The Ecological Footprint; The Necessity of Rejuvenating Cairo's Youth

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Abstract

Increasing evidence of global change is clear warning that human activity may now be undermining global life-support system. If we are to live sustainably in our surrounding environments; the cities and urban centres, we must ensure that we use the essential products and processes of nature no more quickly than the can be renewed, and that we discharge wastes no more quickly than they can be absorbed.

From an ecological perspective, the growing `ecological footprint` of our urban centres is typically many times their total administrative area. A leading scholar (William Rees) has calculated that the total footprint of all cities is now greater than the land area of our planet Earth. This analysis suggests that, in order to better or even sustain our quality of life, we have to change the governing strategies when developing urban centres and more specifically on the strategic level of urban development projects.

The future vision of Egypt's Cairo, with its current deteriorating urban status is darker than ever before. Strategic planning and decision making is to take the front stage to highlight a new strategy for dealing with the current and future problems and challenges.

Problem Definition
Egypt as a whole lacks in commitment to a clear sustainable development agenda for the development of new and existing cities. The new urban development plan for Greater Cairo Region is a significant opportunity for envisaging a sustainable agenda for the creation of urban development constraints.

Hypothesis
This paper discusses the current problems and challenges facing Cairo and the possible future scenarios for the capital in the year 2020. The authors promote a new vision for a capital that from an ecological perspective, embraces its habitants and lead them to a better quality of life as it is the case for major capital cities.

Objective
On the planning and decision making levels, a strategic MasterPlan is needed for the effective planning of a new Capital of Egypt; Cairo in the year 2020 is a bigger, richer, and more sustainable capital. The ecological footprint of Cairo is within unacceptable limits, therefore the proposed vision for a strategic MasterPlan promotes a much brighter bigger picture for a much positive future.

Key Words: Ecological Footprint, Cairo 2020, Urban Agglomeration, Strategic MasterPlan, Greater Cairo Region.

1. INTRODUCTION

In recent years, environmental policy and research circles have advocated an ecosystem approach in light of the growing importance of ecological issues and the recognition of the interconnectedness of social, economic and environmental systems. With global population growth centered largely in urban areas, cities are increasingly becoming the locations where human activities and their associated ecological impacts can be most aptly met with policy and planning responses.

The alternative healthy lifestyles and better quality of life which is advocated to the people and the habitants of the major capitals and cities can only be materialize into a reality with a new approach towards the management and betterment of the existing lifestyles. The sustainability of the management process lies at the core of the amount of productive land and water that people need in order to support what they use and most importantly what they discard.

The significance of integrating sustainable development guidelines into all sectors and fields of our life is immense whether on the global, international or national levels. International research has now moved from the phase of introducing the concept of sustainability to the following phase of implementing its core recommendations. This is underpinned by an extensive stage of research and development which started by the first emerge of the term in the Brundtland report back in 1987.

The implementation of sustainable development has acquired several new agendas in most business sectors such as (construction, insurance, system development, tourism, manufacturing, stock market …etc) and it has significantly influenced governmental policies and strategies prevailing businesses, social societies and governmental practices. Sustainability can only be achieved when cities are approached as systems and components of nested systems in ecological balance with each other. The success of integrating sustainable development into the lifestyles of the habitants of such cities mainly relies on the parallel level of research which focused on the analysis and breakdown of complex systems and detailed study of the functioning frameworks.

"Any approach to urban policy development and management, which aims to add value to current practice, must build upon or adapt to what is already in place, or at least express how the new approach departs and adds value to those existing"[1]

For Egypt's capital; Cairo is suffering from colossal urban challenges inherited from a long history of frail short term planning and an over population rate which brought the capital's infrastructure to extreme inefficiencies levels. This has affected the lifestyles and the quality of life of not only the low income and poor percentage of Cairo's population but also the privileged sector of society.

The government of Egypt has embarked on a new planning and urban trend of new satellite cities on the peripherals of Cairo such as New Cairo City, The 6th of October

[1] United Nations University, Institute of Advanced Studies UNU/IAS, 2003, Defining an Ecosystem Approach to Urban Management and Policy Development, UNU/IAS Report, Tokyo, Japan

City, El Shorouk City, Badr City, El Amal City…this is list is by no mean exhaustive but it highlights the size of the planning development and the implications it might have on the urban life of the new habitants, these new cities are marketed as alternative lifestyle than the existing ones inside the condensed old capital.

Obviously, Cairo (the capital) is no longer capable of sustaining the provision of various lifestyles it used to offer. The habitants of the Egyptian capital have -to a large extent- focused their urban future on leaving the premises of Cairo to new urban possibilities in the new satellite cities. The lifestyles offered in these new urban communities are more futuristic in terms of meeting the demands of the current and future generations. The authors have reservations on what these cities could supply for the future generations bearing in mind the current rate of development inside these new communities.

The authors will demonstrate the degrading status of the current capital, its problems, challenges and solutions later in this paper, but would like to start our feature with a demonstration of what "the Ecological Footprint" could stand for as a benchmark for the lifestyles and choices we make every day.

2. THE ECOLOGICAL FOOTPRINT

While the environmental problems in cities in the developed and developing world manifest differently, what is becoming increasingly evident is that the social and ecological components of such problems are inseparable.

"Within cities everywhere, the concerns of development and those of environment and social welfare demand an integrated approach for their solution."[2]

Different cities in different parts of the world at different stages of development have varying priorities. Therefore, the authors portray the different lifestyles offered in cities according to three categories: least developed cities, rapidly developing and finally the developed world cities.

2.1 Cities in the Least Developed World

Although the least developed cities in Africa, Asia and Latin America have experienced little benefits from the globalization flows, they face rapid urbanization and the need to simultaneously expand and modernize their infrastructure while dealing with profound internal socio-economic inequalities as well as severe environmental deterioration.[3]

The tremendous pressures on these locales have helped to create both ecological and socio-environmental problems within the city and the surrounding peripherals where the most critical environmental burdens of low-income and smaller cities then to be local

[2] Molly O'Meara, Reinventing Cities for People and the Planet, Worldwatch Paper 147, Washington DC: Worldwatch Institute, 1999 (www.worldwacth.org)
[3] Bartone, C, Bernstein, J, Leitmann, J, and Eigen, J (1994). Toward Environmental Strategies for Cities: Policy consideration for Urban Environmental Management in Developing Countries. World Bank, Washington DC.

such as inadequate and unsafe piped water supply, lack of proper sewerage and storm water drainage, lack of provision of garbage collection and disposal, indoor air pollution that results from burning waste and poor health care services.[4]

On the social level, a range of problems include over-crowding, slum and squatter settlement challenges where the UNCHS[5] suggests that sixty or more percent of those living in Cairo are living in slums and squatter settlements with crime, loss of greenery and biodiversity, urban flooding, and susceptibility to other natural disasters.[6] Hence, the ecosystems within these borders and in the surrounding peripherals are suffering.

2.2 Cities in the Rapidly Developing World

Nations developing during the current period are undergoing compressed and collapsed transitions where rapid growth has been facilitated by governmental institutions that provided national policies and coherent, but inequitable development strategies for major metropolitan centres. While they have been able to compete successfully with emerging technical processes in western cities they have paid the price in terms of environmental burdens.[7]

In contract to the experiences of the western cities where the emergence of environmental challenges appeared over longer periods of technological and socio-economic change and in sequential order, these cities have a new mix of environmental problems which cause related illnesses which in turn carry related social and economic costs. The transition of environmental problems experienced in both compressed and collapsed cities have created overlapping sets of challenges emerging over a short period of time.

2.3 Developed World Cities

The ecosystems within their borders are less degraded than their counterparts in other parts of the world. These cities provide more services than expected including higher levels of biodiversity. Along with increasing numbers of households combined with automobile and telecommunications technologies, air conditioning and building technologies facilitated the expansion of urban land uses, consuming land at greater rates than that of population growth. This uncoordinated growth of cities at their margins is contributing to a variety of regional and global problems including increased energy consumption and carbon dioxide emissions which is a major cause of global warming.[8]

This classification of cities listed above demonstrates that the categorization simply

[4] McGranahan, G, Songsore, J, and Kjellen, M (1996) "Sustainability, Poverty, and Urban Environmental Transitions". In C Pugh (Ed.), *Sustainability, the Environment and Urbanization*, Earthscan, London.
[5] UNCHS United Nations Centre for Human Settlements - Habitat
[6] "Global Trends" from the Global Urban Observatory at http://www.unchs.org/habrdd/global.html
[7] Asian Development Bank (1997), Emerging Asia: Challenges and Changes. Asia Development Bank and Oxford University Press, Hong Kong.
[8] United Nations University, Institute of Advanced Studies UNU/IAS, 2003, Defining an Ecosystem Approach to Urban Management and Policy Development, UNU/IAS Report, Tokyo, Japan

boils-down to the different lifestyles offered in each category (city) to its habitants. This lifestyle demands not only a continuously changing amount of resources but also a relationship between the consumption of these resources and the amount of land needed to absorb the resources used.

2.4 What does the "Ecological Footprint" stand for?

"Consumption of resources provided through trade and lifestyles is affecting ecosystems around the globe. From an ecological perspective, the growing "Ecological Footprint" of urban centres is typically many times their total administrative area."[9]

The Ecological Footprint is an accounting tool that enables us to estimate the resource consumption and waste assimilation requirements of a defined human population or economy in terms of a corresponding productive land area. It is also the area of land and water ecosystems required, on a continuous basis, to produce what the population consumes, and to assimilate wastes that the population produces, wherever on Earth the relevant land/water is located.[10]

William Rees is a leading scholar in this field of ecological footprint, he describes it as the total area of terrestrial ecosystem types needed continuously to support all the social and economic activities carried out by people of our city as they go about their daily activities, keeping in mind that the land with ecosystems is needed to produce resources, to assimilate wastes and to perform various invisible life-support functions.[11]

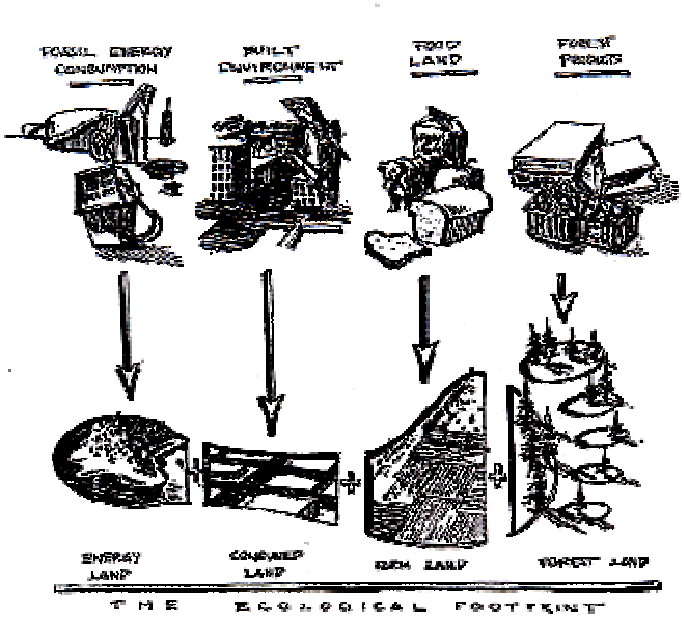

Fig. 1: Breaking down the meaning of Ecological Footprint

If we are to live sustainably, we must ensure that we use the essential products and processes of nature no more quickly than they can renewed, and that we also discharge wastes no more quickly than they can be absorbed.

This is because, people are part of the natural ecosystem where nature supplies material requirements for life, absorbs our wastes and provides life-support services such as climate stabilization, all of which make Earth hospitable for people.

[9] Ibid. pp. 11
[10] Rees. W.E. (2002), *Globalization and Sustainability: Conflict or Convergence?* Bulletin of Science, Technology and Society, EarthScan, London.
[11] Wackernagel, Mathis, and William Rees (1996), *Our Ecological Footprint: Reducing Human Impact on the Earth*, Philadelphia: New Society.

It should be obvious that the ecological footprint of a city will be proportional to both population and per capita material consumption but for modern industrial cities the area involved is orders of magnitude larger than the area physically occupied by the city, for example, London's ecological footprint is 120 times the area of the city itself and Tokyo needs 1.2 times the land area of all of Japan to sustain its level of consumption.[12] Modern cities and whole counties survive on ecological goods and services appropriated from natural flows or acquired through commercial trade from all over the world. The Ecological Footprint therefore represents the corresponding population's total appropriated carrying capacity.

Fig. 2: The Overarching Concept of Ecological Footprint

For our Planet Earth, our ecological footprint keeps growing while our per capita "Earth-Shares" continue to shrink. Since the beginning of this century, the available ecologically productive land has decreased from over five hectares to less than 1.5 hectares per person in 1995. With the growing ecological demands of our daily lifestyles, this could mean that the Earth could not support our over populated cities in the near future.

The bigger picture of such phenomenon could lead us to an even bigger and darker image where one of the scenarios would be that it would take at least two additional planet Earths to produce the resources, absorb the wastes, and otherwise maintain life-support systems.

The Ecological Footprint as a benchmarking tool was developed in the early 1990s by the academics Mathis Wackernagel and William Rees in Canada. The term is now so commonly used that it appears in the new Oxford English Dictionary. Its calculations are based on two straightforward assumptions:[13]
1- That we are able to estimate with reasonable accuracy the resources we consume and wastes we generate.
2- That these resource and waste flows can be converted to the equivalent biologically productive area necessary to provide these functions.

The nature of such calculations identify the characteristics of the lifestyle that we practice in our daily activities in relation to the city we live in and its population as well as the country, the corresponding continent, the habitant's age, sex and the climate condition of the urban environment.

[12] Ibid.
[13] http://www.myecofootprint.net/ecofoot_en.htm

If we take a quick look at the online quiz furbished for all users to evaluate their personal ecological footprint, we find that the questions can be divided as follows:-[14]

- Food Footprint

1. How often do you eat animal based products? (Beef, chicken, fish, eggs, dairy products)
2. How much of the food that you eat is processed, packaged and imported?

- Goods Footprint

3. Compared to people in your neighbourhood, how much waste do you generate?

- Shelter Footprint

4. How many people live in your household?
5. What is the size of your home?
6. Which housing type best describes your home?
7. Do you have electricity in your home?

- Mobility Footprint

8. On average, how far do you travel on public transportation each week (bus, train, subway or ferry)?
9. On average, how far do you go by motorbike each week (as a driver or passenger)?
10. On average, how far do you go by car each week (as a driver or passenger)?
11. Do you bicycle, walk, or use animal power to get around?
12. Approximately how many hours do you spend flying each year?
13. How many litres per 100 kilometres does your motorbike consume?
14. How often do you ride your motorbike with someone else, rather than alone?
15. How many litres per 100 kilometres does your car consume?
16. How often do you drive in a car with someone else, rather than alone?

With average answers corresponding to a male living in Cairo, Egypt the answers given produced the following shocking values:-

CATEGORY	GLOBAL HECTARES
FOOD	0.5
MOBILITY	7.5
SHELTER	0.8
GOODS/SERVICES	8.1
TOTAL FOOTPRINT	16.9

IN COMPARISON, THE AVERAGE ECOLOGICAL FOOTPRINT IN YOUR COUNTRY IS 1.5 GLOBAL HECTARES PER PERSON.

WORLDWIDE, THERE EXIST 1.8 BIOLOGICALLY PRODUCTIVE GLOBAL HECTARES PER PERSON.

IF EVERYONE LIVED LIKE YOU, WE WOULD NEED 9.4 PLANETS. [15]

[14] The Ecological Footprint Quiz is accessible online at http://www.myfootprint.org/
[15] This is an exact copy of what the Online Quiz provided us as answers at the same website.

2.5 Planning for a Sustainable Future; where does Egypt's Capital Stand?

Based on the previous analysis we can conclude that the ecological footprint is a tool to help us plan for sustainability. It not only addresses such global concerns as ecological deterioration and material inequity, but it also links these concerns to individual as well as institutional decision-making which defines the lifestyles offered by our urban centres. Ecological Footprint analysis helps us put things in the larger perspective, when we address the problems and challenges facing the Urban Sector in Egypt and Cairo, we need to understand that the resources we have in creating solutions are finite. Therefore, thinking about such a limited city forces us to consider not only all the ways in which the habitants remain dependent on nature, but also on all the ways we can reduce humankind's negative impact on the systems that sustain us.

Building a sustainable society in Cairo has to start by identifying the actual problems which affect our lifestyles within the city and lead us to a better quality of life in the new urban satellite cities which the government seem to be committed to such as the case of New Cairo City.

3. A FUTURE VISION FOR CAIRO IN THE YEAR 2020

Egypt's Capital, Cairo is one of the oldest capitals of the world. Its history goes back to 650 A.C. when its urban agglomeration was only 1.72km^2.

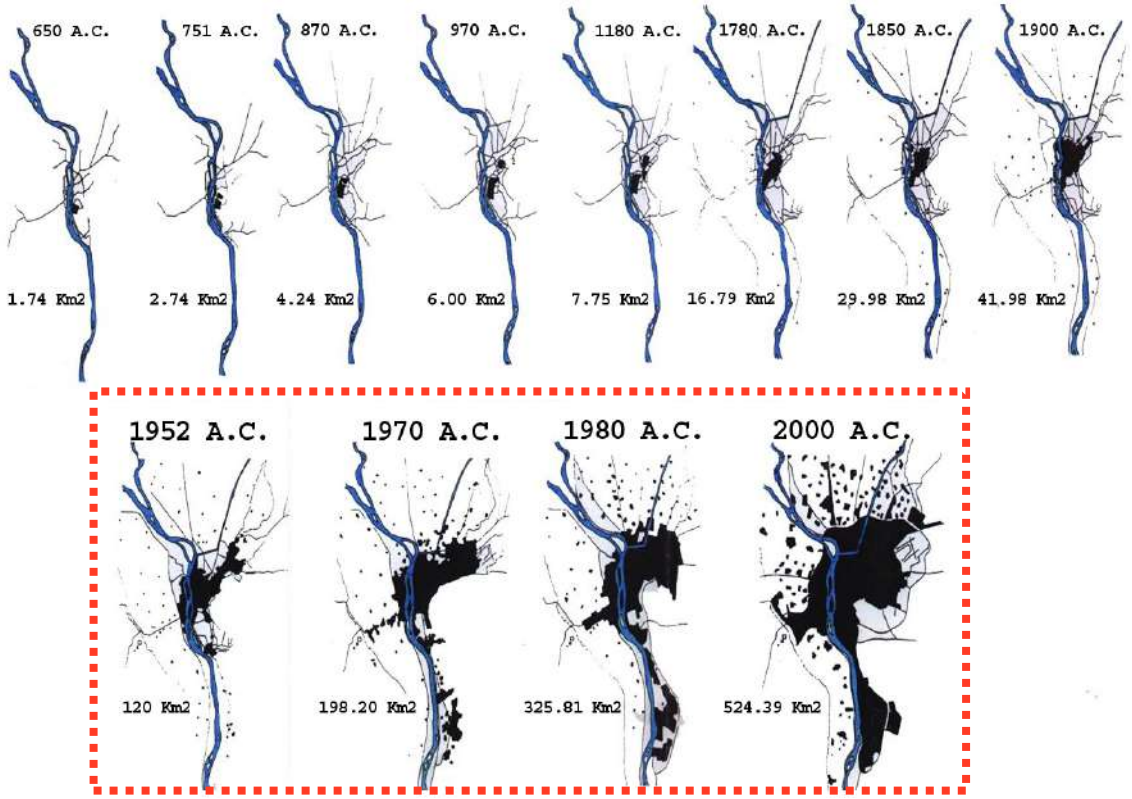

Fig 3: The Urban Agglomeration of Greater Cairo Region

3.1 Visual Analysis of Cairo's Current Urban Status

As one of the most over-populated capitals of the world, Cairo is facing significant challenges in terms of its urban texture and most importantly the potential various lifestyles it offers to its habitants. The dark faces of the urban problems we face in our daily lives in Cairo and greater Cairo Region can be portrayed as follows:-

1- Informal urbanization "Encroachment" over agriculture land.

2- Huge increase of population's density, in addition to its inefficient distribution.

3- Existence of random housing within and around the urban agglomeration.

4- Inadequacy and concentration of facility services, in addition to the low standard conditions of the roads network and traffic congestion.

5- Obvious lack of harmonious distribution of land and property uses

6- Deterioration of the urban and architectural style.

7- Widespread of environmental pollution which directly increases health problems

The authors believe that these problems are mainly caused by:-

1- Absence of a clear vision for the future of Greater Cairo as a one city with special focus on Cairo (the old capital)
2- Absence of a MasterPlan within Greater Cairo planning region.

In order to highlight the scale of the problems, challenges facing Cairo in the future, as well as the possible solutions; the authors display a comparison between Cairo (City in the Least Developed World) with London & Paris (Cities in the Developed World).

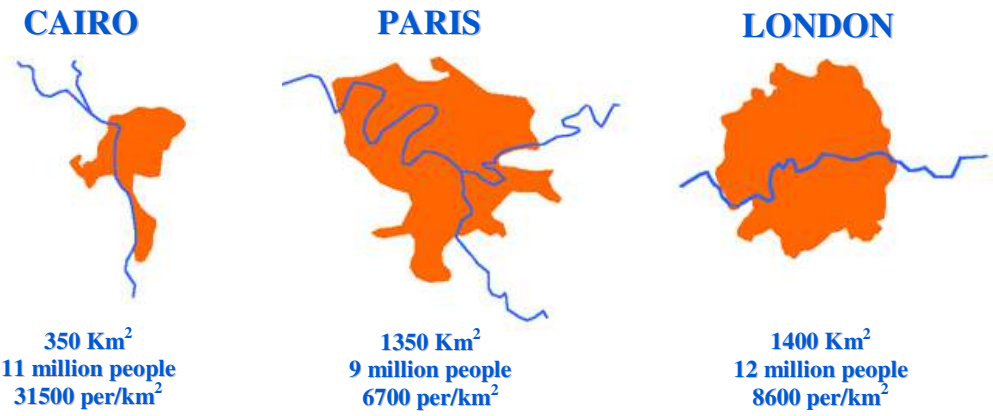

Fig 4: Current Urban Status for Cairo – Paris – London

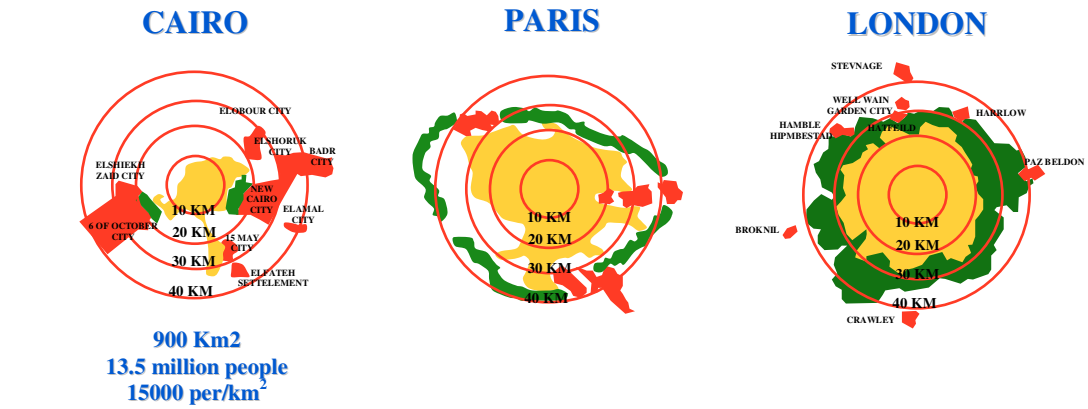

Fig 5: Distances Between existing Landmass and New Cities (New Urban Satellite Cities)

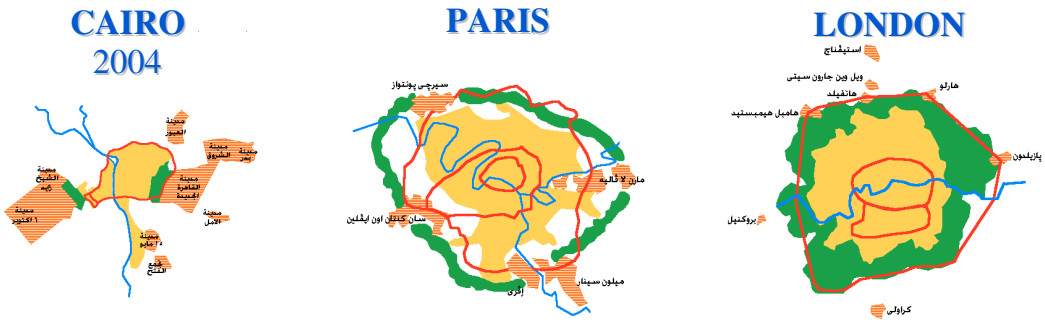

Fig 6: Ring Roads connecting the existing Landmass and New Cities (New Urban Satellite Cities)

This comparison is based on the fact that the number of population of three cities is nearly the same but the difference in the possible lifestyles offered in each capital is apparent. The figures featured above pinpoint the basic difference and approaches adopted by the governments in each case to deal with the same problems of over population and degradation of the quality of life.

For a future vision for the Greater Cairo Region, the authors propose the following:-

A Strategic MasterPlan that relies on three main aspects:-

1- Promoting the Economic Development and the Decentralization Policy
2- Improving the micro climate and the urban environment
3- Enhancing the social life standards and implementing the principle of Public Participation

The following figure displays such vision and highlights the three main themes of the proposed approach. The quality of life and potential lifestyles which embrace these three themes would not only improve the current urban status of Cairo but also represents an attempt in reducing the current ecological footprint which the habitants seem to be abusing.

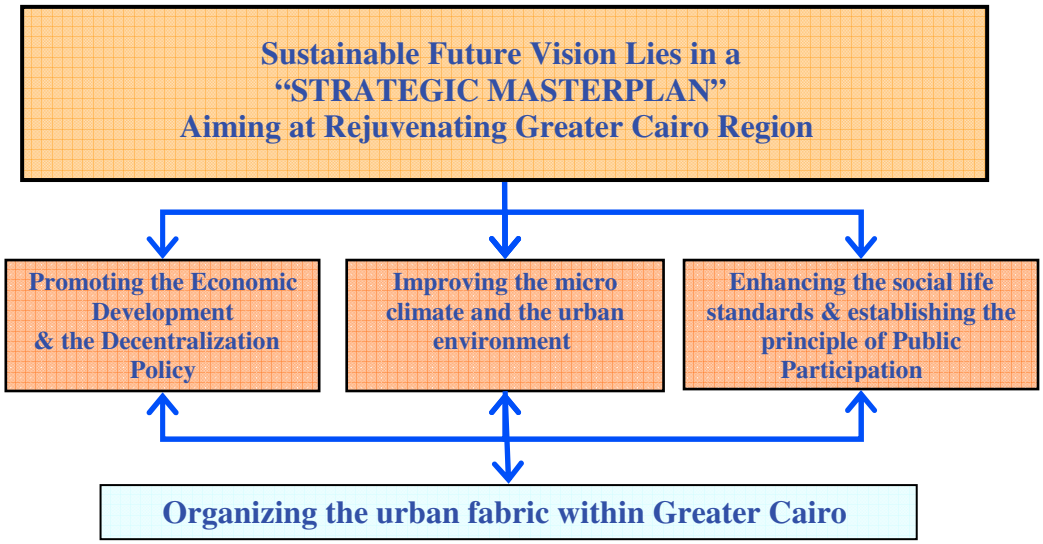

Fig 7: A Visual display of the proposed approach to the Future Vision of the Strategic MasterPlan

The Proposed MasterPlan should achieve the following:-

1. A greater Cairo Capital that is full of open spaces and green areas to promote healthy lifestyles. A Capital that embraces and fulfills the needs of all its residents, with trees and desert forests distributed on the edges. Currently the personal share of greeneries and open spaces is as follows:

Cairo	1.2 m^2/per person	Paris	16 m^2/per person
Vienna	25 m^2/per person	Washington	45 m^2/per person

2. Comfortable and speedy roads with transportation network that connects and interlinks all Cairo's different districts together.
3. Convenient and healthy residences having all infrastructures gratifying all needs of the modern citizens.
4. Various levels of streets and Urban Centers in all districts all connected and linked to each other accommodating Commercial, Cultural and Entertainment facilities.
5. A highly efficient local and international communication network that connects all inhabitants with all local and international regions (Governmental – Political – Commercial – Banks – Sports – Recreational - ... etc.)
6. Residential parcels possessing a great deal of quietness and tranquility, having broad planned streets with buildings of organized and unique urban styles, in addition to shaded spaces accommodating schools and nurseries surrounded by trees and flowering plants.
7. Improving the river Nile to exhibit the capital in a civilized shape and people experiencing its shoreline which accommodates shaded pedestrian paths, bicycle paths, entertainment areas and boats docking …. . Wide planned vehicle roads with high distinctive buildings of prominent financial level on the sides.
8. Esteemed cultured historic areas that reflect Egypt's personality and Cairo's profound history.
9. Industrial, Governmental and Administrative clusters appear on the city edges in addition to collective markets (hypermarkets) and specialized universities.
10. Sports parks and clubs facilities spread in an equitable manner.

3.2 The Three Parallel Levels of the Proposed Strategic MasterPlan

The authors argue that developing a strategic MasterPlan within the suggested Greater Cairo region should include: land use plan, main roads and transportation network, controlling all pollution sources, with distinctive Design Guidelines on the regional and districts levels.

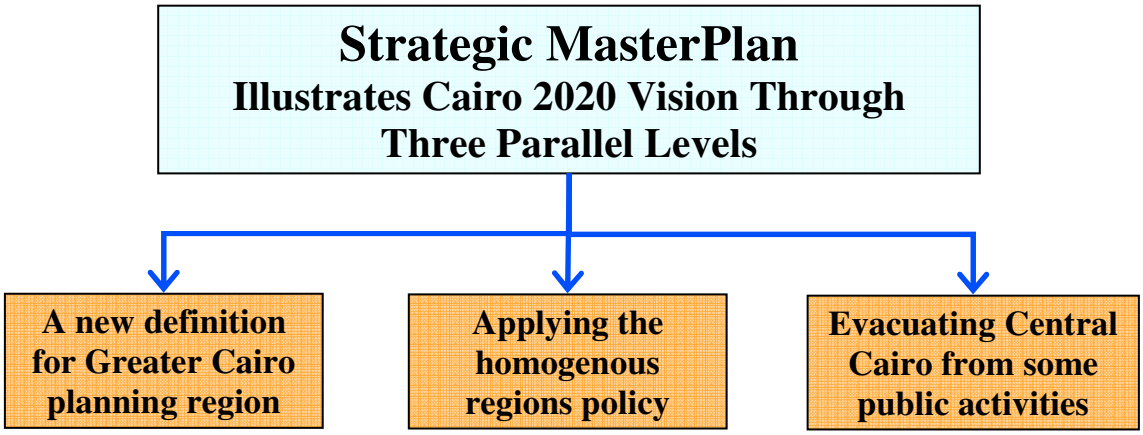

Fig 8: the three Parallel Levels from which arises the proposed Strategic MasterPlan

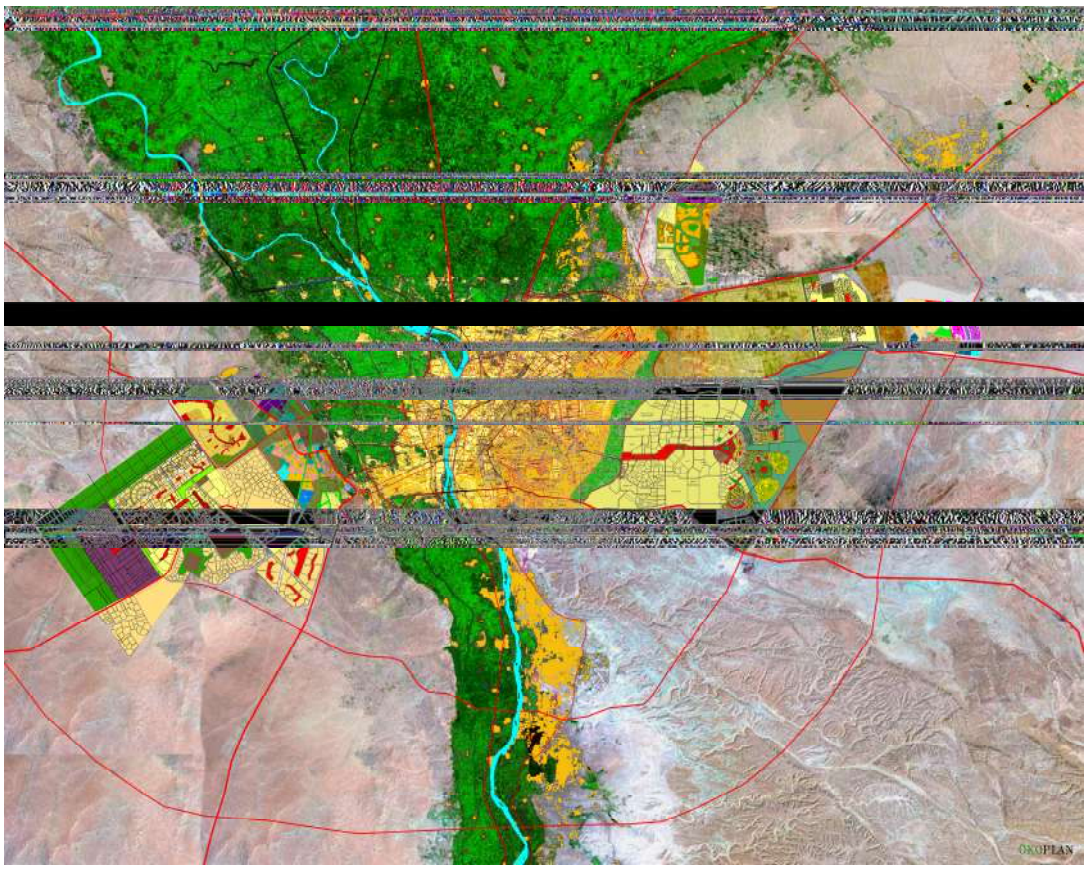

Fig 8: The Current Status of Greater Cairo Region

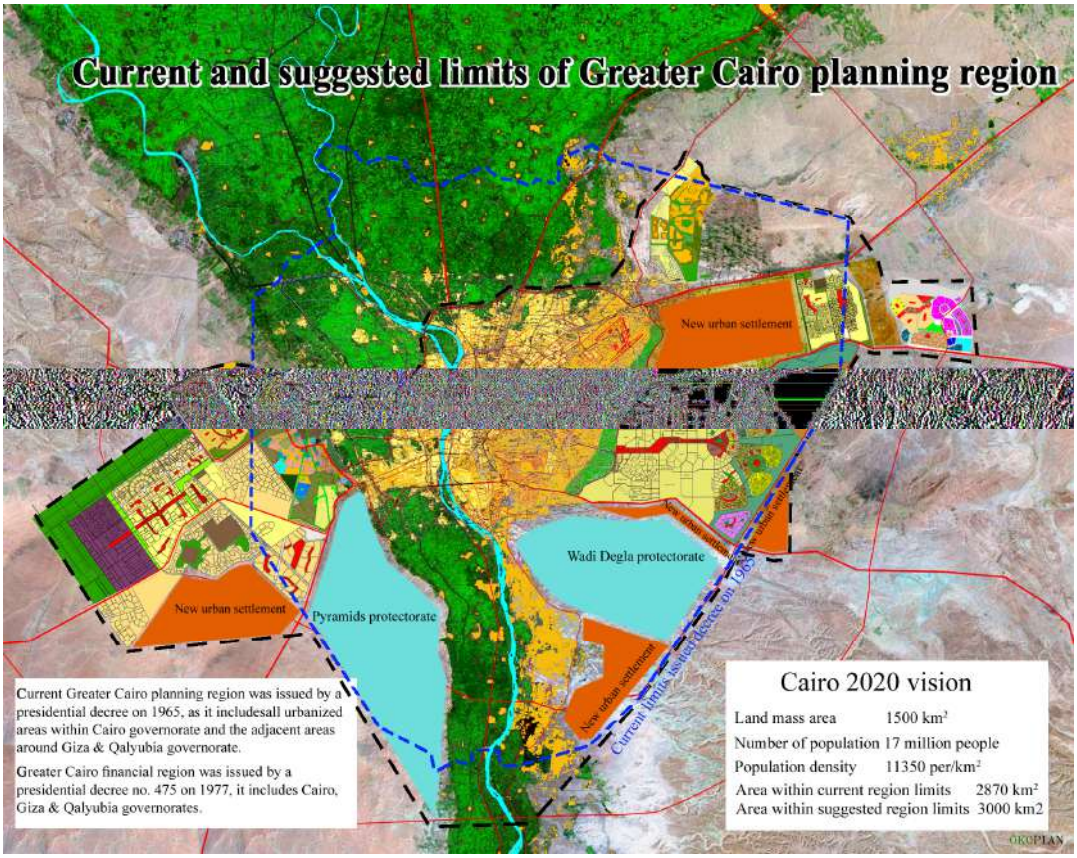

Fig 9: Current & Proposed limits of Greater Cairo Planning Region

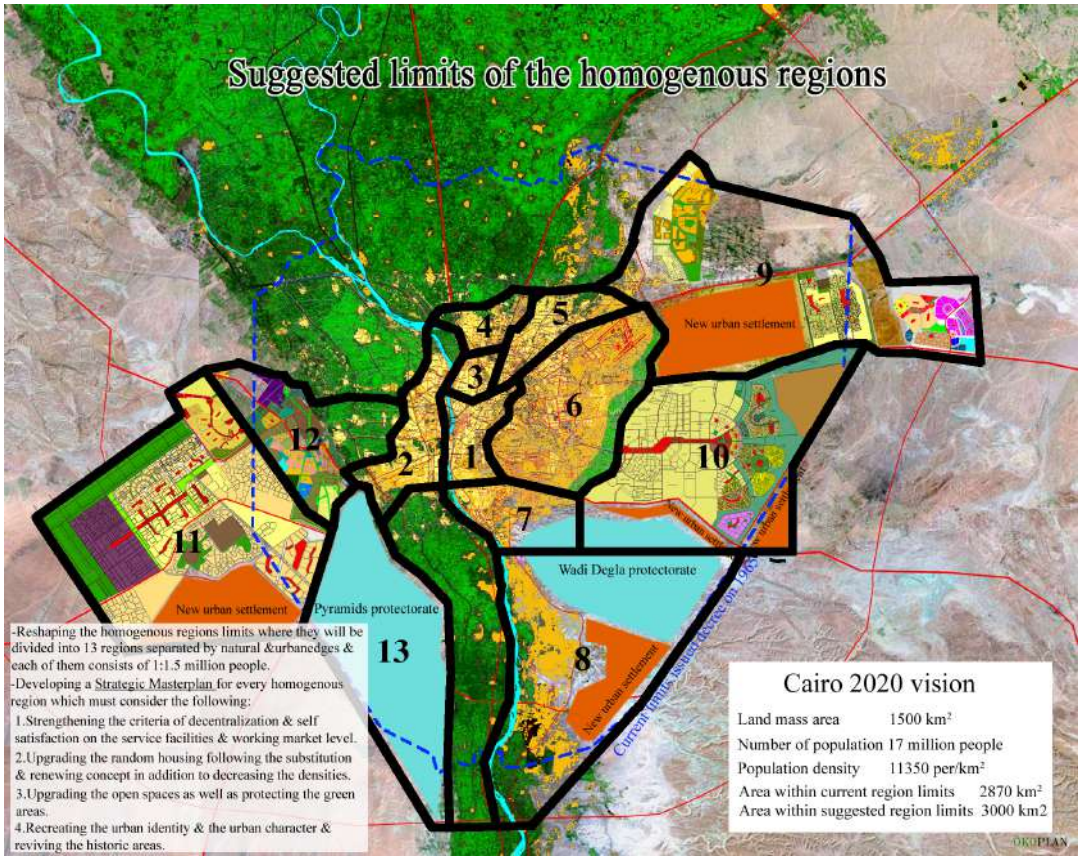

Fig 10: Suggested limits of the Homogenous Regions

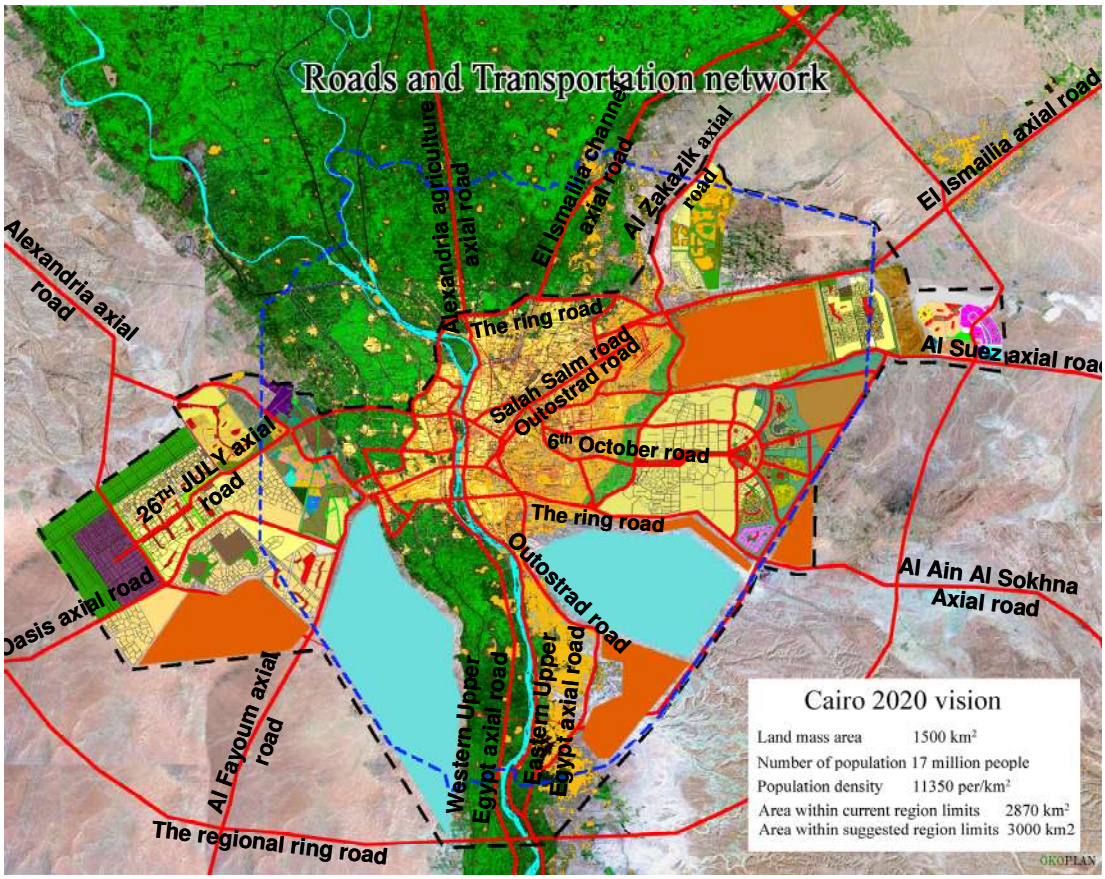

Fig 11: Roads & Transportation Networks

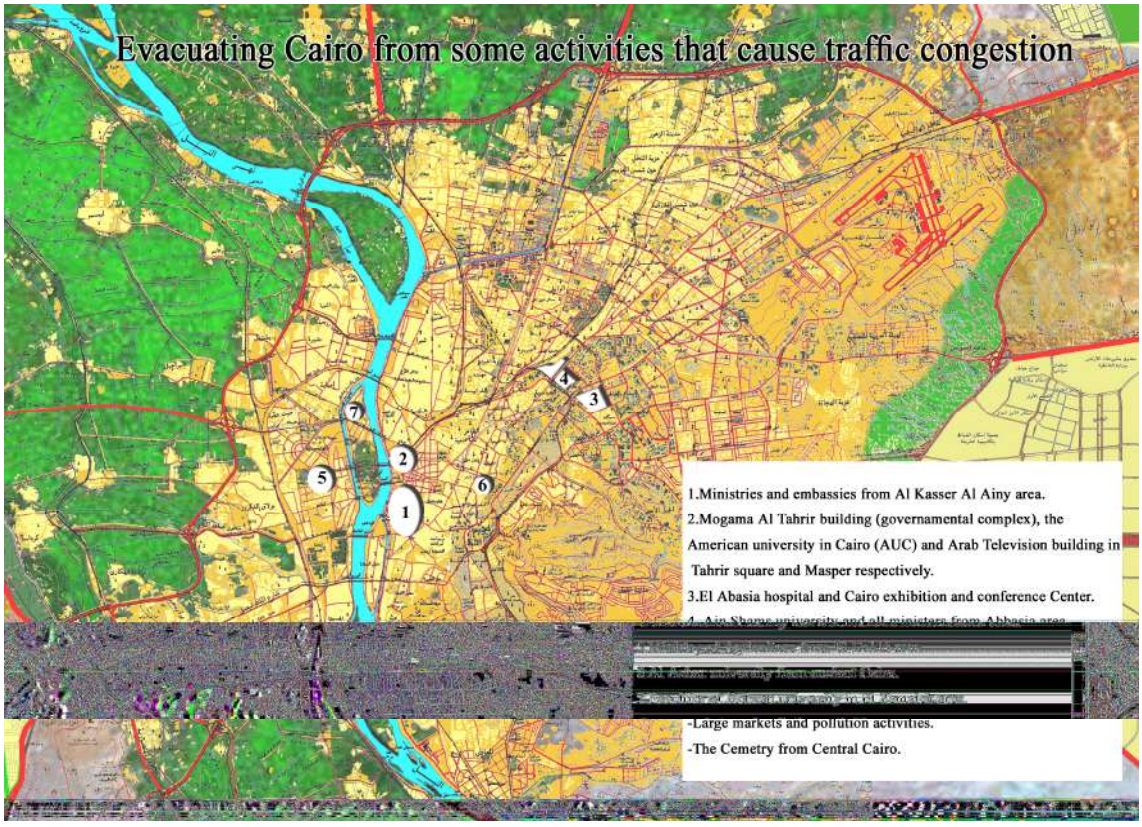

Fig 12: Activities which cause Traffic Congestion in Down Town Cairo

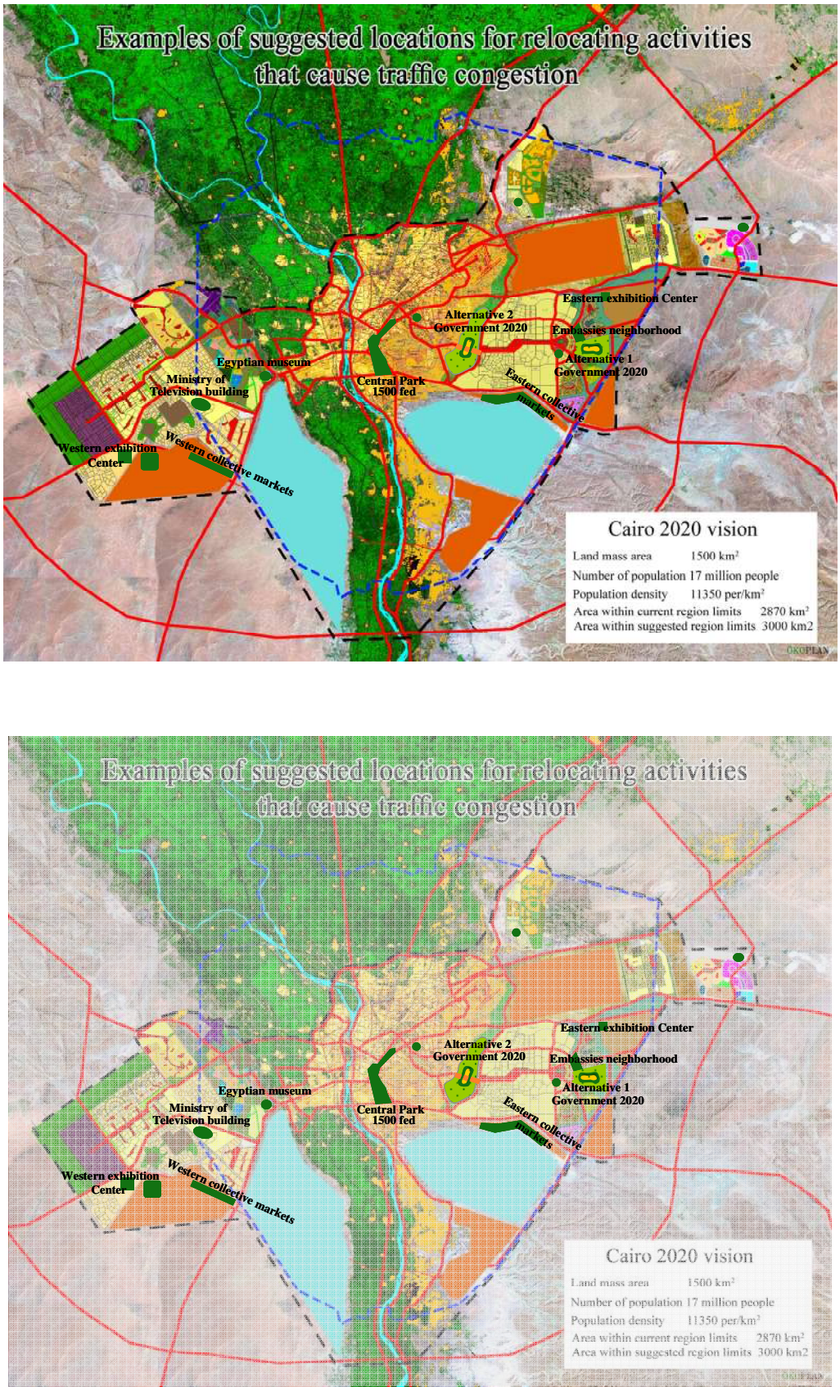

Fig 13: Examples of suggested location for the relocation of activities which cause traffic congestion

4. CONCLUSION

Cairo with its long history, has always offered to its habitants a distinctive variety of lifestyles, a rich cultured urban environment and a quality of life that characterises its heritage and identity. This long history was also combined with a significant lack of long term planning visions of the capital which would serve an over populated society. Currently, and because of the accumulation of not so successful planning decisions along the years, Cairo is no longer the hospitable capital capable of embracing the human development activities of its habitants, no longer able to provide the resources need for such development activities and most importantly, Cairo is has no longer the competency of absorbing the wastes produced by such activities.

Egypt's capital can no more offer the quality of life that would satisfy the different sects of society. The ecological footprint of Cairo has gone times and times beyond the limits of an acceptable living standard and most importantly, it can no longer sustain the current status for the long term vision of a brighter future. The authors presented in this paper, a proposed vision for the future of Cairo the capital in the year 2020.

The ecological footprint is portrayed in this paper as a benchmarking tool for comparing the standard of living and the factors that affect it within the urban agglomeration of Cairo and its peripherals. The authors have displayed an extensive visual analysis of where this standard of living currently stands. From visual pollution to health problems, from an old inefficient road networks to an inadequate distribution of facilities and services, from illegal housing to informal urbanization over agriculture land, the bigger picture of living standards in Cairo and Greater Cairo Region has darken and hold no potential for improvement as long as we do not deal with the real problems.

The authors put forward a proposal for a strategic MasterPlan which is based on three pillars marketing a new definition of Greater Cairo Region as the peripherals of the new capital, applying a new policy for homogenous regions within the new boundaries with an equitable distribution of services and finally evacuating central Cairo from some public activities which cause congestions and disrupt the flow of our daily lives.

This paper argued that if planners and decision makers do not act now on changing the current urban status, the capital will not be able to sustain the ongoing rapid growth rate of its urban agglomeration accompanied by the even faster increase rate of population.

5. BIBLIOGRAPHY

Asian Development Bank (1997), Emerging Asia: Challenges and Changes. Asia Development Bank and Oxford University Press, Hong Kong.

Bartone, C, Bernstein, J, Leitmann, J, and Eigen, J (1994). Toward Environmental Strategies for Cities: Policy consideration for Urban Environmental Management in Developing Countries. World Bank, Washington DC.

McGranahan, G, Songsore, J, and Kjellen, M (1996) "Sustainability, Poverty, and Urban Environmental Transitions". In C Pugh (Ed.), Sustainability, the Environment and Urbanization, Earthscan, London.

Molly O'Meara, Reinventing Cities for People and the Planet, Worldwatch Paper 147, Washington DC: Worldwatch Institute, 1999 (www.worldwacth.org)

Rees. W.E. (2002), Globalization and Sustainability: Conflict or Convergence? Bulletin of Science, Technology and Society, EarthScan, London.

UNCHS United Nations Centre for Human Settlements – UN-Habitat
"Global Trends" from the Global Urban Observatory

United Nations University, Institute of Advanced Studies UNU/IAS, 2003, Defining an Ecosystem Approach to Urban Management and Policy Development, UNU/IAS Report, Tokyo, Japan

Wackernagel, Mathis, and William Rees (1996), Our Ecological Footprint: Reducing Human Impact on the Earth, Philadelphia: New Society.

6. ELECTRONIC BIBLIOGRAPHY

The Global Urban Observatory at http://www.unchs.org/habrdd/global.html

The Ecological Footprint online http://www.myecofootprint.net/ecofoot_en.htm

The Ecological Footprint Quiz http://www.myfootprint.org/