

Assessment of the environmental impact and social interactions of new Megacities in Arab world in the era of disasters

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ABSTRACT

The beginning of this century watch established and developed of Mega cities at many Arabic countries, most of them in the desert areas and with different ideas and trends that using the concepts of sustainability and smart green cities. In view of the enormity of these cities, their large areas and population size and the fact that they contain multiple activities as trade, administration, and various services at all levels, the environmental impact of these cities will be severe and proportional to their size, function, and population size, especially with the outbreak of epidemics (Covid 19) in addition to the succession of natural disasters and the negative impacts of climate change. This is in addition to the fact that social interaction will be different due to the large number of people moving onto these cities and the multiplicity of their social characteristics acquired from their previous place of living in different regions and environments. Therefore, dealing with this kind of cities and its planning methodology is a more complicated and unclear process.

There are many ways and methods of how to predict environmental impact and measuring methods of social interactions, especially in an era in which plagues and all kinds of disasters that threaten health and life in all societies, therefore this requires modern compatible foundations and standards that needed to be included in the planning of Mega cities in the Arab world. The current study aimed to establish a methodology on the environment and population social interaction for new megacities and its surroundings, then establish suitable planning methodology that contributes to development of another megacities, and to reduce the negative environmental impacts and enhancing the quality of life that increase the positive interaction of the citizens in these cities with the inclusion of the process of continuous evaluation of the stages of planning and implementation and its steps, and then taking the appropriate decision toward off risks to reduce the negatives and maximize the positives impacts. The descriptive analytical approach and the comparative analytical method were used in the chosen case study. The study indicated that there was coastal erosion in some areas adjacent to the new megacities as El Alamein, New Mansoura and Port Said East. These cities will still suffer in the future from the increase of unplanned population activities.

Keywords: Megacities, sustainable and smart cities, disasters and epidemics, assessment and evaluation approach, resilience, quality of life elements.

INTRODUCTION

Egypt and many Arab countries in the last ten years have increased the urbanization in the desert and coastal areas by applying the policies of new cities of various sizes, functions and directions.

Despite these cities differing in sizes, functions and even their urban structures, their planners and investors indicated that they followed the principles and concepts of sustainable, smart and green cities (see [sds_egypt_vision_2030](#) and [saudi_vision](#)

203). To achieve those cities, it is important to determine the requirements and desires of the current residents and not to harm the internal environment or the surroundings areas. The impact on the environment and population varied with the multiplicity of cities and the diversity of their sizes between small, medium and large, as well as according to their location if they were coastal or desert or near agricultural areas such as the city of New Mansoura in Egypt, and also according to the activity that the city's economy will be based on. There were cities for administration and governance such as the New Administrative Capital city or for tourism and housing, such as the New El Alamein city in Egypt.

Most of these cities have been started to implement in Egypt, like the first phase of the New Administrative capital (ACUD, 2021) as well as the city of New El Alamein and New Mansoura (<http://www.newcities.gov.eg>), while work is underway to start implementing in other the cites like Neom in Saudi Arabia. Despite the start and continuation of the implementation of these projects, there is criticism of the implementers that they only depend on the regional environmental studies to carry out the environmental and social studies necessary for such projects project (GOPP, UNDP, MHUC, 2014), especially the mega-million cities in sparsely populated or environmentally sensitive areas such as the city of New El Alamein, which is expected to have a population of 3 million person, (<http://www.newcities.gov.eg>), or the administrative capital, whose population is 6.5 million (ACUD, 2021), or the LINE Neom on the western coast of the Kingdom of Saudi Arabia, which was announced that it will extend stripe to settle about 7 million people, as well as the linear New Mansoura city, whose population will reach about 0.7 million people (<http://www.newcities.gov.eg>).

The seriousness of the matter is that most critics of the speed of implementation

in these cities assert that there are severe negative effects that will occur as a result of urban activities and that the social return of the population will not be in the interest of implementing cities of this size in this short time (Nesreen, 2010; Esraa, 2022).

Most of the important environmental problems such as pollution, beach erosion, rising sea levels and the greenhouse gas phenomenon, are all due to environmentally unstudied urban development. There are several types of coastal structures, such as groins, revetments, jetties, and breakwaters connected to the shore at Sidi Abd El-Rahman coastal zone on the Mediterranean Sea; these structures were constructed to mitigate coastal erosion, recreational activities, and other purposes. However, this area has undergone an extensive erosion process since 2016 (El-Masry, 2022). Also, coastal engineering structures built to maintain recreation facilities at Marina El-Alamein resort created an erosional chain reaction along the Mediterranean coastline (Emam and Soliman, 2020; Frihy and Deabes, 2012).

The main aim of this research is to spot the light on the importance of the environmental and social studies concerning the major cities in the Arab world to reduce environmental damage. Also, this work aims to:

- Apply planning recommendations of new megacities and developing existing ones to maximize the positive environmental and social impacts and reduce the negative ones resulting from them.
- Establish a mechanism to supply the requirements of the population and to achieve the principles and elements of quality of life for residents in these cities.

METHODOLOGY

The current study methodology depends on applying the descriptive analytical approach and using the

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comparative analytical method in the chosen case study.

RESULTS

Evaluating the existing cities (historic and new) in some Arab countries and their environmental impact and social interaction:

1- Sustainability and the new Arab cities

By understanding the principles of sustainability and identifying the elements and components of green cities that will not be harmful to the environment, the following aims can be achieved in Egypt or in other Arab countries (National Institute of Administration, Governance Centre-2018);

- Planning cities without negative environmental impacts.

- Establishing green cities that do not produce any carbon emissions (Zero carbon)
- Increasing green spaces to improve the health level of the population.
- Using all possible elements and methods to save consumption of energy that pollute the environment and use new, clean energy to obtain the lowest carbon emissions.
- Construction of cities that take into account urban efficiency, the most important of which is the efficiency of the environment inside them, which helps to use less energy, reduce water and energy losses, reduce travel time, secure local jobs, improve security, and reduce air and water pollution and noise, and all this in turn leads to sustainable development and achieving orientation (Al-Sayed, 2015) as shown in Figure (1).

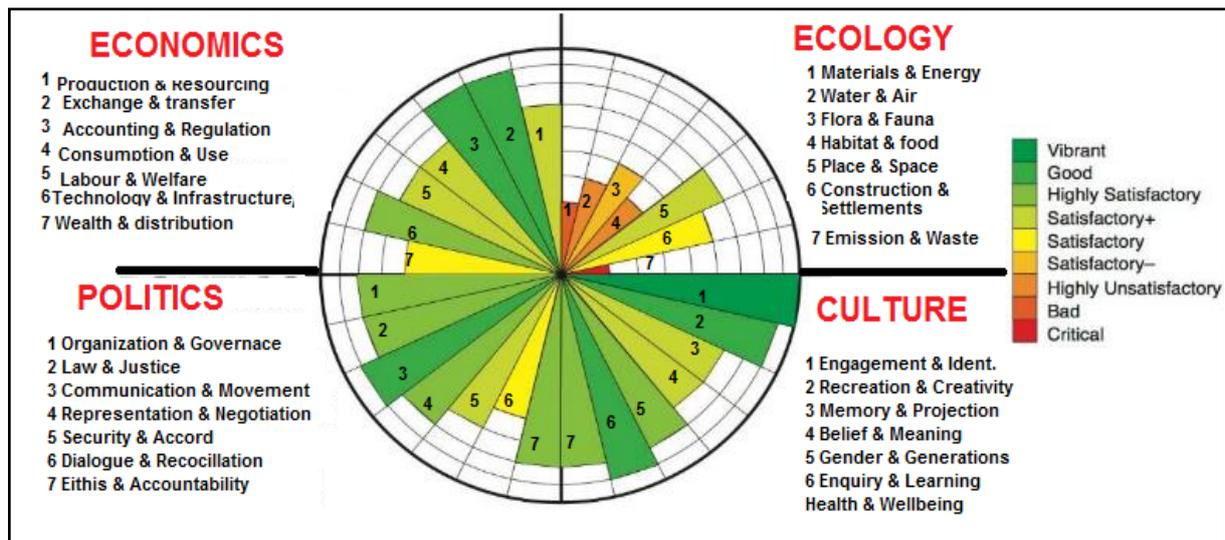


Fig. (1). European green city index (GCI) (Modified after Al-Sayed, 2015)

2- Current trends in urban planning

In addition to the modern traditional models that appeared at the end of the nineteenth century, there are three approaches used for urban planning in the twenty-first century (Al-Sayed, 2015). These are;

First: A group of cities that plan and direct on an environmental basis. These include

green cities, healthy cities, and cities that do not emit carbon dioxide and do not harm the environment and provide a green lung or several lungs of varying size and function for the city's residents.

Second: A group of cities that plan and direct on a technological basis. These include smart cities and energy efficient cities

Third: A group of cities that combine environmental and technological orientation.

This trend first appeared in the United States of America, where basic services and utility services are provided through networks linked to the controlling devices through automated computers that manage them and deliver them to their users in a smooth and fast way, which helps reduce waste and reach optimal consumption and better use of the output of these facilities. These cities take into account the use of everything that is modern such as means of communication and access with the possibility of developing them according to the rapid technological development, and since this beginning, this type of cities has spread in most European countries and in Southeast Asia and recently reached the Middle East and many Arab and Middle Eastern countries. This trend resulted in many types of cities, including: Electronic City, Silicon city, Huge and sky scraper cities, some imaginary futuristic cities, Future cities, and Digital Cities.

3- Environmental and social impact assessment Programs and models

Because of the importance of the environmental component, it has become clear the necessity of environmentally evaluating of new cities in order to identify their achievement of the minimum requirements of the green city and the concepts of sustainability, even if it is from the second group, in which the planning of these cities depends on the technological dimensions and their development (GAUP, 1992). In this context, several models and approaches to environmental assessment have been used for those cities, including the following:

3-1 Participation of the United Nations and the World Bank in studies and projects to assess and improve the environment (World Bank, 2002)

As for international organizations and their participation in environmental impact assessment studies, a recent assessment

describes a group of 15 out of 27 countries in the Europe and Central Asia / Middle East and North Africa region. In 1998, the Mediterranean Environment Technical Assistance Program initiated the Project on Strengthening Institutional Environmental Assessments through the World Bank's Development Grant Facility Program to assist cooperating countries in obtaining technical tools and policies to establish credible environmental assessment systems in assessing operations and programs which began in 2000, included the establishment of an Environmental Assessment Center in Tunisia, the expansion of environmental assessment systems in Algeria, Lebanon, the Kingdom of Morocco, Syria and Yemen, It aims to protect human health and ecosystem functions or reduce the production and impact of air, land and water pollution, and therefore begins with an analysis of the importance of the impact of pollution and options for its removal or mitigation within an environmental assessment that includes technical knowledge and the views of real stakeholders. This project has been prepared under a modifiable program to allow for continuous support in phases over a period of about 10 years. The first phase mainly focuses on strengthening institutions (in charge of monitoring, licensing and coastal zone management) and defining the parameters and priorities of environmental problems. The second and third phases will provide matching grants for subprojects to protect important environmental assets (forests and water resources) and improve environmental management (solid waste collection and disposal).

3-2 Green City Index (GCI) (Roland, 2012)

GCI was developed by the Economist Intelligence Unit (EIU) in cooperation with Siemens. It has about 30 indicators in eight to nine categories depending on the region. It includes indicators some of them cover CO₂ emissions, air quality and other elements

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affecting city environment, energy, air quality and many of these indicators are quantitative (numbers) and came from official sources, for example, CO₂ emissions, water, and consumption per capita, recycling rates and air pollutant concentrations, other indicators are qualitative that assess the city's environmental policies– as, the city's commitment to sourcing more renewable energy, traffic – congestion - reduction

policies (Stefan, 2009; Roland, 2012) (Fig. 2). GCI helped cities stakeholders to better understand their specific challenges, provides them insights into effective policies and supports their decision making to build a greener city and now it was applied in many regions as USA and Canada and, latten America, Europe and far east, lately it was applied in some Arabic countries which lies in Arid zone (Al-Sayed, 2015).

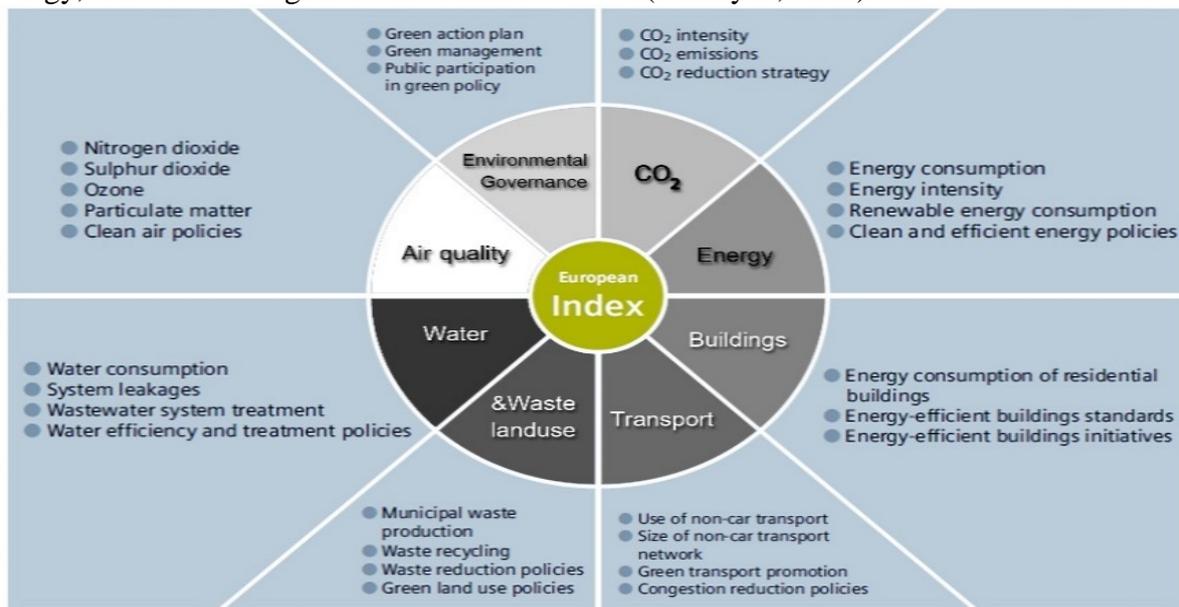


Fig. 2: The European Green City Index (GCI) (Source: Roland, 2012)

3-3 Green and sustainable rating systems

Green assessment systems were created to stimulate the application of green architecture and urbanism principles. As the natural development of its emergence became to ensure its implementation in cities, and it was necessary to develop tools and systems to evaluate this urbanization, which allows the result to activate and spread green urbanization, and multiple methodologies have emerged dealing with environmental assessment and urban measurement, which differed assessment methods and classifications of reconstruction from one country to another (UNCCCP, 2017) as follows:

- **LEED Rating System** (U.S. Green Building Council, 2017):

Leadership in Energy and Environment (LEED) Rating system helps building owners and operators' measure operations, improvements and maintenance on a consistent scale, with the goal of maximizing operational efficiency while minimizing environmental impacts. It evaluates and measures the impact and performance of any facility, through a set of points, including site sustainability, energy savings, and water efficiency. LEED for Existing Buildings addresses whole-building cleaning and maintenance issues (including chemical use), recycling programs, exterior maintenance programs, and systems upgrades. It can be applied both to existing buildings seeking LEED certification for the first time and to projects previously certified under LEED

for New Construction, Schools, or Core and Shell.

▪ **BREEAM assessment system** (Saunders, 2008):

Building Research Establishment Environmental Assessment Method (BREEAM) is implemented in the United Kingdom, and many countries of the world. A version of the system was developed under the name BREEAM GULF to suit the local climate there. The areas of its application include management, energy use, health and well-being, elements of quality of life, water, transportation, waste, pollution and noise caused by urban interventions, land use and the environment: includes urban coordination and preservation of the value of the ecological site.

▪ **The CASBEE assessment system**

The Comprehensive Assessment System of Building Environmental Efficiency (CASBEE) is based on two main directions of urban assessment: The first trend: (Quality) measures the quality of the performance of the building itself, and aims to raise the level of environmental performance of the building in order to comfort the users of the building. The second direction: (Environmental Loadings) measures the impact of the building on the surrounding environment and aims to assess the negative impact that occurs to the environment.

▪ **Green Star Rating System:**

It was issued in 2003 by the Australian Green Building Council (Hassanein, 2014), which has become a source of public support for the establishment of green architecture councils in some European and African countries. The system aims to raise the level of public awareness of the benefits of urbanization and green architecture. Its evaluation areas include the management of internal and external environment quality, energy, transportation and water

quality, ecology of the site, its use, and emissions.

▪ **Globes Green System:**

It was implemented in Canada, and then in America in 2004 (Taha, *et al.*, 2014). It is an online environmental auditing model that assesses the environmental performance of existing buildings. This system deals with site management, project and resource utilization including energy, water and solid and liquid waste management. In addition to indoor and outdoor environment

3-4 Arab countries that use a measure of green urbanization:

In the Arab world, there are only four countries that adopt a measure of urbanism and green architecture, namely the United Arab Emirates, Jordan, Qatar and Lebanon. Other 3 countries: as Morocco, Saudi Arabia and Egypt, which created system to evaluate green buildings and encourage the application of its principles (in 2011 developed a Green Pyramid Rating System). But the three countries are still in an experimental stage (Othman, 2012).

▪ **Estidama Sustainability System (AUE):**

It was issued in 2009 as part of the Abu Dhabi Vision 2030 project, which represents a general framework for transforming the Emirate of Abu Dhabi into a leading center in the field of sustainable development (Abu Dhabi Urban Planning Council, 2010). It is based on environmental, economic, social and cultural dimensions (Fig. 3). One of the main tools of this program is the PRS (Pearl Rating System), which has been specially designed to suit the hot weather and desert climate of the Emirate of Abu Dhabi. The system provides a set of measurable and evaluable instructions that were applied in the new cities and the existing and historical cities that were planned in the past years of the twenty-first century, which help Emirates to deal with climate changes and improving the environmental and social returns of the cities built on its lands. Masdar City in

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Abu Dhabi represents a planning of a sustainable city in the desert (Fig. 4).

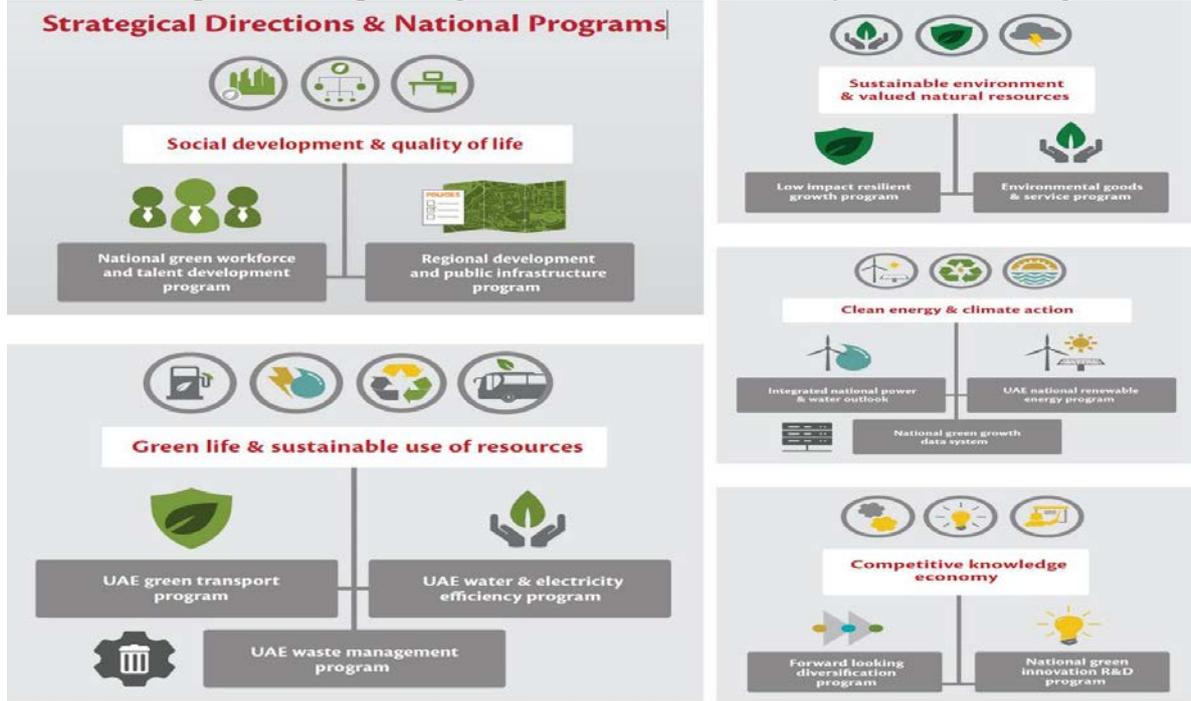


Fig. 3 : UAE green growth strategy streams -2021 (Source: Abu Dhabi Urban Planning Council, 2010)

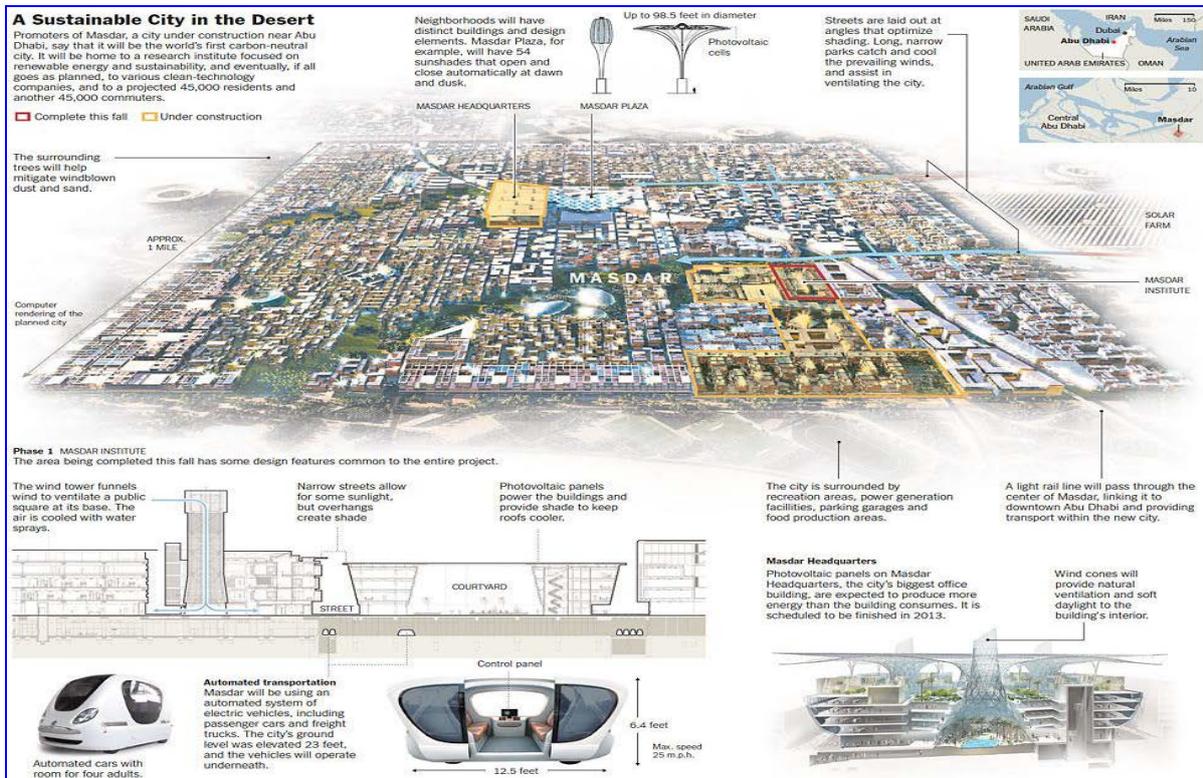


Fig. 4: Masdar City, Planning a Sustainable City in the Desert (Source: www.moccae.gov.ae)

▪ **Qatar Sustainability Assessment System (QSAS):**

It was developed in 2010 by the Gulf Research and Development Organization (GORD) in cooperation with the T.C. Chan at the University of Pennsylvania and aims to create a sustainable urban environment to reduce the environmental impacts of buildings while fulfilling the needs of the community (Ferwati and Al Saeed, 2018). The most important feature of QSAS is that it takes into account the social, economic, environmental and cultural features of the community, which differ in regions of the world. Many Middle Eastern countries such as Saudi Arabia, Kuwait, Jordan and Sudan have shown keen interest in adopting QSAS as the standard code for green buildings in the region. The system includes about 140 sustainability assessment mechanisms, and is based on eight main areas, including: urban connectivity, location, energy, water, materials, indoor environment, economic and cultural value, management and operation, each of which measures a specific characteristic in the environmental impact of the project. Qatar also had a greater role, as it supported some Arab, African and Asian countries to stimulate environmental assessment, improve socio-economic conditions in them, and reduce poverty rates and rates in partnership with World Bank. As for the local urban level, it has implemented the smart city of Lusail overlooking the coast of the Arabian Gulf, with a commitment to planning the city to be energy-saving and its impact on the environment is less harmful than traditional cities.

▪ **Saudi Arabia**

There are various applications for sustainable development, including the residential industrial city of Jubail in the Eastern Province, which has reduced the

impact of urbanization and human activities on the environment through a system of monitoring and follow-up of environmental impacts around the clock, as well as working on recycling to reduce pollution. There are also studies conducted on cities to follow up the implementation of environmental legislation and laws, which reduce the negative impact of the environment, as happened in NEOM (the linear city) (<https://www.neom.com>).

▪ **State of Oman:**

When planning the Economic City in DUQM (Fig. 5), an environmental impact study was conducted (<https://www.duqm.gov.com>) in which the impact of activities, uses and population on the coastal area was studied, especially with the availability of multiple activities between tourism and industry as two main economic activities for the city, which extends over about 90 km on the coast as comprehensive range and about 16 km tourist beach and about 20 km economic coast of the port and the economic zone. In (2015), the Economic Zone Authority in Duqm identified a set of activities for which an Environmental Impact Assessment was conducted. Conditions have been set to be adhered to improve the environment or at least not harm it. These requirements vary and differ according to the activities, with the development of some foundations and standards and obligating investors or developers in the construction and operation phases in the following areas: Atmospheric Emissions Stationary Sources, Site and Mobile Sources Emissions and Greenhouse Gas Emissions, Liquid Waste - Domestic and Construction Water, Solid waste - hazardous and non-hazardous, Noise - Outside Surroundings and Structural Works. This is in addition to the effect on the waters of the Gulf and the ocean and their temperature.

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Fig. 5: Amman Economical city – DUQM (<https://www.duqm.gov.com>)

▪ **Morocco:** It has made tools to control the actual return on the environment and programs to improve the efficiency of the urban and social environment and improve the quality of life for residents of cities and villages in different regions (UNITED NATIONS ECONOMIC COMMISSION FOR AFRICA Office for North Africa - 2014) (Hassanein, 2014).

▪ **Egypt:** Environmental Law No. 4 was issued at 1994, then preparing a model for environmental evaluation of projects and determining the requirements for environmental impact studies. The projects and activities that are being implemented (Khalifa and Abdelkader, 2018). At 2008 The Green Pyramid Rating System (GPRS) is an Egyptian environmental rating system for buildings. It evaluates environmental credentials of buildings (HBRC, 2011 & 2017; Karmany, 2016).

From the previous study, we concluded that there are global measurement systems that have been applied to improve the environment. There is agreement among them on five basic areas to achieve a good environment for urbanism and architecture in cities, namely: Location, energy, water, resource use, and the internal and external environment.

Strategies developed were to deal with the environment and climate changes to help improve the environment and provide elements of quality of life through the following:

- Strategies for social development and improving the quality of life for the population.
- Strategies for achieving sustainable environment goals
- Green Energy Strategies and Climate Management
- Competing knowledge economy strategies
- Strategies for achieving green living, sustainable use of resources and savings
- This is in addition to green investment strategies, which have an effective role in dealing with the environment.

4- The recent change in city structure in Arab countries in 21st century

There have been global developments and great leaps in the planning of new cities and changes in their urban structures. The planning models that were followed in the nineteenth and twentieth century depend on three basic models: the central, strip and multi-core model, which was based on how to provide the necessary services in a gradation

commensurate with the categories and social needs. These changes were evident in Egypt by studying many new cities and communities as follows (Said, 2015).

- The explosion of service centers: with the change in the arrangement of services in the city, and the transfer of some basic service elements from city centers and the centers of their planning units to the external parties or to non-centralized areas.
- The diffuse distribution of basic services rather than the centralized one.
- There have been changes in the concept of aggregating services in grouped service centers, and they have been transformed into separate services spread within the city and at its borders.

4-1 Change in the requirements, components and functions of services (Table 1):

By comparing the standards and rates for services that were established in 1993 and what was established in 2014 in Egypt, we find that there is a general tendency to reduce the per capita share of basic services, as it decreased from 2.85 m²/person for educational services to 1.6 m²/person in 2014, the minimum space (for units) allocated to educational services has also decreased. After the area of the basic school was about / 5 acres in 1993, it reached in the rates that were issued in 2014 to less than an acre and may sometimes reach 2500 square meters, as well as the health services, which decreased to about 0.25 m²/person after it was 0.35 square meters / individual in 1993 after it was 0.35 m²/person in 1993, while the per capita share in general of basic services decreased in 2014 than in 1993, it increased in recreational services and green areas to reach about 20.7 m²/person instead of 6.36 m²/person in 1993.

Table 1: The change in Egyptian cities standard between 1993 and 2014 (GAUP, 1993 & 2014)

Service	m ² /P (1993)	m ² /P (2014)	Change %	Change type
Education	2,85	1,6	34 %	-
commerce	1,8	2,0	11 %	+
health	0,35	0,25	29 %	-
religious	0,55	0,55	-	Change not
Social and others	0,4	0,35	13 %	-
Admin and gov.	1,3	1,3	-	Change not
Total domestic	7,25	6,05	17 %	-
recreation	6,36	21,7	241 %	+
Total services	13,61	27,75	100 %	+

m²/P = meter square per person

Through a comparison between the rates in 1993 and the same in 2014, it was found that there was a decrease in the per capita share of educational, health, social, security and cultural services, while there was no change in the rates of religious and administrative services and affected the increase in commercial services and recreational services, whose increase was significant. At the level of total basic services, the per capita share decreased from 7.25 m²/ person to 6.05 m²/ person,

while the rate of total recreational services and green areas increased to 21.7 m² / person instead of 6.36 m²/ person. Service rates changed: the percentage of recreational services and green areas increased from the rates and rates of services at the beginning of the information revolution era, while the percentage of basic services (educational, health and religious) decreased from the percentage and rate of basic services in the nineties.

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4-2 Change in some features of the city's visual image in Egypt:

Green and recreational areas have

become the visually distinct center, located between the residential areas (Fig. 6).

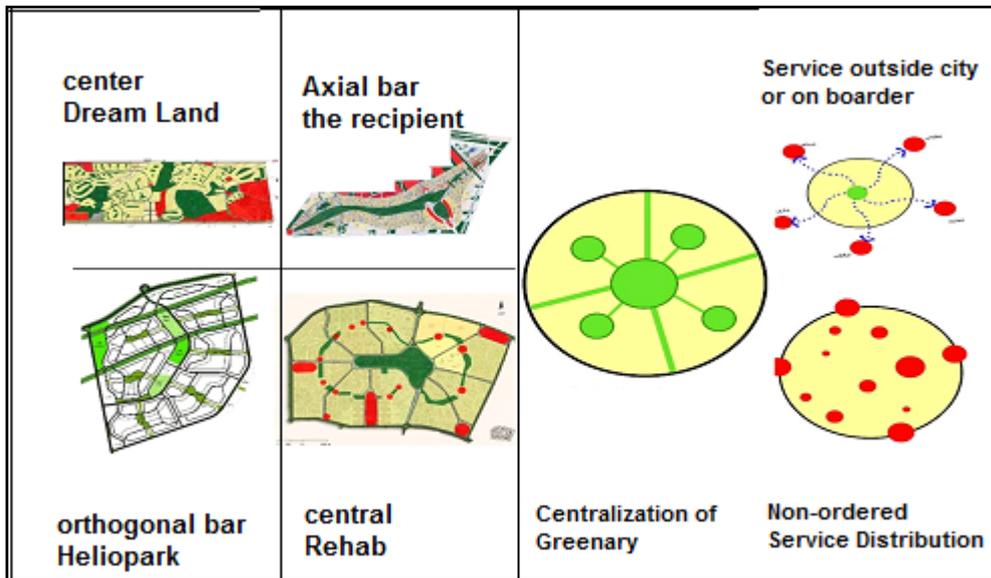


Fig. 6: the urban structure change in Arab countries at 21st century (Said, 2015)

5- Case study

In most Arab countries, new global trends have been followed in urban planning to achieve the principles of sustainability, such as green cities, smart and healthy cities, and resilient cities that are resistant to disasters and are able to withstand them. The principle of smart cities has been applied in many Gulf countries and North Africa, including Egypt which implement 16 new cities in the fourth-generation that follow the principles and concepts of sustainability and green cities, such as New Mansoura, Sphinx, Al Alamein and Ras Al-Hikma, in addition to the largest and most important of them, the new administrative capital, which will become the administrative capital of Egypt. The brief description of these Mega cities is as follow:

5-1 New El Alamein City (<http://www.newcities.gov.eg>)

It is considered the first model for the new fourth generation of cities and is classified as a mega city, with a total area

of 48 thousand acres, accommodating about 3 million residents with many diverse activities, most of which serve the political activities of the Egyptian state as well as tourism of all kinds, where recreational activities have been placed in an international tourist center. Attention has been paid to the beaches and the preparation of tourist housing in varying degrees socially, with the achievement of high communication, especially with the passage of the Sahilly international road to Salloum, south of the city. The first phase consists of two main sectors with an area of about 8,000 acres, namely the coastal sector, which includes the World Tourist Center sector, the archaeological sector, and the urban sector (Fig. 8). It is expected that the population will reach 400,000 people, based on the study that was developed in cooperation with the United Nations Office for Human Settlements in Cairo, to take advantage of the northwestern coast and develop it with a depth of more than 60 km, south of the coastal strip.



Fig. 8: The current status of Al-Alamein City in 2022 (<http://www.newcities.gov.eg>)

5-2 New Mansoura City

(<http://www.newcities.gov.eg>)

New Mansoura (Fig. 9) is one of the fourth-generation cities that was inaugurated by a presidential decree in 2018. The city is located directly on the international coastal road, confined between it and the Mediterranean Sea, covering a distance of 24 km, extending from Gamasa city to reach the Kafr El-Sheikh governorate road on an area of about 24,000 acres, accommodating about a million and a half citizens. The city was divided into 4 phases. Work was carried out in 2017 in the first and second phases on an area of about 6,000 acres for each phase. The implementation and

development were a partnership between the state, the private sector and the public business sector. The design of New Mansoura differs in terms of residential as it enjoys a closer coastal environment (the width of the city does not exceed 2 km). The residential projects range from villas, apartments and studios. The city is considered one of the fourth-generation residential cities with the provision of basic regional and local services to serve the city's residents to be attractive to residents of the cities in the Delta, especially Dakahlia, as well as a regional tourist outlet that serves Egyptians and tourists with advanced tourism services, areas and high-level recreational services.



Fig. 9: The current status of New Al-Mansourah City in 2022

5-3 New Port Said East City (<http://www.newcities.gov.eg>)

The new million-million city that will be built east of Port Said, known as “New Port Said”, is the first million-million city in Sinai (Fig. 10). It was established recently with the aim of reducing the population density from overcrowded areas, and providing 185,000 permanent job opportunities for young people. It also aims to keep pace with modernity in Advanced electronic systems with services provided to the population. New Port Said is located in the East Port Said region on the borders of North Sinai Governorate, with a length of 35 km on the Mediterranean, and is bordered to the west by the Suez Canal Development Project and Port Said City, and to the south of the

city is an agricultural area of 50,000 acres, and the Salam Canal passes through it. This city was planned to become a global tourist city. The city consists of 6 urban sectors and 12 residential neighborhoods. The area of the city is 19,000 acres on the east coast of Port Said, to be completed to about 50,000 acres in areas that contain the largest industrial city, logistical areas, and an area for fish farms, in addition to Residential neighborhoods, various service centers and tourist centers.

The city will be a link between the western region and the eastern region by linking it with a network of roads, a railway and through tunnels. It contains national, economic and tourism projects. It provides projects for low-income people in the southeastern part of the city.



Fig. 10: Land use plan for Port Said East city (<http://www.newcities.gov.eg>)



Fig. 11: Google earth image showing the current status of new city of Port Said East in 2022

5-4 The New Administrative Capital (<http://www.newcities.gov.eg>)

It is a new mega city classified as a mega city. It can accommodate a population ranging from 6 to 7 million people and provides about 2 million jobs, including 100,000 government administrative jobs. The city is located in the eastern desert at a distance of 60 km from Cairo and the same from the Red Sea, the Suez Canal and the port of Sokhna. In the area between Cairo-Suez and Cairo-Ain Sukhna roads, and the most important roads served by this regional ring road (Fig. 7). Its main function is that it is the administrative capital of the Egyptian state and its financial center, business and energy exchange. The city planned on 170,000 acres and contains an airport, lands for embassies, a government district, in addition to the financial center, the business center, as well as residential neighborhoods. Housing was allocated to middle, upper middle and upper levels of

the population, while social housing was allocated in the gardens of the capital north of the city (west of Badr city). Proposing a series of gardens with an area of more than 1,000 acres and a length of more than 10 km², in addition to green and open areas, which will achieve a total of 15 m²/person living in the city according to the recommendations of urban coordination, i.e., availability of about 24,000 acres green areas and gardens. The studies that were prepared depended on achieving the principles of the smart city and achieving the concepts of sustainability in smart management and sustainable dealing with savings in energy, water, wastes.

There are 7 goals set for city planning for business, control and management, which achieve the principles of the smart and green city, and achieve the concept of sustainability and high human communication that arise from providing a city for pedestrians, as well as providing ways of life and achieving the quality of its elements.



Fig. 7: the location of the New Administrative Capital (<http://www.newcities.gov.eg>)

Discussions

In a study between Habitat and the UAE Ministry of Climate Change and Environment, it was concluded that the construction sector in Egypt accounts for approximately 0.04% of the total carbon dioxide emissions on the globe and consumes 72% of the country's total electrical energy (ESCWA- United Nations, 2018). The way to achieve sustainable development and address this burden is through achieving the sustainability of the stock of real estate units (new and existing). Therefore, Egypt should adopt sustainable development approaches in formulating and implementing policies to stimulate economic growth on a sound basis. Policies should also be developed to ensure that the planning and decision-making process is centered on environmental and social objectives. Particular emphasis should be placed on considerations of property rights, social justice and the right of all citizens to live in a decent and dignified life. Efforts must be focused on improving capacities and formulating policies aimed at maximizing the benefit from investment in environmental infrastructure, while at the same time ensuring that the poor, disadvantaged and

marginalized classes of society get benefit from the benefits of the developmental process.

There were environmental problems that appeared in the coastal areas, such as what happened to the erosion of the beaches of Ras El Bar, Baltim and Rashid, especially after the shortage of sedimentation of the Nile silt after the construction of the High Dam (Esraa , 2022). The current study indicated some of the environmental and social impacts of establishing some of the new coastal million-cities in Egypt including New El Alamein, New Mansoura, New Port Said East city in addition to the new administrative capital city.

1- Environmental and social impacts and the mitigation actions of the city of El Alamein

- The city was established in an environmentally sensitive area, as it is located on the coast of the Mediterranean Sea, at a beach distance of up to 16 km.
- There are some problems that occurred as a result of the tourist projects built on the coast, such as the erosion of the beach for some tourist villages east of Sidi Abdel Rahman (<http://www.newcities.gov.eg>).
- The water needs of the city are about 600,000 cubic meters per day of potable

water. The city is supplied with water through a desalination plant to reduce pressure on the surface waters of the Nile.

- Sanitation water will reach to about 500,000m³/day and will be used for irrigation of forests.
- The city dealt with the beach by developing from the trimming of the lakes with the work of strip lakes around and between the projects in the first phase in an area of 8,000 acres.
- The beaches are relatively stable and have not been encroached upon, 150 to 200 m wide.
- The environmental study of the city mostly depend on the regional environmental study of the north coast and Matrouh government , but the environmental study of the Northwest Coast development project included its recommendations for the proposal to establish the Mega city of El Alamein in that area (Un-Habitat, GOPP, UNDP, MHUC- (18th – 22nd May 2014).

2 Environmental behaviors and actions for the city of New Mansoura

The city is a stripe, to be implemented in four stages, for a population of up to 1.5 million people, who need one million two hundred cubic meters of drinking water.

- The disposal of sewage water will not be less than one million cubic meters. It needs a treatment plant with a mechanism to use the water generated in agriculture after triple treatments and the use of sludge for composting or making tree forests on an area.
- The city is on semi-flat swampy land with slopes of no more than 2%. The tendencies are in the direction of the sea, so there will be treatments to raise the sewage water to transport it to the south.
- The city does not have an environmental study, except for what was found from a

study of the Alexandria region, the Delta region and the Dakahlia governorate, which recommended the rational use for those lands, with a focus on tourism uses or low-density residential uses.

- Leave a campus for the beach from 100 to 200 meters wide. And dealing with environmentally sensitive beaches without any violent urban interventions, while doing environmental studies for any project that affects the environment, such as the marina or major tourism projects, or that need intensification of buildings and people, such as the university or any industries or utility projects and methods of providing drinking water and disposal of sewage products.

3- Environmental behaviors and actions of the New Port Said East city

- The city was established in an environmentally sensitive area, as it is located on the coast of the Mediterranean Sea, at a beach distance of up to 20 km.
- The estimated potable water needs of the city are about 200,000 cubic meters per day.
- The city is supplied with water through a desalination plant to reduce pressure on the surface waters of the Nile.
- Sanitation will not be less than 160,000 cubic meters per day on which agricultural forests can be built.
- The city dealt strongly with the beach by developing from the huge shaping of the lakes.
- There was regional environmental study of Port Said and North Sinai government without recommendation to establish the Mega city of Port said East in that area. However, the environmental study of the Northwest Coast development project included its recommendations for the establishing of Port Said East in its current site.

4- Environmental behaviors and actions for the New Administrative Capital city

- The city is a stripe, to be implemented in four stages, for a population of up to six and a Half million people who need one million two hundred cubic meters of drinking water per day.
- The disposal of sewage water will not be less than one million cubic meters per day. It needs a treatment plant with a mechanism to use the water generated in agriculture after triple treatments and the use of sludge for composting or making tree forests on an area.
- The city's water supply is being studied through a desalination plant to reduce pressure on the surface waters of the Nile.
- The city will have a positive impact on the climate due to the large green area, also it will change the desert ecosystem, in addition to the pollution resulting from the traffic aspects that will be commensurate with its size, function and green spaces.
- The city's application to provide green spaces at a rate of 15 square meters per person of the city, will provide 24 thousand acres of green areas representing about 15% of the city's area, while exploiting them for investment and enhancing the environment.
- As for the population, it belongs to the middle and socially higher classes, while the lower classes will be settled in the gardens of the capital, north of the city and east of Badr City.

Conclusions

From the above mentioned the following conclusions were drawn:

- The Egyptian experience was large in planning and establishing of new megacities in different environmental areas (desert lands - coastal), however, a strategic Environmental Impact assessment did not perform before the implementation of some of these Megacities.
- The negative effects due to coastal erosion in some areas adjacent to the new cities, especially in the north delta and

some tourist resorts were related to increasing of unplanned urban activities in these cities especially in the coastal cities such as New El Alamein, New Mansoura and Port Said East. These cities will still suffer in the future from the increase of the anthropogenic activities.

- There is a problem of population polarization due to the lack of sources close to the population in the city of New El Alamein and the new city of Port Said East. The city of New El Alamein, whose population will reach 3 million, has no sources and population container in the nearby cities and the nearest city that suffers from population increases is Alexandria, and its population is about 4 million. There are also projects taking place around and within the governorate that will accommodate any residents.
- New Mansoura will have a population assimilation based on population attraction from the cities of Dakahlia Governorate and its crowded villages, as well as the city of the administrative capital.

Recommendations

- The study recommends conducting an environmental study for each of the cities before starting the implementation of the following stages.
- Taking into account the participation of representatives from the community, specialists and government in planning for the upcoming projects in each city.

REFERENCES

- Abu Dhabi Urban Planning Council (2010). Pearl Building Rating System for Estidama: Design & Construction, Version 1.0", Abu Dhabi, UAE.
- ACUD, Administrative Capital for Urban Development (2021). At: <https://www.ecrg.de/images/Download/pdf/Brochure.pdf>.
- Bo Oneqa, A. (2017). Master thesis - Violent dealing with the urban environment and its impact on cities

- in the context of sustainable development (A case study of the new city neighborhood - Tasift – Tahir. Om ElBawaqy Univercity Algeria. At: <http://www.hdl.handle.net/123456789/7122>(Arabic Report).
- Cityquest - KAEC Forum, New cities foundations and king Abdullah Economic city (2015). New Cities and Concepts of Value: Planning, Building, and Responding to New Urban Realities, Reflection and analysis of themes emerging from.
- EEAA(2017). State of the environment report for the year 2016 in Egypt (Arabic Report).
- EEAA, UNDP, and GEF- 2018- BUR - The first biennial updated report of the Arab Republic of Egypt - submitted to the United Nations Framework Convention on Climate Change (Arabic Report).
- Emam, W.W.M. and Soliman, K.M. (2020). Applying geospatial technology in quantifying spatiotemporal shoreline dynamics along Marina El-Alamein Resort, Egypt. *Environmental Monitoring and Assessment*, 192, 459. <https://doi.org/10.1007/s10661-020-08432-w>
- ESCWA- United Nations (2018). Progress in the Arab Region in the Field of Sustainable Energy - Global Tracking Framework Regional Report
- Esraa A.E. (2022). Beach responses to coastal structures and their impacts on tourism investment, Sidi Abd El-Rahman coastal zone – Mediterranean Sea, Egypt. *Arabian J. Geosciences*, 15(1708):1-9 (Arabic).
- Ferwati, M.S. and Al Saeed, M. (2018). Qatar Sustainability Assessment System (QSAS)-Neighborhood Development (ND) Assessment Model. *J. Building Engineering*, Elsevier Ltd.
- Frihy, O. and Deabes, E. (2012). Erosion chain reaction at El-Alamein Resorts on the western Mediterranean coast of Egypt. *Coast Engineering*, 69: 12–18.
- GAUP, General Authority for Urban Planning (1993). Foundations and planning rates, Cairo.
- General Authority for Urban Planning (2014). Manual of Planning Rates and Standards for Services, Arab Republic of Egypt, Cairo.
- GOPP, MHUC (2017). Urban development strategy for coastal destinations - the northwestern coas (Arabic Report).
- GOPP, UNDP, MHUC (2014).The national strategic plan for urban development and priority development areas- (Arabic Report).
- Hassanein, A.T. Mohamed (2014). Green Architecture between Theory and Practice - A Critical Study of the Application of Green Architecture in the Arab Region. Master's Thesis, Faculty of Engineering, Cairo University, Egypt
- https://www.arabdevelopmentportal.com/sites/default/files/publication/sds_egyp_t_vision_2030.pdf
- <https://www.archdiwanya.com/2022/03/leed-breeam-casbee-green-globes.html>.
- <https://www.duqm.gov.com>.
- <https://www.moccae.gov.ae/ar/knowledge-and-statistics/green-economy.aspx>.
- <https://www.neom.com/en-us/sectors>
- http://www.newcities.gov.eg/know_cities/newmansoura/default.aspx
- https://www.vision2030.gov.sa/media/rc0b5oy1/saudi_vision203.pdf
- Karmany, H.M. (2016). Evaluation of Green Building Rating Systems for Egypt. MSc thesis. Center for Sustainable Development, The American University in Cairo. At: <http://dar.aucegypt.edu/handle/10526/4628>
- Khalifa, S. and Abdelkader, M. (2018). Obstacles of Application of Green Pyramid Rating System (GPRS) on Local Projects in Egypt. International Conference on Sustainability, Green Buildings, Environmental

Assessment of the environmental impact and social interactions of new Megacities in Arab world in the era of disasters

- Engineering & Renewable Energy (SGER).
- Matrouh Gov., EEAA (2008). Environmental characterization of Matrouh Governorate (Arabic Report).
- Med ECC (Mediterranean Experts on Climate and environmental Change)-2020 Climate and environmental change in the Mediterranean basin, The current situation and future risks, First Mediterranean Evaluation Report - Summary for policymakers
- Mona, S. (2019). The Role of Technology in Applying the Principles of Green Architecture. Master's Thesis, Faculty of Engineering in Shubra, Benha University, Egypt (2019).
- National Institute of Administration, Governance Centre (2018). Egypt and the eleventh goal of sustainable development goals- (sustainable cities and communities)- (Arabic Report).
- National water research center, UNDP, and GEF and others (2016). ICZM in The Northern Coast of Egypt, A Scoping Study (Draft final study report).
- Nesreen, E. (2010). Towards creating areas of excellence and new sustainable cities in Egypt, A critical vision of planning new cities in Egypt.
- Othman, F. Osman (2012). Theses for Developing a Local Scale for Sustainability of Architecture and Urbanism. A Study of Global Sustainability Standards. J. Engineering Sciences, Faculty of Engineering, Assiut University, Egypt.
- Reeder, L. (2010). Guide to Green Building Rating Systems, John Wiley& Sons, Inc., New Jersey, Canada.
- Roland, B. (2012). The Green City Index A summary of the Green City Index research series A research project conducted by the Economist Intelligence Unit, sponsored by Siemens AG. At: <https://assets.new.siemens.com/siemens/assets/api/uuid:cf26889b-3254-4dcb-bc50-fef7e99cb3c7/gci-report-summary.pdf>
- Said Hassanein Al-Sayed (2015). The future of the urban structure of the Arab city in the one century and the nest. PhD thesis, Faculty of Engineering in Shubra, Benha University, Egypt.
- Saunders, Thomas (2008). A Discussion Document Comparing International Environmental. Assessment Methods for Buildings, BRE Globa.
- Stefan Denig (2009). European Green City Index Assessing the environmental impact of Europe's major cities A research project conducted by the Economist Intelligence Unit, sponsored by Siemens AG. At: <https://assets.new.siemens.com/siemens/assets/api/uuid:fddc99e7-5907-49aa-92c4-610c0801659e/european-green-city-index.pdf> .
- Taha, A.M. Ibrahim, et al. (2014). A comparative study of green architecture evaluation systems, Faculty of Engineering, Assiut University, 42(4).
- U.S. Green Building Council (2010). Green Building and LEED Core Concepts Guide, USGBC Publications, Washington.
- U.S. Green Building Council (2017). LEED for existing buildings v2.0 reference guide.
- UAE Ministry of environmental changes, Un-Habitat -(2021). Green growth strategy streams.
- UNCCCP (2017), in cooperation with the United Nations Climate Change- The Current State of Sustainable Cities and Buildings in the Arab Region.
- Un-Habitat (2011). Cities and Climate Change Global Report on Human Settlements - ABRIDGED (Arabic Report).

Un-Habitat, GOPP, UNDP, MHUC (18th – 22nd May 2014) Experts workshop, A model for an economic and environmental sustainable city in Egypt, North coast- Arabic Report. United Nations Economic Commission for Africa -Office for North Africa

(2014). Morocco Environmental Performance Reviews- United Nations publication. World Bank (2002). Environmental Impact Assessment (EIA) Systems in Europe and Central Asia Countries.

تقييم الأثر البيئي والتفاعلات الاجتماعية للمدن الكبرى الجديدة في العالم العربي في عصر الكوارث

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المستخلص

شاهد بداية هذا القرن إنشاء وتطوير المدن الكبرى في العديد من الدول العربية ، ومعظمها في المناطق الصحراوية وبأفكار واتجاهات مختلفة تستخدم مفاهيم الاستدامة والمدن الذكية الخضراء. ونظراً لضخامة هذه المدن ومساحاتها الكبيرة وحجم سكانها واحتوائها على أنشطة متعددة مثل التجارة والإدارة والخدمات المتنوعة على جميع المستويات ، فإن الأثر البيئي لهذه المدن سيكون شديداً ومتناسباً مع حجمها ، الوظيفة ، وحجم السكان ، خاصة مع تفشي الأوبئة (كوفيد ١٩) بالإضافة إلى تعاقب الكوارث الطبيعية والآثار السلبية لتغير المناخ. هذا بالإضافة إلى حقيقة أن التفاعل الاجتماعي سيكون مختلفاً بسبب العدد الكبير من الأشخاص الذين ينتقلون إلى هذه المدن وتعدد خصائصهم الاجتماعية المكتسبة من مكان معيشتهم السابق في مناطق وبيئات مختلفة. لذلك فإن التعامل مع هذا النوع من المدن ومنهجية التخطيط الخاصة به عملية معقدة وغير واضحة. هناك العديد من الطرق والأساليب لكيفية التنبؤ بالأثر البيئي وطرق قياس التفاعلات الاجتماعية ، خاصة في عصر تنتشر فيه الأوبئة وجميع أنواع الكوارث التي تهدد الصحة والحياة في جميع المجتمعات ، لذلك يتطلب ذلك أسس ومعايير حديثة متوافقة ومعايير مطلوبة ليتم تضمينها في تخطيط المدن الكبرى في الوطن العربي.

هدفت الدراسة الحالية لتسليط الضوء على أهمية إدراج المردود البيئي والتفاعل الاجتماعي السكاني للمدن الكبرى الجديدة ومحيطها ومراعاة ان تشمل منهجية التخطيط لها على الدراسات البيئية والاجتماعية الضروري ، لتعظيم ايجابيات التخطيط لتلك المدن والتقليل من الآثار البيئية السلبية وتعزيز نوعية الحياة التي تزيد من التفاعل الإيجابي للمواطنين في مدنها مع إدراج عملية التقييم المستمر لمراحل التخطيط والتنفيذ وخطواته ، ثم اتخاذ القرار المناسب لدرء المخاطر لتقليل السلبيات وتعظيم الآثار الإيجابية. تم استخدام المنهج الوصفي التحليلي والطريقة التحليلية المقارنة في دراسة الحالة المختارة. أشارت الدراسة إلى حدوث تآكل ساحلي في بعض المناطق المجاورة للمدن الكبرى الجديدة مثل العلمين والمنصورة الجديدة وشرق بورسعيد. ستظل هذه المدن تعاني في المستقبل من زيادة الأنشطة السكانية غير المخطط لها. أشارت الدراسة إلى حدوث تآكل ساحلي في بعض المناطق المجاورة للمدن الكبرى الجديدة مثل العلمين والمنصورة الجديدة وشرق بورسعيد. ستظل هذه المدن تعاني في المستقبل من زيادة الأنشطة السكانية غير المخطط لها.