ECO & GREEN CITIES AS NEW APPROACHES FOR PLANNING AND DEVELOPING CITIES IN EGYPT

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ABSTRACT

This paper tries to attract decision taker's attention to the essential need to apply sustainable development fundamentals and approaches of Green and Eco cities in planning and developing cities in Egypt, not only to deal with the Egyptian cities' structural problems and challenges (Environmental Pollution, Deterioration of Urban environment and infrastructure…etc), but also to help in improving the effective and efficiency of the existing strategy of new communities in Egypt.

This paper will introduce the first practice in planning and developing Green and Eco new city in Egypt (located at Eastern Desert, in the governorate of Sohaj, on the corridor of Upper Egypt\Red Sea), including elaboration of its urban structure, land use and its green systems which produce most of its needed infrastructure (specially electricity power network, integrated sewage and solid waste management systems) without making any pressures on the national and local existing infrastructure systems. Finally, the paper will conclude lessons learned from the introduced practice, and present recommendations to improve Egyptian cities and make it more sustainable.

KEYWORDS: Eco Cities - Green Cities - Green infrastructure systems –Livable cities - Sustainable Development - Urban Challenges and Problems

1. INTRODUCTION

Many years ago, a lot of environmental, urban, social and economic challenges are facing Egyptian cities. These challenges have many negative impacts on cities' development efficiency and performance. These challenges are emerged as a result of many reasons including, adopting of ineffective and unsustainable policies, systems and technologies in the process of planning and management of Egyptian cities. In the next few years, and with high expectations of population increasing, it is expected that these challenges will be expanded to reach very dangerous degrees on human being. In this context, the importance of this paper comes out, as it tries not only to elaborate problems in Egyptian cities, but also to find an effective system and technologies to deal with these problems.

2. URBAN PROBLEMS IN EGYPT

Egypt faces many urban problems and challenges, including urban deterioration, slums and informal areas, land use conflicts, lack of basic services and infrastructure, roads networks and traffic jams, population densities, urban sprawl on the agricultural land, environmental and visual pollution, concentration of economic activities in specific urban centers, weak and informal economic activities in most of urban centers, ….etc. This paper will try to demonstrate number of these problems (the available space could not allow to demonstrate all problems) as follows:

a) Increasing of population densities in urban and rural centers.

This problem emerged as a result of over population growth and the over concentration of population and economic activities in the Nile Valley and the Nile Delta. This problem causes many negative impacts especially on social services and infrastructure. [i]

Fig. 1: Population densities & concentration of activities

b) Urban Deterioration, Slums and Informal Areas

This problem considered as one of the most common problems in the Egyptian cities. Deteriorated urban areas are defined as the urban areas which characterized by old and destroyed buildings, small size building and land blots, high population densities, lack of basic services and infrastructure, narrow and tortuous road networks …etc [ii]. Slums and informal areas are defined as settlements that have arisen in the absence of overall planning, with disagreements of law and violation upon the property of the State.

Fig. 2: Deterioration of the urban environment

Both deteriorated urban areas and Slums and informal areas are lacking of all types of facilities and basic services including water and electricity, moreover they do not have a police or health unit or a school or transport and are not reached by the emergency vehicle. As a result of this cruel deprivation of the minimum standard of living, the situation has spread among the inhabitants of these areas endemic diseases and the spread of ignorance and illiteracy and

unemployment, appeared category extracurricular law became a source of violence and terrorism [iii].

c) Urban Sprawl on the Agricultural Land

The problem of urban sprawl started at the beginning of 70th decade and it still continuing and threatening the limited highly fertile land in Egypt. Many official reports and studies has monitored and evaluated this problem and indicated that the built-up areas in the Nile Delta increased from 1134.7 km^2 in the year 1984 to 1593.7 km^2 in 1992 and to 3671.0 km^2 in the year 2006 [iv], also indicated that the agricultural land at the rural Governorates in Egypt was decreased from 6.156 Million feddans (without reclamation land) in the year 1986 to 5.957 Million feddans in the year 2002[v].

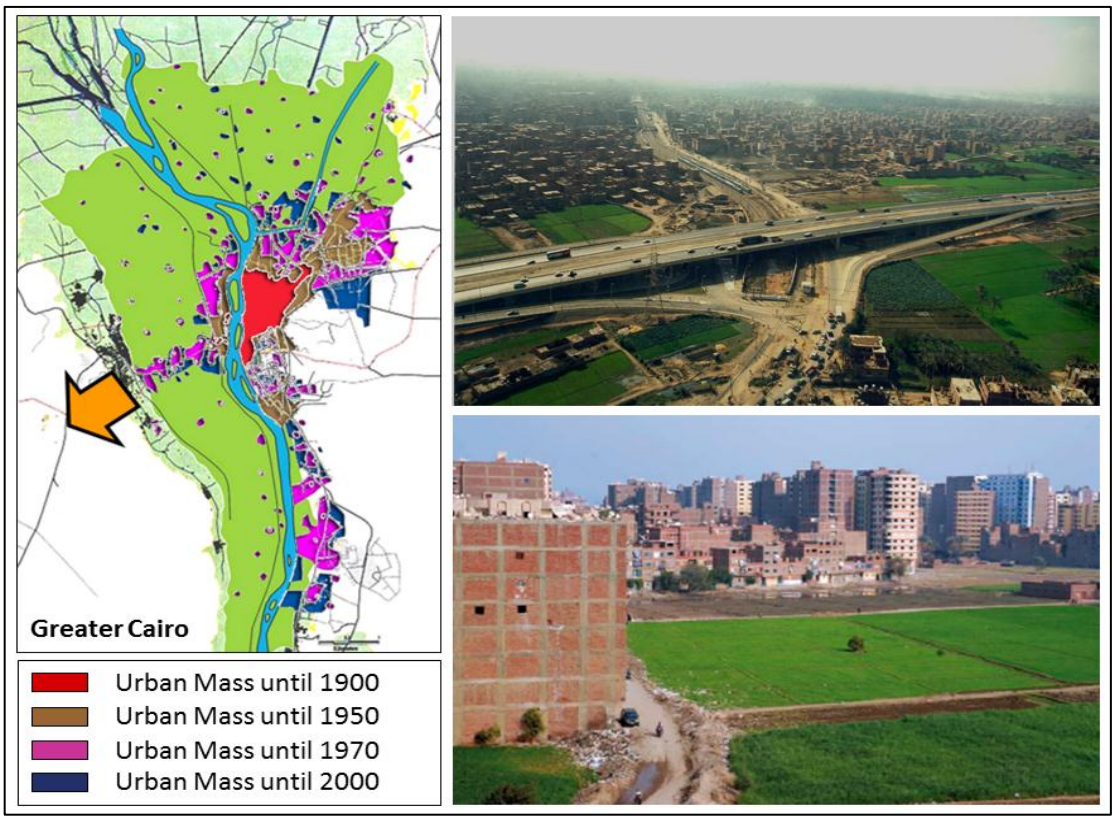

Fig. 3: Urban Sprawl on the Agricultural Land

Another study indicated that built-up areas in the Greater Cairo Region increased from 42 km^2 in the year 1900 to 120 km^2 in 1950 and to 525 km^2 in the year 2000 [vi], which is meant that the built-up areas increased about 12.5

times along this period while the population increased only about 9 times along the same period. On the other hand, the annual loss in agricultural land for urban uses In Egypt has been estimated according to MPWWR (1984) between 10–75 thousand feddans with an average of about 45 thousand feddans annually [vii], and has been estimated according to Ministry of Housing and urban communities between 50–70 thousand feddans [viii], while it has been estimated of about 20 thousand feddans [ix].

d) Environmental Pollution

Environmental Pollution considered as one of the most important and serious problem facing the Egyptian cities. This pollution includes air, soil and water pollution. This pollution emerges as a result of many factors, including: [x]

- Over concentration of population, Economic, industrial and traffic activities in urban centers, causes increasing of emissions, air pollution and makes extreme pressure on the existing infrastructure systems.
- Inadequate sewage disposal and solid waste management systems.

Fig. 4: Environmental Pollution

This pollution causes many negative impacts, not only on the health and life of the population but also on the total national production and efficiency of the national economy [xi].

3. SUSTAINABILITY APPROACHES (ECO & GREEN CITIES)

3.1 Sustainability Origins and Concept

The phrase "Sustainable Development" was emerged and defined by the World Commission on Environment and Development in 1987. They set forth that *"sustainable development is improving people's life-enabling habits to meet our needs in the present without compromising the ability of future generations to meet their needs*" [xii]. Natural resources such as water, air, soil, plants, and animals are the basic assets upon which all life, human and otherwise, depends. Therefore, according to this definition it is unwise to use up these supplies, or we will be threatening the security of all people, in the present and future.

Sustainable development calls for improving the quality of life for all of the world's people without increasing the use of our natural resources beyond the Earth's carrying capacity. While sustainable development may require different actions in every region of the world, the efforts to build a truly sustainable way of life require the integration of action in three key areas: [xiii]

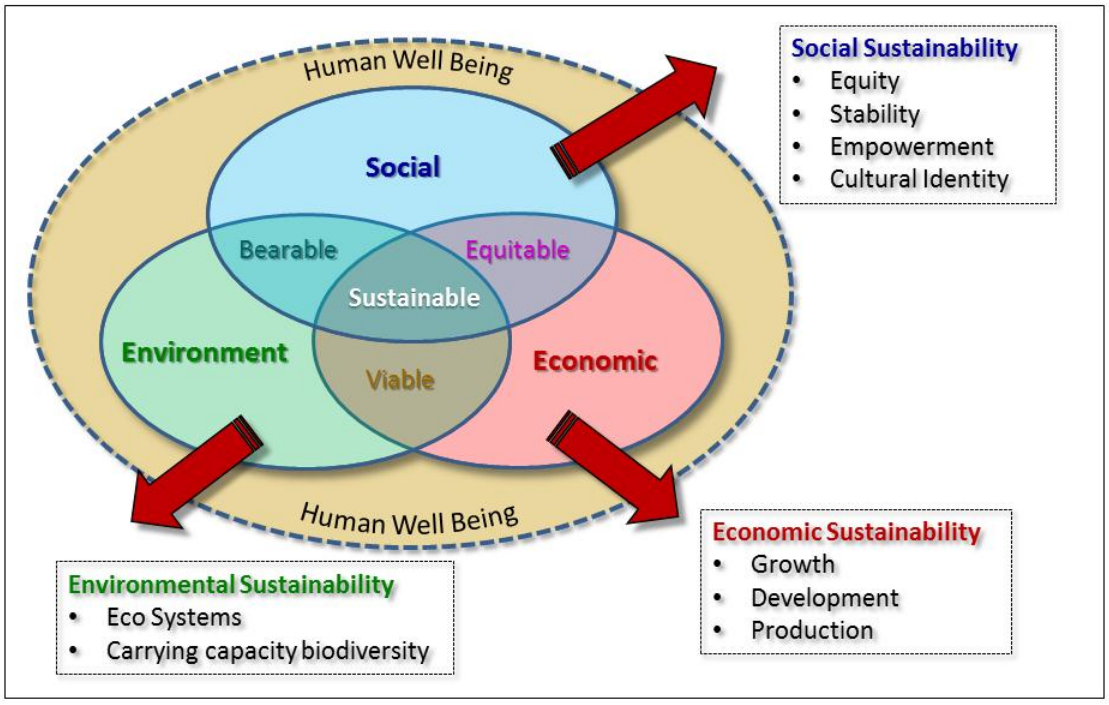

Fig. 5: Dimensions of Sustainability

- Economic Growth and Equity – Today's interlinked, global economic systems demand an integrated approach in order to foster responsible long-term growth while ensuring that no nation or community is left behind.
- Conserving Natural Resources and the Environment – To conserve our environmental heritage and natural resources for future generations, economically viable solutions must be developed to reduce resource consumption, stop pollution and conserve natural habitats.
- Social Development – Throughout the world, people require jobs, food, education, energy, health care, water and sanitation. While addressing these needs, the world community must also ensure that the rich fabrics of cultural and social diversity, and the rights of workers, are respected, and that all members of society are empowered to play a role in determining their futures.

It is important to note that sustainability is not a "thing we do" or a "program we carry-out". Instead, it is a process by which we reason and a way we choose to live; a process that uses common sense and intuition as a baseline. Sustainability should be viewed as a philosophy, or ethic, affording people the ability to consider long-term consequences of actions and to think broadly across issues, disciplines, and boundaries. As a process, sustainable community development exposes citizens to the ramifications of their thoughts and actions on others, their local environment, and the surrounding landscape, as well as motivating and organizing people to direct change within the context of a responsible and shared vision for a collective future.

3.2 Sustainability Approaches (Green City, Eco City & Livable City)

There are many approaches of sustainability including Green city, Eco city and Livable city. Each approach is focusing on specific issues of sustainability. Green cities are defined as the cities which striving to lessen their environmental impacts by reducing waste, expanding recycling, lowering emissions, increasing housing density while expanding open space, and encouraging the development of sustainable local businesses. [xiv]

Eco-city is defined as an umbrella metaphor that encompasses a wide range of urban-ecological proposals that aim to achieve urban sustainability. These approaches propose a wide range of environmental, social, and institutional policies that are directed to managing urban spaces to achieve sustainability. This type promotes the ecological agenda and emphasizes environmental management through a set of institutional and policy tools [xv]. Also, Eco-city is described as 'a city that provides an acceptable standard of living for its human occupants without depleting the ecosystems and biochemical cycles on which it depends. [xvi]

When Livable city is described as an urban system that contributes to the physical, social and mental well-being, and personal development of all its inhabitants. It is about delightful and desirable urban spaces that offer and reflect cultural and sacred enrichment. Key principles that give substance to this theme are equity, dignity, accessibility, conviviality, participation and empowerment. [xvii]

The concept of livability should encompass those elements of home, neighborhood, and metropolitan area that all contribute to safety, economic opportunities and welfare, health, convenience, mobility, and recreation. The adjective livable for a city connotes a desirable quality of life for its citizens - including social activities, attractive public places, provision of a certain level of privacy, as well as a sense of community. [xviii]

4. CASE STUDY (THE FIRST SustainabiE 'ECO, GREEN & LIVABLE CITY IN EGYPT)

4.1 General Information

a) Location and basic information

This case presents the first Egyptian try to plan a new city using the sustainability approaches "Eco, Green and Livable cities". The new city is located at the east of Suhag Governorate (about 35 km far of Suhag city) on the Upper Egypt\Red Sea development corridor. It was planned on area of about 4300 feddan to accommodate about 75:100 thousands inhabitants, with growth density 18-25 persons\feddan. [xix]

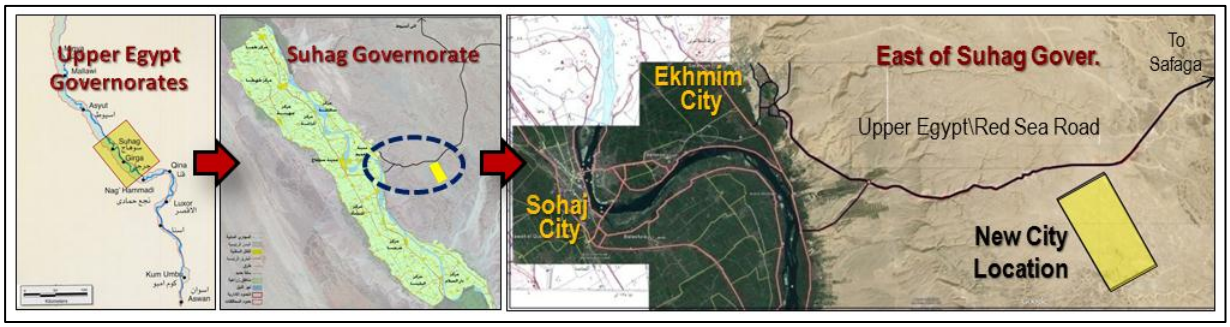

Fig. 6: The New City Location

b) City Vision and Master Plan

The city vision focuses on creating a unique new urban center in south Egypt region, specialized in delivering high class of urgent needed regional services which are not available in south Egypt's governorates, including Recreation, Health, Education, Tourism, Business and Trade services "wholesales, commercial centers, Malls and exhibitions for agricultural and industrial productions". Also, the city vision focuses on creating the first model of new cities\communities which is adapting sustainability approaches "Eco, Green and Livable cities". [xx]

The main idea of the city master plan depends on dividing the city to 3 main planning units\corridors, each planning unit\corridor have a unique urban structure and function. The three corridors are formally and functionally integrated to produce a unique regional services center and achieve the main city's function as it was described in the city vision. Planning corridors include the following:

- The Eastern linear corridor (Regional Services Corridor): This corridor includes areas defined to regional services uses, including special kinds of health and education services, which are not available at south Egypt governorates. Regional health services include centers for eyes, liver, heart, cancers and psychotics. Regional education services include non-governmental universities and high institutes, technology academy, branch of Al-Azahar University, branch of Alexandria library, general and technical high schools.

Fig. 7: The New City Master Plan

- The Western linear corridor (The city residential area): This corridor includes residential districts, local services centers, regional trade and exhibition area "at the northern side", public facilities areas, and workshops. The main function of this corridor is to provide housing plots and local services to the permanent city residents. Housing plots are planned and categorized in 4 levels (low, medium, over-medium and high housing "villas") to suit all social and economic population categories. Local services are planned and categorized in 2 levels. The first level is the districts services centers, which provide daily and weekly needs to districts residents, including basic schools, health units, kid's gardens, social units, mosques and churches, markets, cinemas, public libraries, post offices and emergency unites "police points – fire point – ambulance point". The second level of local services is the city services center, which provides the higher level of services to the city residents, including secondary schools,

general and specialized hospitals, social center and club, elder house, grand mosque and church, shopping center, cinema, theater, public library, communication center "main post office – telephone – telegram), emergency center "police– fire– ambulance units", and administration services.

Use			Area (Fed.)	% of Urban Mass	% of the Total City
Urban Mass	Residential Uses	Residential Areas	1241.86	32.46	28.68
		Green & Open Spaces	88.20	2.29	2.02
		City Local Services – Distrect Service Center	53.45	1.39	1.23
		City Local Services – City Service Center	99.5	2.59	2.28
		City Local Services – Total of City Local Services	152.95	3.98	3.51
		Total of Residential Uses & Local Services	1483.01	38.56	34.06
	Regional Services & Activities	Regional Educational Services	474.83	12.35	10.91
		Regional Health Services	249.25	6.48	5.73
		Regional Trade & Exhibitions	113.4	2.95	2.6
		Business Center	34.71	0.90	0.80
		Mixed Use	45.60	1.19	1.05
		Touristic Zone	47.48	1.23	1.09
		Regional Recreational activities	107.03	2.78	2.46
		Regional Green & Open Spaces	582.34	15.14	13.38
		Total of Regional Services & Activ.	1654.64	43.03	38.02
	Other Uses	Public Facilities (Water, Electricity)	24.13	0.63	0.55
		Workshops	10.63	0.28	0.24
		Cemetery	16.55	0.43	0.43
		Major Roads Network	656.69	17.08	15.09
		Total of Other Uses	708	18.42	16.26
	Total of Urban Mass		3845.56	100	88.30
Public Facilities	Solar Energy Station		325.68		7.48
	Public Facilities (Sewage and solid waste Stations)		53.16		1.22
	Reserved Area		128.60		2.95
	Total of Public Facilities		507.44		11.66
Grand Total			4353		100

Table. 1: The New City Land Budget

– The middle linear corridor (Regional Recreational Corridor): This corridor provides unique regional parks and recreational activities to both suhag governorate and most of south Egypt governorates. These parks and activities

include Zoo Park, Water Park, specialized gardens, recreational kids city and cafeterias and restaurants. Functions of this corridor are not only to provide services, but also to create a good urban environment in the heart of the city, and also to play as a barrier between the eastern corridor (regional services) and western corridor (residential areas) in order to prevent the city from traffic jams and air pollution.

4.2 Sustainability bases in the new City (Case Study)

The new city master plan tries to achieve sustainability in different fields (economic, social, urban, environment …etc). Following are number of sustainability indicators that the planning team of the new city has tried to achieve:

a) Urban, Land Use & Architecture Sustainability Indicators

- *Demand on Housing and Services*: The proposed residential areas and regional and local services are urgently needed (big demand) by both people and investors not only at suhag governorate but also at south Egypt region.
- *Land Use Distribution*: The spatial distribution of land uses tries to reduce distances among homes, services and works places and makes them close to each others. This will help in minimizing need to travel using cars in order to save time, fuel and to keep quiet and air quality.
- *Urban Form:* The city is compact, highly integrated, easily walkable and small enough to decrease the travel distances between activities and to eliminate even the desire for a private cars.
- *Access to Affordable, Location-Efficient Housing*: The proposed city's housing program was designed to afford a number of housing units in different classes (low, medium, over-medium and luxury housing) to fit the demand and to suit all resident's income classes. Also housing location were placed near work places at regional and local services centers in order

to save time, minimize transportation cost, keep the environment clean and to keep health of city resident.

- *Green, Open Spaces & Recreation*: The proposed master plan expands green, open spaces and recreation activities to achieve many benefits: 1) Amelioration of the physical urban environment by reducing air pollution, moderating the extremes of the urban climate, and contributing to cost-effective sustainable urban drainage systems. 2) Improvement of the urban image and quality of life. 3) Increasing the economic attractiveness of a city and fostering community pride.
- *Green Building Standards*: Green buildings standards, for both public and private buildings, are adopted to consume less energy, produce fewer emissions, protect occupant health, minimize waste and create jobs.

b) Infrastructure & public facilities Sustainability Indicators

- *Transportation System*: The proposed transportation system Provide more transportation choices such as private cars, mass transit and non-motorized options like bike lanes and walkable streets, This makes help to decrease household transportation costs, reduce our nation's dependence on foreign oil, reduce air emissions, improve air quality, improve public health, increase housing values, promote economic development and contribute to a greater sense of place and community.
- *Energy*: The proposed master plan adopted many ways to keep energy sustainability: 1) Curb energy consumption by replacing homes, public buildings, traffic and street lighting with energy-efficient LEDs. 2) Depending on solar energy as a master source to feed all activities in the city with all needed electricity power.
- *Waste Management System*: The proposed master plan adopted ways to keep sustainability in waste management: 1) Using recycling technologies to recycle water wastes and reuse it in irregation of parts of green areas and

wood forest. 2) Using an integrated solid waste management system to identify the suitable way to deal with all kinds of solid wastes.

c) Social Sustainability Indicators

- *Equity:* The master plan offers locations and energy-efficient housing choices for all people to lower the combined cost of housing and transportation. Also offers equal chances for all residents to access basic urban services, without regard to their ages, incomes, races, and ethnicities..etc,
- *Social Inclusion*: All city residents, irrespective of gender, age, ethnicity, cultural heritage, beliefs, religion and economic status are encouraged to participate in all activities of the city.

d) Economic Sustainability Indicators

- *Economic Base & Employment*: The proposed master plan founded a strong economic base through:1) Diversity of economic activities, such as construction, recreation industry, local and regional special education and health services, trade, and tourism. 2) Integration of economic activities that enhance the city's economic competitiveness. 3) Create thousands of reliable new jobs.
- *Private Sector Development*: Most of development activities and projects in the city will be developed by private sector.

e) Environmental Sustainability Indicators

- *Air Quality & Noise:* Kindly refer to points of *Land Use Distribution, Urban form, Green, Open Spaces & Recreation, Energy* and *Transportation System.*

f) Management & Governance Sustainability Indicators

- *Participation*: The city master plan proposed a council includes

governmental body, investors, civil society and elected representatives of the residents. This council allows his members to participate in decision making process and to manage all issues of the city.

- *Environmentally Preferable Purchasing (EPP):* This strategy forced the city government to adopt selected criteria in evaluating its purchased products and materials in order to reduce waste, conserve natural resources, eliminate the use of toxic materials or pollutants and promote the use of recycled content.

5. CONCLUSIONS

This paper concludes that most of urban problems and challenges in Egyptian cities are mostly connected to present unsustainable urban development forms and patterns. Many structural changes should be done in these forms and patterns in order to solve cities' problems and make it more sustainable to meet the standards of Green, Eco and Livable cities. These changes should be done not only in urban form, transportation systems and water, waste and energy technologies, but also in the value systems and underlying processes of urban planning and governance.

Toward sustainable urban form, a compact, high density, and mixed-use are critical, along with ensuring that the city protects and enhances its green and open spaces. City's urban uses and economic activities should be highly demanded and should be distributed in a way that eliminates distances and curbs automobile dependence.

Changes in transportation systems to make it more sustainable and livable should not only give people the option of waking, biking and using public transit, in addition to driving, but also reduces traffic congestion, protects the environment, and encourages physical activities.

Traditional technologies of water, waste and energy applied in the Egyptian cities should be replaced with modern and efficient environmental technologies in order to maximize the possibility that cities can meet their needs from water and energy in a

renewable way and to adopt integrated waste management systems to recycle and re-use their own wastes.

There is an increasing demand to change the existing value systems and processes of urban planning and governance. Values of democracy, human rights and good urban governance should be adopted, including transparency, accountability, Fairness and participation of all citizens, irrespective of their gender, age, ethnicity, cultural heritage, beliefs, religion and economic status, in decision making process and to manage all sustainable urban development issues of city.

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الملخص العربى

تنطوى الفكرة الأساسية للورقة البحثية على توجيه النظر الى الحاجة الشديدة والماسة لتطبيق مبادئ التنمية المستدامة ومداخل المدن الأيكولوجية والخضراء والقابلة للعيش فى تخطيط وتنمية المدن الجديدة فى مصر ، وذلك لمواجهة المشكلات والتحديات الكبيرة التى تواجهها المدن المصرية (التلوث البيئى ، التكدس ، تدهور شبكات البنية الأساية ، ... الخ) وما يرتبط بها من مخاطر تهدد صحة وحياة الإنسان بالإضافة الى المخاطر الإجتماعية والإقتصادية والبيئية الأخرى .

كما تنطوى الفكرة على استعراض الجوانب المختلفة لأحد التجارب المصرية الحديثة فى تخطيط وتنمية اول مدينة جديدة خضراء ومستدامة فى صحراء مصر ، وذلك بغرض استخدامها كنموذج يحتذى به فى اقامة مزيد من المدن الجديدة فى الصحراء المصرية والتى تعتمد على نفسها فى تدبير احتياجاتها من المرافق المختلفة (مياه – كهرباء – صرف صحى .. الخ) دون أن تشكل مزيد من الضغوط على شبكات المرافق القائمة هذا من ناحية ، ومن ناحية اخرى تهدف دراسة هذه التجربة الى استخلاص عدد من الدروس لإستخدامها "بمعرفة الجهات المعنية" كمدخلات اساسية فى صياغة استراتيجية وطنية متكاملة لتخطيط وتنمية المدن الخضراء والمستدامة فى مصر .

وفى هذا الإطار ، تتعرض الورقة البحثية لمشكلات المدن القائمة فى مصر وتداعياتها ومخاطرها المختلفة ، بالإضافة الى مبادئ التنمية المستدامة والمدن الخضراء كمداخل أساسية للتخفيف والحد من هذه التداعيات ، كما تتعرض الورقة لدراسة وتحليل التجربة المصرية (المدينة الجديدة بشرق محافظة سوهاج) ، وتأثيرات الإلتزام بمعايير الإستدامه بها على الهيكل العمرانى للمدينة ونسب ونمط توزيع استعمالات الإراضى بها ، واساليب ونظم التغذية بشبكات البنية الأساسية ، ومن ثم استخلاص الدروس المستفادة منها .

الكلمات الدالة

التنمية المستدامة – المدن الخضراء – المدن الأيكولوجية - المدن القابلة للعيش - مشكلات المدن القائمة