUTION ABATEMENT PROJECT AND GREEN SUSTAINABLE INDUSTRY GREEN FINANCING

The Environmental Pollution Abatement Project (EPAP) tendered one of the first soft green loans in Egypt in 1996 by using a "carrot and stick" approach consisting of setting up the Egyptian Environmental Affairs Agency (EEAA) compliance system; building the EEAA compliance system capacity; securing industrialists' buy-in by offering soft loans through the banking sector and free technical assistance; ensuring a quasi-budget-neutral financing mechanism as the Ministry of Finance (MOF) had to only cover the sovereign loan guarantee; reinvesting loan repayments and incentives thanks to international financial institution (IFI), development finance institution (DFI), and official development assistance (ODA) lending on various terms; and more importantly introducing the compliance action plan (CAP). The latter is an agreement between the EEAA and the polluter, and the polluter commits to implementing the CAP within a specified timeframe. This allowed the polluting industry to benefit from an initial soft loan with a blended rate to be provided by the MOF and/or IFI, DFI, and ODA that could be followed by a bridge loan to implement the full CAP. An Apex bank (that is, the National Bank of Egypt) oversaw on-lending to participating public and private banks, which in turn provided subloans to creditworthy polluting industries that had committed to reduce their pollution or to implement the CAP.

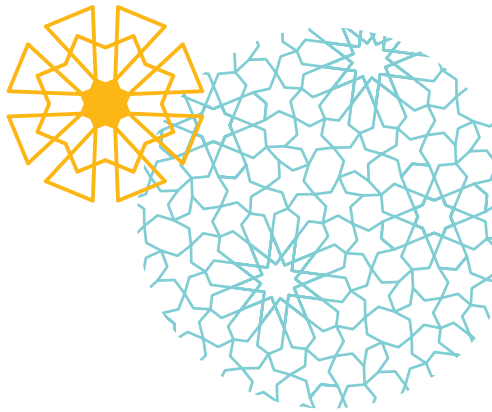
EPAP I (1997–2005, US$40.7 million) funded by the World Bank, European Investment Bank (EIB), and Government of Finland. **EPAP II (2006–14, US$166 million)** funded by the World Bank, EIB, Agence Française de Développement (AFD), Japan International Cooperation Agency, and European Union (EU). **EPAP III (2015–25, €140 million equivalent to US$153.1 million)** funded by EIB, AFD, EU, and Kreditanstalt für Wiederaufbau, with the EEAA as overall manager; National Bank of Egypt (NBE) as the Apex Bank; and Commercial International Bank, Qatar National Bank Alahli-Egypt, and Banque du Caire as participating banks. The three phases of EPAP have directly triggered over €550 million (equivalent to US$600 million) investments in green technology, demonstrated solutions for replication by other companies and supported several national banks to strengthen sustainable financing in their bank operations.

The **Green Sustainable Industry (forthcoming, €271 million equivalent to US$290 million),** which is funded by EIB, AFD, and the EU through the Neighbourhood Investment Platform, is a framework loan managed by the EEAA. Building on the success of and modeled after EPAPs, the financial mechanism provides funding to public and private industrial companies through the banking sector and technical assistance. It focuses on pollution abatement, decarbonization, and energy and resource efficiency so that borrowers comply with national environmental regulations. The guarantees are provided under the Global Europe Neighbourhood Development and International Cooperation Instrument and the European Fund for Sustainable Development Plus.

Source: EIB 2014, 2022.

The UNIDO and SwitchMed technical assistance is modeled after the EPAP compliance setup, with a focus on the adoption of Resource Efficient and Cleaner Production approaches. Initially, technical assistance was directed to identify cleaner production opportunities in companies where demonstration projects proved successful (see chapter 3). The future mobilization of public, private, and/or ODA, DFI and IFI green financing could be the turnkey to a more holistic approach by moving the scope of cleaner production and resource efficiency to the CE and then to scale up the CE to industrial zones (that is, EIPs). That way, local technical CE solutions can be calibrated, promoted, and leveraged by start-ups and academia. Within the TA tools, the Resource Efficient and Cleaner Production Assessment suggested by the UNIDO should be expanded and adopted as a CE tool by the industrial subsector and across sectors. Similar ODAs, DFIs, IFIs, public sector setups are intermediated mainly by the banking sector with soft loans and grants. These are offered with or without TA to MSMEs and households to reduce their local environmental footprint and/or carbon footprint (table 5.2). Furthermore, building on the success of the 2011–16 Industrial Energy Efficiency,[178] UNIDO launched the Industrial Energy Efficiency Fund in 2019 in cooperation with the Regional Center for Renewable Energy and Energy Efficiency and the EEAA to support the delivery of technical services to industrial facilities in Egypt to achieve energy efficiency.[179]

The scaling up of green financing to MSMEs cannot be achieved without credit guarantees, as 90 percent of MSMEs in Egypt are not creditworthy.[180] CBE and some ODA, DFIs, and IFIs provide credit guarantees to MSMEs through the Credit Guarantee Company (box 5.2). There also are hybrid credit guarantees provided by the private sector and ODA, DFIs, and IFIs, such as the EU, the Dutch FMO bank, and the Dutch government that have provided a US$50 million credit guarantee agreement to Commercial International Bank. Yet relevant actors need to pool their efforts and resources to monitor and evaluate MSME green financing outcomes to distill, adapt, and scale up green financing best practices.



BOX 5.2: SELECTED EGYPTIAN CREDIT GUARANTEES

The Credit Guarantee Company (CGC), which is a private joint stock company established in 1989, assists in facilitating access to finance micro, small, and medium enterprises (MSMEs) in Egypt through the application of different credit guarantee products (portfolio, individual, and wholesale) and programs. The CGC offers guarantees for MSME programs relevant to the blue economy and circular economy, such as the following:

- Small and Emerging Business Program covering the microenterprise industrial, service, and commercial sectors since 1999 with cofinancing from the U.S. Agency for International Development and the Ministry of International Cooperation. Target and/or terms: Poor women without or with little income.
- Small and Medium Enterprises Program covering all sectors since 1991. Target: new and existing small and medium enterprises according to the Central Bank of Egypt (CBE) definition for MSMEs.
- CBE Program covering all MSME sectors with a special focus since 2018: creditworthy.
- CBE Tourism Program covering the MSME tourism sector (hotel, tour, transport, and restaurants) since 2020 to mitigate the COVID-19 effects on the sector with the CBE and Ministry of Finance: creditworthy or uncreditworthy.

Source: Credit Guarantee Company, https://cgcegypt.com/; MENA Transition Fund, www.menatransitionfund.org/documents/green-growth-industrial-waste-management-and-sme-entrepreneurship-hub.

178 See Microsoft Word - ToR_EGY_100349_finaldraft.docx (unido.org).
179 See Industrial Energy Efficiency fund (IEEF) - RCREEE.
180 See https://euneighbours.eu/.

Ongoing programs for climate action, energy efficiency, and renewable energy build on the EPAP blending approach with or without TA and could be tapped for selected CE priorities (table 5.2). Despite this diverse green finance supply in the Egyptian market, most funds are directed to energy and climate change mitigation. The Egypt—Accelerating Deployment of Solar Energy in Industrial SMEs initiative is a critical example of how grants can leverage up to 1:10 national capital. Still, limited international and national finance is available for waste management and symbiosis, EIPs, water efficiency, and other CE wholistic approaches.

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Table 5.2: Selected Supporting Donors, Private Sector, and Government of Egypt Green On-Lending, Technical Assistance, and Grants

Mechanism	IFIs/DFIs/ODAs/Private Institutions/ GOE	Amount	Objective/Scope	Target
On-lending through local participating financial institutions (LPFI)	Green for Growth Fund (GGF)	NA	Support renewable energy, energy efficiency and resource efficiency projects	Industry, agriculture
On-lending through local participating financial institutions (LPFI)	Egypt Sustainable Energy Financing Facility (Egypt SEFF)'s EBRD – AFD	€140 million	Promote energy efficient and renewable energy technologies, appliances, and equipment	Private sector
On-lending through LPFI + TA	Green Economy Financing Facilities (GEFF) I's EBRD -EIB – AFD – CBE	€150 million -EGP200 million	Improve use of energy, water and land resources	Industry, commerce, agriculture
On-lending through LPFI + TA + EU grant (10-15%)	GEFF II's EBRD – EU – GCF – AFD	Improve use of energy, water, and land resources	Provide ECO-loans for investments in a wide range of technologies leading to improved competitiveness: • for Businesses: Capital expenditure investments leading to energy, water, and resource efficiency, circular economy, or the use of renewable energy. • for households: certified green buildings, solar water heaters, solar PV, investments in rehabilitation of existing buildings and energy efficient appliances. .	SMEs, households
On-lending through LPFI	Green SME Loan I's EBRD	US$100 million	Promote targeted investment in sustainable energy and climate change mitigation, in the highly diversified private sector	Industry, commerce, transport, agriculture
On-lending through LPFI + TA	Value Chain Financing Facility (VCFF)'s EBRD	€111.1 million	Support SMEs invest in climate mitigation and adaptation solutions and technologies that improve competitiveness and enhance the development of green value chains	Industry, commerce
Grant and Private-Public leveraging	Egypt – Accelerating Deployment of Solar Energy in Industrial SMEs	SMEs,	Unlock the potential in the industrial MSME sector by removing the barriers and operationalizing an enabling framework that allows solar PV business models to become financially self-sustainable	Industry
On-lending through LPFI + TA	Dutch Entrepreneurial Development Bank (FMO) – EU – Dutch Government	US$50 million	Support SME lending, entrepreneurship, and innovation, including a TA through the risk-sharing facility to be provided by the Frankfurt School of Finance and Management	SMEs
On-lending through LPFI + TA + grant	Egypt EPAP III EIB – EU – AFD – KfW	€140 million	Support Environmental and pollution control	Industry
On-lending through LPFI + TA + grant	Green Sustainable Industry's (GSI) EIB – AFD – EU	€271 million	Support Egypt's industry transition to a green economy, including actions for climate change and environmental sustainability	Industry
On-lending through LPFI + TA	EU – Federation of Egyptian Industries' (FEI) Environmental Compliance and Sustainable Development Office (ECO)	Revol-ving grant	Support for renewable energy, energy efficiency and environmental compliance and cleaner production	Enterprises
MSMEDA	World Bank	NA	Support renewable and energy efficiency	Industry, commerce, agriculture
MSMEDA Grants	Bioenergy foundation for Sustainable Development affiliated to MOE	NA	Biogas to small holders	Small holder farmers
MESMEDA Grants	MOE	NA	Finance shredders and equipment for collection and baling of rice straw	Waste contractors
MSMEDA Grants	MOE	NA	Finance shredders and equipment for collection and baling of rice straw	Waste contractors

Source: See https://www.ebrd.com/egypt.html; Egypt and the EIB; Green for Growth Fund (ggf.lu); www.eeaa.gov.eg; www.fmo.nl; Egypt and the EIB; GEFF Egypt II – Welcome to the Green Economy Financing Facility (ebrdgeff.com) Eligibility – Environmental Compliance and Sustainable Development Office (eco-fei.org); EU has been financing projects in Egypt at 500 million euros: MENA – Egypt Today – See https://euneighbours.eu/.

REGULATORY POLICY INSTRUMENTS FOR THE BLUE ECONOMY

Integrated Coastal Zone Management programs in Egypt are mainly financed by ODA, DFIs, and IFIs in conjunction with GOE budget allocations. The ICZM process sometimes lacks continuity while prerogatives across sectors and government tiers often overlap. For instance, two ICZMs were implemented almost in parallel by the MOE and MWRI for the Mediterranean Sea. Moreover, the ICZM scope lacks a strategic perspective when considering the coastal and marine environment to promote BE growth: Resources are in competition, while land-based and marine-based pollution degrades resources and ecosystem services. Marine spatial planning can help public and private marine sectors contribute to green and inclusive development as its process[181] cuts across different coastal and marine sectors, issues, or opportunities where economic tools allow for determining a full range of synergies and trade-offs among competing uses (figure 4.3).

The MSP could build upon ICZMs as well as SEAs, such as the one carried out for the Southern Red Sea tourism sector[182] and could be complemented by the ongoing ICZM process. Although such planning tools have been funded by ODA, DFIs, and IFIs and implemented by governments, the GOE should create enabling conditions for marine financing and reprogram public green financing to help the process.[183] As a first step, government budget allocations toward the MSP process should be funded by earmarking a share of existing rights, permits, charges, and/or taxes collected by the GOE from all maritime activities (such as offshore oil and gas extraction and pipelines, and maritime traffic). Hence, the GOE's MSP process, management, and monitoring could initially require some ODA, DFI and IFI funding, but it should be fully financed by the government budget and be sustainable over time with the redirected focus on BE.

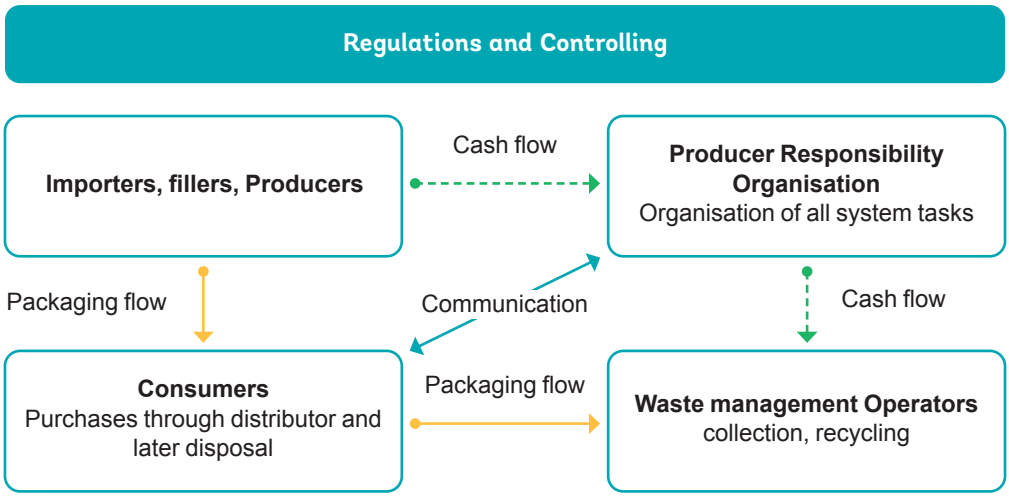
FISCAL POLICY INSTRUMENTS FOR THE CIRCULAR ECONOMY

Thanks to successive IMF programs, the GOE gradually removed the fuel and electricity subsidies and is trying to reduce water consumption by increasing charges and tariffs and introducing penalties.[184] These policies ultimately feed into the CE economy in terms of market prices that will reduce consumption. Conversely, the EPR is the first green fiscal instrument introduced in Egypt with the support of GIZ[185] based on the Waste Management Law 202/2020 and its Executive Regulations Decision 722/2022. Although some private voluntary EPR initiatives are ongoing with the support of the MOE (e-waste), a compulsory hybrid EPR system derived from the German Dual system has started for single-use plastic bags and e-waste, with an EPR fee collected by the MOE/WMRA from producers and distributors. The WMRA is overplaying its role as a regulator and will seek the services of producer responsibility organizations (PROs) to allocate funds to manage the full chain of waste, including collection, recycling, treatment, and disposal. Lessons learned from implementing the single-use plastic bag EPR will help the WMRA design more efficient EPR systems targeting EIPs and industrial zones where waste synergies could be reaped. Based on waste volume, the market can sustain several private, specialized PROs to increase competitiveness and efficiency.[186]

Experiences with the German Dual system are relevant, and clean cut in terms of roles and responsibilities, and can be adapted and replicated to cover different categories of waste. However, the financial burden will be fully borne by the private sector, meaning the consumer, as producers, distributors, and importers will have to build the waste management cost into prices (figure 5.1). The implementation of the industrial waste EPR in Egypt will have to consider critical factors to be successfully scaled-up to reach various segments of the industrial waste value chain: (i) full enforcement and completeness of the EPR regulation which are fully aligned with other relevant regulations; (ii) time bound EPR targets, comprehensive and reliable data, self-reporting, existence of an EPR registry and verification regime by third parties; and (iii) effective collection system, infrastructure and capacity, ideally industrial waste source separation and integration of the informal sector in the scheme. Moreover, the process of transferring waste services to the private sector should also devolve liabilities stemming from waste transport, treatment, and disposal to waste management operators who will have to subscribe to an environmental liability insurance.

181 Alder and Castaño-Isaza 2022.
182 UNDP and Environics 2022.
183 World Bank 2022a.
184 See IMF Executive Board Approves 46-month US$3 billion Extended Arrangement for Egypt.
185 GIZ 2021.
186 See www.gruener-punkt.de.

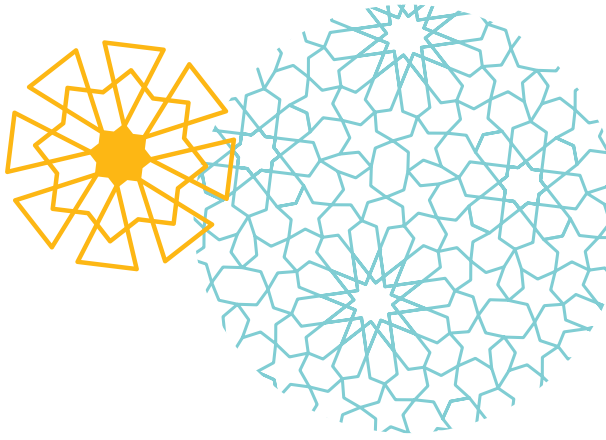
Figure 5.2: German Dual System EPR Setup



Source: GIZ 2018.

FISCAL POLICY INSTRUMENTS FOR THE CIRCULAR AND BLUE ECONOMIES

The MOPED-MOE Framework of the Environmental Sustainability Standards Guide is a commendable initiative that should be mainstreamed and enforced to green the budget, the TSFE, and the issuance of sovereign bonds. Moreover, if the GOE is planning to issue environment impact bonds in the future, repayment is usually indexed to forecasted and/or realized environmental benefits. Considering CE and BE criteria in results-based indexation could therefore help achieve CE and BE outcomes. Conversely, the MOE's Environment Protection Fund that is funded through EEAA resources, penalties, and fees could be used to increase CE and BE outcomes by providing judicious incentives: provision of green incentives toward coastal conservation; complementing MSME loans obtained through various ODA, DFIs, IFIs, and the Micro, Small, and Medium Enterprises Agency (MSMEDA) windows; and/or target direct entities. For instance, the EEAA provided incentives through MSMEDA to traders to collect rice straws that were transformed into profitable products, hence increasing circularity of this agricultural waste and marginally reducing the black cloud.[187] Moreover, the debt-for-climate or debt-for-nature swap instrument, or bilateral swap was reemphasized at COP27 as an instrument for forgiving part of a nation's debt and investing it in conservation and/or climate action schemes.[188] The IMF suggests that the swap be an integral part of a macroeconomic and budget framework with strict macroeconomic and environmental conditionalities to reduce the debt and increase the environmental impact (box 5.3).[189] Debt-for-project swaps were already used in Egypt by ODA, notably the Italian-Egyptian Debt Swap Program[190] that proved successful. The latter was however wider in scope and less efficient as it covered several sectors although some of the previous proceeds were allocated toward green financing; for example, €6 million (equivalent to US$6.8 million) of the Italian Cooperation were allocated to CE for the establishment of the Robbiki Leather City.[191] Hence, the swap instrument should be pursued with ODA within an overall framework of macroeconomic stability while targeting BE natural resources.



187 See www.eeaa.gov.eg.
188 See https://cop27.eg/assets/files/days/COP27%20INNOVATIVE%20FINANCE-DOC-01-EGY-10-22-EN.pdf.
189 Chamon et al. 2022.
190 See https://ilcairo.aics.gov.it/home/country/debt-swap/#:~:text=The%20Program%20was%20established%20in,fifty%2Dthree%20initiatives%2C%20operating%20in.
191 For more information, see https://indiplomacy.it/en/egypt-cairo-ita-leather-italian-companies-2021/; https://cid-egypt.com/about-robbiki/; https://impa.gov.eg/en/project/to-catch-a-moon-fish/; https://cid-egypt.com/about-robbiki/; and www.investinegypt.gov.eg/english/pages/project.aspx?projectid=165.

BOX 5.3: DEBT SWAPS TO BE BOUND BY MACROECONOMIC AND ENVIRONMENTAL CONDITIONALITIES

Debt-for-climate swaps are worth promoting, so long as they (i) expand the fiscal resources of debtor countries that cannot shoulder climate investments based on loans alone and (ii) are designed to maximize the benefits to the debtor. Specifically, they should be structured to ensure that the funds generated by the reduction in debt service are spent on the desired investment rather than general debt service.

The recent debt swap targeted to marine conservation in Belize followed this approach. Belize restructured US$553 million in outstanding bonds through a financing arrangement with U.S.-based Nature Conservancy and pledged to protect 30 percent of its ocean, enforce regulations for fisheries, and draft a framework for blue carbon projects.

Furthermore, to the extent that the debt swap involves a buyback of commercial debt in the secondary market, the buyback should be conducted by a donor/creditor rather than the debtor, as a third party may be able to purchase the debt at a lower price than the debtor country.

Source: Chamon et al. 2022; Chauvin 2023.

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The State Ownership Policy of 2022[192] **clarified the Law 67/2010 and its Executive Regulations issued through Prime Ministerial Decree 238/2011, and could attract the ecotourism sector private investors to consider concession or partnership responsibilities for PA management.**[193] From now on, all PPP contracts in Egypt will be governed by the State Ownership Policy. Egypt has successful ongoing PPP projects ranging from renewable energy projects to green hydrogen projects where a MOU was signed between the GOE, TSFE, and multinational private sector companies. For instance, the MOF PPP Central Unit has prequalified 17 consortia for the tendering process to develop several desalination plants powered by renewable energy. The State Ownership Policy considers all categories of PA management ranging from partnership responsibilities to concessions where the ecotourism sector together with private investors could contemplate right, license, leasing, and concession options (table 5.3).

© Adobe Stock

192 CARE 2022.
193 Hazzaa, Shehata, and Seif 2019.

Table 5.3: Options for Partnership Responsibilities and Concessions for PAs

Options	Description	Period	Examples
Concession	A concession is the right to use land or other property for a specified purpose, granted by a government, company, or other controlling body. It can include a commercial operation and/or a piece of land.	10-40 years	Accommodation, food and beverage, recreation, education, retail, and interpretive services.
Lease	A contractual agreement in which one party transfers an estate (i.e., land and facilities) to another party for a specified, limited period. The lessor retains ownership of the property while the lessee obtains rights to use the property. Typically, a lease is paid for.	5-30 years	Use of fixed infrastructure such as accommodation, airports, restaurants, shops etc. for a rental fee.
License	Gives permission to a legally competent authority to exercise a certain privilege that, without such authorization, would constitute an illegal act. Often seen by the public as a form of quality control and requires due diligence by the competent authority, in contrast to a permit. Possession of the land is not granted through the license. Licenses give protected area authorities the ability to screen applicants to ensure that they fulfil a set of conditions.	Up to 10 years	Means of transportation-based tours (e.g., hot-air ballooning, boat cruise) using operators own equipment.
Permit	A temporary form of permission giving the recipient approval to do a lawful activity within the protected area. Permits normally expire within a short period. Usually, the number of permits is large and limited by social or environmental considerations. In most cases, permits are given to anyone who pays the corresponding fee.	Up to 10 years	Activities such as guiding, boating, canoeing, fishing, and climbing using operators' own equipment.

Source: Adapted from Spenceley et al. 2017.

INCENTIVE POLICY INSTRUMENTS FOR THE CIRCULAR AND BLUE ECONOMIES

Fiscal CE and BE incentives should be overseen by the MOF in conjunction with relevant institutions to increase consistency, efficient greening, and accountability. This will allow investments to be gauged on clear global and local environmental merits, notably with regard to CE and BE outcomes. Under the drive of greening public finance, most of the following incentives should be adjusted to include clear CE and BE criteria:

- Article 11 of the Investment Law 72/2017 provides an incentive in terms of profit tax deduction to projects operating under the agricultural waste recycling industry;
- Prime Ministerial Decree 56/2022 allows investments (notably industrial, housing and utilities, tourism, environment, and agriculture) fulfilling certain criteria to be considered national or strategic and therefore benefit from a Single Authorization Process, while the Public Planning Law 18/2022 reinforces collaboration between the public and private sectors to implement the country's *National Plan for Sustainable Development*;
- Prime Ministerial Decree 20/2022 and subsequent Decrees 981, 982, and 983 allow green hydrogen and ammonia manufacturing projects (including chemicals and chemical products, rubber and plastics products, and other nonmetallic mineral products) to benefit from special incentives to be processed by the General Authority for Investments and Free Zones (GAFI);
- The CBE provides loans guarantees and credit facilities directed to MSME projects and to manufacturing, agricultural, and construction sectors that were discontinued in November 2022 after it adopted a restrictive monetary policy;[194]
- Several governorates provide discretionary tax exemptions as incentives to new enterprises operating within industrial zones or industrial parks; the Special Economic Zone provides incentives for new enterprises in terms of tax and nontax benefits;[195]
- GAFI provides general, special, conditional, and additional condition incentives mostly derived from those provided under Investment Law 72/2017, notably targeting industries (such as packaging, chemical, pharmaceutical, furniture, and agri-food industries) and SMEs;[196] the IDA allows land payments in instalments and provides procedural incentives to MSMEs;[197] and
- The MSMEDA, which collaborates with IDA on industrial parks, grants a series of incentives, such as nontax financial incentives, tax-related financial incentives, and nonfinancial incentives (table 5.2).[198]

Improving the enabling environment and targeted financing for ecosystem services and artisanal fisheries should be promoted. The EBRD carried out an assessment for natural capital valuation in the Red Sea to determine gaps and weaknesses that should be addressed.[199] Egypt recently became a member of UNDP's Biodiversity Finance Initiative that includes the development of a national biodiversity financing strategy and a set of financial solutions to bridge the biodiversity financing gap in the country.[200] The only instrument currently used by the MOE to improve PA management is PA entrance and concession fees; 75 percent of these revenues are deposited in the MOE's Environment Protection Fund. Promoting the creation of markets is also warranted by introducing and scaling up new payment or ecosystem services that will help bridge the biodiversity financing gap. Indeed, the EBRD and UNDP are leveraging these efforts to create these markets and targeted financing schemes for ecosystem services and traditional fishermen.

The *perequazione urbanistica*[201] instrument developed and used in Italy allows transferring building exploitation coefficient rights from one area to another. Hence, coastal conservation or *non edificante* in coastal areas could be promoted by exchanging an exploitation coefficient right (mainly in terms of height) that will be used in urban areas. This right could also be traded on the secondary market and could be bought and sold by developers, investors, and others for future urban development. This instrument could inspire an alternative instrument where the GOE could auction exploitation coefficient rights in new urban development areas such as the New Capital, with the proceeds earmarked for coastal conservation and PAs.

194 See https://www.cbe.org.eg/.
195 Badawy 2020.
196 See www.gafi.gov.eg.
197 See http://ida.gov.eg/webcenter/portal/IDA.
198 See https://www.msmeda.org.eg/.
199 Lammerant and Van Ham 2023.
200 UNDP 2023.
201 See https://elibrary.fondazionenotariato.it/articolo.asp?art=34/3402.

MORAL SUASION POLICY INSTRUMENTS FOR THE CIRCULAR AND BLUE ECONOMIES

Egypt's enterprises are keen on earning international public and private recognition for the quality of their goods and services through certifications that would increase local and export markets for their goods and services. For instance, the integrated platform for social responsibility and sustainable development certified 146 responsible enterprises in Egypt.[202] The 2021 MOPED-MOE Environmental Sustainability Standard Guide adopts the ISO 14030-3 Environmental Performance Evaluation. This specifies the environmental safety standards for each economic sector addressed by the specification, based on a set of basic pillars, in addition to environmental risks management methods.[203] Moreover, in 2019, about 83 hotels in Egypt received Green Star Hotel Certification, which is reported on and provides updates on CSR advancement in the country.[204] Egypt also uses 14 international eco-labels.[205]

202 See https://www.csregypt.com/en/responsible-companies/.
203 See https://www.mped.gov.eg/DynamicPage?id=95&lang=en.
204 See https://www.csregypt.com/en/responsible-companies/.
205 See https://www.ecolabelindex.com/ecolabels/?st=country,eg.

5.4.

Green Financing Opportunities

Capital sources of green financing could be local, international, or a hybrid of both. Table 5.4 lays out Egypt's green financing opportunities by the national and international public sector, private sector, ODA, DFI, IFI and hybrid green financing. Egypt's enterprise, banking, and insurance sectors include publicly owned and private entities, while both publicly owned enterprises and banks are run on a commercial basis.

Table 5.4: Green Financing Opportunity Matrix

Capital Source	National Classification	International Classification
Government	Budget, CBE, Green/Blue Bond Export Credit Guarantee of Egypt Environment Protection Fund MSMEDA TSFE	ODA + Debt/swaps Trade finance Environmental funds Social funds Sovereign wealth funds
Nonprofit groups	Private philanthropy NGOs (micro-credits/ conservation management)	Foundations (innovation) Private philanthropy: donor-advised funds NGOs (help in debt/swaps)
International Financial Cooperation		Multilateral and regional development banks/ funds (IFIs) Development finance institutions (DFIs)
Private Finance	Self-financing Commercial banks Selling off ownership stakes Private equity investors Venture capitalists Crowd funding	Self-financing Commercial banks Selling off ownership stakes Private equity investors Venture capitalists Crowd funding Institutional investors Impact investors
Hybrid	Blending, such as ODAs/DFIs/IFIs and/or public or private apex institution for financing (NBE, MOE/EPF, MSMEDA, etc.) PPP such as setting up a private trust fund	Blending PPP

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NATIONAL GREEN FINANCING

The national green financing in Egypt is partly driven by the GOE. Government budgeting, CBE, debt-for-nature or debt-for-climate swaps, and TSFE were reviewed in section 5.3, where CE and BE criteria need to be mainstreamed into the greening process that was just initiated by the MOPED and MOE. Nonprofit groups include micro creditors that need to include CE and BE criteria in their greening portfolio drive, especially when they target artisanal fisheries.

An enterprise (industrial and tourism, large enterprise, or MSME) or start-up has various sources of financing but does not always qualify for financing (table 5.3):

- **Self-financing** is where the accumulation of retained earnings could be used by the enterprise to improve its CE and BE stance on a voluntary basis or to comply with CE and BE regulations introduced by the GOE.
- **Egyptian banks** are playing an increasingly active role in resilient sustainable development, where 12 out of 33 banks are offering homegrown green financing that targets the renewable energy and housing sectors and will start offering climate-related green loans (see sections 5.2 and 5.3). EPAP-like schemes are needed where a TA could help initially introduce CE criteria to green the banks' portfolio that could later be expanded to target BE (table 5.4). Only about 10 percent of Egyptian enterprises could borrow private money. Egyptian enterprises do not have sufficient corporate ESG responsibility and practice.[206] Most enterprises seek hybrid or blended green financing primarily to increase profits by reducing their production cost structure, especially for energy efficiency, water recovery, and upcycling. Whereas homegrown green financing is a nascent but growing sector that focuses on housing and energy efficiency, enterprises are more likely to borrow from banks on-lending ODAs, DFIs and IFIs hybrid or blended soft loans with very attractive terms, and possibly backed by a TA. Some DFIs are circumventing the government and opting for a direct venture with the banking sector, where in addition to a possible grant for TA, an Apex bank receives the loan to be on-lent to participating banks that will provide soft subloans to enterprises. Yet local banks are not allocating their own resources and realize a small mark-up on the ODA, DFI, and IFI loans as they are unwilling to take the risk of providing the needed capital through traditional lending or leasing for green investments with CE and BE priorities.
- **Egyptian markets do not have sufficient volume and diversity (depth) to support capital market borrowing.** Selling ownership stakes publicly is a common financing mechanism, where 254 companies are listed on the stock exchange with a 4.8 percent dividend yield weighted average. Fifty-three producer manufacturing, industry services, and process industries are listed with a market capitalization of EGP 107.4 billion that could be targeted to improve their CE and BE stance. Whereas the first two sectors show a much better performance (6.02 and 11.5 percent dividend yield, respectively), the latter sector seems to be lagging (0.18 percent). Still, the market capitalization[207] to GDP moved from being significantly overvalued in 2007 (106.8 percent of GDP) to significantly undervalued in 2020 (11.3 percent of GDP)[208] which is unattractive to investors.
- **Egypt has more than 19 venture capital firms that are funded by foreign and local capital.** There is a growing demand for capital from a growing start up ecosystem in Egypt. It is being met by growing venture capital firms (see Supply-Side Green Financing below). Indeed, Egypt is becoming the fastest growing start-up ecosystem in the region. Most financing is directed toward ITC. Innovation, and thus financing, lags in the CE and BE sectors due to lack of guidance (based on an Industrial Needs Assessment) and focused incentives.
- **Private equity firms.** After a hiatus that lasted until 2014, a new generation of private equity firms were driven by the DFIs, such as the EIB, the EBRD, the Dutch entrepreneurial development bank FMO, and British International Investment.[209] In addition to capital to large enterprises, private equity firms also provide expertise to help companies develop, institutionalize, and adopt best practices for ESG matters.[210] These firms are essential to promoting CE and BE practices in the future.

206 See https://euneighbours.eu/.
207 Market capitalization is the share price of the company multiplied by the number of shares issued.
208 See https://data.worldbank.org/indicator/CM.MKT.LCAP.GD.ZS?locations=EG.
209 See https://www.edfi.eu/member/bii/#:~:text=British%20International%20Investment%20(previously%20CDC,for%20International%20Development.
210 Koh 2021.

- **Venture capital for established firms.** Egypt has a few active venture capital firms that provide US$0.5–US$2 million and target SMEs, which is attributed primarily to the high-risk nature of their investments. Venture capital firms that provide US$2–US$10 million are still developing in Egypt and need better promotion,[211] and they should be tapped to better internalize CE and BE practices.
- **Venture capital for the start-up ecosystem.** Egypt has the fourth largest start-up ecosystem in Africa[212] and strengthened its start-up culture[213] by promoting an angel investor network, as there is growing interest from angel investors and venture capitalists to finance green start-ups. There are numerous success stories and there are traditional bottlenecks such as difficulties accessing early-stage financing and steady revenue despite attractive business proposals. Moreover, another main issue of Egypt's entrepreneurship ecosystem is the lack of creative and novel ideas: most entrepreneurs are recycling ideas and trying to adapt them to their context. Incubators and accelerators to support green entrepreneurs would overcome this obstacle, supporting the process from project idea to proof of concept and early-stage operations (box 5.4).
- **A public-private effort indicates growth opportunities in mobile, internet, social media, and e-commerce services, with support from seed capital to incubation services, business consultancies, and networking opportunities.** After the MSMEDA creation in 2017, a venture capital unit was set up to support start-ups through direct investments in venture capital companies, incubators, and accelerators, as well as loans to venture capital firms and early-stage start-ups that partner with a strategic investor. In parallel, the MOIC has partnered with the private sector to create Egypt Venture (MOIC, GAFI and Free Zones, Saudi Fund for Development, and NI Capital)[214,215] and EPG EV.[216] The MOCIT, with the Technology Innovation & Entrepreneurship Center, provides a full chain of support directed specifically at boosting Industry 4.0 technologies. All these public conduits could be used to guide and support CE and BE start-ups, such as the MSMEDA for the BE and the MOIC for the CE.
- **Hybrid blended.** In Egypt, public entities, public banks, and private banks all participate in blended finance. Hence, most MSME, enterprise, state-owned enterprise, project, or program could tap green financing that includes CE or BE criteria. The latter should be seen not only in terms of incentives provided for financial gains but also as a premium accruing to society that should be quantified in terms of social benefits. This approach could be adopted by all ongoing blending operations to promote CE and BE.

Hybrid local PPPs. The PPP mechanism could be used by thoroughly addressing the legal, financial, environmental, conservation, social, and other important aspects before launching the tenders. Private sector contracts are already common for waste collection, treatment, and disposal, and the MOE could rely on PPP contracts to manage PAs. The ecotourism sector can benefit from areas surrounding PAs as long as it manages them according to internationally recognized criteria (such as the Convention of Biological Diversity). A revolving PPP agreement could be considered to develop, manage, and transfer PAs. It would cover aspects of conservation, including engaging communities, promoting sustainable artisanal fisheries, and involving academia in the monitoring of the state of the PA and its surroundings. The SEA prepared for the Southern Red Sea tourism sector could serve as a prototype. The Al Ahrash PA located in North Sinai governorate and the various ICZMs prepared for the Mediterranean coast could serve as a prototype for the Mediterranean. The forthcoming Egypt Coral Reef Initiative of the U.S. Agency for International Development (USAID) is implemented by the UNDP in conjunction with the Global Fund for Coral Reefs.[217] The USAID blended finance vehicle is used to set up a private trust fund to mobilize additional private funds. It is planning to provide an initial seed funding (US$5 million) that should be leveraged by corporations interested in improving their CSR/ESG stance, such as oil and gas offshore companies operating in the Red Sea, maritime transport companies, international telecom companies managing underwater cables, and so forth. Although the trust fund modalities are still being developed, the future fund revenues will help manage and increase the resilience of the Red Sea coral reefs that will be transformed into a PA as mentioned at the COP27 by the MOE.

211 See https://www.ebrd.com/egypt_pevc.pdf.
212 Disrupt Africa 2021.
213 GEM and AUC 2021.
214 See https://egyptventures.com/.
215 See https://falakstartups.com/.
216 See https://www.efgev.com/.
217 See https://globalfundcoralreefs.org/.

BOX 5.4: SELECTED VENTURE CAPITAL FOR START-UPS AND GREEN ENTREPRENEURS IN EGYPT

The Ministry of Environment launched the National Programme for Sustainable Entrepreneurs to support the green economy in partnership with the Center for Environment and Development for the Arab Region and Europe (CEDARE) and MedWaves. The Ministry of Planning and Economic Development, in cooperation with other ministries, also launched the National Initiative for Green Smart Projects in Governorates. Projects and programs also support green entrepreneurs through technical support and capacity building in incubation and acceleration programs like StartEgypt, ClimaTec Run 2020, Green Tech Projects Initiative, and the United Nations Industrial Development Organization's Inclusive Green Growth in Egypt.

Accelerators, investors, and regional funds could be tapped to promote circular economy (CE) and blue economy (BE) innovations, such as RISE Egypt global enterprises and accelerators/investors; Flat6Labs and industry groups and educational institutions; Changelabs is supported by official development assistance (GIZ and Swiss Agency for Development and Cooperation, among others); *Scale Up to Green* in partnership with the Green for Growth Fund and the EU4Energy Initiative implemented by the International Energy Agency. The Green for Growth Fund is a specialized impact investment fund that invests in measures to reduce energy consumption, resource use, and carbon emissions, but the CE and BE are not well defined under the fund's scope of work.

Selected successful green entrepreneurs in Egypt include the following:

- **Tagadod:** pioneering waste management company that usus innovative technology to collect and refine used cooking oil into biodiesel.
- **Go clean:** encourages consumers to segregate recyclable materials such as plastics, paper, and metals.
- **Mobikya:** green interior design studio and upcycling furniture firm.
- **Greenish:** designs and implements sustainable green solutions for schools, NGOs, retailers, and restaurants.
- **Recyclobekia:** first formal company for electronic waste recycling.
- **Up-Fuse:** transforms nearly 3,000 plastic bags a month into fashionable and colorful fabrics, and produces backpacks, tot backs, wallets, cases, and other products.
- **ZeroWaste:** collects aluminum cans through their projects, CanBank, and turns them into products by encouraging can donations in exchange for phone credits.

Sources: www.riseegypt.org; www.flat6labs.com/program/flat6labs-cairo/; https://green-energy-academy.com/; https://changelabsme.org/; www.ggf.lu; https://www.iea.org/programmes/eu4energy; https://egyptventures.com/; https://falakstartups.com/; https://www.efgev.com/.

NATIONAL PRUDENTIAL FRAMEWORK

The green financing of CE and BE activities should be backed by an adjusted prudential framework that includes environmental insurance, green loan guarantees, and an export credit guarantee. The Financial Regulatory Authority, which supervises and regulates Egypt's insurance sector, has implemented new insurance and reinsurance executive regulation decrees to regulate the sector that is governed by the Insurance Supervision and Control Law 10/1981. The latter should soon be replaced by implementation of a comprehensive Insurance Act. The non–life insurance sector also covers natural hazards and liabilities. However, it still needs to comply with international standards, as drafted in the new Insurance Act, before it can attract additional resources such as: foreign insurance companies; draw foreign capital; and develop specific business lines targeting environmental management (such as waste services, PA management, and environmental self-reporting liabilities).

Conversely, the Credit Guarantee Company (CGC), which is a private joint stock company established in 1989, helps facilitate access to finance MSMEs and large enterprises in Egypt. This is achieved through the application of different credit guarantee products (portfolio, individual, and wholesale) and programs and is financed by ODA, DFIs, and IFIs relevant to the CE and BE (box 5.2). The CBE and EU have used the CGC[218] to hedge funds. More specifically, it has a credit guarantee mechanism to encourage banks to finance medium- and long-term credit facilities with high credit risks, and this instrument could be extended to cover investments with CE and BE activities. Finally, the Export Credit Guarantee of Egypt[219] provides prudential services, including export credit guarantees; new rules are needed to strengthen current ESG. This should not only include climate-friendly policies but also ESG, including CE and BE incentives such as longer-term repayment loans or flexible repayment structures, as was innovated by the MOF with the new public credit line extended to the tourism sector with repayment terms linked to each borrower's occupancy rate.

218 See https://cgcegypt.com/.
219 See https://www.ege-eg.com/.

SELECTED INTERNATIONAL GREEN FINANCING

Six international green financing sources are worth mentioning as they could be an interesting vehicle to be tapped for CE and BE activities:

- There are two main types of debt swaps—ODA and third-party/trilateral swaps. The latter involves the participation of another organization, typically an NGO, which purchases debt at a discount from face value from a creditor and negotiates separately with the debtor government the cancellation of the debt in exchange for project funding (although the debtor government still must put aside funds to cover any projects) (box 5.5).
- Through their foundations, individual philanthropists provide donations based on their personal interests and typically do not seek a financial return whereas additional funding is offered by philanthropists through donor-advised funds, a sort of savings account for philanthropists.
- Impact finance is an investment or financing strategy that aims to accelerate the just and sustainable transformation of the real economy by providing evidence of its beneficial effects. It is based on the theory of change model in line with the SDGs.[220]
- ESG normalized scores are very important, as issues such as climate change, loss of biodiversity, waste, and pollution are now key topics for asset managers, banks, and other financial services firms. For instance, the EU has a venture capital and business angel green financing guide to promote the CE with investments in large, medium, and small market capitalization companies. The CE is increasingly seen by businesses, thought leaders, and policy makers to deliver long-term growth to investors while helping address the green agenda, including climate change and other global challenges that will increasingly be assessed according to ESG normalized scores.[221]
- International blending where regional (such as the Green for Growth Fund; see tables 5.3 and 5.4) and global platforms dedicated to climate-related investments' scope could be extended to include mutual benefits where CE and BE criteria could be considered to provide concessional loans to private enterprises in developing economies.[222]
- IFIs could help maximize concessional resource borrowing with guarantees such as the partial guarantees provided by the World Bank to support sovereign or subsovereign commercial debt financing.[223]

BOX 5.5 THIRD PARTIES ENTERING A DEBT-FOR-NATURE OR DEBT-FOR-CLIMATE SWAP AGREEMENT WITH A DEBTOR GOVERNMENT

Low-lying island nations like the Seychelles depend on, and are at the mercy of, the seas. The Seychelles' economy is based on tourism and tuna fishing, meaning it is in the country's best interest to preserve the coral reefs and species that surround it, and it also has a significant financial incentive to sustainably catch fish. The government and nongovernmental organizations (NGOs) agree that the environment and the economy are part of the same ecosystem that is threatened by anthropogenic factors that will be exacerbated by climate change—notably, sea level rise in the future. An international NGO, The Nature Conservancy, brokered the US$22 million deal in 2016 to lower the Seychelles' debt (US$2.6 billion in 2016) where the proceeds of the debt-for-nature swap were transferred to a newly created fund, the Seychelles Conservation and Climate Adaptation Trust. The fund supports adaptation to climate change through improved management of coasts, coral reefs, and mangroves. The financing will promote implementation of a comprehensive marine spatial plan for the entire Seychelles exclusive economic zone, a territory approximately 3,000 times the size of the country's land mass. The deal will also ensure approximately 400,000 square kilometers will be managed for conservation as marine protected areas within five years.

220 Paris Europlace 2021.
221 See https://www.circularcityfundingguide.eu/funding-types-and-their-applicability/equity-and-quasi-equity/venture-capital-business-angels/.
222 See https://cop27.eg/assets/files/days/COP27%20INNOVATIVE%20FINANCE-DOC-01-EGY-10-22-EN.pdf.
223 World Bank 2017.

CHAPTER 6

Toward Green and Resilient Growth

Over the last decade, Egypt has improved its policy and systems for environmental and pollution management. Achieving cleaner and more resilient growth in Egypt will depend on further developing and strengthening complementary policies and systems as well as mobilizing financing for environmental protection, industrial development, and natural resource management. Moreover, institutional reforms and capacity building will be key to ensure effective implementation of adopted strategies and policies.

Based on the analysis in this CEA, priorities for reform and investment should include the following:

i. Strengthen environmental governance
ii. Apply CE principles to reconcile environmental performance with competitiveness
iii. Harness the power of the BE
iv. Promote green financing to protect the environment and ensure sustainable use of resources
v. Build capacities and raise awareness

Key recommended actions, summarized earlier, have been prioritized in terms of impact (high or medium), timeline (short is one to three years, medium is three to five years), and responsible parties. Prioritization is based on consultation and assessment results. Table 6.1 highlights immediate steps the GOE can take while emphasizing the need for medium-term policy and institutional reforms and investments.

Table 6.1: Recommended Actions

Key message	Action	Impact	Timeline	Responsible parties
I. I. Strengthen environmental governance				
Strengthen national environmental law, policies, and national decision making	Promulgate the revised Environmental Law to integrate climate change	High	Short	MOE
	Revise EIA regulations in the new environmental law to include social aspects and strategic assessments	High	Short	MOE and IDA
Mainstream environmental sustainability (including CE and BE) in all national policies	Mandate CE principals in sectorial strategies and develop CE guidelines for industrial sectors (starting with Food & Beverage)	High	Short	MOE, MOTI, MOALR in coordination with MOPED, private sector, and NGOs
Strengthen local decision making and promote partnership	Decentralization: Support Cairo or Alexandra Governorates implement their SDG Plans	Medium	Medium	MOLD, Municipalities of Cairo and Alexandria
	Enhance continuous public-private dialogue for better waste recovery and recycling	Medium	Medium	MOE and MOTI
Enhance institutional framework	Restructure the MOE to reflect core functional areas (policies, planning and innovation)	High	Medium	MOE
Strengthen efficiency and effectiveness of enforcement	Outsource the follow up of environment and social management plans, regular inspections, and monitoring to certified party	High	Medium	MOE (EEAA, WMRA) and IDA
	Modernize environmental management with digital transition (e.g. digital monitoring system, self-reporting)	Medium	Medium	MOE
	Mandate reporting of resource use in license registration and self-reporting of industries during license renewal	High	Medium	MOTI
	Enhance the Continuous Emission Monitoring System and integrate it with other ministries	High	Medium	MOE, EEAA, MOWRI, and MOHP
Improve data reliability, quality, transparency, and accountability	Require a third-party certification	Medium	Medium	MOTI and MOE
	Improve public access to information and participation in environmental matters and engage and empower NGOs and business community	High	Short	MOE

Table 6.1: Recommended Actions

Key message	Action	Impact	Timeline	Responsible parties
II. Apply CE principles to reconcile environmental performance with competitiveness				
Develop incentive mechanism	Set clear national standards for green products	High	Short	MOTI
	Adopt and implement mandatory sustainable public procurement practices	Medium	Medium	MOF and MOE
	Demonstrate Extended Producers Responsivity (EPR) for priority products (e.g. IT equipment, plastic)	Medium	Short	WMRA and MOTI
	Continue to revisit water and energy pricing to gradually remove subsidies	High	Long	MWRI, Ministry of Electricity and Renewable Energy and MOPMR
	Revise the categorization of recycling industries to enable more recycling industries to obtain licenses	High	Short	MOTI
Promote eco-industrial parks	Provide incentives and technical support for CE incubation and acceleration programs to nurture recycling industries	High	Medium	MOE, MOTI, MOPED, MSMEDA, and Private VC accelerators
	Promote technology transfer CE platforms among industries	High	Medium	MOTI
	Promote waste exchange platform based on pilot	High	Short	WMRA

Table 6.1: Recommended Actions

Key message	Action	Impact	Timeline	Responsible parties
III. Harness the power of the BE				
Strengthen the coastal and marine governance system and policy framework	Transfer back overall coordination of all actors to MOE/EEAA through a Prime-Ministerial decision	Medium	Medium	Prime Minister's office
	Strengthen coastal and marine governance by articulating a Blue Economy Strategy	High	Short	MOE/EEAA, Suez Canal Authority and other relevant stakeholders
Launch MSP and ESW (in line with the CCDR and other water-food-energy recommendations)	Adopt MSP to derive synergies between competing demand on marine resources	High	Medium	MOE/EEAA and all relevant stakeholders
Promote investments to increase productivity of fish farming and continue conservation efforts	Explore PA alternative funding such as PPP, creating markets for ecosystem services, debt-for-nature/climate swaps and *prequazione urbanistica*	Medium	Short	MOE, MOTA, MOALR, MOF, and possibly EBRD
	Gauge short- to long-term costs and benefits to help MOE make informed choices when considering PPP or other conduits for PA	Medium	Short	
	Create markets and targeted financing for ecosystem services and micro-credits for artisanal fishermen	Medium	Short	MOE and possibly UNDP
	Involve the private sector having economic activities with a risk to the marine environment in conservation through contributing to the private trust fund for conservation	Medium	Short	MOE and possibly USAID
Increase resilience	Invest in Nature-Based Solution (e.g. reintroducing the Posidonia Oceanica Sea Grass unique to the Mediterranean region) to reduce coastal erosion	High	Medium	MOE, MOALR, NIOF, academia, and possibly IUCN
	Integrate and update EO-based preparedness and response systems across sectors	High	Medium	MOE and all relevant stakeholders

Table 6.1: Recommended Actions

Key message	Action	Impact	Timeline	Responsible parties
IV. Promote green financing to protect the environment and ensure sustainable use of resources				
Promote innovative financing mechanisms for CE and BE	Scale up and mainstream EPAP-like green financing and TA facility	High	Short	MOF, CBE, MOTI, and possibly intermediation mechanisms financed by ODAs/DFIs/IFIs
	Seek innovative financing to improve the stewardship of the BE natural capital: • Negotiate concession or partnership responsibilities to be granted to ecotourism, artisanal fishermen and communities to manage Protected Areas; • Consider debt-for-nature/climate swap agreements; • Encourage the setting up of private Trust Funds to preserve fragile and unique resources	High	Short	Intermediation mechanisms financed by ODAs/DFIs/IFIs to be gradually replaced by the national financial system own resources
	Target start-ups and MSMEs to advance the CE and BE entrepreneurial ecosystem by providing grants, low-interest loans, and credit guarantees	High	Short	MOTI and WMRA
	Build on experience of issuing Green bonds, promote Blue bonds to design investments to protect coastal and marine environment	High	Medium	MOE, MOF, and MOPED
Develop prudential framework for CE and BE green financing	Prepare guidelines for tendering and the MOE monitoring and verification regime	High	Short	CBE and CGC
	Develop the new product lines in the insurance sector to de-risk CE and BE investments	High	Short	Financial Regulatory Authority and insurance sector
	Boost the CGC capacity to provide trade guarantees for CE and BE export products	High	Short	MOF and Export Credit Guarantee of Egypt

Table 6.1: Recommended Actions

Key message	Action	Impact	Timeline	Responsible parties
V. Build capacities and raise awareness				
Strengthen specialized technical institutions	Establish national or regional knowledge center of excellence to promote CE, environmental management policies and standards, and good international industry practices	Medium	Medium	MOE and MOTI
Encourage education	Encourage educational institutions to develop CE programs and environmental degrees	High	Medium	Ministry of Education and Technical Education and MOE
Empower the public	Develop a communication strategy and raising awareness campaigns to address the major environmental and social issues	High	Short	MOE, EEAA, IDA, and WMRA

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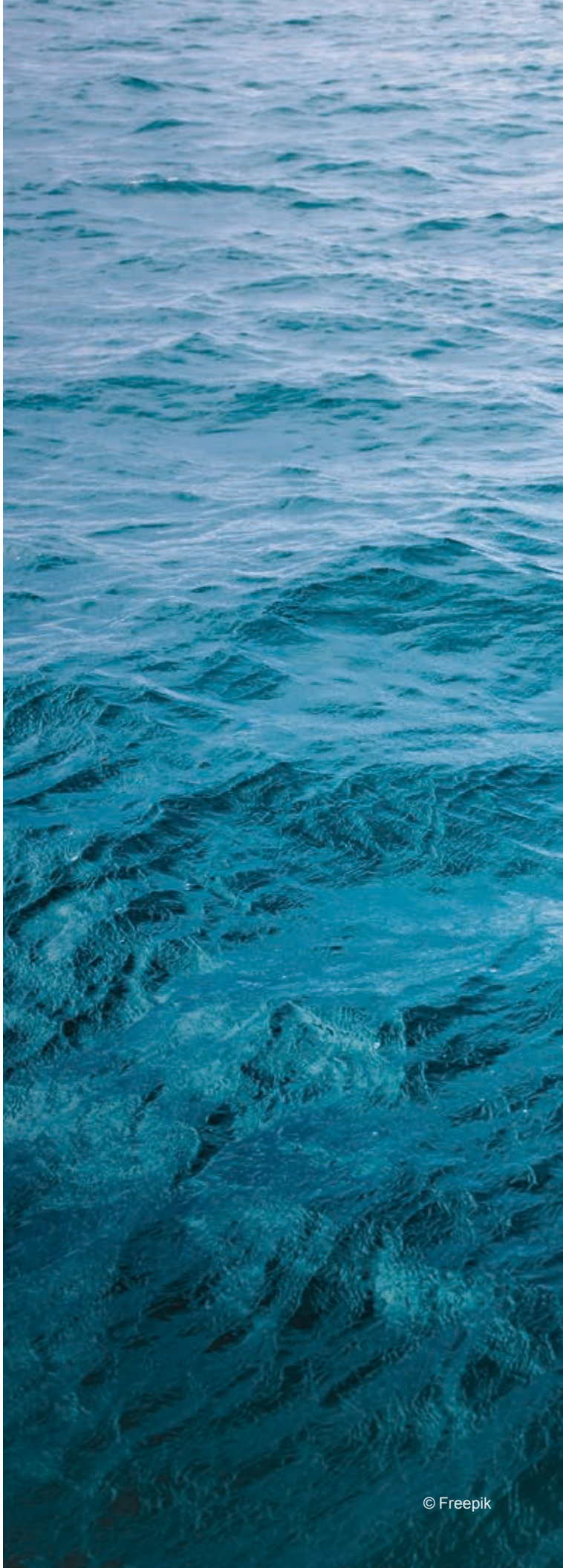

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Annex 1: Cost of Environmental Degradation (CCZED) Methodology

POPULATION

The 2021 population was obtained from CAPMAS (2022) and the WDI (2023).

AMBIENT AIR POLLUTION

- Risk factors from PMx and Ozone are used to derive DALY lost are from the Institute for Health Metrics and Evaluation (IHME) for year 2019 and used for 2021. However, it is important to note that the average PM2.5 as calculated below includes natural (desert dust, sea spray, etc.) and anthropogenic (human-produced) pollutants. A new refined analysis to show the marginal ambient pollution impact from natural causes could be done in Egypt when the ongoing source attribution analysis will be officially released. Population exposed is the coastal urban population in cities with more than 50,000 inhabitants. Although the rest of the coastal population is exposed to a lesser extent to air pollution, it is not considered in the analysis. PM2.5 annual average levels for coastal urban areas were provided by MOE.
- Monetization used is the Value of Statistical Life (VSL) as derived from OECD (2012) and adjusted to 2021 prices is used for premature death using (Navrud, 2009) benefit transfer method, whereas the human capital approach is used for morbidity as follows: the GDP/capita/year in 2021 is used per Disability-Adjusted Life Year (DALY) lost (Murray and Lopez, 1996) which is a health metric equivalent to 1 lost year of healthy life.
- Navrud (2009) for the benefit transfer method.
- GDP figures are available in WDI (2023).

Several epidemiological studies revealed even stronger correlations recently between long-term exposure to $PM_{2.5}$ and **premature mortality** (Apte et al., 2015; Brauer et al., 2016; Gakikou et al., 2017; Leliveld, 2019, among others). In this particular case, the Stanaway et al. (2017) dose response functions for 2019 are used by IHME and were considered for Egypt.

For the Valuation, the VSL is used for mortality whereas the GDP per capita is used *in lieu* of morbidity or the cost of illness.

The benefit transfer involves transposing existing monetary environmental values estimated at one site (study site) to another (policy site), usually with similar context or physical characteristics. There are two approaches for the benefit transfer: the unit value transfer; and the transfer function. In this particular case, the unit value transfer and more specifically the transfer of the unit is used to adjust for differences in income value as described in Navrud (2009).

The transfer of the unit to adjust for differences in income value is as follows:

$$WPp = WPs \times (Yp / Ys)^{ß}$$

Where:

WPp = willingness to pay by household in policy country

WPs = willingness to pay by household in study country

Yp = income in the country policy denominated in purchasing power parity dollar (PPP$)

Ys = income in the country of study denominated in purchasing power parity dollar (PPP$)

ß = income elasticity for different environmental goods and services, which are considered normal goods, are typically greater than 0 (perfectly inelastic which would have meant that the WPp = WPs only adjusted by income where ß = 1.2).

For Egypt, the income elasticity is assumed to be conservatively set at 1.2 (more inelastic), which means that the percentage responsiveness of quantity demanded (in this case the resource) is significantly and slightly lower to the percentage change in income. Hence, the VSL for Egypt amounts to US$336,041whereas the DALY lost is equivalent to the GDP per capita and amounts to 3,876 in 2021.

The Burden of air pollution per coastal urban area is illustrated in table A1.1.

Table A1.1: Egypt Annual Total Cost of Coastal Zone Environmental Degradation - Mean estimate, 2021

Coastal Zone	Population	Avg $PM_{2.5}$	Mortality	Morbidity	VSL	GDP	Mortality	Morbidity	Total
		µg/m³	#	DALY	US$ / Death	US$ / DALY	US$	US$	US$
Med Sea	**5,914,903**		**4,188**	**13,737**			**1,407,345,593**	**53,248,805**	**1,460,594,398**
Al Arish	161,578	25	100	375	336,041	3,876	33,688,901	1,454,608	35,143,509
Alexandria	4,555,661	59	3,384	10,580	336,041	3,876	1,137,159,765	41,012,395	1,178,172,159
Damietta	327,448	17	184	760	336,041	3,876	61,971,539	2,947,855	64,919,394
Marsa Matruh	162,936	25	101	378	336,041	3,876	33,972,043	1,466,833	35,438,876
Port Said	630,528	18	360	1,464	336,041	3,876	120,941,180	5,676,153	126,617,333
Rashid	76,752	74	58	178	336,041	3,876	19,612,165	690,961	20,303,126
Red Sea	**989,800**		**639**	**2,348**			**214,707,980**	**9,100,163**	**223,808,143**
Ismailia	365,858	26	228	850	336,041	3,876	76,618,795	3,293,641	79,912,436
Sharm es Sheikh	55,705	26	58	178	336,041	3,876	19,612,165	690,961	20,303,126
Suez	568,237	25	353	1,320	336,041	3,876	118,477,020	5,115,561	123,592,580
Total	**6,904,703**		**4,827**	**16,084**			**1,622,053,573**	**62,348,967**	**1,684,402,540**

Sources: CAPMAS 2022; www.healthdata.org; Stanaway et al. 2017; $PM_{2.5}$ annual average by urban area provided by the MOE.

Note: PM2.5 annual average were used per coastal area (italicized in the table) and were used for urban areas without data (that is, Al Arish, Marsa Matruh, Ismailia, and Sharm es Sheikh). µg/m³ = one microgram of pollutant per one cubic meter of air.

WATER, SANITATION, AND HYGIENE

Unimproved Water, Sanitation, and Hygiene

- Risk factors to derive DALY lost are from IHME for year 2019 and used for 2021. Population exposed is the entire coastal population (see table A3.2).
- Monetization used is the Value of Statistical life as derived from OECD (2012) and adjusted to 2021 prices is used for premature death using (Navrud 2009) benefit transfer method (using adjusting for purchasing power for parity and elasticity for preference) whereas the human capital approach is used for morbidity as follows: the GDP/capita/year in 2021 is used per DALY lost.
- GDP figures are derived from World Bank WDI (2023).

Water Resource Quality

- Ministry of Water Resources and Irrigation (2021).
- Primary, Secondary, and Tertiary treatment cost based on COWI Consult (2010) levelized costs.
- GDP figures are derived from World Bank WDI (2023).
- For water resource quality, the improvement of all untreated or untreated to tertiary level of coastal wastewater plants is considered to improve the water quality of all coastal bodies.

Water Resource Quantity

- Global Water Market. 2020. Published by Media Analytics Ltd., Oxford United Kingdom.
- For water resource quantity, the unaccounted-for-water (Alkholy, 2021) for the water used for domestic and industrial use was considered as a proxy for accounting for the water that was extracted which affected environmental flow, ecosystem services, rising water table salinity and decreasing water table level. The opportunity cost of water for desalination plant bids in the region is used (mid-point of US$ 0.5/m^3).

WASTE

- Only treatment is covered under waste where the opportunity cost of all recyclables is considered to reduce the waste flow to the coastal and marine environment and is based on Doumani et al. (2015). SWM model prepared for Sweepnet and funded by GiZ. The Model was used to derive the degradation for each coast. The management efficacy reported in the 2020 EEAA SOE of 62 percent for municipal waste is used in the model. Air pollution, leachate (water) and carbon dioxide (global environment) emissions were not considered as they are already accounted for under air, water and global environment, nor the mismanagement of transfer stations, dumps and landfill was considered as mapping of these will require official data and/or Earth observatory analysis.

Fisheries (Sea Around Us). <www.seaaroundus.org/data/#/eez/422?chart=catch-chart&dimension=taxon&measure=tonnage&limit=10**> and the fishery stock used to calculate Egypt's WAVES in World Bank 2021 (Annex 2).- de Groot et al. (2012) for Marine environment and ecosystem services.**

Coastal Disamenities:

- Navrud (2009) for the benefit transfer method.
- GDP figures are derived from World Bank WDI (2023).

The coastal zone is under much stress due notably to untreated wastewater and industrial effluents, fish farms, unchecked ballast water release, harmful algae bloom events, thermal shocks, and risk of oil spills. However, environmental heath diseases associated with these forms of pollution are difficult to identify and some of them are not considered in the calculations.

The degradation and loss of habitat of coastal and marine ecosystems are mainly caused by (EEAA, 2016; Cesar, 2013; PERSGA, 2002; Burke et al., 2011; El-Askary et al., 2014):

- Poor urban planning, rapid development and artificialization of the northern coast and the center of the Suez Canal that is also leading to beach erosion. Coral reefs in Egypt are under threat from high siltation and sedimentation rates due to poorly planned and implemented construction of buildings, especially hotels and resorts facilities associated with the tourism industry. Construction of hotels and other infrastructure often leads to the destruction of fringing reefs, which grow seaward directly from the coastlines, caused by the dredging or dumping of large amounts of sediment. Though this seems particularly a problem of past construction, the impacts of these activities continue. For instance, Hurghada's coral reefs are damaged, displaced, polluted, and stepped on. Corals near Hurghada (Barrania, 2017) have declined by as much as 50 percent over three decades.
- Oil production in general as well as reported and unreported oil spills are fragilizing coral reefs.
- Unsustainable practice regarding the use (deep water overfishing) of marine resources. There are reports of some unsustainable fishing practices along the Egyptian Red Sea coastline, including the use of closed mesh nets, catching fingerlings and even blast fishing. Shark finning and sea cucumber collection have appeared as major additional threats to Egyptian reefs. Removal of sea cucumbers could lead to increases in algae and bacteria in coral reef ecosystems with possibly disastrous consequences.
- Deterioration and loss of spawning sites and the proliferation of algae, especially in the Mediterranean and to a lesser extent in the Red Sea due to existing PAs along the coasts and islands.
- Mining of coastal sand and black sand.
- Thermal stress. Power plants usually release large quantities of hot water in the marine environment.
- Tourism could also be a threat to coral reefs. Offshore coral reefs have suffered damage from careless snorkelers and scuba divers. Visitor numbers in diving areas have ranged from 10,000 to 60,000 divers annually. PERSGA (2002) suggests 10,000 dives per year to maintain the carrying capacity of coral reefs. This is higher than the number of 4,000-6,000 that Dixon et al. (1993) established for Bonaire in the Caribbean but lower than the 10,000-15,000 dives per site established under the Coral Monitoring Program in Hurghada, which is used by the EEAA as a guideline for coral health and sustainability.
- Rate of discharge of sewage, industrial effluents and agricultural runoff in the Mediterranean and coastal lakes. Sewage and phosphate ore washing are the main sources of nutrient enrichment in the Egyptian Red Sea. Sewage, high in nitrogen and phosphorous causes primary production in the marine environment. Algal blooms then subsequently die off, reducing the amount of oxygen in the water causing eutrophication and threatening marine organisms.
- Deterioration of seagrass and corals due to maritime traffic (anchor, etc.). The Suez Canal brings with it a large amount of international trade to be transported through the Red Sea. Therefore, important coral reef ecosystems are under threat from ship groundings. Also, cruise ships and dive boats in reef areas have caused major damage.
- Social pressure on the government to meet the population needs (unemployment, the introduction of new patterns of development, and competition for the utilization of available resources, and the lack of public awareness regarding resource use and depletion).
- The implementation of planned projects including the bridge linking Saudi Arabia to Sharm es Sheikh in Egypt through Tiran and Sanafir islands could constitute additional pressure on coral reefs.
- Corals are particularly sensitive to elevated sea surface temperatures, which can lead to coral bleaching. The Red Sea appears to have suffered less from coral bleaching than another major reef regions. However, thermal stress and ocean acidification in the Middle East region are projected to increase threat levels to nearly 90 percent by 2030, while by 2050 these climate change impacts, combined with current local impacts, will push all reefs to threatened status, with 65 percent at high, very high, or critical risk.

Most compounds monitored by the EEAA along the Mediterranean (15 stations) and Red Sea (8 stations) coasts are above or just within the allowed limits in terms of physical, biological, and chemical measurements. Although significant progress was achieved to reduce marine pollution, the composite index remains high in certain areas of the Mediterranean but relatively in check in the Red Sea. For instance, demand for oxygen exceeds the allowed limits along both the Mediterranean Sea and Red Sea whereas total and fecal coliforms exceed the allowed limits along Mediterranean coastal urban areas putting at risk swimmers and affecting coastal tourism.

FISHERIES

The trend of fisheries from 2004 to 2018 was derived from Lange et al. (2011), Lange et al. (2018), and World Bank 2021 WAVES results for Egypt, as it is derived from Sea Around Us where an extrapolation till 2021 was applied.

COASTAL EROSION

Coastal erosion focuses on the erosion associated with the artificialization of the coast. Sea level rise and its effects on the Nile Delta was covered in the World Bank Group's CCDR. The coastal erosion annualization is derived from Iskander, 2021 where very conservative erosion areas associated with dredging and artificialization of the coast in coastal resorts and hotels were considered. Incidentally, the building of jetties in certain resorts are creatin accretion and erosion although only the latter is considered. From Marsa Matruh to Alexandria, it is estimated that a length of 6.22 km with a width of 3.5 m was lost while in the Sinai, a length of 3.1 km with a width of 3 m was lost (Iskander, 2021). The unconstructed average cost per square meter in these resorts and hotels was derived from several real estate online sites and a US$600/m2 is used. These are preliminary results that need to be firmed up by using Earth observation to determine the actual area eroded due to dredging and artificialization of the coast.

CORAL REEFS

The degradation value of the coral reef ecosystem services is based on the negative trend flows over the last 10 years as calculated and reported in Annex 2 regarding the Natural Capital where De Groot et al. 2012 was used to determine the degradation value based only on the reduction of the coral reef areas over the last 10 years (see Annex 2).

MANGROVES

The degradation value of the mangrove ecosystem services is based on the negative trend flows over the last 10 years as calculated and reported in Annex 2 regarding the Natural Capital where De Groot et al. 2012 was used to determine the degradation value based only on the reduction of the mangrove areas over the last 10 years (see Annex 2).

SEAGRASS

The degradation value of the seagrass ecosystem services is based on the negative trend flows over the last 10 years as calculated and reported in Annex 2 regarding the Natural Capital where Scanu et al., 2022 was used to determine the degradation value based only on the reduction of the seagrass areas over the last 10 years (see Annex 2).

THERMAL SHOCK

There was no data available to assess the damage of thermal shocks to the marine environment next to coastal power plants and certain industrial facilities.

BRINE

All desalination plants use reverse osmosis in Egypt. The brine degradation cost is based on the opportunity cost of producing raw salt from the brine instead of releasing it back to the marine environment. An average 6,298 tons were calculated based on volume produced and are released in the Mediterranean Sea while 4,822 tons are released in the Red Sea in 2021 given the current capacity and production of desalination plants. The opportunity cost per ton of treated brine used for industrial purposes is set at US$230 per ton (Statista 2023).

BALLAST WATER

The disposal of ballast water in coastal areas is undertaken when the tankers reach the shipping ports. This is a source of oil residues that can pollute the waters of the marine environment as well as invasive species that damage local ecosystems. According to WWF Silent Invasion report, not treating ballast waters imposes marine pest associated with direct costs equivalent to about US$0.75 per ton of untreated water in 2021 prices or US$7.5 billion per year for the 10 billion tons of water transported globally each year (WWF International 2009).

As an indication of the size of the problem, it is estimated that globally there are around 10 billion tons of ballast water released into the seas annually (IMO 2012). If responsibility for these is proportional to the volume of trade (almost 90 percent of traded good go by sea) then Egypt would account for about 0.19 percent of the total. Based on the WWF estimate of damages this would result in releases of 16.71 million tons of ballast water. The annual cost would be US$12.53 million.

HARMFUL ALGAE BLOOMS

Although UNESCO has set up a harmful algae bloom monitoring system for Northern Africa, the effects of these events were not valued, given the lack of evidence-based data on their effects on the marine environment in Egypt.

OIL SPILL

There is no information on the cost of clean up after all the oil spills that occurred in Egypt. Unfortunately, the cost grid developed by Etkin 1999 (US EPA, 2004) could not be used as the oil spill volume is not officially reported in Egypt. The GOE fined a tanker for an oil spill in 2010 which is the only official cost of US$108,000 and adjusted for 2021 (US$132,937 per event) that is available. The fine was used for all oil spills that occurred irrespective of the severity of the oil spill.

In the Mediterranean Sea, 218 oil spills occurred between 2014 and 2020 (El Magd et al., 2021) while in the Red Sea only four oil spills were reported by the media between 2010 and 2019. The sum of associated fines was annualized and used in the analysis.

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AGGREGATED RESULTS BY SUB-CATEGORY

Tables A1.2 to A1.4 illustrate the total, Mediterranean Sea and Red Sea CCZED results.

Table A1.2: Egypt Annual Total Cost of Coastal Zone Environmental Degradation - Mean estimate, 2021

Category	Population Considered	Total $CCZED_{2021}$			
		Lower Bound	Upper Bound	Middle Bound	
	million	US$ billion	US$ billion	US$ billion	% of GDP
Air		**1.646**	**2.848**	**1.717**	0.447%
Ambient Air	6.9	1.630	2.784	1.769	0.438%
Ambient Ozone	6.9	0.016	0.064	0.038	0.009%
Water		**2.169**	**3.267**	**2.690**	**0.666%**
Drinking Water, Sanitation and Hygiene	7.4	0.113	0.242	0.149	0.037%
Water Resource Quality	7.4	1.818	2.726	2.272	0.562%
Water Resource Quantity	7.4	0.239	0.298	0.268	0.066%
Waste		**0.629**	**0.851**	**0.740**	**0.183%**
Treatment	7.4	0.629	0.851	0.740	0.183%
Coastal Zone		**0.519**	**5.142**	**0.754**	**0.187%**
Fisheries		0.535	0.723	0.629	0.156%
Coastal Erosion		0.046	0.107	0.077	0.019%
Coral Reefs		0.002	0.398	0.006	0.002%
Mangroves		0.000	0.024	0.000	0.000%
Seagrass		0.012	0.017	0.012	0.003%
Thermal Shock		NC	NC	NC	0.000%
Brine		0.001	0.002	0.001	0.000%
Ballast Water		0.004	0.029	0.025	0.006%
HABs		NC	NC	NC	0.000%
Oil Spill		0.001	4.193	0.004	0.001%
Sub-total		**4.963**	**12.107**	**5.901**	**1.482%**
Global Environment		**1.204**	**2.408**	**1.806**	**0.447%**
Total		**6.167**	**14.515**	**7.706**	**1.929%**
National GDP_{2021}				404.14	

Note: NC = Not Calculated.

Table A1.3: Egypt Annual CCZED Mediterranean Sea- Mean estimate, 2021

Category	Population Considered	Total $CCZED_{2021}$			
		Lower Bound	Upper Bound	Middle Bound	
	million	US$ billion	US$ billion	US$ billion	% of GDP
Air		**1.410**	**2.440**	**1.493**	0.37%
Ambient Air	5.9	1.396	2.385	1.461	0.4%
Ambient Ozone	5.9	0.014	0.055	0.032	0.0%
Water		**1.969**	**2.957**	**2.440**	**0.6%**
Drinking Water, Sanitation and Hygiene	5.9	0.090	0.193	0.119	0.0%
Water Resource Quality	5.9	1.663	2.495	2.079	0.5%
Water Resource Quantity	5.9	0.215	0.269	0.242	0.1%
Waste		**0.615**	**0.831**	**0.723**	**0.179%**
Treatment	5.9	0.615	0.831	0.723	0.179%
Coastal Zone		**0.507**	**4.532**	**0.631**	**0.156%**
Fisheries		0.447	0.605	0.526	0.1%
Coastal Erosion		0.046	0.107	0.077	0.0%
Coral Reefs					0.0%
Mangroves					
Seagrass		0.012	0.017	0.012	0.0%
Thermal Shock					0.0%
Brine		0.000	0.001	0.001	0.0%
Ballast Water		0.002	0.014	0.013	0.0%
Harmful Algae Blooms					
Oil Spill		0.001	3.789	0.004	0.0%
Sub-total		**4.501**	**10.761**	**5.288**	**1.31%**
Global Environment		**0.602**	**1.204**	**0.903**	**0.2%**
Total		**5.103**	**11.995**	**6.190**	**1.5%**
National GDP_{2021}				404.14	

Note: NC = Not Calculated.

Table A1.4: Egypt Annual CCZED Red Sea - Mean Estimate, 2021

Category	Population Considered	Total $CCZED_{2021}$			
		Lower Bound	Upper Bound	Middle Bound	
	million	US$ billion	US$ billion	US$ billion	% of GDP
Air		**0.236**	**0.408**	**0.224**	0.08%
Ambient Air	1.0	0.234	0.399	0.309	0.08%
Ambient Ozone	1.0	0.002	0.009	0.005	0.00%
Water		**0.200**	**0.309**	**0.249**	**0.06%**
Drinking Water, Sanitation and Hygiene	1.5	0.023	0.049	0.030	0.01%
Water Resource Quality	1.5	0.154	0.231	0.193	0.05%
Water Resource Quantity	1.5	0.023	0.029	0.026	0.01%
Waste		**0.014**	**0.020**	**0.017**	**0.00%**
Treatment	1.5	0.014	0.020	0.017	0.00%
Coastal Zone		**0.012**	**0.609**	**0.123**	**0.03%**
Fisheries		0.088	0.119	0.103	0.03%
Coastal Erosion					0.00%
Coral Reefs		0.002	0.398	0.006	0.00%
Mangroves		0.000	0.024	0.000	0.00%
Seagrass					0.00%
Thermal Shock					0.00%
Brine		0.001	0.001	0.0401	0.01%
Ballast Water		0.002	0.014	0.013	0.00%
HABs					0.00%
Oil Spill		0.000	0.053	0.000	0.00%
Sub-total		**0.463**	**1.347**	**0.613**	**0.17%**
Global Environment		**0.602**	**1.204**	**0.903**	**0.2%**
Total		**1.065**	**2.550**	**1.516**	**0.4%**
National GDP_{2021}				404.14	

Note: NC = "Not Calculated."

Annex 2: Coastal Natural Resource Stock Calculations

WAVES METHOD FOR THE BLUE ECONOMY

The Wealth Accounting and the Valuation of Ecosystem Services (WAVES) methodology allows to: (i) estimate quantitatively the stock of wealth of a nation or total wealth (TW) and provide a decomposition of this wealth that helps decision makers identify priority categories; and (ii) provide a proxy to estimate depletion for each category Lange et al. 2011; and Lange et al. 2018). This analysis aimed at calculating Egypt's BE Resource Rents (RR), meaning the net income from resource extraction and ecosystem services (renewable or nonrenewable) available in the coastal and marine environment. RR can be defined as the "projected" total revenue from gross sales less all costs incurred in the extraction process as well as ecosystem services adjusted for inflation that is based on the latest IMF <www.imf.org> macro-framework projections. The current projections relied on actual trends, being positive or negative. Unlike WAVES that projects RR over 100 years, the RR is projected over the time of a generation (considered to be equivalent to 25 years, from 2021 to 2045) in this analysis.

Hence, the natural capital's (NC) stock represents one of the TW four main categories, according to the following basic equivalence:

NC+PC+IC+NFAs= TW

Where:

- *NC* is the Natural Capital, and it corresponds to total resources available in coastal areas and marine waters, including their biodiversity: crude oil, natural gas, fishery, PAs, coral reefs, mangroves and seagrass. Whereas crude oil, natural gas, fishery, and PAs methods are well established, the ecosystem services generated by coral reefs (such as seafood and recreational tourism), mangroves (such as carbon sequestration, fish habitat, coastal protection from storms, wood and nonwood products, and shrimp farming) and seagrass (such as supporting food security, mitigating climate change, enriching biodiversity, purifying water, protecting the coastline, and controlling diseases) are not usually included in WAVES and were valued based on a benefit transfer from meta-analyses notably produced by De Groot et al. 2012 and Scanu et al., 2022) although there is a study that was published in 2003 but was not used (Cesar, 2003). As coral reefs, mangroves and seagrass subcategory valuations are not usually included in WAVES, their valuation bring a more comprehensive dimension to Egypt's BE natural wealth.

- *PC* is the Produced Capital, defined as the accumulation of investment series (that is, gross fixed capital formation), accounting for depreciation of capital. In other words, produced capital can be regarded as the sum of physical capital and urban land but is not calculated in this context.

- *IC* is the Intangible Capital, and it is calculated as a residual but is not calculated in this context.

- *NFAs* are the Net Foreign Assets, calculated as total value of the assets that the country detains abroad minus the value of the domestic assets owned by foreigners. The NFAs are available in the 2021 External Wealth of Nations Mark II database (Milesi-Ferretti, 2021) but are not calculated in this context.

- *TW* is Total Wealth, to be regarded as the present value of future consumption, which is sustainable, discounted at a rate of time preference, over a defined time scale.

Coastal and marine natural capital stock subcategories are illustrated below where table A2.1 provides the area assumptions and retained median values for the NC calculations while tables A2.2–A2.5 provide the projections and meta-analysis adjustments.

1. Oil and Gas: estimation in Red Sea and Med Sea. The WAVES method is used for potential extraction where projected stock and extraction stock were derived from Petrodata Offshore Rig Day Rate Trends (S&P Global Commodity Insights n.d.); and British Petroleum (BP 2022). Incidentally, all variables (volume and prices) could be adjusted to carry out simulations and sensitivity analyses. Tables A2.1 and A2.2 illustrate Egypt's marine flows of oil and gas.
2. Fishery: Three types—artisanal with nonmotorized and motorized as well as industrial time series data—on: catch by pelagic, cephalopod, demersal, and crustacean; total and by boat number of fishermen by fishing type; number of boats by fishing type; average days of work per year per type; as much as possible, the average market price of the four species and if the cost structure is available for fuel, lubricants, and other boat operations and maintenance. The fishery NC relies on the adjusted World Bank 2021 calculation adjusted for 2021, projected over 25 years and discounted at 3 percent. Incidentally, all variables (volume and prices) could be adjusted to carry out simulations and sensitivity analyses in case new policies are introduced to improve the fish stock.
3. Protected areas: The protected areas NC relies on the adjusted World Bank 2021 WAVES calculation adjusted for 2021, projected over 25 years and discounted at 3 percent. There are new protected areas in the pipeline to comply with the Convention on Biological Diversity's Aichi Biodiversity Target 11. All these new PAs could be considered in future to adjust the PA contribution to the NC. Variables (areas) could be adjusted to carry out simulations and sensitivity analyses in case new Coastal and Marine PAs are adopted.
4. Coral reefs: quality and mapping areas: qualitative EEAA data evidenced by available data from scientific literature helped validate trend based on ICRI (Annex 1). Incidentally, all variables (areas and values) could be adjusted to carry out simulations and sensitivity analyses.
5. Mangroves: quality and mapping areas: qualitative EEAA data evidenced by available data from scientific literature helped validate trend as a policy to increase the mangrove areas by 200 ha was adopted by GOE and is being implemented (Annex 1). Incidentally, all variables (areas and values) could be adjusted to carry out simulations and sensitivity analyses.
6. Seagrass: Mapping areas and quality: official data was validated by scientific literature (Annex 1). Although De Groot et al. 2012 provides seagrass values, Scanu et al. 2022 was retained as the analysis is more recent, is more robust and covers several Mediterranean sites in Italy. A benefit transfer was carried out to determine the seagrass values. Incidentally, all variables (areas and values) could be adjusted to carry out simulations and sensitivity analyses.

Table A4.1: Areas and Values Used for Coral Reefs, Mangroves and Seagrass Natural Capital Calculation

Sub-Category	Estimated Area in 2021	Value in 2021		
		Median	Low	High
Unit	**ha**	**US$/ha**	**US$/ha**	**US$/ha**
Mediterranean Sea				
Seagrass	**34,840**	**7,139**	7,000	9,977
Red Sea				
Coral Reefs including seagrass	**319,325**	**79,777**	24,046	4,989,199
Mangroves	**700**	**3,249**	99	243,189

Source: adapted from Chapter 1, Chapter 4 and Annex 1; De Groot et al. 2012; and Scanu et al. 2022.

Table A2.2: Projected Oil and Gas Extraction Cost and Prices truncated in 2030

Production Cost and Spot Price	Unit and ±%	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Production Projection											
Cost of Offshore Oil Extraction	US$/ BOE	46.38	46.84	47.31	47.79	48.26	48.75	49.23	49.73	50.22	50.73
Cost of Offshore Gas Extraction	US$/$m^3$	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.17	0.17	0.17
Spot Price Projection											
Oil Spot Price	US$/ BOE	70.86	71.57	72.28	73.01	73.74	74.47	75.22	75.97	76.73	77.50
Periodical Price Change	±%		1%				1%				
Natural Gas Henry Hub	US$/ million BTU	3.89	5.20	5.36	5.52	5.68	5.85	6.03	6.21	6.40	6.59
Periodical Price Change	±%		3%				3%				
Natural Gas Henry Hub equiv.	US$/$m^3$	0.14	0.18	0.19	0.20	0.20	0.21	0.21	0.22	0.23	0.23

Note: BOE stands for barrel of oil equivalent. BTU stands for British thermal unit.

Sources: BP 2022; S&P Global Commodity Insights n.d.

Table A2.3: Projected Egypt Active Offshore Oil and Gas Production and Natural Capital Flow truncated in 2030

Offshore Oil and Gas in2021 Prices	Unit and ±%	±%, or Log	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Med Sea Offshore Gas Production	**m^3 billion**		**63.07**	**63.07**	**63.07**	**63.07**	**63.07**	**63.07**	**63.07**	**63.07**	**63.07**	**63.07**
Abu Qir	m^3 billion	0%	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
West Nile Delta	m^3 billion	0%	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54	16.54
Nooros	m^3 billion	0%	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4
Atoll	m^3 billion	0%	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6	3.6
Zohr Phase 1	m^3 billion	0%	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6
Zohr Phase 2	m^3 billion	0%	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3
Red Sea Offshore Gas Production	**m^3 billion**		**11.9**	**11.9**	**11.9**	**11.9**	**11.9**	**11.9**	**11.9**	**11.9**	**11.9**	**11.9**
Belayim	m^3 billion	0%	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9	11.9
Gas Natural Capital												
Med Sea NC	US$ billion		(1.1)	1.7	2.0	2.2	2.5	2.8	3.1	3.4	3.7	4.0
Red Sea NC	US$ billion		(0.2)	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.8
Med Sea Offshore Oil Production												
Abu Qir	BOE million		11.0	10.4	9.9	9.4	9.0	8.6	8.2	7.8	7.4	7.0
Red Sea Offshore Oil Production	BOE million		261.0	260.0	259.1	258.2	257.3	256.5	255.7	254.9	254.2	253.5
Belayim	BOE million		27.4	26.4	25.5	24.6	23.7	22.9	22.1	21.3	20.6	19.9
Suez Ras Fanar	BOE million	0%	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6
Suez Ras Budran	BOE million	0%	109.5	109.5	109.5	109.5	109.5	109.5	109.5	109.5	109.5	109.5
Suez Zeit Beit	BOE million	0%	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5	82.5
Oil Natural Capital												
Med Sea NC	US$ billion		0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Red Sea NC	US$ billion		6.4	6.4	6.5	6.5	6.6	6.6	6.6	6.7	6.7	6.8

Sources: EIA 2022; Offshore Technology, www.offshore-technology.com/marketdata/abu-qir-development-lease-conventional-gas-field-egypt/.

Table A2.4: Coral Reef Meta-Analysis Adjusted and Weighted for Egypt, in 2007 PPP$/ha

Coral Reef	Median	Min	Max	Importance for Egypt	Adjustment factors	Median	Min	Max
Provisioning services								
Food	155	0	6,175	Medium-High	75%	116	0	4,631
Raw materials	245	9	64,328	Low	10%	25	1	6,433
Genetic resources	33,048	33,048	33,048	Medium-High	75%	24,786	24,786	24,786
Ornamental resources	292	16	1,555	None	0%	0	0	0
Regulating services								
Climate regulation	1,291	83	2,192	Low	10%	129	8	219
Moderation of extreme events	1,514	4	104,134	Low	10%	151	0	10,413
Waste treatment	85	85	85	No (unknown)				
Erosion prevention	153,880	1,333	306,427	Low	10%	15,388	133	30,643
Habitat services								
Genetic diversity	1,099	7	92,401	Medium	50%	550	4	46,201
Cultural services								
Esthetic information	1,562	0	1,484,996	High	100%	1,562	0	1,484,996
Recreation	114	4	6,429	High	100%	114	4	6,429
Cognitive development	197,899	36,793	2,129,121			45,128	26,038	1,628,426
Total (2007 US$)	**197,899**	**36,793**	**2,129,121**			**45,128**	**26,038**	**1,628,426**

Source: De Groot et al. (2012).

Note: Adjustment factors: 10% for low; 50% for moderate; 100% for high.

Table A2.5: Mangrove Meta-Analysis Adjusted and Weighted for Egypt, in 2007 International Dollar/ha

Mangroves	Median	Min	Max	Relevance for Egypt	Adjustment factors	Median	Min	Max
Provisioning services								
Food	234	0	18,743	Moderate	50%	117	0	9,372
Fresh (water) supply	296	1	4,277	N/A	0%	0	0	0
Raw materials	93	0	4,218	Low	10%	9	0	422
Genetic resources	10	10	10	Moderate to High	75%	8	8	8
Medicinal plants	301	7	596	Low	10%	30	1	60
Regulating services								
Climate regulation	31	7	184	High	100%	31	7	184
Moderation of extreme events	2,238	2	32,291	Moderate	50%	1,119	1	16,146
Waste treatment/water purification	4,197	6	640,099	Moderate	50%	2,099	3	320,050
Erosion prevention	1,226	188	13,076	Medium-High	75%	920	141	9,807
Nutrient cycling	45	45	45	Moderate	50%	23	23	23
Habitat services								
Lifecycle maintenance (esp. nursery service)	1,127	5	123,886	Moderate to High**	100%	1,127	5	123,886
Gene pool protection (conservation)	1,815	9	22,054	Moderate	50%	908	5	11,027
Cultural services								
Opportunities for recreation, tourism	549	20	28,347	High	100%	549	20	28,347
Total	**12,162**	**300**	**887,826**			**6,933**	**212**	**519,329**

Note: Adjustment factors: 10% for low; 50% for moderate; 100% for high.

Source: De Groot et al. (2012)

Annex 3: Existing and Suggested Green Instrument Taxonomy for the Circular and Blue Economies

Instrument Taxonomy	Existing Green Instruments	Green Instrument Implementation, Adjustment, or Introduction
Regulatory	• Standards, bans, permits/quotas, compliance, monitoring, enforcement, and penalties exist • EIA suggested for all projects in FEDDG, 2021 • SEA already used for the Southern Red Sea Tourism Sector • Environmental audit • -MSP and ICZM • Public Contracts Law 182/2018 prioritizes the demand for and from local markets for green and sustainable products	• Cleaner production assessment and eco-efficiency suggested in MOE and SwitchMed, 2016 needs to be implemented • Demolition audit (EU guidelines to be adapted for Egypt) • EEAA to be mandated to drive MSP process • Green procurement (percent recycling) suggested in EU SwitchMed, 2016 and FEDDG, 2021 needs to be implemented
Fiscal / Budget	• Green tax, polluter-pays principle, such as Extended Producer Responsibility (EPR) Executive Regulations under Waste Management Law 202/2020 • Subsidy removal (being gradually implemented by GOE with IMF support) • Charge/fee increase to improve cost recovery and service efficiency (water, liquid/solid/other wastes, energy, etc. is being gradually implemented by GOE) • Debt-for-project swap (4 ODA organizations, including Italian cooperation that is still ongoing) • Green budgeting (implemented by MOPED, mainly focusing so far on transport, construction, and electricity) • TSFE (operational since 2019 and managed independently but in close collaboration with MOPED and close coordination with other regional sovereign funds) • Sovereign green bond of US$750 million so far, mainly targeting transport, water, and wastewater • Environment Protection Fund managed by MOE with some focus on waste and mainly funded by the MOE's own budget, penalties and fines as well as ODAs • PPP funding is common	• Compulsory EPR started to be implemented (e.g., single-use plastic bags and e-waste) and private voluntary EPR initiatives exist for mainly plastic bottles and e-waste • German Dual System EPR to be scaled up to cover waste categories, especially in eco-industrial parks and industrial zones • Target ODA willing to use debt-for-nature/climate swap that was reemphasized at the COP27 • Prioritize green budgeting by notably including CE and BE criteria to be introduced • Greening TSFE projects to be implemented as suggested by FEDDG, 2021 • Green and blue bonds' investments need to cover other sectors by setting CE and BE investment criteria with the possibility of introducing environment impact bonds • Regular public fund appropriations are needed to be leveraged by ODA/DFIs/IFIs to provide CE and BE incentives based on criteria • Public-Private Partnership Law 67/2010 and its Executive Regulations Decree 238/2011 need to be considered for the management of PAs to be managed by the ecotourism sector

Instrument Taxonomy	Existing Green Instruments	Green Instrument Implementation, Adjustment, or Introduction
Incentive	• Tax/tariff exemption, blending, soft loans, etc. extended by several GOE entities and Governorates (e.g., Investment Law 72-Article 11/2017; SCEZ, GAFI, IDA, MSMEDA), and ODA/DFI/IFI facilities through the banking sector • MOE rice husk incentives are being provided through MSMEDA • Procedural incentives (e.g., increasing the renewal cycle, etc.) (considered under Waste Management Law 202/2020) • Voluntary carbon market to offset carbon dioxide emissions and carbon credit company launched in November 2022	• Introducing CE and BE criteria to grant soft loans or provide incentives • Well targeted CE and BE incentives are needed to cover the subsector incentive gaps • Deposit-refund schemes are not considered yet and could be demonstrated for waste categories under EPR, notably e-waste, batteries, glass and plastic bottles, etc. • Creating markets and targeted financing mechanisms for ecosystem services and artisanal fishermen to be complemented by the biodiversity gap financing to determine various sources of funding to bridge this gap • Setting up private trust funds for conservation such as the USAID to be set up under the Red Sea Coral Initiative Trust Fund to be set up by USAID with seed funds to be leveraged by the private sector, notably those involved in the maritime environment • Tradable coefficient of exploitation to preserve the coast and manage protected areas
Moral Suasion	• International Certification, e.g.: • ISO 14030-3 Environmental Performance Evaluation • Ecolabeling • Fair trade • CSR Egypt platform • Knowledge alert, e.g., early warning systems for high levels of pollutants under the ongoing *World Bank Greater Cairo Air Pollution Management and Climate Change*.	• International Certification to be introduced, e.g.: • Circularity • Social Enterprise Accreditation • Environmental Performance Rating (PROPER) was considered under EPAP II but was not implemented


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