

Principles of Green Urbanism: the Absent Value in Cairo, Egypt

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Abstract—Cairo is considered one of the main growing cities in the Arab world today. Conventional planning has failed to direct this growth towards creating sustainable urban environments for all, and has instead encouraged lopsided development that caters only to the affluent sections. This trend has affected public urban spaces as well, which are now centered on consumption and dependant on heavy investment in real estate and technology. This has a considerable impact on the spectrum of socio-economic groups that are able to access and use them. Taking as a starting point the principles and concept of Green Urbanism, the paper questions the prevalent situation, and focuses on three aspects that have been ignored in recent approaches in recent development plans. The first (Green Urbanism) is explored as a main principles to revitalize the second (Public Spaces), in order to achieve the third (Sustainable Model) as a long term goal. This is done using analysis and design in parallel, and results in a proposal for a new design process and through it, scale specific design solutions for Cairo public spaces that will create a high quality of life for the people of the heavily populated, demographically diverse and socio-economically fragmented city.

Index Terms—Green Cairo, GCR vision, green urbanism, urban spaces, smart green city.

I. INTRODUCTION

Over the last fifty years, cities and towns have been under great transformation, from compact forms with an identifiable centre and bearers of history and culture, into amorphous urban areas, sprawled, without borders and losing their cultural identity and functions. The city became less defined by its physically borders with the development of suburbia and huge areas with detached buildings. Moreover, the biggest challenge for cities and towns nowadays is integrating the requirements of sustainability. Thus, the development of comprehensive and sustainable green city approach, or eco-cities, will be vital for the urban future of the middle-east, especially a city like Cairo with all what is happening in it now in the major political and urban changes. The research plan for this paper was to cover these points:

- The general overview of green Urbanism and its main principles.
- The current urban spaces network situation in Cairo, and its future vision.
- Proposing sustainable design and evaluation process.

II. GREEN URBANISM REVIEW AND PRINCIPLES

A. Theory Review

Green Urbanism is a conceptual model for zero-emission and zero-waste urban design, which arose in the 1990s, promoting compact energy-efficient urban development, seeking to transform and re-engineer existing city districts and regenerate the post-industrial city centre [1]. It promotes the development of socially and environmentally sustainable city districts. According to Beatley [2], green urbanism is the term that captures both urban and environmental sustainability. The need for a revised approach has been an ongoing concern with the so called new urbanism, so enthusiastically endorsed by many American architects and planners [3]. Beatley, in his revolutionary book (Green Urbanism: learning from European cities) has mentioned that the vision of green urbanism includes the programs, policies and creative design ideas for urban renewal and environment sustainability.

Steffen Lehmann [4] added the phrase also provides a proactive vision of what might be our zero-carbon, fossil fuel free future: overlapping mixed-use activities, living and working building typologies explored on the urban scale, infrastructures systems for renewable energies, public transport and individual energy-efficient building designs.

According to Beatley [5], cities that exemplify green urbanism are which have the special and important design qualities and characteristics as shown in Fig. 1.

Green Urbanism in the city	<i>Strive to live within their ecological limits, reduce their ecological footprints, and acknowledge their connections with and impacts on other cities.</i>
	<i>Green and that are designed for and function in ways analogous to nature.</i>
	<i>Achieve a circular rather than a linear metabolism, which nurtures and develops positive symbiotic relationships with and between its hinterland.</i>
	<i>Strive toward local and regional self-sufficiency and take full advantage of and nurture local/regional food production, economy, power production.</i>
	<i>Facilitate and encourage more sustainable, healthful lifestyles.</i>
	<i>Emphasize a high quality of life and the creation of highly livable neighborhoods and communities.</i>

Fig. 1. Design characteristics of green urbanism in cities (Beatley, 2000)

B. Green City, and Principles of Green Urbanism

An increasing proportion of research in climate change mitigation and adaptation in certain disciplines focuses on the future of our cities and how we will design, build, operate,

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maintain, and recycle products, as well as on buildings and city districts in a low-carbon urban future [6].

According to Lindfield [7], the urban dimensions shown in Fig. 2 represent different overlapping layers that are needed for creating a smart urban structure. Such a model for smart cities needs a systemic approach, encompassing different dimensions of “smartness” and stressing the importance of integration and interaction across many areas.

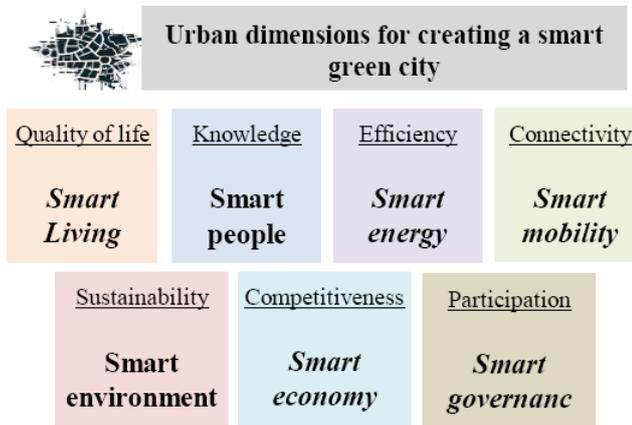


Fig. 2. Main urban dimensions for creating a smart green city (Beatley, 2000)

Steffen Lehmann [8] defined Green Urbanism as an interdisciplinary process; it requires the collaboration of landscape architects, engineers, urban planners, ecologists, transport planners, physicists, psychologists, sociologists, economists and other specialists, in addition to architects and urban designers. He reached in his book (The Principles of Green Urbanism. Transforming the City for Sustainability, 2010) a short list of 15 principles for local action and a more integrated approach to urban development, which are:

- *Climate and Context*: Based on climatic condition prior to selected city, every sustainable design project needs to maintain a complexity within biodiversity, eco-system or neighborhood layout.
- *Renewable Energy for Zero CO2 Emissions*: Transform city districts into local power stations of renewable energy sources including solar PV, solar thermal, and other new technologies.
- *Zero Waste City*: Cities should adopt zero-waste urban planning in line with the manufacturing of metals, glass, plastics, paper into new products.
- *Water*: Cities can be used as a water catchment area by educating the inhabitants in water efficiency, promoting rainwater collection.
- *Landscape, Gardens and Biodiversity*: Introduce inner-city gardens, urban agriculture and green roofs to maximize the resilience of the eco-system through urban landscape.
- *Sustainable Transport and Good Public Space*: Compact and Poly-Centric Cities: An integration of non-motorized transport, such as, cycling or walking and bi-cycle or pedestrian-friendly environment with safe bicycle ways, eco-mobility concepts & smart infrastructure.
- *Local and Sustainable Materials with Less Embodied*

Energy: City construction by using regional, local materials with less embodied energy and applying pre-fabricated modular systems.

- *Density and Retrofitting of Existing Districts*: The city is with retrofitted districts, urban infill, and densification/intensification strategies for existing neighborhoods.
- *Green Buildings and Districts, Using Passive Design Principles*: The city, here, applies deep green building design strategies and offers solar access for all new buildings.
- *Livability, Healthy Communities and Mixed-Use Programmes*: The prime concern of the city is for affordable housing, mixed-use programmes and a healthy community.
- *Local Food and Short Supply Chains*: High food security and urban agriculture by introducing ‘eat local’ and ‘slow food’ initiatives.
- *Cultural Heritage, Identity and Sense of Place*: A sustainable city with high air quality, no pollution for good health, fosters resilient communities having public space networks and modern community facilities.
- *Urban Governance, Leadership and Best Practices*: The city applies best practice for good urban governance through combined management and governance approaches and sustainable procurement methods.
- *Education, Research and Knowledge*: The city includes technical training and up-skilling, research, exchange of experiences and knowledge dissemination for all in sustainable urban development.
- *Strategies for cities in developing countries*: Particular sustainability strategies are needed for cities in developing countries, such as train local people to empower communities, creating new jobs and diversifying new job structures to harmonize the impacts of rapid urbanization and globalization.

III. CAIRO CITY SCALE ANALYSIS

A. Background and Current Situation

When the city of Cairo was rebuilt and laid out by the Fatimid's in 969–974, and named al-Qahira (the victorious), 20 percent of it – roughly 30 hectares – was devoted to open space. East of the al-Mu'izz palace, horse-riding grounds were turned into a royal park and garden and a large central space to the west was dedicated to military parades and religious gatherings. During the Fatimid, Ayyubid and Mamluk periods, Cairo was one of the most advanced cities of learning in the Islamic world [9].

The growth was compounded by an urban dynamic characterized by disinvestment in the city centre areas. The combination of less investment – particularly in the maintenance and development of housing – and an influx of people, created stresses in the urban fabric that condemned many people to lower standards of living [10]. These days,

Greater Cairo Region¹ consistently scores low on quality of life indexes, brought down by air pollution, congestion and education. It ranks better when economic and political weight is taking into account (Fig. 3).



Fig. 3. The ranking of Cairo city in 2010

It is worth mentioning that the revolutions and unrest of the Arab springs of 2011, have affected North African and the Middle Eastern countries in varying ways. And till now it is still affecting the development plans in Cairo.

According to Elzamly [11], most of green urban spaces located around the central Cairo and Giza area, except for the two parks in Helwan (Tokyo gardens – Japanese garden). Also the biggest two parks (El-Fostat park – Al-Azhar park) located in historical context in old Cairo.

Recently, there is a lot of new private housing compounds built around the ring road, and it has large spaces of green areas to be used privately by its inhabitants.



Fig. 4. Existing green spaces network of Cairo city in 2011 (Google earth image adapted by the researcher)

B. Greater Cairo Region Vision

According to Ibn Khaldun, Cairo was once "a city beyond

imagination", rapid growth over recent decades have brought great challenges. Toward regaining that, in greater Cairo region urban development strategy report which were established in 2011 by General Organization for Physical Planning in Cairo (GOPP), and after two years or experts studies covering a wide spectrum of topics to bring together the vision and development ideas for the future of GCR, they defined a clear vision for the future of GCR. The vision of Cairo 2050 consist of three pillars to summarize it, which internally divided into eight moves to turn this vision into reality, and to guide the decision making into the implementation period. Fig. 5 [12]



Fig. 5. GCR Vision: three pillars and eight moves

C. Proposed Sustainable Design and Evaluation Process towards Green Urbanism

Based on Green Urbanism theory review, as well as preliminary study of Cairo city scale and its governmental vision for future development, this paper form the basis for a proposed sustainable design and evaluation process of the project to achieve green urbanism principles, and proposal of solutions at different scales and break points in the process. Fig. 6

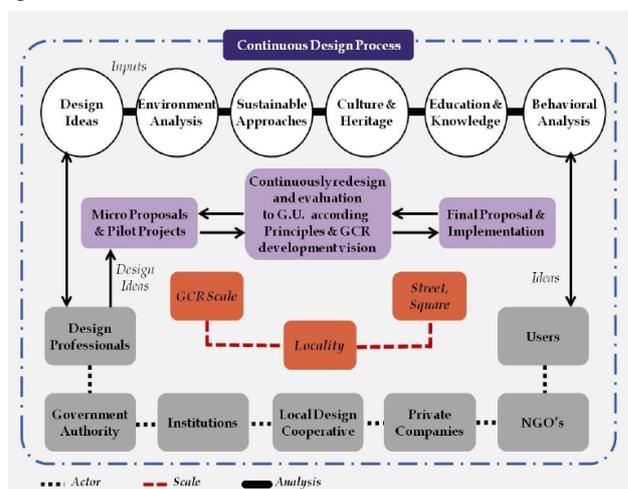


Fig. 6. Proposed Sustainable Green Urbanism design model for GCR

¹ Greater Cairo Region is the integrated urban area around Cairo, spanning across part of three governorates, Cairo, Giza and Qaliobyia.

The proposed design and evaluation process covered green urbanism principles, and achieve a middle ground between the theory and the current situation of GCR. Graphic representation of the model shows actors, scales and analysis fields, it also map the hierarchy from users to government

through the process. To show the connection intensity, and influence at different design scales, this model needs to be tailed according to the specialty of each location. Each one of the actors has a special role as in Fig. 7 [13].

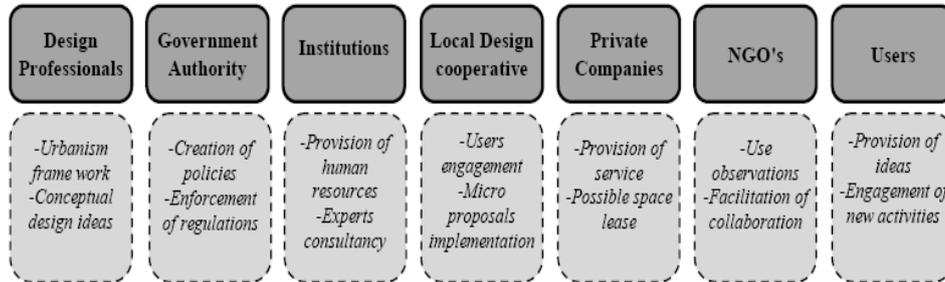


Fig. 7. Tasks of each actor in the design proposal (Adapted by the researcher)

IV. CONCLUSION

The proposed design process will empower the urban designer – to borrow Richard Buckminster Fuller’s [14] words – to find ways of ‘doing more with less.’, it has touched on some of the urgent topics around sustainable Green Urbanism and Cairo city development vision. It will be essential to continue to develop the proposed design process taking into considerations some of the important points which were derived from the study such as:

- Green Urbanism is a holistic approach that requires a combination of intelligent planning, efficient design and the cooperation of both the urban population and government. Without collaboration of all actors, the best plans to build a regenerative city will fail.
- The proposed design proposal is a continuous process and should have no end.
- Understanding the nature of each place leads to more informed policy development and service delivery at all levels.
- A baseline of data will enable change to be tracked over time and enable planning for a changing climate.
- Each one of the actors has its impact and influence on the design process scale, and some of it is an essential part of the implementation of micro projects as well. For that it is one of the most important next steps to study in focus to magnify the complicated network.
- Cairo city needs to maintain its unique identity, cultural value, memory, diversity and authentic character. The most sustainable building is the one that already exists.

sustainable region. This proposed vision translates into a clearly define set of priorities that will guide the policies and decisions during the implementation period. Ten key targets summarize the priorities for Greater Cairo in the future:

- There will be at least 15 million inhabitants living in new urban communities with an increased diversity of house hold types.
- The use of public transportation for a professional commutes will dramatically increase with a maximum time of 45 min. between down town and all new urban communities.
- There will be 0 (Zero) inhabitants living in unsafe areas.
- There will be at least 4.8 million additional affordable housing units in the region.
- The region will have created at least 8 million jobs with an increase share of business services and high tech industries.
- The region will be ranked within top 3 of the best locations in the Middle East and Africa for doing business.
- There will be more than 100 million nights spent by tourists in the region annually.
- The region will be systematically ranked better than 25 in Global City Ranking.
- The region will reduce its green house gas emissions by 30 % from 2010 levels.
- The part of renewable energy in GCR will rise and reach 20% of total electricity usage in the region.

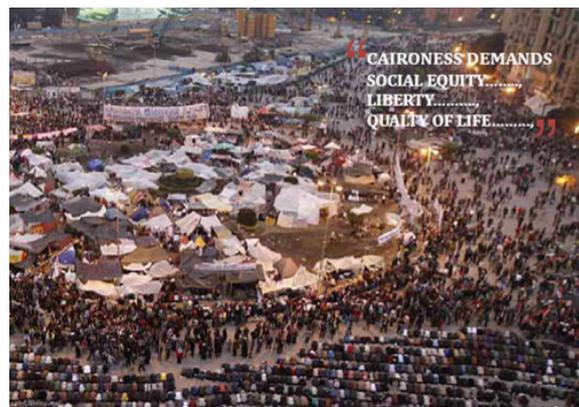
APPENDIX

A. GOPP

GOPP, General Organization for Physical Planning, is the governmental organization responsible for planning public policy and sustainable urban development, and preparation of plans and programs of this development at the national, regional level. (<http://www.gopp.gov.eg>).

B. GCR Vision: [12]

GCR's future vision is one of a global, inclusive and





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