State of the Environment
Arab Republic of Egypt
Summary for Policymakers
2020
In the Name of God, the Most Gracious, the Most Merciful
State of the Environment
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Summary for Policymakers
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Introduction
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Environmental action faces many challenges in Egypt; however, the achievements and breakthroughs are enormous. In this report on the State of the Environment in Egypt for 2020, we present accurate monitoring of all the elements of the environment and the mechanisms for confronting various challenges, as well as an outlook for a greener future. It is worth noting that 2020 was a pivotal year, not only on the national level but also on the global one. In 2020, the world faced unprecedented challenges, represented by the COVID-19 pandemic, which crossed the geographical borders between countries, and claimed the lives of thousands of people in various parts of the world. Its impact also extended to the economic and social aspects.

There is a clear similarity between the COVID-19 pandemic and climate change. Both do not recognize the borders between countries and both require the vital international cooperation to overcome this pandemic and address climate change. These challenges highlighted the need to seize the available opportunities to support the resilience of the national economy and its ability to withstand and respond to emergencies and disasters. They also stressed the importance of capacity-building in the areas of post-pandemic green recovery and the preparedness to face climate change impacts.

Environmental action has witnessed several important transformations during the current period due to the tremendous support provided by the political leadership. His Excellency, the Egyptian President has always emphasized that improving the state of the environment is a participatory process that should be carried out by all without distinction, in order to preserve natural resources, and secure their optimum use without any waste or depletion since they belong to future generations. This goal can only be achieved through empowering the youth and raising environmental awareness among Egyptian citizens, in addition to launching green incentives to support the participation of the private sector in environmental action.
The Egyptian constitutions and their amendments included explicit and implicit texts related to environmental protection. Article 46 included the right to a sound and healthy environment, considering it a binding national duty for everyone to preserve these resources, protect them from any harm, strive for their development, and take into consideration the rights of future generations to these resources.

Environmental and health sustainability issues were among the most important issues tackled by the global community during the past decade. These issues deserve priority attention because they are linked to national development. The report highlights the importance of the environment’s contribution to promoting human health and well-being and focuses on the interactions and links that connect the environment and human health.

The COVID-19 pandemic represented a great challenge impeding the achievement of sustainable development goals in our dear country. However, we proudly thank God the Almighty for having a wise political leader as His Excellency President Abdel Fattah El-Sisi, who set the protection of the environment and the achievement of sustainable development as top priority issues. This resulted in confronting all the challenges systematically and collectively, enabling Egypt to overcome this enormous ongoing ordeal. Integration between the various relevant ministries resulted in containing the pandemic, mitigating its negative effects, and overcoming the successive waves of Coronavirus.

In addition, environmental programs and plans were implemented to confront the impacts of this critical problem, which reflects the political leadership’s wise and rational role in managing crises. In the meantime, I would like to point out Egypt’s success in 2015 (the same year that witnessed the United Nations’ adoption of the Global Sustainable Development Goals) in formulating a Sustainable Development Strategy (SDS) entitled “Egypt’s Vision 2030”. The vision emphasized the environmental dimension in the development process by integrating environmental considerations into economic and social development planning for the effective management of natural resources, and the preservation and development of natural capital to preserve the rights of future generations. Egypt’s Vision 2030 aims to improve the quality of life in the country, raise awareness of environmental protection issues and reduce climate change impacts. In addition, it emphasizes the need to stop the deterioration of the environment and maintain a balance between population surge, economic growth, and the available natural resources through the shift to more sustainable consumption and production patterns, encouraging the transition towards a green economy as well as providing a new understanding of the relationship between the environment and the economy.

The State of the Environment Report 2020 explores the key environmental issues in an attempt to show common interlinkages and the environmental, economic, social, technological, and awareness challenges. Furthermore, it provides an analysis of the transformational sustainable development paths and policies to achieve the Sustainable Development Goals and other internationally agreed environmental targets while highlighting the gaps between achievements and commitments.

Therefore, this report sheds light on the challenges, obstacles, and structural problems in all sustainable development dimensions, and identifies the necessary policies to deal with them, with an emphasis on future directives to ensure their implementation on the ground. It also underlines the role of the youth and the integration of society with all its sects, especially women, in the field of environment to achieve sustainable and equitable development, highlighting the important role played by trade unions, syndicates, the private and civil sectors, and other non-governmental institutions. This approach coincides with the endeavor of the Egyptian state, since the beginning of the current millennium, to find an appropriate mechanism to implement the principles of environmental governance, in a manner that benefits all the parties involved in the development process and helps achieve sustainable development.
This report considers climate change as one of the driving forces of environmental changes; as Egypt opted to join the whole world in confronting this phenomenon, owing to the grave dangers it poses. It suffices to note that the Intergovernmental Panel on Climate Change’s (IPCC, 2021) recent report has shown that extreme heat waves that used to occur once every 50 years are already occurring once every ten years. If the human community manages to keep the temperature increase rate at 1.5°C, these phenomena will recur approximately every five years. The report also stated - with a greater degree of confidence than ever - that without a real effort to eliminate carbon emissions, the temperature will rise to at least 1.5°C above the pre-industrial levels over the next two decades, and this will have serious and irreversible effects.

Through this active participation in international efforts to address climate change, and in line with Egypt’s Vision 2030, the Egyptian government is working towards reducing greenhouse gas emissions, to which Egypt’s contribution does not exceed 0.6% of the global total. Egypt has adopted policies for the transition towards clean energy by completing the legislative framework supporting the dissemination of renewable energy technologies, which significantly contributed to attracting private sector investments that amounted to about 6 billion US dollars in 2020, bringing the total renewable energy capacities to about 6 thousand megawatts. Egypt has also announced a national goal represented in producing 42% of its electricity from renewable sources by 2030.

Additionally, several initiatives are being implemented to improve energy efficiency in the industrial, construction, and electricity production sectors. Egypt is also implementing several sustainable transport projects such as the underground metro, the monorail, and electric trains; to encourage the use of public transportation instead of passenger cars which are one of the main sources of air pollution and carbon emissions. Egypt has also completed the legislative and institutional framework necessary for the integrated management of solid waste, which is also one of the sources of greenhouse gas emissions. Egypt has strong reasons to combat climate change, not only because it is one of the countries most vulnerable to its impacts which threaten the sustainability of the development process and the well-being of its people, but also to remain competitive as the global economy moves towards a carbon-free future.

The report exhibits many details of the various environmental issues that concern Egypt. On top of these issues is the national program for integrated solid waste management. Egypt has attached special importance to solid waste to restore the country’s civilized facade, as production and consumption unsustainable patterns threaten its ability to achieve sustainable development. In addition, Egypt exerts endeavors at the national and international levels in the field of biodiversity protection, while it has assumed the presidency of the Convention on Biological Diversity Conference of the Parties 14 (COP14), and now holds the presidency of the United Nations Framework Convention on Climate Change COP27. This reflects Egypt’s recognition of the vital importance of natural capital, biodiversity, and ecosystem services, and its quest to increase support for nature-based solutions, due to their importance for climate change mitigation and adaptation. Egypt is working to protect and exploit its natural heritage to promote sustainable eco-tourism through 30 nature reserves, some of which are of unique value to the world’s natural heritage, such as the Wadi Al-Hitan site in Wadi El-Rayn Reserve.

Air quality is also one of Egypt’s top priorities as declared in “Egypt’s Vision 2030”. Therefore, the state has issued many legislations and policies that go in line with the global initiatives to reduce emissions. In this regard, the Ministry of Environment has installed an integrated and advanced system for environmental monitoring, consisting of 108 stations distributed geographically throughout the country. Air quality monitoring is carried out through automated 24-hour monitoring systems to improve and develop pollutants monitoring and control systems, and to
integrate air pollution impacts into the health and economy systems.

Water resources are one of the most important natural resources in Egypt, among the most significant elements of the ecological system, and one of the axes of development in the country. The report sheds light on the state of water resources in Egypt, citing that the Nile River is the main source of water, while the other sources represent about 7% of the water resources in the country. Due to the limited per capita share of fresh water, especially with the increasing demand as a result of the high population growth, it was necessary to preserve and protect these resources, exert all possible efforts for their optimal use, and safeguard them against pollution risks, in a manner that guarantees the rights of future generations.

The report seeks, as well, to identify the challenges facing land resources’ sustainability and protection against pollutants that affect food security. Thus, Egypt is implementing a strategy to support and develop the agricultural sector and has succeeded in providing food security despite the difficult conditions caused by the COVID-19 pandemic.

The report also reviews the existing status of biodiversity in numbers, with an accurate vision that is not limited to the quantitative number of species, but rather the qualitative diversity and its significance in terms of the number of subspecies, breeds, endemic and semi-endemic species as well as the newly registered species within the Egyptian flora. Moreover, it highlights the potential impacts of climate change and the global situation during and after the COVID-19 pandemic.

The current report for 2020 presents the scientific evidence that confirms the interdependence between human activities, climate, and biodiversity in changing the marine/coastal environment, which significantly affects its environmental and functional characterization. It also emphasizes the role played by the state, represented by the Ministry of Environment, to achieve the sustainability targeted in Egypt’s Vision 2030, in line with the global development goals and commitments. This in particular concerns the natural coastal and marine environment (ecosystem), its impacts on the social and economic aspects of the surrounding communities, the integrated coastal environment management, and its relation to the sustainable development goals.

The future vision of environmental action in Egypt relies on basic principles that are compatible with the sustainable development strategy – Egypt’s Vision 2030 - to achieve the concept of sustainable and balanced growth and development. The state is aware that environmental systems constitute a complex network of interactions that require the Ministry of Environment’s coordination with various ministries, concerned parties, as well as scientific, research, and academic institutions to contribute to the analysis of these interactions and their impact on the economic and social aspects of the public’s life. These interactions are then linked to the pillars and axes of the state of the environment and Egypt’s Vision 2030.

Through this integrated environmental assessment and the analysis of the state, impact, driving forces, and pressures that cause environmental change, this vision hopes to develop effective and fair policies and better formulate future environmental decisions through acquiring knowledge about the state of the environment. It also hopes to address interconnected pressures and impacts as a new baseline to develop environmental and sustainable development policies and the associated governance systems in light of the current and future development challenges. Therefore, I hope that this report supports the Egyptian state’s plans and “Vision 2030” to achieve the sustainable development that we all aspire to and for which the political leadership has harnessed all the means in various areas of developmental action throughout the country.

Long live Egypt! Long live Egypt! Long live Egypt!
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walid Hassanein 2007 White Desert in western Egypt
Environment and Development: Priority Issues

Egypt formulated the Sustainable Development Strategy “Egypt’s Vision 2030” in 2015. This strategy emphasized the environmental dimension in the development process by integrating environmental considerations into economic and social development plans, to manage natural resources, preserve the natural capital and develop it to uphold the rights of future generations. This strategy aims to improve the quality of life in Egypt, raise awareness about environmental protection issues and reduce the impacts of climate change. It also underlines the need to stop the deterioration of the environment and conserve its equilibrium by striking a balance between population, economic growth, and available natural resources. This is achieved through the shift to more sustainable consumption and production patterns while encouraging the transition toward a green economy.

In 2020, the world faced unprecedented challenges, represented by the COVID-19 pandemic, which crossed geographical borders between countries, and claimed the lives of thousands of people in various parts of the world. It also affected the economic and social aspects. Its impacts were similar to those of climate change in terms of their indifference towards borders between countries, and the significance of international cooperation to overcome them. These challenges revealed the need to seize whatever opportunities they may offer to support the resilience of the national economy and its ability to withstand and respond to emergencies and disasters. They also underlined the importance of building capacities in post-pandemic green recovery areas to complete preparedness for climate change impacts.

The evolution of consumption patterns in Egypt is one of the most important issues known for its environmental and economic impacts. Consumption patterns, accompanied by significant economic and population growth, successive technological developments, as well as cultural and social factors, have undergone significant changes during recent decades. The rates of ownership of cars, household appliances, and communication tools such as mobile phones and audio-visual equipment have increased. This has been clearly demonstrated during the COVID-19 pandemic lockdown, leading to the exacerbation of waste problems. Accordingly, these changes highlighted the urgent need to change unsustainable consumption habits through continuous efforts in the field of education and public awareness, and the involvement of NGOs, the academia, the media, and intellectuals in society.

Estimates have shown that if global consumption patterns continue as they are today, by 2050 people will need three times more resources than those currently on earth. Therefore, the transition from a linear to a circular economy must be considered, along with encouraging sustainable consumption and production patterns, which will result in reducing the quantity and improving the quality of generated waste. In order to change the current unsustainable patterns of consumption and production, the Egyptian economy must go through a transitional phase towards building a circular economic model, in which waste production is reduced and the quantities dumped in landfills minimized. This is to take place through the expansion of recycling and reuse operations, and upgrading the efficiency of the use of raw materials and products, in addition to improving waste disposal efficiency.

Waste management has always been a major environmental issue in Egypt. Waste production increasing rates can be attributed to population growth, change in consumption patterns, changes in waste characteristics, and the low level of technology associated with its disposal, in addition to the financial sustainability of its management systems. Recently, the sources of waste have diversified by adding new forms such as hazardous waste, electronic waste, as well as construction and demolition waste. The waste sector contributes about 8.1% of the total greenhouse gas emissions in Egypt, and the unsafe disposal of waste in open landfills contributes to air pollution and increases greenhouse gas emissions resulting from the open burning of waste or spontaneous combustion. Egypt produces about 90 million tons of solid waste annually, about 20 million tons of which are municipal solid waste, whose mismanagement and unsafe disposal lead to serious environmental and health risks. Moreover,
poor solid waste management practices in Egypt cost about 0.2% of the gross domestic product annually (UNDP, 2021). The increase in waste production due to unsustainable consumption patterns also poses a major threat to ecosystems. This excessive consumption results in producing non-biodegradable waste in the form of plastic packaging, toxic e-waste, and harmful chemicals that seep into groundwater and waterways. Even when some of this waste ends up in sanitary landfills, it generates huge amounts of methane, which is considered one of the worst greenhouse gases due to its superior warming potential.

Waste management concepts around the world have evolved from managing end-of-life products waste to a more comprehensive resource management; that is, from a linear to a circular economy, where materials are reused within the economic system to reduce waste production. All components of the hierarchical waste management system must be taken into account, including collection, transportation, recycling, treatment, and even final disposal. Therefore, integrated waste management is a critical empowerment for the circular economy. According to the circular gap report for 2021 (Circle Economy, 2021), Egypt ranks among the largest “developing countries” characterized by increasing industrialization rates and growing demand for resources. Thus, many opportunities should be seized when prioritizing resource efficiency improvement, energy efficiency improvement and renewable energy use. Consequently, the climate policies currently adopted in Egypt will play a vital role in the transition to a circular economy.

Furthermore, the municipal solid waste policy and management framework are relatively complex. Tasks regarding implementing various aspects of the waste management system are carried out by different ministries and agencies, including the Ministry of Environment, the Ministry of Local Development, and the Ministry of Interior, in addition to relevant governorates, and private and informal sectors. This requires a great deal of coordination and cooperation between these authorities. The Waste Management Law No. 202 / 2020 has contributed to defining the roles of the different entities operating within the waste management system at the national level while promoting a set of integrated waste management principles, such as the “Polluter pays” principle and the “Extended producer responsibility” principle. The new
law also reinforces the principles of reducing waste generation, and the need for waste reuse and recycling, while ensuring the financial sustainability of the system, which was one of the most important obstacles during the past years. The Waste Management Law places restrictions on the manufacture, import, and export of single-use plastics. It also seeks to promote the production of environmentally friendly alternatives to single-use plastic bags by providing economic incentives such as tax exemptions for private sector companies and single-use plastic bag producers.

As the world shifts away from using fossil fuels in industry, transportation, and power generation, plastics appear as the last chance to continue producing and using oil and gas. The International Energy Agency (IEA) expects petrochemicals to account for more than one-third of the growth in world oil demand by 2030, and nearly half of that growth by 2050. The Agency also reports that energy demand in the plastics and petrochemical industries has exceeded the demand in other industrial products (such as steel, aluminum, or cement). This demand has almost doubled since 2000 (IEA, 2018). The petrochemical sector represents about 3% of Egypt’s GDP, and 12% of the industrial sector output. Despite the relative availability of oil and gas, Egypt is highly dependent on petrochemical imports from the global market. The state’s plan for petrochemicals currently aims to balance the trade deficit by increasing exports and reducing dependence on imports (Fitch Solutions, 2021).

Waste conversion into energy also plays an important role in the circular economy, as non-recyclable waste or waste that can no longer be recycled can now be treated and its energy used. This is also coupled with the elimination of toxic waste through thermal treatment in order to prevent it from ending up in landfills or being burnt; thus, releasing methane or carbon dioxide, in addition to its associated negative effects on air quality and human health. Through this controlled burning, waste energy is used to generate electricity and heat, which contributes to saving fossil fuel use. This recovered energy can also be used in domestic, industrial, or commercial applications, and the bottom ash produced during incineration can be used in paving roads. Thus, the conversion of waste into energy is a clear example of the adoption of the concept of sustainability in the circular economy.

Egypt issued an electricity tariff for energy generated from waste in 2019 and a pilot project was implemented to generate energy from municipal and agricultural waste in Fayoum Governorate. The Egyptian government encourages the private sector to invest in this field by providing easy financing opportunities through public banks.

The COVID-19 pandemic and climate change have highlighted the need for international cooperation that ensures fairness in the distribution of vaccines, emphasizing the necessity of collaboration to reduce greenhouse gas emissions and move towards a carbon-free economy. Moreover, support should be provided to developing countries to enhance their ability to adapt to climate change impacts and reduce these negative effects on human life. Egypt has taken many exceptional measures to deal with the pandemic, and protect people’s lives and livelihoods. It is now steadily moving towards a “green recovery” that aims to rebuild the economy and create job opportunities while pushing forward green growth.

The latest report by the Intergovernmental Panel on Climate Change (IPCC, 2021) reveals that the extreme heat waves that typically occur once every 50 years are now occurring on average once every ten years. If the human community manages to maintain the temperature increase rate at 1.5 degrees Celsius, these phenomena will recur once every almost five years. The report also stated - with a greater degree of confidence than ever - that without a real effort to eliminate carbon emissions, the temperature will rise by at least 1.5 °C above the pre-industrial revolution levels over the next two decades, and that will cause serious irreversible effects. Climate forecasts show that the Middle East will be specifically affected by rising temperatures that will lead to a tremendous increase in water scarcity.

Through active participation in international efforts to address climate change, and in line with Egypt’s Vision 2030, the Egyptian government is working
to reduce greenhouse gas emissions, to which Egypt’s contribution does not exceed 0.6% of the global total. Egypt has also adopted policies for the transition towards clean energy by completing the legislative framework supporting the dissemination of renewable energy technologies. This has contributed significantly to attracting private sector investments, which amounted to about 6 billion US dollars in 2020, bringing the total renewable energy capacities to about 6,000 megawatts. Egypt has also announced a national goal, aiming at producing 42% of its electricity from renewable sources by 2030. Several initiatives are now being launched to improve energy efficiency in the industrial, construction, and electricity production sectors. Egypt is also currently implementing several sustainable transport projects such as the underground metro, the monorail, and electric trains, to encourage the use of public transportation instead of private cars, which are one of the main sources of air pollution and carbon emissions. Egypt has also completed the legislative and institutional framework necessary for the integrated management of solid waste, which is also one of the sources of greenhouse gas emissions. It has strong reasons to combat climate change, not only because it is one of the countries most vulnerable to its impacts that threaten the sustainability of the development process and the well-being of its people but also to remain competitive as the global economy moves towards a carbon-free future.

Most studies on climate change vulnerability indicate that Egypt is among the countries most vulnerable to climate change impacts. Egypt ranks 107 out of 181 countries in the 2019 ND-GAIN Index (ND-GAIN, 2019) of climate change vulnerability, according to a combination of economic, geographic, and social factors. The Mediterranean Coast is more vulnerable to sea level rise due to its relatively low level. The Nile
Delta and its northern coast host many cities such as Port Said, Damietta, Rashid, and Alexandria; the latter has a population of several million and contains huge investments in industrial, touristic, and agricultural activities as well as infrastructure that serves those activities. Egypt is also highly vulnerable to climate change due to its primary dependence on the Nile River, which provides the majority of its needs for drinking water, agriculture, industry, fish farming, power generation, inland river navigation, mining, oil and gas production, as well as electricity generation. This makes the country more vulnerable to rising temperatures and changes in precipitation patterns at the sources of the Nile.

Water security, energy security, and food security are very much linked to one another in Egypt since it is, as previously mentioned, most vulnerable to climate change impacts, which necessitates the adoption of a nexus approach when managing these three vital resources. Climate change represents an additional challenge that exacerbates the scarcity of water and food, and negatively affects food security. The problems of water scarcity and drought, in addition to the expected decrease in the productivity of some major crops such as wheat and maize, and the heavy reliance on oil and gas to meet energy needs, are major challenges facing the transition towards a flexible, low-carbon economy. Furthermore, Egypt is adversely affected by the fluctuations of the global food market, as it relies on imported food products to cover nearly 50% of its needs. Therefore, adopting the nexus approach connecting between energy, water, food and climate has become a necessity to meet the resource scarcity challenge in Egypt in a global climate that is changing at an accelerating pace.

Moreover, the interdependence between climate change and biodiversity issues should not be underestimated, as it is not only about climate change impacts on biodiversity, but it also concerns other environmental pressures that lead to biodiversity loss, and thus deepen the climate change crisis. As Egypt assumes the presidency of 14th session of the Conference of the Parties (COP) to the
Convention on Biological Diversity and is willing to assume the presidency of the United Nations Framework Convention on Climate Change COP 27, it has recognized the vital importance of natural capital, biodiversity and ecosystem services. Egypt is also striving to increase support for nature-based solutions because of their importance for climate change mitigation and adaptation. It is working, as well, to protect and exploit its natural heritage to promote sustainable eco-tourism through 30 nature reserves, some of which represent a unique value to the world natural heritage, such as Wadi El-Hitan site in Wadi El-Rayyan Reserve in Fayoum Governorate.

The COVID-19 pandemic and the consequent economic crisis, represented in the slowdown in some sectors such as tourism, air transport, supply chains and the loss of some jobs, have disproportionately affected the disadvantaged social groups and reduced their ability to adapt to severe weather conditions. As Egypt continues to respond to this crisis with its rebuilding efforts, there is an urgent need to integrate climate and development strategies to achieve sustainable and resilient green development. The post-pandemic economic recovery based on green principles represents a great challenge, but at the same time, it is an opportunity that must be seized. While financial stimulus packages for recovering from the COVID-19 pandemic offer an opportunity for a green recovery, the COVID-19 crisis also provides lessons to support planning and financing for adaptation to climate change. A clear example is the planning and provision of funding to enhance the capacity, resilience and ability of health care systems to prepare for emergencies. These efforts cannot be separated from adaptation to climate change impacts. The pandemic also highlighted the importance of addressing complex risks through an integrated risk management approach. Therefore, the government has to seize this opportunity to identify and prioritize the interventions that achieve economic growth while being able to withstand climate change, through green recovery concepts.

Green recovery focuses on policies and long-term solutions, including measures to protect the environment and the ecosystems, address climate-related issues and create a resilient and sustainable economy. Climate-related issues include, but are not limited to, energy, transportation, waste management, and nature-based solutions such as afforestation and expansion of green areas.

Egypt will review its efforts to combat climate change during the 27th session of the COP to the United Nations Convention on Climate Change, which Egypt is hosting in Sharm El-Sheikh. Those efforts include renewable energy and energy efficiency projects, improving waste management; wastewater treatment and reuse; and the establishment of a new electric public transport infrastructure, including the underground metro, monorail and electric trains. Egypt has recognized the need for urgent investments to finance its efforts to reduce climate change and adapt to its impacts in order to fulfill its commitments under the United Nations Framework Convention on Climate Change and the Paris Agreement.

Egypt was the first country in the Middle East and North Africa to issue green bonds, as it started the first issue of these bonds with a value of 750 million dollars in September 2020. Fifty four percent of the revenue of these bonds were allocated to finance water and sanitation projects and the rest to finance sustainable transport projects. Egypt decided that green projects should represent 30% of public projects by 2024. Accordingly, the government aims to increase the proportion of these green projects to 50% of the budget in 2030. The revenue of these green bonds will be used to finance or refinance green projects in sectors such as sustainable transportation, renewable energy, energy efficiency and wastewater treatment projects.

This report focuses on climate change and the transition to a resilient economy capable of adapting to the effects of these changes. It also highlights solid waste management as part of the country’s policies to shift to a green circular economy, especially during the recovery phase after the COVID-19 pandemic.
Mohammed Alaa - Before the storm, Burullus Lake
The environment is an essential component crucial to achieving sustainable development and Egypt Vision’s 2030 (Cabinet of Ministers, 2011). A number of principles should be taken into consideration to achieve sustainable, balanced and equitable development. These principles comprise the inclusion of the economic, social and environmental dimensions of the sustainable development, in a clear and interconnected manner; within all axes and various production and service fields. In this regard, consideration should be given to the close, influential relationship and interconnection between these dimensions to ensure the achievement of sustainability in all the strategies, programs and projects.

The country’s strategic goals, dimensions and axes must be consistent with the UN sustainable development goals, international commitments and agreements, especially the UN conventions on climate change, biodiversity, and desertification. This also entails ensuring integration between the government, and the private and cooperative sectors in implementing sustainable development programs, and defining the coordination mechanisms between the different sectors’ initiatives, efforts and investments in the economic, social and environmental fields. The highest degree of coordination and cooperation between the different axes must be ensured in order to achieve integration, guarantee the absence of conflict between the policies and objectives of each axis, and maximize resource use efficiency. This requires investment in natural and human capital to ensure the sustainability of natural resources and ecological services necessary to support production and service activities for the current and future generations.

It is also necessary to identify the challenges, obstacles and structural problems in all sustainable development dimensions, determine the necessary policies to deal with them and emphasize the actuality of future directives to ensure their application on the ground. It is also important to underline the role of the youth, women, unions, cooperatives, the private sector, the civil sector, and other non-governmental institutions in achieving sustainable and fair development. It is crucial, as well, to adopt methodologies of the green economy, the circular economy, and the closed-loop economy as a mechanism to achieve equitable sustainable development. Furthermore, it is essential to highlight the role of medium, small and micro enterprises in integrating the majority of citizens supporting the development path, and provide a modern and more accurate database such as the general census data for population, housing, establishments and field surveys. It is also necessary to take into account the change in the global balance of power as a result of the COVID-19 pandemic and the consequential severe economic crisis and the decline in global growth.

**Investing in Human Capital**
Investment in human capital, as mentioned earlier, is an essential factor for bringing about a qualitative leap for development, which results in building the cadres necessary to achieve sustainable development. This investment includes vocational and technical training, and the preparation of technical cadres in the various fields and technologies to support sustainable development path. This requires reconsidering and reformulating the education system to ensure integrating the environmental, social and developmental dimension into the various educational curricula. Teachers need to be qualified and develop their educational capabilities to support the transformation process to sustainable development. To achieve this, high quality education must be available to all without discrimination within the framework of an efficient and fair institutional system for all the citizens, including women and the poor and marginalized groups. Raising the human capital index and creating a new generation aware of environmental issues and capable of achieving development and regional and international competition are among the priorities required to achieve a qualitative leap for development in Egypt.

**Innovation and Scientific Research**
Structuring a system for science, technology and scientific research is the cornerstone for building the nation. The efforts exerted to achieve sustainable development in Egypt rely mainly on justice and social equality. In this context, the policies, strategies
and applied research plans should be consistent with the integrated and equitable development plans, and a scientific evaluation should be conducted on the impact of these policies and strategies on the development plans. Increasing the number of specialized scientific research centers has become one of the mechanisms for the countries that have participated in the race to achieve sustainable development, by depending on the contributions of scientists, intellectuals and post-graduate students. Partnership between societal and educational bodies, scientific research centers and government institutions has become the means to eliminate crises, solve the most complex problems, address economic, social and environmental challenges, as well as promote scientific research in Egypt. In addition to providing the necessary financial resources, it is necessary to develop legislations to regulate the organization, management and performance of scientific institutes and research centers and universities, and coordinate between the various parties. It is also vital to issue new legislations to motivate researchers to direct their research to modern technologies and artificial intelligence applications that serve the environment in order to achieve the sustainable development goals and the artificial intelligence strategy.

The development of legislation and administrative regulations of the higher education and scientific research institutions contributes, as well, to strengthening their independence and impartiality, as well as enhancing transparency, quality, coordination and integration between the various research bodies and centers in Egypt. Allocating sufficient budgets for scientific research would also provide modern environment-friendly technologies to support the transition to sustainable and equitable development, which results in rational and optimal use of resources, reducing waste production, waste recycling and reusing, creating new decent job opportunities, increasing competitiveness, and creating new markets locally and abroad. Therefore, it is necessary to link scientific research strategy to the transition to the green economy and sustainable development.

**Investing in Natural Resources**

Investing in natural resources is one of the main pillars for achieving sustainable development and Egypt’s Vision 2030. Such investments include investment in new and renewable energy, water resources, water systems and networks - to
increase their operation efficiency and reduce water losses, in addition to water desalination and recycling for reuse in agriculture and green spaces and forest irrigation, by using renewable energy as a major source of energy. Investment in land and ecosystems is also added to this list. Therefore, one of the most important objectives of Vision 2030 is the rational and sustainable management of natural resources to create new job opportunities, increase competitiveness, and support the national economy. Vision 2030 also emphasizes the importance of preserving natural resources, especially water, air, land and energy, taking into consideration the climate change impacts.

New and Renewable Energy

Egypt’s Vision 2030 attaches great importance to investing in new and renewable energy to secure and ensure the provision of the necessary energy for production and service activities through the following:

- Allocating funding and competencies to turn Egypt into a regional hub for the production and export of electricity, especially that produced from renewable energy, to Africa and Europe.
- The necessity of expanding smart grid systems and electrical interconnection with neighboring countries and the global network.
- Raising awareness of the importance of rationalizing energy use through public awareness campaigns, in addition to policies and legislation to reduce wasteful use.
- The tendency towards intensifying investment in the various sources of new and renewable energy, while providing financial incentives to the private sector.
- Manufacture of renewable energy components to meet the local and global market requirements.
- The tendency towards producing bio-energy from municipal and agricultural waste.
- Adopting technologies of energy production from water downfall and waves movement, in addition to other renewable energy alternatives.
- Supporting the private sector, especially start-ups and entrepreneurs, in the production and export of renewable energy components.
- Finding finance systems to encourage citizens to use solar energy.
- Strengthening efforts towards the use of new and renewable energy, and investing in the development of technology used in the field of solar energy, wind energy, bioenergy and energy generated from earth’s core.
- The need to take into account the social dimension in terms of providing energy at an appropriate price for the disadvantaged groups, and the need to cooperate with the Ministry of Social Solidarity to identify the disadvantaged groups who require subsidy.
- Emphasizing the importance of setting and enacting strict environmental standards for the use of coal as a source of energy, with the development of a long-term strategy to reduce this use.
- Directing scientific research towards providing technologies for using renewable energy in seawater desalination.
- Emphasizing the importance of having a national energy information system to facilitate the process of providing data and information on the sources and types of energy.

Governance and Supportive Climate

“Environmental governance” is one of the modern concepts that seek to rationalize the relationship between man and his environment; it is a compound term that includes two main components, governance and the environment. Although it is difficult to define the term “governance” due to the divergences related to its definition, it can be generally viewed as a group of laws, regulations and decisions that aim to achieve quality and excellence in performance, by choosing appropriate and effective methods to realize the institution’s plans and objectives. Governance also includes the elements that strengthen institutions in the long term and determine the responsibility and the responsible person. If we add the term
Egypt has sought, since the beginning of the current millennium, to find an appropriate mechanism to implement the principles of environmental governance for the benefit of all parties involved in the development process, in a way that helps achieve sustainable development. These endeavors have gone through many stages, starting with the development of separate plans for the governance of environmental activities, passing through a comprehensive and integrated view of the environmental system, and reaching an integrated development view that does not set the environment in isolation from the other axes of economic and social development. Then, a comprehensive concept of the governance of the ecosystem is developed, involving all parties, namely citizens, the government, civil society organizations, the private sector as well as development partners from relevant international and regional organizations.

Source: UNDP and Ministry of Planning and Economic Development 2021
The urgent need for environmental governance arises as a result of the several driving forces affecting the environmental situation in Egypt, foremost of which is the steady increase in population and the associated increase in demand for natural resources, basic services and infrastructure services. The population estimate of the Arab Republic of Egypt, according to the Central Agency for Public Mobilization and Statistics on January 1, 2020, reached 99,842,504 people, and the population growth rate in the 2017 census was 2.56% (Statistical Yearbook, 2020). This increase has led to the continuous need for the developmental expansion through the implementation of infrastructure projects and various industrial and agricultural ventures to bridge the gap between demand and supply create job opportunities and reduce the unemployment problem. It has also led to the need for urban expansion, the shift towards green, smart and flexible cities, and other basic services needed to meet the increasing demand for goods and services. Moreover, this developmental expansion of the state has increased pressure on natural resources such as land and water resources, raw materials, petroleum materials, and energy. Natural gas consumption, for example, increased from 30.4 million tons in 2006/2007 to 41.5 million tons in 2016/2017, with an increase of 36.5%. Liquid gas (butane) consumption also increased by 14.5% during the same period while gasoline and diesel consumption rose by 121% and 41.4%, respectively (Central Agency for Public Mobilization and Statistics, 2021 - Energy Balance 2016/2017).

Hence, the Egyptian state has taken into consideration the urgent need to implement environmental governance systems and mechanisms, and create the appropriate supportive climate to advance economic development that takes into account social and environmental aspects, in order to achieve the desired progress. Environmental governance treats natural resources as natural capital for future generations, as the integration of the environmental dimension into the state’s policies and directives has become a tangible issue that cannot be disregarded with or ignored.

Themes for Implementing Environmental Governance

Over the past years, the Egyptian government has adopted a policy of implementing environmental governance systems and achieving sustainable development through cooperation between all ministries and governmental and non-governmental entities. The work included a number of main themes as follows:

I. Creating and updating the legislative environment:

Egypt’s Vision 2030 identified a set of challenges facing development and quality of environment. Therefore, updating and reviewing environmental policies have been categorized as a challenge of high-impact. The vision clarified that weak punitive policies related to environmental pollution, as well as weak incentive policies are two factors that negatively affect the implementation of Egypt’s Vision 2030. Accordingly, the year 2020 witnessed the issuance of the Waste Management Regulation Law No. 202 of 2020, which ended more than 50 years of legislative vacuum in waste management. The state introduced a legislative framework that takes into account both the legal and the institutional frameworks and disentangles all the parties working in this field. The law separates the regulatory, planning, executive and supervisory aspects, and defines the roles and responsibilities of the various authorities to ensure the sustainability of the activities carried out in the field of upgrading the integrated waste system. The law also provides an opportunity for private sector companies to work within the system according to a specific act that stimulates private companies.

Drafting a unified environmental law started in 2020 to serve as the first unified law that covers all the various elements of the environment. The draft law integrates all environmental issues under a unified legislative umbrella, especially priority issues, which were not included in previous laws, such as climate change. Through this draft law, the Ministry seeks to unify environmental concepts and standards at the state’s level, and prevent
conflicts in concepts and specifications of the various legislative texts, in order to ensure the sustainability of the environmental system, and link the environment to the economy through the adoption of the green economy and the circular economy concepts.

The Egyptian government, represented by the Ministry of Environment, has also issued a draft law regulating access to biological resources and the equitable sharing of benefits arising from their use. This is an important step in the nation’s path towards the rational use of natural resources and their preservation and non-depletion, to ensure achievement of sustainable development. The law serves as a national bulwark that prevents free appropriation of the state’s biological and genetic resources, their genetic origins and traditional knowledge. It is also an important tool that ensures Egypt’s rights to its resources and the benefits that may result from their use by others.

2. Digital and Technological Transformation:
Digital transformation policies are the backbone that enables the implementation of governance in general and environmental governance in particular. Environmental improvement efforts always encounter obstacles due to the lack or unavailability of data. This constitutes a major problem to the formulation of environmental policies, the development of appropriate programs for resource management, and achievement of optimal and sustainable use thereof. Digital transformation processes overcome these obstacles by ensuring the provision of the necessary information and data and making them accessible to users. They also play an effective role in tightening monitoring and transparency processes, leading to the success of the various policies and efforts with the transition from electronic security to cyber security.

Digital transformation contributes to bringing about fundamental change in work. In this
case, a great technical development takes place to provide beneficiaries with faster and more diversified services and strengthen the response systems especially for emergencies and environmental incidents. Digital transformation provides huge potential for building effective, competitive and sustainable societies by achieving a radical change in the services of various parties, including consumers, employees and beneficiaries, and improving their productivity through a series of appropriate processes. Digital transformation requires a culture of creativity in the work environment and the availability of an appropriate infrastructure (Ahmed, 2020).

One of the basic requirements for achieving environmental governance is to build an integrated environmental information system through which basic environmental and relevant data necessary for environmental planning processes can be provided. This will enable identification of the technical, legal, executive and financing requirements for the environmental improvement processes and the sustainable use of natural resources and assets. Consequently, this will facilitate the drawing of an integrated picture of the environmental, economic and social status of any specific issue in a way that enhances and supports decision-making processes.

Egypt seeks to build a digital state and reach a society that deals digitally in all aspects of life. This is to take place through promoting the information and communication technology infrastructure, improving digital services in government agencies to improve the performance of ministries and other government entities, upgrading services’ quality and efficiency by improving the work environment, providing support for the decision-making process, as well as resolving issues of interest to society. In summary, the digital transformation strategic path in Egypt aims at the following:

- Upgrading citizens’ quality of life by improving their living conditions, providing multiple electronic services through all digital and non-digital outlets, and encouraging digital participation in environmental decision-making.
- Transforming the government into a digitally interconnected government by linking its digital systems and improving work within the state’s administrative body to operate efficiently and effectively.
- Empowering the state with e-government, and enhancing the values of transparency, accountability and control of all forms of business through interaction and participation between the various sects of society, including universities, the private sector, civil society and others (Ministry of Communications and Information Technology).

3. Creating a Supportive Climate:
In a world full of changes, the integration of the environmental dimension into the state policies has become an undeniable reality. The government has succeeded in achieving comprehensive economic reform which takes into consideration environmental dimensions and aims to achieve sustainable development and the transition to a green economy; thus, maximizing the benefit from the state’s human and natural elements. In this regard, the Ministry of Environment’s vision aimed at creating a supportive climate and transferring the environmental system into an economic one that works in partnership with the private sector. The Ministry worked to shift from the prevailing concept that the environment is in conflict with development to the concept: “environment for the sake of development”, highlighting that preserving the environment is not a luxury, but rather an economic system that works by integrating the environmental dimension into the Egyptian government’s approach with all its sectors.
By doing so, the Ministry aims to attract investments, stimulate youth's interest in the environment, transfer environmental technology, develop the infrastructure, and increase citizens' awareness of environmental issues. The Ministry continues to work on this change in order to emphasize the concept that the environment is a basic pillar for investment, and that all categories of the Egyptian society are convinced of this concept, from the ordinary citizen to decision-makers.

The Ministry of Environment has adopted a number of mechanisms to enhance the creation of a supportive climate, as follows:

A. Integrating the environmental dimension into all sectors of the state through partnerships with ministries and governmental and non-governmental agencies, as follows:

- Holding government partnerships to integrate the environmental dimension into all sectors of the country.
- Holding partnerships with the private sector in various environmental issues such as transferring waste-to-energy projects and investment in nature reserves.
- Holding partnerships with the banking sector through green and sustainable financing programs.
- Holding partnerships with civil society organizations through the Small Grants Program.
- Supporting youth initiatives related to the environment.
- Inclusion of local communities and women in environmental work.

B. Greening the state's general budget:
The Ministry of Environment, in cooperation with the Ministry of Planning and Economic Development, issued the first Guide to Environmental Sustainability Criteria (Figure 2). The Guide is applied to public budget projects, as a pivotal step to protecting natural capital from depletion and degradation, some of which are scarce or limited such as water resources. It also tackles the necessity of contribution to addressing global environmental risks such as climate change and biodiversity loss. Furthermore, the guide places sustainability considerations amidst the funding criteria for government projects, and sets a roadmap for the exit of technologies that deplete natural resources, with the aim of increasing the percentage of green projects in the state's general budget to 50% in the 2024/2025 budget.

**Figure (2): The Guide to Environmental Sustainability Criteria**
Figure (3): Timeline for incorporating environmental sustainability criteria into the government’s investment plan

C. Raising environmental awareness among citizens:

Environmental governance stems from a set of general properties and principles, foremost among which is consolidating the concern for the environment at all levels of decision-making, and emphasizing the close connection between citizens and the ecosystem in which they live. Despite the clarity of this matter, its neglect or omission leads to serious consequences. Therefore, the Ministry of Environment, in its quest to promote environmental awareness among all segments of the Egyptian society, adopted a number of techniques and methodologies that work together in a parallel and complementary manner to reach all these segments of the society at different cultural, educational and social levels. These techniques aimed to encourage the transition from the state’s environmental control to self-censorship and societal accountability. They include the following:

- Integrating basic environmental concepts into education curricula:
  - Basic education: Cooperation with the Ministry of Education’s Curriculum Development Center to integrate basic environmental concepts and link them to Science and Social Studies curricula, in addition to languages, religion and national studies curricula, in different stages of basic education. This aims to instill environmental protection concepts into children’s behavior and cultural formation and enhance the values of ownership and environmental responsibility among them at an early age.
  - Higher Education: Coordination with the Ministry of Higher Education
and Scientific Research to prepare a professional master’s program in the field of environmental sustainability to build cadres and experts in the environmental field, link them to scientific, economic and social specializations, and help open new areas for business and investment in various environmental fields.

- Information campaigns to spread environmental awareness:
  - Launching an initiative entitled “Go Green” to spread environmental awareness, under the auspices of His Excellency the President of the Republic. The initiative aims at raising awareness among the different segments of the society about the importance of preserving the environment and natural resources, enhancing the citizens’ sense of ownership of natural capital assets and their responsibility towards preserving resources and using them in a sustainable manner, for the benefit of human health and well-being at all levels. The initiative targeted all the segments of the society through various media and awareness activities.
  
  - Launching the first promotional campaign - “Eco Egypt”- to support eco-tourism and nature reserves within the Ministry of Environment’s strategy to develop reserves. The campaign aims to maximize the sustainable use of nature reserves, raise awareness of their significance, highlight the importance of contribution to their protection, and integrate the local community thereto through training and developing methods for promoting cultural products and handicrafts, and boosting investment opportunities in the reserves.
Chapter Two: Waste Management in Egypt
The waste problem is one of the most important environmental challenges facing the Arab Republic of Egypt. The state, represented by the Ministry of Local Development and the Ministry of Environment, has given it strategic attention, especially with regard to municipal, plastic, agricultural and electronic waste, health care waste and other hazardous waste. The state is also interested in implementing the concept of the circular economy.

The economic development that Egypt witnessed during 2020 led to an increase in the quantities of generated waste in the whole country. This was due to urban expansion in new cities, slum development projects, production and consumption patterns and the steady increase in health care programs, especially during the COVID-19 pandemic. The total volume of municipal solid waste for 2020 amounted to about 20.9 million tons (Waste Management Master Plans in the governorates). This increasing amount of generated waste placed pressure on the environment, public health, water resources, and air quality. The steady increase in medical waste during the COVID-19 pandemic also led to health risks when not properly handled or treated.

The challenge facing all world countries to realize their citizens’ desires and meet their legitimate aspirations for a decent life and a better future is closely related to the countries’ abilities, policies and legislations adopted to create a clean healthy environment.

Therefore, Article 46 of the Egyptian Constitution emphasized the right of every person to a sound healthy environment. It asserted that environment protection is a national duty, and that the state is obliged to take necessary measures to protect, and ensure not to harm the environment; ensure a rational use of natural resources to achieve sustainable development; and guarantee the right of future generations thereto.

The waste system in the Arab Republic of Egypt faces a number of significant challenges due to overlapping and intertwined responsibilities and the weak links between planning, financing and cost recovery. This system also needs to offer new solutions that guarantee the identification of the competent administrative authority in charge of organizing, following up and monitoring all integrated waste management processes, from a technical and administrative point of view, in addition to creating investment opportunities in the field of integrated waste management, and the safe management of all types of waste.

The National Solid Waste Management Program has also been prepared to raise the efficiency of the waste system. The Ministry of Environment has supported the infrastructure of the waste management system in various governorates, and supervised and followed-up its implementation, in addition to expanding bioenergy production and seeking to reduce the usage of single-use plastic bags. The ministry has also succeeded in controlling agricultural waste, reducing the “Black Clouds” phenomenon and expanding central solid waste treatment plants. Furthermore, it has worked on managing e-waste, as well as launching the E-Tadweer application and estimating future quantities required for its management.

Integrated waste management is linked to achievement of the 12th sustainable development goal (SDG 12).
- related to ensuring sustainable consumption and production patterns- as well as execution of the African Agenda 2063’s first ten-year Implementation Plan (2014-2023) which stipulates that different recycling activities’ percentage in cities should not be less than 60% of generated waste. Integrated waste management is also related to the second strategic objective of the Sustainable Development Strategy’s Environment Axis that underlines the necessity of “reduction of pollution and integrated waste management.”

Through its efforts to achieve the sustainable development strategy (Egypt’s Vision 2030), Egypt seeks to reduce waste’s harmful environmental and health effects by raising public awareness, emphasizing the importance of reducing and recycling generated waste, reducing the release of hazardous waste, developing the waste management system and methods, recycling e-waste and cooperating with private companies in waste management. Endeavors have also included monitoring air quality in random landfills, developing the construction and demolition waste system, and supporting and encouraging investment in the field of waste management.

Figure (4) shows the quantities of municipal solid waste generated during the period from 2017 to 2020, revealing the significant increase in waste, reflected in the annual per capita share of waste generation.

Moreover, release of construction and demolition waste has increased in many regions in Egypt, due to the great boom in the construction and building sectors in many areas; the growth rate in the construction sector in 2019 reached 9%, compared to the other economic sectors, which achieved an average growth of 5.5%.

The special importance that the state has recently given to citizens’ health care led to a significant increase in...
in the emission of medical waste. This is manifested in the implementation of several national programs that provide special medical services such as the Women's Health Support Program, the “100 Million Seha” (100 Million Healthy Lives) initiative, and other national programs.

In addition, health care waste generation rates have tremendously increased in conjunction with the COVID-19 pandemic and patients’ flocking to various medical centers across the country. This led to an increase in the release of medical waste in public and private hospitals, and households, especially with the increase in COVID-19 infections.

**Solid waste in Egypt**

Municipal waste characteristics in Egypt vary according to the different standards of living and consumption patterns from one governorate to another. Organic materials account for the largest proportion of municipal waste generated in Egypt, as shown in Figure (5).

**Figure (5): The amount of waste generated in Egyptian governorates 2020 (tons/day)**

![Graph showing the amount of waste generated in Egyptian governorates 2020 (tons/day)](image)

Source: Ministry of Environment 2020

**Chapter Two: Waste Management in Egypt**

The Ministry of Environment’s efforts in supporting the integrated waste management system in various governorates

The Ministry of Environment has implemented several projects aimed at managing medical and electronic waste. The Ministry has implemented the pilot project for the treatment of hazardous medical waste in Gharbia, and the project for sustainable management of persistent organic pollutants, especially with regard to the safe disposal of the highly hazardous pesticides and materials.

The National Solid Waste Management Program

The National Solid Waste Management Program is one of the Ministry of Environment’s most significant activities that aims to raise the efficiency of the waste system in some governorates, namely Gharbia, Kafr El-Sheikh, Qena and Assiut. In addition, the program provides technical, investment and institutional support to the Waste Management Regulatory Agency through cooperation with a group of development partners, including the German Development Bank, the German International
Cooperation Agency, the European Union and the Swiss Agency for Development and Cooperation.

Transforming waste into a source of energy to maximize its economic value is one of the Ministry of Environment’s priorities, and one of the most important solutions to diversify energy sources; a policy that Egypt is currently seeking, for its environmental and economic benefits. This has prompted the government to adopt a state-level strategy to allocate a share of the collected waste (about one and a half million tons annually) to be converted into energy. Many facilities have currently been licensed to deal with waste as an alternative fuel; as these facilities are equipped with air purification devices to avoid any negative effects associated with this type of fuel. In the meantime, the Prime Minister has issued a decision regarding the tariff for electricity produced from waste; annexed to it a procedural guide for projects converting waste into energy, and a list of the companies operating in this field.

The infrastructure projects plan - the second phase for 2020-2021 (intermediate stations - sanitary landfills - waste treatment facilities) has been prepared and implemented through a cooperation protocol between the Ministry of Environment, the Ministry of Local Development, the Ministry of Military Production, the Ministry of Planning and Economic Development, in addition to the Arab Organization for Industrialization.

The infrastructure plan first phase has been implemented as follows:

Sanitary landfills:
- A number of 20 landfills are being established in the governorates of Fayoum, Suez, Beheira, Red Sea, Sohag, Matrouh, Luxor, Aswan, Giza, North Sinai, South Sinai, Sharkia, Menoufiya, the New Valley and Beni Suef.

Intermediate fixed stations:
- Four intermediate fixed stations have been established in Cairo and Beni Seuf governorates
- The construction of five intermediate fixed stations is underway in the governorates of Sharkia, Buhaira and Fayoum.

Figure (6): Establishment of sanitary landfills and stations for the infrastructure plan first phase for 2019/2020
• An intermediate station has been established in Minya al-Qamh city in Sharkia governorate, and it has been handed over to the city council to enhance hygiene in the city.

**Intermediate transfer stations:**

• Equipment has been delivered to seven intermediate transfer stations in the governorates of Cairo, Damietta and Ismailia.
• The supply of equipment is underway for three intermediate transfer stations in the Fustat area in Cairo governorate, Minyat al-Nasr city in Dakahlia governorate, and Matrouh city in Matrouh governorate, after their conversion from fixed to transfer stations.

**Waste treatment and recycling facilities:**

• Construction of three facilities is underway in the governorates of Sohag, Minya and Gharbia.
• The efficiency of six lines is being upgraded in Gharbia governorate.
• A contract has been signed with three consulting research entities to review and approve infrastructure projects’ engineering designs and supervise implementation.
• Safe closure of “Al-Wafaa Wal Amal” landfill
• Coordination is underway with all parties to treat and transfer the filter fluid generated daily from the sanitary landfill in Al-Wafaa Wal Amal area in Cairo governorate, to the reception tanks at the sewage treatment plant located in the Al-Gabal Al-Asfar area in the Qalyubia governorate.

The draft strategy for construction and demolition waste has been reviewed with the concerned authorities.

**Informal Waste collection sector and its role in the circular economy**

The informal waste collection sector includes up to 50-60% of Cairo’s waste. It must be said that the main activity of this sector is the collection of recyclable materials only not all kinds of waste. Waste collected via this sector is recycled, which constitutes an important aspect of waste circular economy across the Egyptian governorates.

The state has been keen to emphasize the adoption of the circular economy approach and the rational management of resources as a means to confront the increase in production and consumption patterns, and as a tool for carbon emissions reduction and systemic transformation to mitigate climate change impacts. Therefore, Egypt is formulating its strategy to coincide with this global trend towards circular economy to maximize benefits from available natural resources. Egypt’s Vision 2030 objectives have underlined the importance of pollution reduction, integrated waste management and maximizing benefits from waste. The waste system’s future vision also targets 90% of collection efficiency by 2030 (Figure 7).
Figure (7): State plans for municipal waste management (collection efficiency ratio)

Solid Waste-Derived Fuels and the Promising Image of Waste-Based Energy
The use of fuels derived from solid waste is one of the steps to achieve sustainable solid waste management which aims to bury the minimum amount of waste and make maximum use thereof.

Extended Producer Responsibility
The Extended Producer Responsibility Strategy is defined as an environmental policy that aims to reduce the environmental impact of a product, by making the manufacturer of the product responsible for the entire life cycle of the product, and especially for the take-back, recycling and final disposal. The system also aims to:

- Alleviate the burden on the state for handling these products’ waste
- Encourage recycling industries
- Protect the environment from unsafe handling of products’ waste
- Reduce pressure on sanitary landfills

This system will be implemented soon.
Chapter Three: Health and the Environment
Environment and health sustainability are among the most important issues facing the global community during the past decade. Such issues deserve priority since they are closely related to national development. Air, water and land pollution, in addition to unhealthy food, improper disposal of waste especially hazardous and medical waste resulting from the COVID-19 pandemic, all these have negative effects on citizens’ health and the state’s development efforts. Therefore, the state pays great attention to surveillance and monitoring, while preserving the environment, and applying the law firmly to any violations that may affect the quality of the environment or public health.

Studies indicate that there is a direct relationship between human health and the quality of the surrounding environment. Meanwhile, it is difficult to have a clean and unpolluted environment in a society where human health is deteriorating. Everyone’s awareness of environmental problems and their threat to human life and economic development in the short and long term has turned the issue of preserving the environment and human health into a strategic dimension and a prerequisite for achieving sustainable development.

**Figure (8): DPSEEA Analytical Framework**

![Diagram](DPSEEA) 

*Source: UNEP 2013*

### Analysis of the relationship between health and the environment

The interrelationships between health and the environment are analyzed by using the analytical framework DPSEEA (Figure 8) (Driving Forces - Pressures - State - Exposure - Effect - Action). This linear framework analyzes the links between the environment and health issues to find out environmental change drivers that lead to these pressures on public health. This is accompanied by an analysis of the current state and the degree of environmental pollution that lead to some health effects, and an analysis of the efficiency of environmental policies, laws and societal responses that are applied to stop those pollutants and avoid negative impacts on citizens’ health.
At the global level, the COVID-19 crisis since 2019 had a significant impact on all health services in various countries of the world. The redirection of medical resources to respond to the pandemic, strict lockdowns, and fear of the virus transmission within health facilities, severely damaged the supply and demand for essential health services especially at the beginning of the crisis. A number of countries cancelled vaccination campaigns while others postponed them. Consequently, access to basic child and maternal health services has declined. This has resulted in disruption to the supply and demand for primary health care services. The outbreak of the epidemic also reduced national environmental monitoring in various countries. This led to increased rates of deforestation and the spread of illegal hunting, in addition to non-availability of sufficient data due to the suspension of environmental monitoring projects, and the disruption of the ongoing multilateral negotiations on climate change and relevant reports by the Intergovernmental Panel on Climate Change (IPCC).

On the positive side, the decrease in vehicular traffic at the local level has led to a relative reduction in greenhouse gas emissions and improvements in air quality. The decline in human activities has resulted in the restoration of some species and the improvement of ecosystems due to the global slowdown in industrial and human activities caused by the epidemic (United Nations, 2021). Egypt has been greatly affected by the COVID-19 pandemic, which prompted the government to take several precautionary measures to protect citizens. The government worked to achieve two strategic goals at the beginning of the pandemic, initially: reducing the number of infections and deaths caused by the pandemic, and secondly, ensuring the continuity and efficiency of all preventive activities related to community health. All state agencies worked to continuously monitor the epidemiological situation in Egypt and the world, through a number of mechanisms namely, quarantine, surveillance of infectious diseases, infection control, developing central laboratories, and providing vaccination.

While various vaccination systems in most countries of the world were affected by the COVID-19 pandemic, resulting in the outbreak of many diseases in several countries, Egypt was able to maintain its compulsory vaccination systems during that time. During 2020, Egypt maintained annual coverage rates of more than 95% of all routine doses. The availability of a permanent strategic quantity of various vaccinations at all levels had a great advantage in not running out of any type of vaccination, despite the pandemic’s impact on air traffic and air freight in different world countries. The compulsory vaccination systems in Egypt were not affected due to citizens’ great confidence in the vaccination program (CAPMAS, 2020).

The COVID-19 pandemic and its impact on achieving sustainable development goals

The United Nations Sustainable Development Report 2020 indicated that the COVID-19 pandemic would have negative effects on some Sustainable Development Goals, - especially those related to eradicating poverty and hunger, ensuring health and welfare, providing decent work, and achieving economic growth-, particularly in Arab and the least developed countries, which makes it more difficult to achieve development plans.

According to the World Bank Report (Blue Skies and Blue Seas), some natural resources in the Middle East and North Africa have been depleted, which affected human and economic development programs and threatened life and livelihoods in the region. Ambient air pollution resulted in at least 60 days of morbidity during a citizen’s lifetime, and caused 270,000 premature deaths in 2019 (Heger et al., 2022).
Egypt’s Sustainable Development Report presented five scenarios for the potential development in the country: 1) economic development, 2) social justice, 3) women empowerment, 4) governance, and 5) the integrated push. All the scenarios agreed on Egypt’s ability to reach rates ranging between 97.8 - 100% in water and sanitation indicators, which will have direct impact on citizens’ health. Egypt’s Human Development Report 2021 also indicated that despite the significant negative effects resulting from the COVID-19 pandemic, especially the enormous pressures on the health system; much funding has been pumped into the health sector to strengthen its ability to confront the impacts of the pandemic. This led to the development of the health system in the country and the speeding up of reforms implementation in this sector.

Figure (9): Progress in achieving Sustainable Development Goals in Egypt

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Source: Sustainable Development Report 2021

Chapter Three: Health and the Environment
The economic and social impacts of the COVID-19 pandemic

Like many developed and developing countries, Egypt, with its emerging and promising economy, was exposed to the long-term effects of the pandemic. The tourism sector was one of the sectors negatively impacted by the pandemic. The decline of this sector amounted to about 84% during the months from April to June 2020, compared to the same period during 2019 and until 2020, according to data compiled by the Central Bank of Egypt (UNDP, 2021). Suez Canal revenues decreased and Egyptian expatriates’ remittances also declined due to the slowdown in the global economy caused by the pandemic. The results of some studies indicate that COVID-19 can reduce national Gross Domestic Product (GDP) by 0.7% to 0.8% (LE 36 to 41 billion) for each month during the global crisis. Similarly, estimates point out to the decrease in household consumption and expenditure by LE 153 to LE 180 per person per month on average, i.e., between 9.0 and 10.6% of the average household income. The cumulative GDP loss from these three external shocks could reach between 2.1% and 4.8% of the annual GDP in 2020, if the crisis continues for another three to six months (Breisinger et al., 2020). On the other hand, there are increasing positive effects represented in the country’s profit from the information and communication technology sector, food delivery, and health care goods.
The increasing consumption of medical goods associated with the pandemic in Egypt also led to an increase in the spread of medical waste, most of which pose a threat to public health and the environment. As a result, the Egyptian government took measures aimed at ensuring the safe disposal of medical waste from more than 1,500 medical facilities, and adopted other integrated systems for solid waste management and pollution reduction. Furthermore, partnerships were established between the Ministries of Environment, Health and Population, Higher Education and Scientific Research, and Local Development to intensify coordination on medical waste management, as well as international cooperation to upgrade medical waste disposal systems in Egypt.

The COVID-19 pandemic and its impact on climate change

Environmental degradation is usually driven by human activities. The pandemic limited our economic activities and consequently production and consumption processes slowed, pollutant emissions and natural resource depletion also slackened, and environmental degradation declined in most regions. However, studies indicate that the COVID-19 pandemic has not slowed the continued progress of climate change at the global level. There is no indication that the Earth has returned to grow in a more sustainable manner, while the pace of carbon dioxide emissions has not decreased rapidly after the temporary economic slowdown. Furthermore, global reduction targets have not been achieved, and greenhouse gas concentrations in the atmosphere continue to remain at record rates (UN Environment, 2021). Concentrations of major greenhouse gases (carbon dioxide, methane, and nitrous oxide) continued to increase in 2020, and the first half of 2021. Overall reductions in emissions in 2020 are likely to reduce the long-term annual increase in atmospheric greenhouse gas concentrations, but this effect was too small to be distinguished from the natural asymmetry. Accordingly, the COVID-19 crisis has only provided a short-term decline in global emissions, and has not significantly reduced the target rate of emissions by 2030, and this will not change unless countries pursue an economic recovery that includes strong decarbonization.

The United Nations Economic Commission for Europe (UNECE) Report indicated that atmospheric concentrations of carbon dioxide during the pandemic continued to rise with the increased use of plastics, particularly for packaging purposes. Activities to preserve ecosystems and biodiversity have also been restricted, which has led to an increase in littering.
illegal hunting and logging. The shutdown delayed vital negotiations on global environmental management in the ‘distinguished year’ for climate change and biodiversity. It is also believed that once the epidemic is over, the pressure on the environment will continue and the risk will become less restrictive.

Investing in the green recovery is an economically important factor to improve the overall situation following the COVID-19 pandemic. Outbreak of zoonotic diseases are also causing trillions of dollars in expenses worldwide. Meanwhile, studies show that taking a series of measures to protect the natural world and ecosystem services will cost just 2% of the post-COVID-19 recovery bill. There is also a global commitment to responding to the COVID-19 pandemic and overcoming its effects. As a result of the outbreak of the COVID-19, the Egyptian government has taken a set of mechanisms and measures to confront the crisis at the social, economic and health levels. This has been achieved through social protection programs that enable the state to achieve sustainable development goals in addition to Civil Society contribution to reduce the severity of the crisis on the most vulnerable groups. The Cabinet of Ministers Media Center Report indicated that Egypt continues to achieve growth despite the pandemic. It is estimated to achieve a growth rate of 2.8% in 2020/2021, compared to 3.6% in 2019/2020. It was targeted to achieve a growth rate of 5.4% during the current fiscal year 2021/2022 (Figure 12).

Figure (12): Egyptian economy indicators’ results surpass international expectations despite the COVID-19 crisis.

Source: State Information Service 2021
The Ministry of Environment’s immediate response to the effects of the COVID-19 pandemic

The Ministry of Environment’s response to the effects of the COVID-19 pandemic has been immediate. A website has been launched to train workers in the field of waste inside hospitals in order to facilitate dealing with the quantities of generated waste in each health facility and the timing of waste transfer to the treatment plants to ensure access to all accumulations, and to direct waste to the appropriate treatment places for safe disposal. A similar site has also been launched for municipal waste data entry. Coordination has been established with the Ministry of Higher Education and Scientific Research and the Ministry of Health to train workers to deal with medical waste data. Medical facilities are also monitored and supervised, to follow up the implementation of the medical waste management system and methods of separation and safe disposal, as well as monitoring of waste dumps and sanitary landfills throughout the Republic (Ministry of Environment, 2020).

In addition to reducing sources of pollution, improving the quality of the environment and preserving natural resources, the Ministry of Environment intensified efforts in a number of axes to combat and prevent the spread of the COVID-19 to protect citizens’ health and safety. The ministry’s efforts included reducing air pollution rates, the safe disposal of solid, municipal and medical waste, raising citizens’ awareness of sound environmental behaviors that help maintain their safety, intensifying continuous environmental monitoring of air pollutants, and tightening control over potential pollution sources.
Endeavors also comprised working to reduce loads in industrial facilities in cooperation with the Ministries of Commerce and Industry, and Public Business Sector. Meanwhile, the Ministry of Environment coordinated with the Ministry of Local Development to intensify efforts for the safe disposal of municipal solid waste to reduce chances of infection transmission through waste. This included ensuring streets' cleanliness, disseminating virus prevention guidelines among workers in the hygiene system for their safety, and using the waste system local rapid intervention units for the speedy removal of street dirt accumulations.

With regard to the safe disposal of medical waste, cooperation and coordination were established between the Ministry of Environment and both the Ministry of Health and Population, and the Ministry of Higher Education and Scientific Research to ensure the accuracy and safety of the disposal system and the safe handling of medical waste. This was accomplished through identifying the employees responsible for handling medical waste in hospitals and medical centers, following up the progress in the safe disposal process around the clock and setting performance indicators and functional tasks for these employees. The Ministry of Environment trained 68 personnel from the Ministry of Health and Population in a number of Egyptian governorates on handling and the safe disposal of medical waste, to play an effective role in training other cadres, and increase the number of personnel trained on the safe handling of medical waste. Operational steps were also developed for the safe disposal of medical waste in hospitals, in cooperation with the Central Environment Department at the Ministry of Health (Ministry of Environment, 2020).
Chapter Four: Climate Change
The world has recognized the gravity of climate change impacts on the environment, due to the increase in average temperatures above their normal rates, the consequent rise in sea level and the emergence of wild weather events. It has thus become necessary to take sustainable action to reduce greenhouse gas emissions, and address their risks by all possible means, since climate change also affects people’s social and economic status.

In addition to natural climatic factors, climate change driving forces are mainly the result of economic growth’s upward trend that leads to a set of pressures which cause climate change. Some human activities contribute directly or indirectly to the release of greenhouse gas emissions into the atmosphere, which increases heat trapping near the Earth surface. These activities are namely production and consumption patterns, rising population growth, unsustainable economic growth, structural change in the service economy, fossil fuel combustion processes, forest area reduction, land use change and non-renewable energy consumption patterns.

Figure (13): Global Climate Change Effects

These driving forces lead to more pressures on the environment resulting from the significant change in the Earth’s climate, represented in temperature increase. Human activities have largely accounted for the significant rise in surface temperature over the past 60 years (Intergovernmental Panel on Climate Change). Enormous increase in temperature and heavy precipitation patterns have also been observed, with a decrease in the area of glaciers and snow cover, in addition to an increase in sea level and acidification.

Climate change impacts in Egypt extend far beyond the observed rising trend in temperature increase. They affect ecosystems in general, and the economy, agriculture and water resources in particular. The coastal areas’ most vulnerable parts are affected by the sea level rise in the Delta and the northern coast, and the increase in the Mediterranean Sea temperature that threatens fish and marine habitats and fisheries, and leads to coral reefs bleaching in the Red Sea, invasive species’ attacks, biodiversity loss, and the decline in tourist investments. All of these issues will in turn affect many communities that depend on the sea for their livelihoods, such as workers in the agriculture, fishing and tourism sectors. Moreover, climate change causes fluctuations in agricultural production, and livestock and fisheries productivity, which negatively influences food security. It also affects desertification and drought and causes fluctuations in the quantities and rates of precipitation and flooding. This will have an adverse impact on public health as a result of the increasing morbidity and mortality rates related to air quality, heat stroke and high temperature.
This chapter tackles Sustainable Development Goal (SDG) 13 concerning the urgent action to address climate change and its impacts (United Nations, 2017). It also deals with Egypt’s Sustainable Development Strategy 2030, which integrates sustainable and integrated ecosystem into the national development agenda, in a manner thatupholds the rights of future generations to a more secure and adequate future. This is achieved by facing climate change effects and enhancing ecosystems’ resilience and ability to face risks and natural disasters. The chapter highlights, as well, the goals of African Union’s Agenda 2063, which seeks to achieve environmentally sustainable and climate-resilient economies and societies.

Egypt’s population, which amounted to more than 98 million people according to the population census in January 2019, as well as the booming economic growth, are among the most important causes of greenhouse gas emissions in Egypt.

These two factors have had a major role in changing different consumption patterns such as energy consumption and water use. This change placed direct pressures on natural and non-natural resources, leading to wasting resources and using them in an unsustainable manner. Increased energy consumption, agricultural activities and unsafe disposal of waste also resulted in an increase in greenhouse gas emissions. Greenhouse gases that cause climate change include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride.

Greenhouse gas emissions in Egypt amounted to about 325,614 giga tons of carbon dioxide equivalent in 2015, according to the first biennial updated report presented in 2019. The energy sector is the largest contributor to greenhouse gas emissions, representing 64.5% of the total emissions in 2015. Agriculture, forestry and other land uses are the second contributor with 14.9%, followed by industrial processes and product use with 12.5%, and waste with 8.1%. Total emissions increased by 31% in 2015 compared to 2005. Emissions from the energy sector, industrial processes and product use, and waste sector increased by 40%, 49% and 34%, respectively. On the other hand, emissions from the agricultural sector, forestry and other land use sectors decreased by 7% during the same period.

According to the IPCC Reports, the Arab Republic of Egypt is evidently affected by the climate change phenomenon. These impacts include: an increase in sea level rise, reduced availability of groundwater, increased salinity in some areas, increased morbidity and mortality from severe weather events, threat to biodiversity, reduced productivity of some crops, migration of some fish species, desertification, erosion of agricultural lands and the wearing away of inscriptions on historical monuments and the temple walls, among others.

**Table (1): Expected changes in the productivity of some major crops in Egypt due to climate change**

<table>
<thead>
<tr>
<th>Crop</th>
<th>2050</th>
<th>2100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>-15</td>
<td>-36</td>
</tr>
<tr>
<td>Rice</td>
<td>-11</td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td>-19</td>
<td>-20</td>
</tr>
<tr>
<td>Soya beans</td>
<td>-28</td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>-20</td>
<td></td>
</tr>
<tr>
<td>Cotton</td>
<td>+17</td>
<td>+31</td>
</tr>
<tr>
<td>Potatoes</td>
<td>-0.9 to -2.3</td>
<td>+0.2 to +2.3</td>
</tr>
</tbody>
</table>

Source: Ministry of Water Resources and Irrigation 2013
The means of responding to the climate change phenomenon depend on the human resources’ ability to solve the existing environmental problems which leads to achievement of comprehensive development, and promotion of the Egyptian economy, within the framework of sustainable development; resulting in maximizing national contributions to reduce climate change adverse impacts.
In light of the importance of climate change as a defining issue, most world countries agreed in 1992 to establish the United Nations Framework Convention on Climate Change. The Arab Republic of Egypt signed the Convention on June 9, 1992 and ratified it on December 5, 1994. Egypt also signed the Kyoto Protocol on March 15, 1999, and ratified it on January 12, 2005. In addition, it signed the Paris Agreement on April 22, 2016, ratified it on June 29, 2017, and it was then entered into force on July 29, 2017. The Ministry of the Environment, as the national focal point for the Framework Convention, participates in the negotiations on the articles of the Convention, the Kyoto Protocol, and the Paris Agreement.

Egypt has sought to fulfill its obligations under international agreements and has thus submitted three National Communication Reports in 1999, 2010, and 2016 respectively, in addition to the first biennial updated report in 2019. It also submitted the Nationally Determined Contributions Report in 2015, and work is currently in progress on the fourth National Communication Report.

In the meantime, Egypt has worked to establish an institutional entity to manage the climate change file at the national level, and to update it in line with developments. Consequently, the Climate Change Unit was established in 1997 to serve as a central department for climate change. The National Council for Climate Change was also restructured, under the leadership of the Prime Minister, supported by the Minister of Environment as Rapporteur, according to a decision by the Council of Ministers in 2019.

Within the framework of Egypt’s efforts to benefit from the Clean Development Mechanism, the Egyptian Office and Council on the Clean Development Mechanism were established in 2005 and reconstructed in 2010. Several Egyptian projects have been registered internationally within this Clean Development Mechanism. Most of these projects have been challenged by the low prices of carbon certificates, due to the low demand for these certificates from developed countries, for their weak obligations under the Kyoto Protocol second commitment period.

As for the national strategies related to climate change, the National Strategy for Adaptation to climate change and Disaster Risk Reduction was developed in 2011, with the aim of increasing the resilience of the Egyptian society in dealing with risks and disasters caused by climate change and its effects on various sectors and activities. The strategy is also geared towards enhancing society’s ability to absorb, contain and reduce these risks and disasters.

In the meantime, the Low-emissions Development Strategy, formulated in 2018, contained a list of mitigation measures undertaken in seven sectors: electricity, petroleum, industry, transportation, agriculture, tourism, buildings, and waste. Different mitigation measures were modeled in each sector, and the strategy is currently being updated. The general framework for the climate change strategy in Giza Governorate was also developed in 2018, which is an important step in including climate change in project planning at the governorate level.

The National Climate Change Strategy 2050, the first integrated strategy in this field, is currently being finalized. The strategy will enable Egypt to plan and manage climate change at different levels in a way that supports the achievement of the country’s desired economic and development goals, by adopting a flexible and low-emissions approach. Egypt’s Sustainable Development Strategy 2030 is also considered the strategic umbrella for development in the country. Accordingly, The National Climate Change Strategy integrates all the goals and sub-goals related to climate change into the updated Sustainable Development Strategy – Egypt’s Sustainable Development Strategy 2030.
Vision 2030. The following are the five main objectives of the strategy:

• Objective 1: Achieving sustainable and low-emission economic growth in various sectors.
• Objective 2: Building resilience and adaptation to climate change and mitigating associated negative impacts.
• Objective 3: Improving the governance and management of action in the field of climate change.
• Objective 4: Improving the infrastructure for financing climate activities.
• Objective 5: Promoting scientific research, technology transfer, and knowledge management, as well as raising awareness to combat climate change.

Egypt has been keen on benefiting from international funds and facilities to finance various projects to reduce emissions and adapt to climate change impacts while paying attention to technology transfer and capacity building. One of those specialized funds is the Green Climate Fund. Among the Egyptian projects submitted by the Ministry of Environment, in its capacity as the national focal point for the Green Climate Fund, is “Promoting Adaptation to Climate Change in the North Coast and Nile Delta regions in Egypt.” The project received the fund’s approval and is currently being implemented.

Other projects comprise the “Renewable Energy Financing Framework in Egypt,” the “Transformation of Climate Finance Systems” program which is being implemented in 17 countries, including Egypt, and the “Joint Financing Program” collectively set up by the Green Climate Fund and the European Bank for Reconstruction and Development, with the aim of increasing finance offered to the private sector, through local financial institutions. The program is implemented in 10 countries including Egypt. Furthermore, about 30 national projects are being implemented by various ministries in the mitigation and adaptation fields, including new and renewable energy projects, electric transport, canal lining, and seawater desalination by using solar energy.

The Ministry of Environment has attached special importance to cooperating with all sectors and bodies to activate the Egyptian initiative launched by His Excellency the President of the Republic in 2020, to integrate the three Rio agreements, with the aim of protecting natural resources and life on our planet. The Ministry of Environment also seeks to implement the following projects in the fields of mitigation of emissions and adaptation to climate change:

• The Fourth National Communication Project,
• A program to build the Resilience of Food Security Systems, which benefits Egypt’s southern region,
• A project to implement the interactive map of climate change risks and threats affecting the Arab Republic of Egypt,
• A project to develop a capacity-building plan for workers in sectors related to the national plan for adaption to climate change, and
• A project to manage energy efficiency in the field of industry.

The future requirements to confront the climate change phenomenon include finance provision, technology transfer, capacity building and activating scientific research technology, as well as establishing a national system for monitoring, reporting and verification. There is also an urgent need to mobilize the necessary technical and financial support to implement research programs on climate change effects, and strengthen technical and institutional capacities at the national level, with the aim of reducing greenhouse gas emissions resulting from economic activities. It is also necessary to implement programs to adapt to climate change impacts while maximizing the potential for international financing, technology transfer, and capacity building.
Chapter Five: Air Quality
Ambient air quality is considered a major cross-dimensional issue. For this reason, the environmental dimension has become one of the most prominent axes for any developmental orientation within the strategic vision for development in the Arab Republic of Egypt by 2030. According to the strategic vision of the Environment 2030, the environmental dimension should be a main focus in all development and economic sectors in order to achieve a clean, healthy and safe environment for Egyptians where air quality plays a major role. In detail, air quality is one of the top priorities of Egypt's Vision 2030 in order to reduce air pollution. This fulfills SDG 11 related to making cities and human settlements inclusive, safe, resilient, and sustainable, and in particular the target concerning reducing cities' adverse per capita environmental impact (UN General Assembly, 2017).

Air quality is directly related to SDG 3 concerning the reduction of morbidity and mortality rates caused by air pollution. It also relates to SDG 13, which calls for urgent action to combat climate change and its impacts and reduce greenhouse gas emissions (United Nations General Assembly, 2017). This important sector is indirectly associated with SDG 7, which calls for ensuring universal access to affordable, reliable, sustainable, and modern energy services, clean fuels, and technology (United Nations General Assembly, 2017) (Figure 15).

Figure (15): Air Quality and Sustainable Development Goals
Through Egypt’s Vision 2030, the state has developed a set of environmental programs, the most significant of which was the adoption of policies to reduce air pollution, combat climate change and protect the environment. Reducing pollution and integrated waste management are also among the strategic objectives of Egypt’s Vision 2030, in order to reduce air pollution loads and pollution resulting from untreated waste (Ministry of Planning, Follow-up and Administrative Reform, 2016). The government aims to reduce the total pollution from respirable suspended dust particles by 50% in Greater Cairo and the Delta by 2030 (Ministry of Planning, Follow-up and Administrative Reform, 2016). Meanwhile, the implementation plan for the first ten years 2014-2023 of the African Agenda specified that by 2025 all African cities would comply with the World Health Organization standards (African Union Commission, 2015).

One of the most important challenges affecting air quality in Egypt is the high population growth, which requires further varied development tools and human activities that pose direct pressures on air quality. Air pollution is one of the biggest environmental challenges that negatively affects citizens’ health. Moreover, the geographical location of the Arab Republic of Egypt as part of the Great Desert, which is exposed to many climatic challenges such as rain scarcity and high temperatures, has placed many pressures on air quality from sandstorms and heat waves.

In order to implement Egypt’s Vision 2030, the state has taken several measures in the past years to monitor and improve air quality. It has also issued many legislations and policies to go in line with global initiatives to reduce emissions, improve and develop pollutants’ monitoring and control systems, and integrate air pollution impact into the health system and the economy. The Ministry of Environment has established and installed an integrated and advanced system for environmental monitoring consisting of 108 stations, geographically distributed throughout the Republic. Monitoring is carried out through automated monitoring systems around the clock, through a program to monitor air quality levels from two main axes: the ambient air quality monitoring system to determine the extent of ambient air quality, and the industrial emissions monitoring system to determine the quantities and track the paths of pollutants released from industrial facilities. The network’s Pollutants Monitoring indicators for gases focused on sulfur dioxide and nitrogen dioxide, which did not exceed the maximum allowed legally for the general average concentration in urban or industrial areas. Carbon monoxide gas was also monitored, and its index was relatively consistent with the averages and legally defined standards in most of the monitoring periods. In addition, the Ground-level Ozone recorded an almost complete consistency with the averages and the legally defined standards in most of the monitoring periods.

The monitoring system detected suspended solid particles, which result from sandstorms or fuel combustion in industrial activities and vehicles, such as the solid particles (PM$_{10}$) less than 10 micrometers in diameter. The indicators recorded that the annual average of these particles in Greater Cairo and the Delta region exceeded the legally defined standards by nearly 69%, and that there was a noticeable improvement compared to the previous years. The improvement rate was 25% compared to the annual average during 2015. As for the solid particles (PM$_{2.5}$) which do not exceed 2.5 micrometers in diameter, the indicators recorded an annual average of about 46% above the legally defined standards. In addition, the indicators for lead, which is one of the most dangerous air pollutants, recorded consistency of the annual average with the maximum standards allowed by law in urban and industrial areas.

Due to the nature and size of major industries and the multiplicity of emission sources, especially from old facilities, and their location within residential blocks, the Ministry of Environment has established a system to monitor industrial emissions from the...
monitoring industrial emissions during 2020, ranges from 95.4% to 100%.

- The percentage of nitrogen oxides’ compatibility with the legal limit for the various industrial sectors linked to the National Network for Monitoring Industrial Emissions during 2020, ranges from 70.6% to 100%.

Due to people’s exposure to particulate matter with a diameter of less than 2.5 micrometers, the annual premature mortality in Greater Cairo was estimated between 12,100 and 13,000, with an average of about 12,600 deaths in 2017. Mortality proportion owing to exposure to these particles was estimated at about 59% of the estimated mortality due to heart disease (IHD), 14% due to lower respiratory infection (ALRI), 13% due to stroke, and 14% due to chronic obstructive pulmonary disease (COPD), lung cancer and diabetes (type 2). These estimates were based on annual exposures to ambient particles less than 2.5 micrometer in diameter within the 66-86 µg/m³ range. In addition, statistics reported that in 2017, approximately 250 million days were lived with illness as a result of ambient PM2.5, which was also a burden on health and economic systems.

The impact of air pollution in Greater Cairo, resulting from dust and suspended matter PM2.5, was estimated at about EGP 47 billion in 2016/2017, i.e., equivalent to 1.35% of GDP (World Bank Report 2019). The state had taken measures to improve air quality in Greater Cairo between 1999 and 2017. This led to a decrease in the proportion of dust and suspended matter PM2.5 by 16%, and a decrease in mortality rates resulting from dust and suspended matter PM2.5 to 8% for every 100,000 people, as well as a decline in air quality costs by about 0.75% of the GDP. The COVID-19 pandemic affected pollution levels, as the year 2020 witnessed a 68.5% decrease of pollutants in the air following the implementation of precautionary measures and lockdown procedures (Ministry of Environment, 2020).
Noise is one of the biggest environmental problems encountering major cities. Road and transportation noise is the main cause of environmental noise in Egypt, especially with the high population growth. Results released by the National Network for Monitoring Noise Levels in Greater Cairo and the governorates during 2020 showed the impact of the decrease in human and commercial activities - that accompanied the COVID-19 pandemic during the second and third quarter of 2020- on environmental noise levels. It was noticed that noise levels were below the normal levels in many locations. The results from many sites were within the permissible limits defined by the executive regulations of the Environmental Law No. 4 of 1994, amended by Law No. 9 of 2009.

The results of the annual average noise levels for 2020 in Greater Cairo and the governorates - during the day and night in industrial areas with heavy industries - complied with the standards in the two sites located in the “6th of October” and “10th of Ramadan” cities. On the other hand, noise levels exceeded the permissible limits and standards defined by the Environmental Law executive regulations in both Helwan and Mostorod.

Egypt has signed the Paris Agreement on Climate Change, under which it is committed to reduce national emissions. In accordance with this agreement, the state has developed plans, policies and programs to confront climate change. During 2020, the Ministry of Environment, represented by the Egyptian Environmental Affairs Agency, managed to improve the quality of ambient air, and to develop monitoring, observation and analysis systems to address the causes of increased air pollution levels from different fixed and mobile sources, and to activate initiatives and partnerships with relevant parties to reduce air pollution. Consequently, by the end of 2020, Egypt ranked 94 out of 180 countries in the Environmental Performance Index by scoring 43.3 points out of 100 points. Egypt’s achievement of this ranking comes as a result of the improvement in the quality of air and drinking water, and the reduction in gas emissions due to the state’s efforts to use clean energy.
Chapter Six: Integrated Management of Fresh Water Resources
Water resources are one of the most important natural resources, as they are an essential component in all development activities and a source of renewable energy. They are also one of the most significant elements of the environmental system and one of the axes of development in Egypt. Water resources are scarce in Egypt; the Nile River is the main source of water and the other sources represent about 7% of the water resources in the country (Ministry of Water Resources and Irrigation, 2020). Due to the increased demand for these resources as a result of the high population growth, it was necessary to preserve them and exert all possible efforts to maximize their use, improve their quality, and protect them from pollution risks, in a manner that guarantees future generations’ rights to these resources. Accordingly, protecting water resources from pollution has become a necessity in order to preserve public health and the environment while means of protecting them from such pollution have become one of the main axes of the Ministry of Environment’s plan.

There are many driving forces affecting the state of water resources in Egypt, such as the expansion in industrial, agricultural and tourism activities, which in turn aggravates pollution of water bodies, in addition to population growth that directly influences the water per capita share. This coincides with the significant increase in the individual's need for water and the change in production and consumption patterns. The per capita share of renewable fresh water resources in 2020 amounted to about 569 m3/person/year, which placed Egypt among the water-poor countries (Ministry of Water Resources and Irrigation, 2020). Encroachments such as drying up, backfilling, and agricultural and industrial pollution also augmented pressures on fresh water sources. The state is working on developing national scenarios for climate change to identify the potential effects of these changes on water resources in Egypt.

**The state of water resources in Egypt:**

Egypt’s total water resources are estimated at about 81.06 billion cubic meters annually, 59.68 billion cubic meters of which are from used fresh water while 21.38 billion cubic meters are from non-conventional sources, mostly reused water.

Figure (17) shows the relative distribution of Egypt’s water resources for 2019/2020.

**Figure (17): Relative distribution of available water resources in Egypt for 2019/2020**

Source: Ministry of Water Resources and Irrigation 2020
Figure (18) shows the relative distribution of Egypt's water uses for 2019/2020: The agricultural sector represents the largest water consumer with a rate of approximately 76% of the total annual water use. Meanwhile, the industrial sector consumes much less water than the agricultural sector, as its consumption represents nearly 6.7% of the total annual water use in Egypt.

**Figure (18): Relative distribution of water uses in Egypt for 2019/2020**

![Figure 18](image)

Source: Ministry of Water Resources and Irrigation 2020

Although a large population lives around the Nile River which is considered a hub for the industrial activities connected to their lives, the water quality of the river and the main canal networks is still fairly good, as the river has so far retained its ability to purify its own water. On the other hand, large quantities of pollutants are discharged into the Nile, leading to the deterioration of its water quality as we head north in the Rosetta (Rashid) and Damietta branches. This is due to the discharge of sewage, agricultural and industrial waste, in addition to the decrease in the flow of fresh water in the Nile as we head further north.

The agricultural drains network is exposed to pollution as a result of the direct discharge of industrial wastewater, untreated sewage water or sewage water that received primary treatment only; thus, leading to deterioration of the drains’ water quality. In addition, the unregulated use of drain water in irrigating agricultural lands leads to increased water salinity. Groundwater is generally of good quality, although it has been noticed that agricultural activities in lands with sandy soil have polluted groundwater because fertilizer and agricultural pesticide residues can easily seep into it. The most important sources of pollution in the Nile River and its two branches are agricultural drainage, sewage and industrial drainage, as well as cooling water used by some industrial facilities and power stations. Fertilizers and composts also contribute to groundwater pollution.

The Nile water quality monitoring results for the governorates bordering the Nile, from Aswan to Greater Cairo, in 2020, showed that most indicators were within the permissible limits while others exceeded them in specific areas. Special importance was laid to discovering the causes behind surpassing allowable limits and the necessary measures were taken to limit or prevent them.
Water policies in Egypt have evolved with the change in the water situation over the past years. Early water policies were geared towards managing water resources when there was water abundance. Over time, with the increase in demand for water, the water policy was directed towards managing resources and needs by raising water use efficiency in all sectors, and allocating water for various sectors. With the growing demand for water, the limited resources and the negative environmental impacts, the need arose for integrated water management. Accordingly, the first national plan for water resources (2005-2017) was issued in Egypt with the aim of supporting social and economic development through the sustainable use of water resources, taking into consideration environmental, legal and institutional aspects. This was followed by the issuance of the Water Resources Strategy 2050, which reflects the future vision over a relatively long period.

As the overall water use efficiency in Egypt is currently high, and since water scarcity has become a reality, a shift from the supply- and demand-oriented strategies to a new strategy has been required to adapt to water scarcity. Therefore, the second national plan for water resources in Egypt (2017-2037) aims in general to achieve “water security for all”. To realize this goal, this plan is based on four main axes: improving water quality, rationalizing water uses, developing water resources, and, finally, creating the appropriate environment for integrated water management and for planning and plan implementation. This plan comprises ideas and inputs that cover social, environmental, engineering, economic, legal, political, and other aspects.

The state is keen to achieve the global sustainable development goals, in particular SDG 6 related to ensuring the availability and sustainable management of water and sanitation services for all (United Nations, 2017). It also cooperates with its neighboring countries in Africa to implement the African Agenda 2063, which stipulates that by 2063 African countries will be among the best performing countries in the global quality of life and human well-being indicators, through comprehensive growth strategies and the provision of basic services, especially water (African Union Commission, 2015).

The state speeded up the issuance of laws, legislation and executive regulations that limit encroachments on waterways and protect them from pollution,
including defining permissible standards to ensure preservation of water quality suitable for various uses. Hence, preservation of water resources from pollution has to be one of the main objectives of the Ministry of Environment’s plan. This can be achieved through continuous and periodic monitoring to measure and evaluate changes in the physical, chemical and biological characteristics of water in water bodies, identifying influential environmental indicators, determining the various causes and sources of pollution and taking urgent corrective measures to reduce their effects. The plan also aims at developing future programs to preserve the environment and control pollution, in addition to providing technical and financial support to industrial facilities to adjust their environmental conditions.

The Ministry of Environment is exerting tremendous efforts to protect the Nile River and waterways from pollution through a set of axes and procedures that are implemented in cooperation with the relevant ministries as follows:

- Environmental monitoring programs axis: It aims to extrapolate the various water quality indicators in order to detect pollutants’ types, causes and sources, identify the vulnerable areas and develop plans and programs to reduce direct and indirect sources of pollution.
- Water quality protection legislative axis: It reflects the importance of protecting the aquatic environment and improving its quality, through amending the Environmental Law and its executive regulations, and adding provisions that take into account improving water quality and reducing pollution of the aquatic environment.
- The axis for environmental control, inspection and reconciliation of environmental conditions: It includes permanent and continuous coordination with all concerned authorities and ministries to rationalize water consumption, benefit from available water resources, reduce waterways’ pollution, and follow up plans to reconcile the environmental conditions of industrial facilities.
- The axis for providing financing mechanisms for the implementation of projects to control industrial drainage into the Nile River: It provides technical and financial support to reconcile the environmental conditions of some factories in order to achieve significant reduction in some pollutants.

**Future Vision:**

The water resources sector is linked to the third, sixth, and eleventh goals of Egypt’s Vision 2030. The Vision’s first strategic environmental objective is to achieve rational and sustainable management of natural resources with a focus on water resources, and to ensure water security, due to its vital importance to national security; especially that Egypt has entered the stage of water poverty (Ministry of Planning, Follow-up and Administrative Reform, 2016). The vision targets the state’s exploitation of its non-conventional water resources to reduce its dependence on the available conventional water resources. It also aims to raise agricultural and industrial wastewater resource efficiency by 80% by 2030.

The strategy for water resources development until 2050 underlined the necessity of formulating policies for water resources development, especially the Nile water and groundwater, and the importance of working on harvesting rain and floodwater, benefiting from wastewater and treated sewage water, as well as desalinating seawater. The strategy emphasized the significance of benefiting from virtual water resources and agriculture outside the borders, while rationalizing water uses in the agricultural and industrial sectors, drinking water, domestic water, in addition to completing and rehabilitating the water system national structure (Ministry of Water Resources and Irrigation, 2010).
Chapter Seven: Land resources
A set of driving forces affect the sustainability of land resources at the global level. These forces, which make human security more fragile, include population growth, climate change, urbanization and immigration, conflict over food and energy, and water insecurity. It has become evident that land degradation and climate change are contributing factors to the feeling of instability in many parts of the world. For this reason, it is necessary to change the way in which the earth’s resources are used and managed.

There are a number of challenges to the sustainability of land resources at the national level. They include limited water resources, small appropriations and continued land fragmentation - which impede sustainable management systems and application of modern mechanization methods - and rapid population growth; the latter leading to the decline of the per capita agricultural area, causing further pressure on agricultural resources and continued land encroachments. The inefficient use of irrigation water resources also adds to the pressures on land resources due to the poor efficiency of water delivery and distribution in various irrigation systems. Losses in agricultural production during harvest, transportation and storage reach an average of about 25%, and may rise for some vegetables to 35%. Finally, environmental issues arising from excessive use of fertilizers and pesticides, burning agricultural waste, deteriorating water quality, and climate change impacts create further pressures on the land resources sector (Ministry of Planning, Follow-up and Administrative Reform, 2019).

The land resources sector is linked to the SDGs 2, 11 and 15. SDG 2 relates to eradicating hunger, providing food security and improved nutrition, promoting sustainable agriculture by eliminating hunger and ensuring universal access to food, especially for the poor and vulnerable groups, by 2030 (United Nations, 2017). SDG 11 is to make cities and human settlements inclusive, safe, resilient and sustainable by promoting inclusive and sustainable urbanization and the ability to plan and manage human settlements in a participatory, integrated and sustainable manner by 2030. One of the most important indicators of this goal is land consumption rate versus the population growth rate (United Nations, 2017).

SDG 15 is to ensure the protection, restoration and sustainable use of terrestrial ecosystems, combat desertification, halt and reverse land degradation, restore degraded lands and soils including lands affected by desertification, drought and floods. It also aims at ensuring the conservation of terrestrial ecosystems, in particular forests, wetlands, mountains and dry lands, and guaranteeing their sustainable use, in accordance with commitments under international agreements by 2030. One of its most important indicators is the proportion of degraded land to the total land area (United Nations, 2017).

In line with Egypt’s Vision 2030, which has defined a set of strategic goals; the most important of which is the rational and sustainable management and preservation of natural resources, especially land, water, air and energy (Ministry of Planning, Follow-up and Administrative Reform, 2016), the state is exerting tremendous efforts to stop the degradation of land resources and maintain their balance. This is achieved by doubling agricultural and pastoral productivity, and increasing the income of small food producers, by ensuring equal access to land and other related production resources by 2030 (Ministry of Planning, Follow-up and Administrative Reform, 2016). The state, in cooperation with the private sector and civil society, focuses on increasing investments through enhanced international cooperation in rural infrastructure, agricultural research and agricultural extension services, technology development and animal and
Agriculture currently contributes 14.5% of the GDP and employs 28% of the country’s workforce, and 55% of the workforce in Upper Egypt (Ministry of International Cooperation, 2021). Therefore, the state is working on updating the sustainable agricultural development strategy 2030, preparing a medium-term action plan, and integrating the current sustainable agricultural development strategy with the existing links between agriculture, water, land use, climate change, agro-industry, input supply, food security and nutrition (Ministry of International Cooperation, 2021). The government’s program of Action for the years 2019-2022 focused on agriculture and food security. The third major program emphasized the paramount importance of food security, and aimed to increase the cropped area to nearly 18 million Feddans for 2021-2022, compared to 16.7 million Feddans for 2016-2017.

The National Human Rights Strategy recognizes the right to food, whereby “the state has the obligation to secure food resources for all citizens, protect and increase the agricultural area and criminalize aggression against it, develop agricultural and animal production, and encourage agro-animal industries” (Supreme Standing Committee for Human Rights, 2021).

Egypt’s agricultural yields in 2015 were estimated at about 25.5 tons per hectare, which was the fifth highest in the world and the third highest in Africa. These returns were about 17.4 tons per hectare in 1990. During the same period, the croplands increased from about 2.6 million hectares to 3.8 million hectares (Ministry of Planning, Follow-up and Administrative Reform, 2016).

Figure (19): Agricultural land from 1961-2019

Source: FAOSTAT 2020
The government’s program aims to increase the storage capacities of the wheat crop to be sufficient to maintain a strategic reserve estimated at 4,030 thousand tons, compared to the current capacity of 2,900 thousand tons, with a 39% growth rate. This is achieved by establishing a large number of vertical metal silos, and increasing the storage capacity to (830) thousand tons, as a precautionary measure for any future scenarios that may affect Egypt’s food security, such as natural disasters and wars.

According to the Global Ecological Footprint Network, the global ecological deficit is a major challenge for a large number of countries. According to national footprint calculations, Egypt’s biological capacity is estimated at about 0.4 global hectares per person, while the ecological footprint per capita is 1.8 global hectares, which results in an ecological deficit. This deficit means that we are depleting more resources than Egypt produces by 1.4 global hectares (Abdelrehim and Daoud, 2022). Figure (21) shows the increase in Egypt’s ecological footprint from 0.81 in 1960 to 1.84 in 2018 as a result of the significant increase in demand for natural resources (Global Footprint Network, 2021).
The country has been working to enhance the sustainability of the agricultural sector, with the support of the United Nations International Fund for Agricultural Development (IFAD) for more than four decades; it has financed 14 projects worth 1.11 billion USD, benefiting more than 7 million rural residents. These projects have contributed to supporting strategies to combat climate change, sustain natural resources, and increase productivity in the Nile Valley and Upper Egypt.

The earth contains several natural resources that humans need and use in their daily life; either visible on the surface of the earth, such as soil, or under the surface, such as minerals. These natural resources are also divided into renewable and non-renewable. Soil is one of the basic components of the earth surface, as it provides the most important resources necessary for the agricultural ecosystem because it contains many minerals and organic substances necessary for the plants’ growth. Soil is a non-renewable natural resource exposed to deterioration that limits its productive capacity.

Egypt is implementing a strategy to support and develop the agricultural sector. Egypt’s food exports have not been significantly affected by the COVID-19 pandemic; hence, Egypt is one of the few countries that have been able to maintain food security despite the difficult conditions caused by the pandemic. According to a report by the Egyptian Food Export Council, manufactured foodstuff exports from January to September 2020 increased by 2% to reach 2.6 billion USD (Ministry of International Cooperation, 2021).

Within this framework, the following are the key messages of this Chapter:
I- At the general level:
• The current pressures on land resources are huge, and these pressures are expected to continue due to the high population growth rates.
• The continuation of these pressures leads to a decrease in the ability to adapt to environmental pressures, in addition to the escalation of competition in the demand for lands that provide food, water, energy and services that support and regulate all life cycles on Earth.
• Natural ecosystems are exposed to degradation due to poor management of land resources and neglecting their sustainability.
• Climate change and biodiversity decline significantly affect land productivity due to carbon emissions, changing precipitation patterns and soil erosion.
• Desertification is one of the main challenges that impede development efforts due to the continuous urban expansion, pesticide and chemical pollution, depletion of soil fertility, in addition to the high frequency of climate change impacts.

II- Repercussions of land resources unsustainability
The concurrent repercussions include the following:
• Fragile food security and the growing gap between production and consumption.
• The current focus is on short-term production and quick profit rather than long-term environmental sustainability. This reflects the need to intensify stimulating efforts to improve water consumption and raise the awareness of the agricultural sector; especially that agriculture is the highest water consumer among all sectors.
• Land degradation negatively affects biodiversity due to their interconnectivity.
• Small farmers are under tremendous pressure due to land degradation and insecure tenures. The global food system, which mobilizes large-scale, highly mechanized businesses, has negative effects on small farmers’ livelihoods.
• Overpopulation is constantly putting pressure on land resources, leading to land use change and degradation, as well as deforestation.

III- The path to sustainable land resources

• A better understanding of the relationship between the water, energy, food, and climate nexus in Egypt creates an informed framework for identifying synergies that meet the demand for these resources, without compromising environmental sustainability while taking into account the scarcity of these resources and the need to develop them to serve all sectors in the country (Egypt HDR 2021).
• Supporting efforts which improve the climate that encourages agricultural investment by studying legislation and procedures for land allocation, and reviewing credit policies for agricultural projects in order to facilitate the procedures for granting loans, especially to small farmers.
• Encouraging the trend towards expanding organic agriculture and developing quality and qualitative characteristics of the products and export crops in accordance with the standard specifications.
• Establishing and applying quality standards and specifications for agricultural products intended for local consumption, and export crops compatible with standard and export specifications.
• Changing consumer and business behavior through more sustainable practices to provide sufficient lands to meet the requirements of goods and services.
• Increased land tenure security, gender equality, and appropriate incentives and rewards are key enabling factors to help producers adopt and expand sustainable land management practices.
• Land use planning should include applying the right practices in the right place and at the right scale, which leads to more efficient use of resources and waste reduction. Planning should also be based on the principles of participation and cooperation among stakeholders.
• Seeking to implement further institutional reforms that include a nexus approach in the process of policy development and implementation, as part of the main efforts to achieve sustainable development and address climate change.
Chapter Eight:
Biodiversity
Momen Saleh - Ghost crabs on Egyptian beaches
The threats to reduce the area of natural reserves, the financial and administrative requirements to implement biodiversity conservation programs, overfishing practices, and unsustainable consumption and production patterns are all among the most important challenges affecting ecosystems and biodiversity in Egypt and the region. Climate change is one of the most significant direct threats to biodiversity in Egypt, as well as on the regional and African scale. It is defined in the African Agenda 2063, as one of the most important risks and threats facing Africa’s development, especially with the continent’s limited capabilities to adapt and deal with it.

A comparison has been held between the proportion of the protected terrestrial land and marine areas in Egypt on one hand and the “11th Aichi Biodiversity Target” of the “Strategic Plan for Biodiversity 2011-2020” on the other hand. The target aimed at the protection of “at least 17% of terrestrial and inland water, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services by 2020. Although Egypt has not yet achieved these goals, it is on the right track to do so. In the coming years, Egypt needs to declare more areas, important for biodiversity and ecosystems, as protected areas, as shown in Figure (22).

Figure (22): Aichi targets percentage for protected areas compared to Egypt's actual percentage

![Graph showing Aichi targets percentage for protected areas compared to Egypt's actual percentage](source: Ministry of Environment 2020)

This chapter deals with the existing status of biological diversity in numbers with a more accurate vision, not limited to the quantitative number of species, but rather the qualitative diversity and its importance in terms of the number of subspecies, breeds, endemic and semi-endemic species, as well as the newly registered species in Egyptian flora. The chapter also takes into account the diversity and geographical spread of the wildlife habitats in Egypt, and their role in the diversity of functional traits that withstand drought stress, salinity, extreme temperatures and climatic changes.

The year 2020 witnessed major events and repercussions as a result of the outbreak of the COVID-19 epidemic at the end of 2019, and its conversion into a global pandemic by the first quarter of 2020. This led to many impacts and
changes as well as environmental, economic and social transformations that made the year 2020 a turning point in many aspects, especially those related to nature conservation, biodiversity and efforts to address climate change impacts.

Several studies and scientific research refer to the close link between the emergence of new epidemic diseases common between humans and animals and the unsustainable human practices that destroy biodiversity and ecosystems. This is evident in the outbreak of hundreds of emerging epidemics and diseases in recent decades, the latest of which is the COVID-19, which research studies indicate that excessive contact with wildlife and illegal trade in wildlife has been a direct cause of its emergence and its rapid transformation into a pandemic that has swept the entire world.

The precautionary measures, lockdowns, and business halts imposed by all countries of the world, within their strategies and plans to control the pandemic, have led to a qualitative and noticeable improvement in the quality of the environment and the state of ecosystems. This was evident in a lower carbon footprint, lower greenhouse gas emissions, an improved ecological footprint, and lower rates of deforestation. However, perhaps one of the most important positive effects of the pandemic is the whole world’s realization that “the time for nature has come”, and that there is no way for us to rebuild and recover economically except by respecting nature, biodiversity and ecosystems. It is also by resorting to nature-based solutions, achieving true sustainability through protecting biodiversity and ecosystems, and working to restore their efficiency and the sustainability of their services. Therefore, it has become necessary for the whole world to adopt “green recovery” approaches and strategies to improve the support for post-pandemic reconstruction efforts.

The activities and plans for managing biodiversity and nature reserves were affected by the measures adopted by the state to face the repercussions of the COVID-19 pandemic. Thus, it was decided to take advantage of lockdowns and closure of reserves to carry out several activities that suited that exceptional period, such as completing the development of basic infrastructure, and carrying out some monitoring programs such as monitoring the environments of mangroves, waterfowl and migratory soaring birds as well as detecting bird flu in migratory birds. Efforts were also geared towards the implementation of monitoring plans and programs for some biodiversity components such as sea turtles and sharks, as well as registering genetic assets. In the meantime, the Ministry of Environment continued to implement its already existing plans to integrate biodiversity values into the developmental sectors such as energy and tourism, and develop a system of permits for activities conducted in nature reserves.

With regard to the situation under the COVID-19 pandemic, the report addressed the efforts exerted to promote conservation and development activities despite the pandemic through the following five axes:

- Managing biodiversity resources and eco-tourism,
- Integrating biodiversity into development sectors,
- Developing monitoring and scientific research programs,
- Developing law enforcement tools and mechanisms for conservation and protection, and
- Raising societal and institutional awareness of biodiversity importance

Despite these exceptional circumstances, Egypt has achieved success in a number of fields at the international level. One of these achievements concerns Wadi Al-Hitan (Whale Valley), Wadi El-Rayan Reserve, that has been rated as the most important site in the world for being very well protected and for its good governance mechanisms, as indicated in the 2020 performance Evaluation Report submitted by the International Union for Conservation of Nature (IUCN) for the World Natural Heritage Sites.
In line with Egypt’s Vision 2030, the state attaches great importance to confronting the challenges by protecting terrestrial and marine ecosystems; promoting their sustainable use; raising environmental awareness and integrating biodiversity conservation concepts into the state’s development plans and efforts to address climate change.

With respect to climate change endeavors, the state assigns priority to fulfillment of its international obligations, finance provision, technology transfer, capacity-building, scientific research, and species distribution modelling to assess climate change impacts on biodiversity in Egypt.

The state’s biodiversity conservation efforts contribute to the achievement of the Sustainable Development Goals (SDGs). Biodiversity relates to SDG 2, which aims to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture by maintaining the genetic diversity of seeds, cultivated plants and farmed and domesticated animals and their related wild species by 2020 (United Nations 2017). Biodiversity is also related to SDG 14 concerning life below water and SDG 15 which aims to protect, restore and promote sustainable use of terrestrial and freshwater ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss by 2020 (United Nations, 2017).

Biodiversity also lies within the strategic objectives of the environment in Egypt’s Vision 2030, in terms of maintaining biodiversity and ecosystems balance and their rational and sustainable management, protecting Egypt’s distinguished biodiversity and raising its efficiency through the natural reserves.

Egypt is one of the leading countries that has always attached great importance to protecting ecosystems and biodiversity. It has demonstrated this interest by acceding to the international agreements that reinforce this trend, especially the UN Convention
on Biological Diversity (CBD), which Egypt ratified in June 1994, became a member thereof at the end of August 1994, and hosted its 14th Conference of the Parties in 2018. Egypt was also one of the first countries to develop and implement a national strategy and a national action plan in the field of biodiversity (1997-2017), with governmental, civil and popular participation. This was followed by updating the National Biodiversity Strategy while ensuring a more effective and comprehensive community inclusion. The Strategy, covering the period from 2016 to 2030, was completed during 2015 and approved in January 2016. It included 20 national goals for biodiversity conservation, all of which were linked to the Strategic Plan for Biodiversity (the Aichi Targets).

In order to continue the biodiversity conservation programs and plans, the report addressed the efforts exerted to enforce the outputs of the 14th Conference of the Parties on investing in biodiversity for sustainability. The Ministry of Environment developed appropriate policies, plans and programs to achieve the objectives of the Convention on Biological Diversity, the Aichi Targets, as well as the National Biodiversity Strategy.

“A coherent approach for addressing climate change, biodiversity loss, and land degradation” was launched in 2018 to counter biodiversity loss, climate change and desertification by linking the three Rio conventions. With regard to nature reserves, the Ministry of Environment was geared towards investing in the services it provides to local residents and visitors, developing the infrastructure and preparing files for some reserves to be included in the IUCN’s Green List. This followed the inclusion of Ras Muhammad Protected area and Wadi Al-Hitan site in the Green List.

The total area of nature reserves in Egypt is about 140,305.4 km², which represents about 14% of the total area of the Arab Republic of Egypt (Ministry of Environment, 2020) (Figure 23).

**Figure (23): Evolution of nature reserves’ number and area in Egypt over the years**

![Figure 23: Evolution of nature reserves’ number and area in Egypt over the years](image)

Source: Ministry of Environment 2020
Chapter Nine:
Marine and coastal environment
This summary presents a description of the state of the coastal and marine environment in the Arab Republic of Egypt, which is included in the 2020 State of the Environment Report. The report deals with the pressures and driving forces that affect the coastal and marine environment, and compares them with the analysis cited in the Report of 2019 and the preceding years. It defines the consequences and response methods and assesses the state of the environment and its components that are affected by these developments. The report relies on the (DPSIR) Analytical Framework which evaluates the action required and taken to address negative impacts, and refers to other activities aimed at adapting to current impacts (immediate/short term plans), reducing future causes and impacts (medium term plans) in addition to supporting activities that promote environmental resilience in the long term (long term plans).

The current report presents the scientific evidence that confirms the interdependence of human activities, climate and biodiversity, and their effect on changing the marine/coastal environment, which significantly influences its environmental and functional characterization. The report also highlights the role played by the state, represented by the Ministry of Environment, to achieve the sustainability targeted in Egypt’s Vision 2030, in line with global development goals regarding the natural coastal and marine environment (the ecosystem), and its effects on the social and economic aspects of the surrounding communities.

Given the importance of water as an essential element for all forms of life on the globe, and with the assumption that consequences will exacerbate with climate change potential risks, it has been necessary to focus on studying the water environments in the Arab Republic of Egypt, especially the marine and coastal environment.

Marine and coastal environment is considered one of the most important natural resources. It contributes significantly to human development and provides food security, transportation, energy supplies, desalinated water, tourism and industry, in addition to the most important ecosystem services.

Urbanization, population growth and the increase in development activities are among the most important pressures affecting the marine and coastal environment in Egypt. This is due to the increased demand for natural coastal resources and the direct/indirect discharge of various partially treated or untreated pollutants into the sea, which results in increased disturbance of biological habitats, causes a lot of damage to coastal and marine ecosystems and negatively affects drinking water, tourism and other activities.

Climate change is one of the most important environmental conditions affecting the global marine and coastal environment in general and Egypt in particular. The gravity of climate change impacts extends to agricultural activities and productivity rates in areas near the coasts (such as the Delta), as well as fish productivity. Climate change affects fish farms and marine fisheries, which is reflected on national food security. It also has a negative impact on energy sources as one of the marine resources, tourism activities and marine/coastal monuments. These effects are reflected on individuals’ social life and well-being, and thus on the economic situation in the country.

The state attaches great importance to the marine and coastal environment, as well as the coastal and inland lakes, which are a valuable source of the country’s national wealth. Fish production from the northern lakes alone amounts to about 77% of the total production of Egyptian lakes, according to a report by the General Authority for Fish Resources Development. The seas and oceans are also a source of protein for millions of people on the planet, a destination for tourism and recreational activities, and a source of mineral wealth and energy such as oil and natural gas. In addition, the oceans play an important role in eliminating high emissions of carbon dioxide, generated by industrial activities and further other operations.
The importance of integrated coastal environment management and its association with sustainable development goals

Due to their complex and rapidly changing environments with ramified relationships bound by several internal and external factors, coastal areas need integrated management of their environment and resources, in a manner that ensures resources’ sustainability and maximizes their benefit, in line with the 14th Sustainable Development Goal. SDG 14 aims to conserve and sustainably use the oceans, seas, and marine resources for sustainable development, and address the effects of increased ocean acidification. This underlines the necessity of international collaboration to rationalize the sustainable use of these resources by mitigating challenges. This entails an international law that helps conserve oceans, seas, and marine resources and achieves sustainable development.

Endeavors to achieve the integrated and sustainable management of the marine and coastal environments are directly related to SDG 13, which aims to address climate change and its effects on marine and coastal areas, which range from noticeable and temporary effects to cumulative and compound or consequential and expected effects. In the meantime, the endeavors are also indirectly related to SDG 1 (Ending poverty in all its forms everywhere by 2030) and SDG 2 (Ending hunger and achieving food security and improved nutrition by 2030). Consequently, it is evident that these efforts should be linked to SDG 3 which targets ensuring healthy lives and promoting well-being for all at all ages.

Figure (24): Integrated Coastal Zone Management and Sustainable Development Goals
The most important drivers and pressures threatening the coastal and marine environment: Drivers (D) - Pressures (P)

The most important drivers and pressures that threaten the health and safety of the marine and coastal environment fall under two types of factors that include a number of activities and processes.

These are environmental and human factors, the most important of which can be summarized as follows (Figure 25):

- The increase in human and development activities and the resulting pollution.
- Climate changes
- Coastal erosion

Figure (25): Pressures, drivers, and state of marine and coastal environment

The state and impacts of the marine and coastal environment:

It is noticed that all the problems and impacts menacing the marine and coastal environment are interrelated and even overlapping. For example, climate changes affect marine and coastal areas, especially the existing activities and population settlement in coastal cities, which negatively influences the economy in response to changing the natural course of the shoreline resulting from increased sea level rise and the exposure of some areas to the risk of drowning or inundation. This will have an impact on the agricultural sector due to the repeated and continuous increase in global temperatures that affects the surface water temperature causes a shortage in irrigation water, and negatively influences the fertile arable lands in the Delta due to saltwater intrusion into aquifers. Naturally, all this leads to a decrease in the productivity of some crops as a result of land and water salinization, pollution, and soil erosion.

The spread of non-endemic species, such as the new environmental herbs, or the introduction of different animal species, is the cause behind the emergence of some marine diseases, which are
difficult for the environment to deal with or adapt to, resulting in environmental dysfunction. This leads to loss / decline of biodiversity and the spread of pests and plant diseases.

The tourism sector is adversely affected by climate change impacts which result in biodiversity decline in marine and coastal environments, especially the vulnerable environments like the coral reefs, which constitute one of the most important tourist attractions in the Red Sea resorts. This will lead to a decline in tourist activity.

Sea level rise is one of the most important effects of climate change, particularly on the Mediterranean coasts. Its severity is projected to increase by the end of this century, though it is not the sole impact of climate change. Sea level rise is also a major threat to marine biodiversity due to the extinction of some species, the supremacy of others, and the introduction of new non-endemic species. It also affects the dynamics and migration of fish, as well as ocean acidity. As for the Red Sea coasts, their rocky formation is a natural barrier to protect them from the danger of sea level rise. However, the possibility of climate changes affecting the distinguished natural habitats of the Red Sea environment remains. This is manifested through global warming environmental pressures and effects, particularly on the distinct and special environments of the Red Sea such as the coral reefs, which are affected by “reef bleaching”, which is a threat to biodiversity and its balance.

Pollution, with its multiple sources and the different nature of pollutants, is one of the biggest challenges facing the coastal and marine environment in Egypt. It is primarily associated with the exponential increase in urban and population growth and related human activities.

Marine litter and solid and plastic waste are among the major challenges facing the environment of seas and oceans and impeding the success of the blue economy. World countries are exerting strenuous efforts to maximize the return on these wastes and reduce their effects. The residues of seaports and maritime transport activities are also one of the most important challenges facing seas and oceans and adversely affecting ports’ environment. This comes as a result of the increase in ports’ waste and the rise in air and water pollution rates.

Oil pollution resulting from commercial ships’ leakage incidents or onshore/offshore oil fields is considered one of the most dangerous marine pollutants affecting the marine environment, as well as the economic returns of these systems. Twenty-three and 14 oil pollution incidents were registered during 2019 and 2020, respectively and the seaports were among the worst affected areas. Waste management in general and marine litter and waste, in particular, need strenuous efforts and executive measures to limit their continuous increase and significant and dangerous negative effects. Concerted efforts are also required at the international, regional, and local levels to achieve a prosperous future through the blue economy.

The country’s efforts towards resource sustainability and creating a more resilient environment (Response):

The most important issues affecting the coastal environments in Egypt that are of interest to the Egyptian state:

Integrated Coastal Zone Management

Mediterranean coastal zone Management:

One of the most important activities in the Mediterranean coast is the implementation of the project for the adaptation of the Nile Delta to climate changes through integrated coastal zone management. The project is funded by the Global Environment Facility, (GEF) and implemented by the Ministry of Water Resources and Irrigation, in cooperation with the Ministry of Environment. Implementation is underway for a new phase of the project entitled “Enhancing Adaptation to Climate Changes in the North Coast and Nile
Delta in Egypt”, funded by the Green Climate Fund (GCF). This phase aims to reduce the risks of coastal flooding in the Delta resulting from the expected sea level rise and frequent severe weather storms. This will be the basis for the long-term integrated plan for coastal zone management of the Mediterranean coast in Egypt.

Red Sea Coastal Zone Management: Cooperation is forged between various sectors with the aim of addressing oil pollution incidents. Collaboration is also taking place between regional and international bodies to implement the human capacity development program under the auspices of the International Maritime Organization (IMO), the Maritime Transport Authority, and the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA). Moreover, the Governor of the Red Sea has issued decision No. 167/ 2019, which limits the use of plastic bags in Hurghada and replaces them with environment friendly bags, within the framework of cooperation between the Ministry of Environment and the Red Sea Governorate.

Coastal water quality - Pollution and its multiple sources
Egypt carries out several monitoring and awareness-raising activities in this field. It also develops and implements plans, conducts water quality monitoring operations in the Mediterranean and the Red Seas, and limits the encroachments along the shoreline in the two environments, as shown in the following maps (Figures 26-27).

Figure (26): Coastal Water Quality Monitoring Sites on the Mediterranean Coast
Towards improving the management of ships’ ballast water
Anational strategy has been prepared in cooperation with the relevant authorities to implement the International Convention for the Control and Management of Ships’ Ballast Water and Sediments for 2004, issued by the International Maritime Organization. An inventory has also been carried out of alien organisms that have been detected in the marine environment.

Egyptian Lakes Protection Plan
The Ministry of Environment assigns top priority to Egyptian lakes and their protection. This is achieved through the application of an integrated system that ensures the sustainability of their natural resources, maximizes their environmental and economic benefits and manages them in an integrated manner. The most important achievement carried out in this respect is the draft executive plan for the rehabilitation of Egyptian lakes, the preservation of natural resources, and the rectification of the current environmental status, in addition to a package of procedures and programs such as the following:
• Approval of the National Strategy for Integrated Coastal Zone Management in accordance with Egypt’s Vision 2030.
• Implementation of the periodic monitoring program for lake water quality in cooperation with the Institute of Marine Sciences since 2009.
• Periodic follow-up of the drains water quality, periodic inspection of industrial facilities that discharge directly or indirectly into lakes, and the establishment of the national network for continuous real-time monitoring.
• Reviewing environmental impact assessment studies submitted by new facilities or projects requiring expansions or modifications, and expressing the relevant technical opinion, by either refusal or approval, with specific environmental controls and obligations.

Preserving and sustaining marine reserves
Egypt attaches special importance and top priority to nature reserves as one of the
most important components of the integrated management of marine and coastal environment. Egypt now houses several internationally recognized Ramsar areas, but the international listing is not sufficient to provide protection for wetlands, as they require protection plans and local integrated management with legal cover. The state seeks to achieve this (represented by the Ministry of Environment), through the integrated management plan for the Egyptian coasts and the adjacent wetlands.

As for pollution by waste (solid/plastic), a project is currently being implemented under the PROBLUE program entitled “Cleaner Marine and Coastal Ecosystems in Egypt”, funded by the World Bank. The regions of Dahab and Alexandria have been chosen as a case study, and the expected results are later applied to all Egyptian coasts including promotional and executive activities. The project also includes launching an extensive underwater cleaning campaign for the Red Sea bed in cooperation with the Red Sea Governorate, the Chamber of Diving and Water Sports, and the Hepca Association. This follows the guidelines of the Ministry of Environment’s “Go Green” initiative “under the auspices of his Excellency the President of the Republic with the aim of protecting marine life and biodiversity.

Egypt seeks to find appropriate ways and systems to manage litter, dispose of marine waste, and reduce the use of plastic bags, through a number of awareness activities and campaigns to collect waste in cooperation with youth initiatives and civil society. It is also geared towards looking for modern technologies to find environmentally safe materials as an alternative to plastic bags, and search for ways to recycle and use it, in cooperation with the Plastic Technology Center. In the meantime, a national committee has been formed to limit the use of single-use bags by a Prime Minister’s decision, in cooperation with the Ministry of Trade and Industry, the Ministry of Finance, the Ministry of Supply and Internal Trade, the Ministry of Health and Population, and the Ministry of Planning and Economic Development.

Protecting biodiversity and fish wealth
Biodiversity conservation is fundamental to the long-term protection of the nation’s natural capital and the achievement of sustainability goals, taking into consideration marine biodiversity and other marine/coastal ecosystem services. The steps to develop fish wealth in Egypt are represented in developing lakes, monitoring sea and lake waters quality, regulating fishing operations, as well as tightening laws, inspections and prosecutions to end illegal fishing activities, and eliminate infringements.
Chapter Ten:
The future vision of environmental action in Egypt and integration with national strategies
The future vision of environmental action in Egypt relies on basic principles that are compatible with the sustainable development strategy “Egypt’s Vision 2030” to achieve the concept of sustainable and balanced growth and development (Ministry of Planning, Follow-up and Administrative Reform, 2016). During the implementation phase of this vision, it must be realized that environmental systems constitute a complex network of interactions that require the Ministry of Environment’s coordination with various ministries, relevant entities and scientific, research and academic institutions. The targeted collaboration aims at analyzing these interactions and their impacts on the citizen’s economic and social life, and linking them to the pillars and axes of the state of the environment and Egypt Vision’s 2030. The vision seeks to improve the citizen’s quality of life, achieve a balanced and diversified ecosystem, and build a knowledge-based, competitive, balanced, diversified and disciplined economy that takes into account the environmental conservation principles to accelerate economic growth rate and reduce pressures on the environment and natural resources. All this aims to ensure a fair distribution of wealth among the different groups of society (framework document for the national strategy for sustainable development and the indicators’ set up methodology, the Ministry of State for Environmental Affairs, the Presidency of the Council of Ministers).

The environment strategic objectives’ future vision during the next phase aims at developing frameworks and tools to implement the fifth strategic goal of the government’s program 18/ 2019 - 21/ 2022, based on the political leadership’s directives included in the Presidential letter of assignment “June 2018”, related to improving the Egyptian citizen’s standard of living. The vision also assigns special importance to the seventh program on the state of the environment, to improve air and water quality and waste management system. This trend is in line with the sustainable development strategy geared to strengthen policies that support the achievement of national development goals and encourage partnership with the public and private sectors and the civil society.

As the ecosystem is intertwined with all development axes, work in the next stage must be linked to and integrated with future national sectoral strategies that support environmental action (Ministry of Planning, Follow-up and Administrative Reform, 2016). Therefore, the environmental action philosophy for the next stage relies on dealing with environmental issues as intertwined and intersecting issues, and viewing them from an integrative perspective. Consideration should be given to the impact of environmental issues on the biosphere and vice-versa, such as the relationship between food, energy and water; and the relationship between climatic changes and human activities, and their impact on the environment and humans to achieve a better holistic knowledge of the interrelationships between these sectors and the environmental dimension.

Therefore, the principles of inclusiveness, partnership and integration must prevail between all national strategies. There are common axes for the integration of these links and their effect on the environment between various strategies namely the following:

- The Agricultural Development Strategy for the Achievement of Food Security (2030),
- The Ministry of Electricity and Renewable Energy’s Strategy for the Optimal Use of Available Energy Sources and the Protection of the Environment from Pollution (2035), and
- The Ministry of Water Resources and Irrigation’s Strategy (2050), namely its first axis to improve water quality.

This trend coincides with the second axis of the National Human Rights Strategy (2021-2026), which ensures the citizens’ rights to safe drinking water and sanitation, as well as the Strategic Plan to expand seawater desalination plants to meet drinking water needs (2020-2025). In addition, efforts are geared towards reducing waste losses, and raising citizens’ awareness of the importance of rationalizing water consumption (National Human Rights Strategy 2021-2026).
It is worth mentioning that Egypt is formulating these strategies in response to the requirements of sustainable environment and development work at the global level and its reflections at the national level. The Paris Climate Change Agreement (2015) (Article (4) paragraph 19, and Article (9) paragraphs 3, 4, and 9 urged member states of the United Nations Framework Convention on Climate Change to formulate and communicate long-term national strategies for low-emission growth, while balancing the issues of mitigation and adaptation to the negative impacts of climate change. The agreement also urged industrialized countries to mobilize the necessary financial resources to assist developing countries in implementing these strategies. The strategic objectives of environmental action until 2030 are reflected in the following four main axes:

1- Rational and sustainable management of natural resource assets to support the economy, increase competitiveness and create new job opportunities,

2- Reducing pollution and integrated waste management,

3- Maintaining the balance of the ecosystem and biodiversity and their rational and sustainable management

4- Egypt’s implementation of its international and regional commitments under environmental agreements and adoption of the necessary related mechanisms, while ensuring their compatibility with national and local policies.

The environmental action strategy does not neglect the efforts and success stories lately achieved despite the major challenges. It rather builds on the achievements and re-evaluates policies and practices that have been ineffective and would be inappropriate to national plans in the coming stage, in order to design appropriate executive programs to achieve vision 2030 and meet the current and future development challenges.

Environmental action in the next phase relies on expanding the use of renewable energy sources, maximizing energy efficiency and expanding the use of modern and clean technology in waste recycling projects and programs for converting waste into electricity at the governorate level. Attention is also directed towards benefiting from the unprecedented development in transport networks, roads and communications within the framework of the green economy concept and the environment friendly projects (the plan for the fiscal year 2019-2020
emanating from the Sustainable Development medium-term plan (2018/2019-2021-2022)). It is expected that in the light of the accelerating economic development, the GDP of the Arab Republic of Egypt by 2030 will be approximately 10% higher than the current rate (United Nations, 2017).

The world is currently witnessing the Fourth Industrial Revolution characterized by an evolutionary leap in artificial intelligence, the world of communications, the Internet, and the Internet of Things, as well as the huge amount of data, which can greatly contribute to understanding the complex and intertwined relationships of social and ecological systems. All this integrates with the National Artificial Intelligence Strategy 2020-2030, which supports the use of artificial intelligence technologies to enhance the achievement of sustainable development goals in Egypt. The “artificial intelligence for development” axis in that strategy focuses on agriculture, water and environmental management, uses of weather forecast data, and the use of artificial intelligence technologies to monitor crops and soil quality and reduce the use of pesticides. The implementation stages of this strategy included a period of three years to expand scientific research scope in the field of the ecosystem (National Artificial Intelligence Strategy 2020-2030). Moreover, the environmental action vision is integrated with the National Strategy for Science, Technology and Innovation 2030 in its second track concerning the “environment and natural resources’ protection axis”, to enhance future predictions of the potential impacts of climate change and develop appropriate technologies to counter these impacts (National Strategy for Science, Technology and Innovation 2030).

The environmental action strategy for the coming period is also in harmony with the United Nations 2030 Agenda for sustainable development, as more than half of its goals are directly related to the environment and natural resources as well as social and economic causes. SDG 6 relates to universal access to clean water and sanitation while SDG 13 concerns climate action. In addition, SDG 14 aims to conserve oceans and life below water whereas SDG 15 seeks to protect terrestrial ecosystems, combat desertification and halt land degradation and biodiversity loss. In the light of the 2030 Sustainable Development Strategy, and the fourth environmental dimension goal related to international and regional environmental agreements, the environmental action vision works to link environmental action national goals with the targets of a number of multilateral environmental agreements. Therefore, the vision seeks to link the three United Nations conventions (the United Nations Convention on Climate Change, the United Nations Convention on Biological Diversity and the United Nations Convention to Combat Desertification) with the relevant national agreements. It is also launching the first national strategy for climate change under the umbrella of the National Council for Climate Change that comprises all ministries and concerned entities and is headed by the Prime Minister. Furthermore, the vision aims to ensure adherence to international and regional agreements, such as those related to hazardous substances, hazardous waste, ozone layer erosion and marine pollution, while setting guarantees that ensure their compatibility with national policies and strategies.

The vision also evaluates the progress in achieving the environmental objectives identified in the multilateral environmental agreements, and pinpoints the gaps between commitments and achievements, as stipulated in the agreements.

The design of the environmental action vision has taken into consideration the activation of the necessary mechanisms for effective participation of community members, and raising awareness about climate change among various stakeholders, especially women, youth, people with special needs, and the elderly. Therefore, the “National Strategy for Mainstreaming Gender in Climate Change” has underlined the importance of diverse participation in environment-related aspects, the responsibility of all citizens, and the contribution of children and youth to measures aimed at protecting and managing the environment (Ministry of Environment website). The «Go Green» initiative is launched as part of the “National Sustainable Development Strategy” «Egypt 2030», and aims to change behaviors, spread environmental awareness, and motivate citizens, especially youth, to participate in preserving the environment and natural resources, to ensure their sustainability and protect the rights of future generations.
The gender equality vision will be achieved through cooperation with Non-Governmental Organizations, institutions, the private sector, ministries, governmental departments and the society in general (National Strategy for Mainstreaming Gender, Ministry of Environment). The “National Strategy for the Empowerment of Egyptian Women 2030” has also been keen on enhancing women’s ability to face environment-related risks, climate change and unsustainable consumption (National Strategy for the Empowerment of Egyptian Women 2030, Vision and Action Axes, National Council for Women). The “National Strategy for Mainstreaming Gender in Climate Change” in Egypt has identified the role that the EEAA will play, in cooperation with strategic partners at the national, regional and international levels, to mainstream gender, and enhance the role of EEAA’s Gender Unit in tackling climate change issues (National Strategy for Mainstreaming Gender in Climate Change in Egypt).

The Information Boom, communication technology revolution, big data, and citizen science, all these present tremendous opportunities for improving our ability to understand environment-human interrelationship. Artificial intelligence technologies have increased opportunities for collection and provision of environmental data. Satellites and other Earth observation technologies will also be relied upon to enhance our capability to understand environmental changes and improve the accuracy of environmental assessments, for drawing knowledge-based conclusions to be disseminated to citizens by means of modern interactive technologies, in addition to making policy decisions based on scientifically reliable information.

The social media revolution, and citizens’ craving for information and data, necessitated enhancing transparency and disseminating information to society members by all modern means of communication. Data and information form the backbone for promoting people’s environmental awareness, increasing popular participation in environmental decision-making, and developing more interactive and more citizen-friendly environmental responses and policies.

This image and accompanying text were produced by Artificial Intelligence and then translated by an automated translator.

Artificial Intelligence can be used in environmental management in several ways. It can be used to monitor air and water quality, track deforestation, detect and identify endangered species, as well as conduct agricultural and climate change studies. AI can also be used to create and manage intelligent predictive models that can predict environmental disasters before they occur. Additionally, AI can automate the tracking and management of environmental data and analyze potential environmental risks. Finally, it can be used to help optimize resource utilization, increase efficiency, and reduce waste.

Source: OpenAI.com
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