



Riverfront regeneration towards Sustainability of Nile in Cairo

Ass. Prof. Zeinab Feisal,

Benha Faculty of Engineering, Benha University, Egypt

ABSTRACT

The riverfront regeneration has brought a new spirit to numerous cities in recent decades. Cities use this development approach to create public spaces, upgrade slow systems, increase green areas, and re-attract inhabitants and tourists to the waterfront. Such integrated landscape practices have improved the local environment efficiently, provided residents with recreational opportunities, alternative commuting routes, and raised the urban economic and social development. The Nile is the cradle of Egyptian civilization and the main source of water. It has a significant ecological, economic, cultural and touristic value. Cairo is a promising city when it comes to the regeneration of the Nile riverfront, where potentials are unlimited. Cairo Nile riverfront areas suffer from several problems such as water pollution, unplanned development, shortage of public green spaces and lack of visual and physical accessibility. So, there is a need for comprehensive planning and strategy to improve the ecology and environment of these regions. That leads to a positive impact on the lives and health of inhabitants in the world's most populated city. The research aims to achieve a clearer understanding of the potential of the riverfront regeneration in South Cairo in order to bring the river back to the city. Accordingly, the first part of the research presented an overview of waterfront regeneration as a global trend. Then, the influence of Waterfront regeneration in sustainable development. The research study area was selected along the Nilefront in Cairo south to the ring road. This study enabled to define the core problems of the selected area. Finally, the research suggests a number of proposed solutions referring to some international successful experiences and a set of recommendations for further development were displayed in the research.

Keywords : Riverfront, Regeneration, Nile, Ecology, Cairo

INTRODUCTION

The vital role that rivers play in the history of cities is well illustrated in many studies either if it was hydrologic, biological or cultural role (Kondolf & Pinto, 2016). Aside from being a main source of water and food (Findlay and Taylor, 2006). Urban Rivers have a significant role in connecting communities to nature and that's why most urban centers were located around rivers (Everard & Moggride ,2012). Urban waterfront regeneration is a new face of urban development that is more fixable and promising for decision makers (Marshall,2001). Much of the existing literature reviews on waterfront regeneration matter emphasize its importance as a tool to increase the local economic, create more public places and increase access to city cultural and natural

amenities promoting its image. Also on international level it is a magnet for investments in competitive global market (Malone, 1996: 2; Sneha, 2012). So, the waterfront regeneration could be a tool for sustainable development. Many previous studies have proved that most of waterfront regeneration plans benefit the cities and inhabitants on many levels, otherwise it couldn't have become a core strategy for urban renewal used and developed every day in different corners of the globe, and various aspects are strongly considered in this process; Culture aspect, Social aspect, Economic aspect, Environmental aspect.

Waterfront Regeneration as a Global Trend:

An over view of the triggering reasons that led to the up rise of waterfront regeneration phenomena shows that the industrial revolution was a great factor in deteriorating waterfronts in the first place , since that in the mid-20th century rising technologies especially in transportation field made people more dependent on rail roads and aircrafts for cargo and shipping (Mouad, 2013; Malone, 1996: 263) ,abandoning costal and river ports leaving behind empty areas and structures in addition to the pollution effect of the factories that led to contaminated water courses and degradation in environment (Dong 2004). So, waterfronts became separated from the rest of the city, unflavored and inaccessible by inhabitants. That was the beginning of a new vision adopted by city local authorities realizing that the redevelopment of waterfronts could be the answer to socio economic and environmental issues that took place (Ansari, 2009), especially that the new lands of waterfronts had low value encouraging investors and developers to consider them for urban development investment (Martires, 2007)

The Up rise:

Waterfront regeneration projects invaded the world in the second half of the 20th century, originally bursting from the United States of America between the 60s and the 70s. Basically to rejoin city and people again with waterfront area replacing industrial abounded buildings and harbors with open spaces and generating more recreation functions. Pioneering projects that were carried out in this phase like Boston, san Francisco and Baltimore inner harbor project (Smith & Ferrari, 2012). Many factors led to this shift in urban context, one of them was the decline of ports and industrial areas and the transition in economy from industrial to postindustrial and that was the first phase of phases of development (Marshall, 2001).

The spread:

The second one was in the 80s aimed at adapting Baltimore measures and extending them (Galland & Hansen, 2012). With examples from Cape Town and Sydney, in Europe the developing of public-private organizational structure made waterfront schemes more up scaled and managed than the first phase like the London dockyards development project that introduced the private sector to the development process which gave the idea more economic dimension (Smith & Ferrari, 2012). At that point the waterfront regeneration projects became an effective tool in urban planning and politics an internationally (Sairinen & Kumpulainen,2006).

Evolving:

The third phase of regeneration characterized as was well received in wider range of cities starting with the continuous spread of the phenomena across Europe port cities like Barcelona and Rotterdam and Hamburg to smaller cities like Berlin's Wasserstadt and Liverpool. The more diverse approaches and regionally based practices led to other worldwide examples like shanghai in Asia and Vancouver in Canada (Marshall, 2001).

New vision and developed approaches:

The fourth phase started in the first decade of the 21st century when the concept of waterfront regeneration developed beyond the post-industrial city reclamation and was evaluated based on past experiences to come out with new notion (the city image) and how to establish its place in the modern economic world, the idea was viral examining a border types of development seen vividly in global examples like Dubai, Hong Kong and Rio de Janeiro (Marshall, 2001). Even more in early 90s waterfront development field was acknowledged on academic level after the founding of the American planning association that was followed by many institutions to evaluate and hold studies of waterfront development practices, in Europe “Citta d'Acqua” center found in 1989 in Venice representing a waterfront city, its mission was to study city-port relationships and the waterfront development approaches from global experiences in addition to cultural and knowledge exchange (El-sherbeny, 2009).

Contemporary Approaches in Waterfronts Regeneration:

Previously mentioned phases of waterfront regeneration included a number of factors that affected the current trend. As inner-city core redevelopment demands, innovation in technologies after the second World War that led to shifting the activities from waterfronts leaving behind vacant waterfront spaces, growing movements to conserve historic and heritage sites, also rising civic awareness of environmental threats and water quality concerns, the urban renewal for Public by different bodies (state, federal and municipal) (Sairinen & Kumpulainen, 2006).

So, the current waterfront regeneration scheme became different and unique from a city to another, depending on many conditions. The parameters of success or failure differentiate, But the most sought after benefits remain common (Smith & Ferrari, 2012). Despite that Breen and Rigby divided regeneration patterns of the waterfront into six distinct categories based on development modes: recreational, cultural educational, commercial, historic, residential, working and environmental, but Contemporary waterfronts projects seen around the world today have one common element which is (multi-functionality) that interpreted as the co-existence of various themes concerning economy, recreation, ecology, atheistic, history and culture (Mouad, 2013). It also includes multi-uses of waterfront joining between water related activities and land use activities (Abdul Latip & et. al, 2009) in terms of urban regeneration. A Waterfront could be a vital tool to upgrade the quality of urban fabric weather it was city center, residential district, Brownfield or environmentally degraded part of the city (Malone,1996: 2).

The Nile in Cairo:

As history shows, the river Nile with its rich culture makes a unique and vibrant urban life in Cairo and still has huge untapped potentials (Kondolf, 2011). Cairo Has been a political, Cultural, Religious and Commercial Capital through Egyptian history (Abbas M. El Zafarany, 2011). its location upstream on the Nile just at the bifurcations of the delta reflects the strategic importance and as one of the top dense cities on the globe with over than 9 million inhabitants in the city and over than 19 million in the metropolitan area, situated on the east bank of the Nile and part of the greater Cairo region which consist of other three governorates. (UN-HABITAT, 2011).

Cairo governorate consists of 38 districts, 11 that directly overlook the Nile banks from south to north; Tebin, Helwan, Maasara, Maadi, Dar El Salam, Old Cairo, West of Cairo, Bulaq, Rod El Farag and El Sahel (CG, 2017). Each district has its special urban pattern and demography.

MATERIAL AND METHODS

Research study area:

Criteria for the selection of the studied area: The study area was chosen along the Nilefront in Cairo south to the ring road. It consists of districts; Tora, Al Ma'asara, and Helwan. The study area was chosen based on a group of reasons which are:

- The scarcity of previous studies of this region. Most of the previous studies related to the Nile were centered around the city center and Zamalek.
- The diversity of urban areas overlooking the Nile River in this part in terms of (Urban pattern theme, Land use and Social Character - economic situation) and other urban considerations.
- The multitude of untapped possibilities along this river strip.
- Increasing problems and exacerbating them without looking for mechanisms to solve these problems
- **Location:** The presence of the study area south of Cairo, where the Nile passes from the south to the north.
- The existence of land areas, the river sides and the width of the waterway, which represents the possibility of future development.
- **Land uses** in the study area varies between residential, administrative and industrial.
- **Environmental factors:** The study area, according to the studies of the Ministry of Environment and international bodies, represents the most polluted areas in Cairo, affecting the environment of Cairo.
- **Socioeconomic factors:** The economic situation of the region and the population is one of the most important factors that can be developed, restructured and fully needed for an integrated strategy for achieving sustainable development.
- **Real estate** value can be developed, thus achieving an economic return to the development process, which represents one of the most important methods of development in partnership between the people and the public sector (ppp).

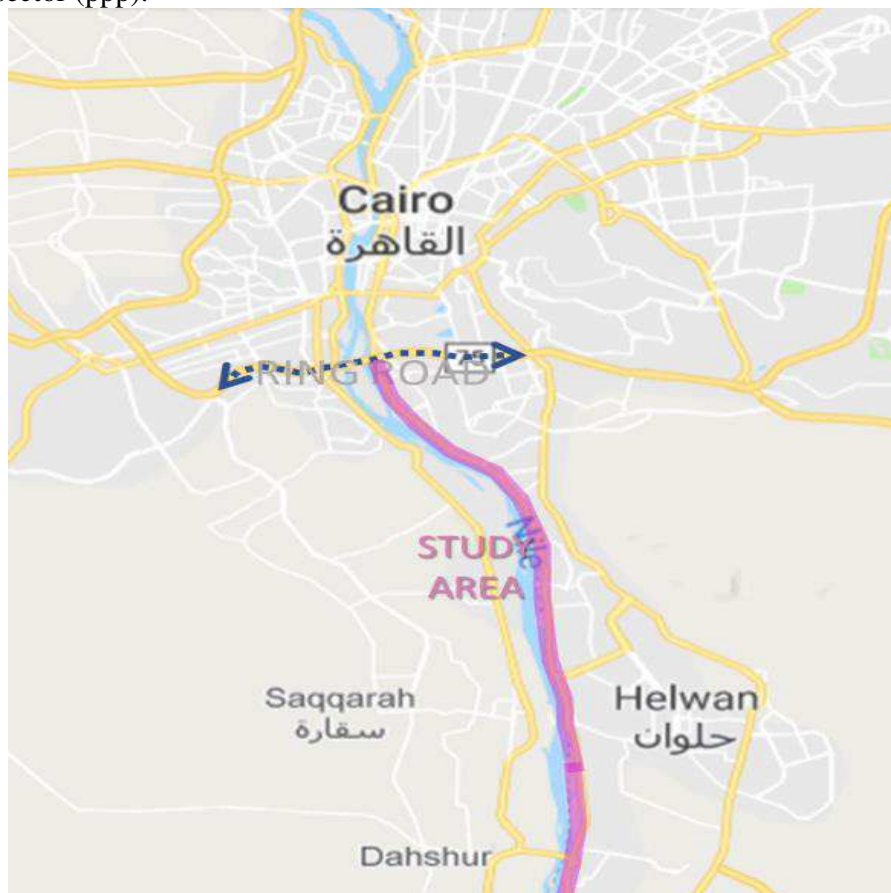


Fig .1 Research study area : Nilefront in south Cairo and Helwan Source: Author

Urban Context:

The research classifies the Study area to zones according to the following reasons:

- Each zone has a different urban character, Land use and Social Character.
- Corniche El-Nile Street extends in front of some sectors, but extends beyond Al-Ma'asara area
- The social and economic situation is greatly differentiated and varied

Zone1 (Maadi) :

The sector is located in the Corniche of Maadi to the south of the ring road. This sector is characterized by its economically valuable facilities. It includes Al Salam Hospital, Maadi Military hospital and the Supreme Constitutional Court, in addition to high-rise residential Towers and other high value mixed use buildings which benefited from the Nile view.

The uses in this sector vary between residential, administrative, medical and mixed uses, which have affected the urban character. There are many recreational facilities, private clubs, tourist marinas and many agricultural nurseries on the Nile bank in this sector.

The width of the Nile River in this sector is more than 700 meters, while its depth reaches about eight meters.

Building heights: The sector is characterized by its high-rise Buildings, The Othman Towers are considered to be the landmark of Maadi Nilefront with a height of 45 floors; some of the sector's Buildings do not exceed four floors of commercial use.

Zone2 (Tora) :

The second sector is located in between Al Maadi and Helwan. This sector is dominated by industrial use, as it is a model for the destruction of the potentials of the River Nile and the pollution of the environment on the river banks. The passage along the Cornish street can see some agricultural lands on the Nile banks, and on the other side, only the high walls of factories can be seen.

Zone3 (El Maasara)

The area overlooking the Nile of Al-Ma'asara district is the second sector. The sector is an informal residential area. The building heights in this area are not more than six floors. The construction methods in this section varies between the skeleton structure, the bearing walls and still few buildings constructed with mud bricks. The area is characterized by its nearness to the factories and its connection to the other bank through the ferry, in addition to its direct connection with the Nile. Corniche Road passes behind the urban area. The width of the Nile in this sector reaches more than 750 meters, while its depth reaches about eight meters (Abo Elfetoh, 2017).

Zone 4 (Monshaat Gamal Abdel Nasir):

The adjacent residential buildings are the clear characteristic of the urban sector, and this dominant land use has a clear impact on the pattern of urban façades bordering the Nile in this sector. The building heights in this sector is characterized by relatively high residential towers, with most building heights ranging between 10 and 13 floors; very few buildings above this rate.

The Nile bank in this sector also includes some recreational establishments, private clubs, marinas, as well as some agricultural nurseries. The width of the Nile River in this section reached more than

670 meters, while its depth reached eight meters (Abo Elfetoh, 2017).

The width of the corniche road parallel to the river is about thirty meters, in addition to the area overlooking the banks of the river, whose depth varies perpendicular to the Corniche road.

Environmental Context:

This study focuses on monitoring and analysis of a set of environmental indicators which represent the main core of the environmental structure of the study area: Water condition, Air quality, Air ventilation of urban blocks and Biodiversity.



Fig .2 Zones of study area Source: Author

Water condition:

• Water quality:

The Nile was subjected to many causes of pollution; agriculture discharge, untreated sewage, increasing discharge of industrial effluents, wastewater disposal, pesticides and fertilizers, oil spills and waste or animal carcasses disposed from Nile boats (Mohamed & et al.,2013). In a recent study conducted by indicators showed that pollution severely affected the water quality, aquatic life and

the river ability of self-purification, all due to the mentioned causes (Abdel-Satar & et al.2017).

Fig.3 Nile pollution sources

Source: EEAA Report 2016

In Cairo the numbers of industries and agriculture drains contribute significantly to the Nile pollution rate as shown (EEAA, 2017). High rate pollution in water quality above limits, the government is spending more money and efforts to reduce negative impact on the Nile but still remains above limits.

Water quantity:

Many studies dealt with the negative impact of the new dam built on the Blue Nile in Ethiopia up stream (Ahmed and Elsanabary,2015) which is the main fed for the Nile in Egypt. The dam is called Grand Ethiopian Renaissance Dam or in short (GERD) that is set to be finished at the end of 2017, although it sparked many political disagreements and uncertainty on the future water governance between Egypt, Sudan and Ethiopia (Hussein,2017) And studies couldn't predict the precise impact on water share due to many variables (Conway, 2017; Abdelhaleem and Helal, 2015). The only fact that remains in all case scenarios that a drop in Nile water levels will take place. According to recent article published by Yale university, an imminent danger is facing Nile water and threatening of water scarce in the near future. Based on a new study in the Geological Society of America's journal GSA Today, the expected drop in water level could reach 25% and by 2025 there will be serious shortage in freshwater and energy and agriculture lands. These impacts should be reduced by new other interventions in water management policies like drip irrigation and water conservation (Conniff, 2017)

Air quality

the numbers of factories and industrial uses within the study area and close to the Nile is considered as a main cause of air pollution. In addition to Cornish main road which travels parallel to the Nile stream in most zones with heavy traffic has caused high Air and noise pollution levels and that also affect the quality of riverfront and the eco-system of the river Nile.

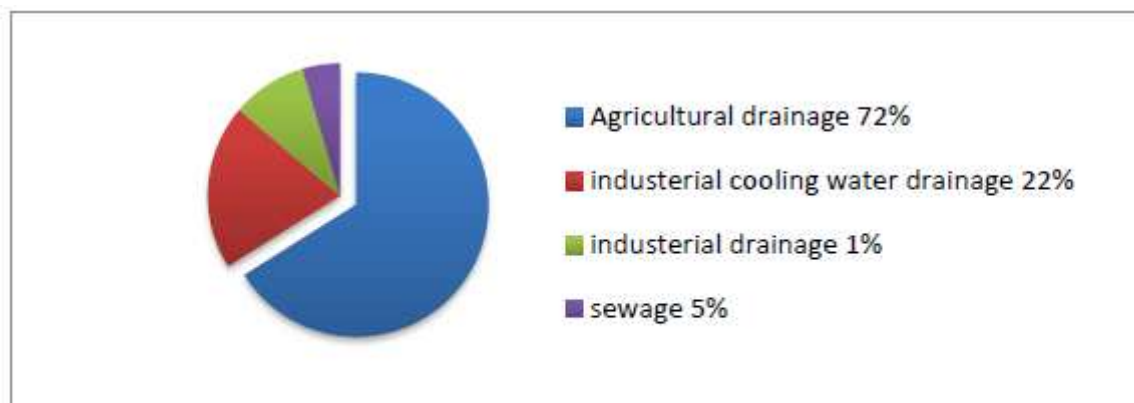


Fig.3 Nile pollution sources

Source: EEAA Report 2016

Year	2010	2011	2012	2013	2014
Smoke	50.00	57.10	96.50	63.54	56.00
T.S.P	476.30	464.00	462.00	485.35	498.00
So2	13.00	12.20	10.20	13.00	11.00

Table .1 Annual averages of air pollutants in Cairo / Unit: Microgram/m³
Source: EEAA Report 2017

Poor Air ventilation of urban blocks

The Nile has a role in ventilating the urban block as one of the ecological services that it offers for the city (Shokry,2010). But the different and sometimes unplanned urban patterns affected the riverfront façade, instead of providing more parks and open spaces that allow air permeability from riverfront realm to inner city lands realm, high dense blocks of concrete buildings, stacked informal settlements and heavy industrial uses act as a barrier that doesn't allow fresh air from the river environment to circulate within the city (Abo-El fotoh, 2017).

Biodiversity:

The water pollution affected the Nile eco-system balance by causing a significant decrease in mammal, bird, fish, and reptile biodiversity. Raptors like lesser kestrel, bird species like white-tailed sea eagles and lesser flamingo, Mammals like snipes and shrew (Abdel-Meguid, 2017), as for fish species, they were dropped to only 13 species in Cairo alone (Said, 2013).

Socio-economic Context:

Cairo Population according to government static reports from 2010 to 2017 shows that 26% of Cairo population lives in districts on the waterfront, with 50% male 50% female, 26.1% under the age of fifteen, 60% ages between15:40, 85% educated, The average income is 2748 \$/Y (UN 2015) unemployment 15 % (CAMPAS 2017)

Al-Maadi zone: The government intervention in the development process of contributed to the increase of the prices of land plots on the banks of the Nile River in Al-Maadi zone, which led to an increase in the number of floors and the rise in unit prices in this area.

Tora zone: The presence of industrial uses greatly reduced the economic value of the Nile façade in this zone.

Al Ma'asara zone: The low socio-economic level of the residents of this sector contributed to the deterioration of the level of façades finishing, where the attention was limited to meet the minimum living, without attention to the aesthetic standards of buildings and facades. The majority of the buildings façades are without finishing.

Monshaat Nasir zone: is a development and expansion of the informal settlements that occupy the back area of the sector. This is also the social development of the residents of the slums. The sector is considered as the link between the middle and lower classes.

Administration context:

The responsibility for managing the riverfront in Cairo is divided between a number of different bodies and ministries. The table shows the scope and the authority responsible for the management of the waterfront and the surrounding area. the table shows the conflict and interrelationship

between them and their roles in achieving development and management of the Nile, which slows down the development process difficult to implement the strategic plans targeted.

Authorities	The scope of responsibility
Cairo Governorate	Roads and land
Ministry of Irrigation	the Nile stream and Nile banks
Ministry Of Agriculture	Nile banks
Ministry of Interior	Nile security
The Ministry of Industry	Factories
Ministry of Military Production	Factories
The Ministry of environment	The environment of the Nile

Table .3 Different Authorities

Zone	Theme	Waterfront uses	Problems
Maadi	residential	residential towers public buildings, commercial and mixed uses	Traffic conjunctions, Lack of public access
Tora	industrial	industrial	Sever pollution, Neglected waterfront
Al Ma`asara	industrial	Informal housing	Sever pollution, Degraded waterfront banks
Monshaat Gamal Abdel Nasir	residential	residential and clubs	pollution, Lack of public access

Table 4 Study area zones and Problems
Source: author

RESULT AND DISCUSSION

On the riverfront the study area urban pattern acts as a mosaic of different contexts and functions varies between the recreation and high rise, industrial zones, and high density informal areas all pressing on the Nile ecosystem, in a city where person share of green space is 1.5m² despite of the existence of Nile fertile corridor (Clark, 2016). Survey study showed that main problems residents are facing are pollution, heavy traffic, lack of accessibility, lack of public recreational and green spaces. Table (5) shows Challenges, locations and proposed solutions with lessons from international experiences.

Reducing pollution could be by planting pollutants absorbent plants (Mohamed & et. al, 2013), restoring flood plains that could increase air quality by 30% than street level (Kondolf & et. al, 2013), implementing floating purifying islands approach (Redeker & et. al, 2013) like Cheonggyecheon stream project that reduced noise, and pollution level and increased water and air quality (Newman & Matan, 2013)

Since Egypt is a developing country, economically it cannot afford regeneration project costs, land value along the riverfront is an important asset could cover project costs, land value reaches average 3000 \$/m² (Ahram 2017), real estate value 500:600 \$/m², making revenues, taxes, job opportunities and environmental improvements.

Developing administrative system includes laws, punishments, monitoring programs and solving conflicts between authorities will be needed to create new vision of sustainable development (Mouad, 2013). Public awareness of environmental culture and history, implementing landscape architecture programs is a key factor of culture change in this issue.

Waterfront recreation strategy must consider various solutions for different zones according theme. The industrial zone was recommended to be removed to the south east (Hashim 2005). Houtan Park project in shanghai using pure landscape approaches to solve water issues on site, basically managed to recreate wet lands, flood control measures and introducing urban agriculture, planting pollutants absorbent species, increased biodiversity with 93 species of plants and over 200 species of animals observed (Saunders, 2013). These results made the Chinese government use same approach in many projects (LPS.2017).

challenges	zone	Proposed solutions	Successful examples
Air pollution	all	Industrial zone filtration or relocation, more planting, decrease traffic flow	Cheonggyecheon stream
Water pollution	all	Monitoring programs, restrict laws and punishments, more awareness through media ,introducing eco-friendly technologies and eco-landscape approaches	Houtan park, Cheonggyecheon stream
Noise pollution	Maadi	Decrease traffic flow, use more landscape approaches	Cheonggyecheon stream , Madrid rio
Fragile Biodiversity	all	restore planting and animal species,	Cheonggyecheon stream, Houtan park
Heavy Traffic	Maadi	reuse and expand ferry stations to Use Nile as alternative traffic hub, increase means of public transport, underground tunnels	Madrid rio, guangzhou pearl river waterfront, Istanbul water tram
Waterfront problems	all	New vision of regeneration plan considering public accessibility, aesthetic values, recreation activities, environmental conservation with public/private/experts involvement	Madri rio, Cheonggyecheon stream, Houtan park
Economic problems	all	High revenue projects to urban regeneration	
Education problems	all	Develop landscape education spreading awareness in the media	

Table .5 Waterfront Challenges, locations and proposed solutions

CONCLUSION

- It’s a fact that The Nile waterfront suffers from the booming population in Cairo, another fact that Cairo itself suffers from lack of green spaces, so the eco-system of the river and the city is highly disturbed.
- Riverfront regeneration scheme could be a very effective economic tool to enhance the river environmental condition as proven to be in many countries.
- must be implemented involving all stakeholders and decision makers through the design phase.
- Developing the complex pattern of Cairo Nile front must consider the socio-economic characteristics, inhabitant’s needs and ecological statues of it.
- Egypt is on the verge of water scarcity crises, there is no way to prevent it so enhancing water resources, uses and quality is a priority and new approaches are needed.
- It could be unrealistic to carry out Mega waterfront projects in a developing country like Egypt however Cairo deserves a chance to achieve economic prosperity by capitalizing forgotten city assets.

REFERENCES

- [1] Abdel-Meguid, A. M. (2017). Ecosystem and Biodiversity in the Nile Basin Case Study: Lake Nasser” in Negm A. M. (Ed), *The Nile River* (pp. 305:353). Switzerland: Springer
- [2] Abdel-Satar , A. M., & Ali, M. H., & Goher M. E. (2017). Indices of water quality and metal pollution of Nile River, Egypt. *Egyptian Journal of Aquatic Research* 43, 21–29
- [3] Abo-Elfotoh, M. A., (2017). *Urban Development on The River Nile From ElMaadi to Helwan, "Elevation and Character Study"*. Master Thesis. Azhar University, Cairo.
- [4] Ahram Economic, 2017, Olx Annual Report for Real Estate Market in Cairo <http://ik.ahram.org.eg/News/42166.aspx>
- [5] Attia, S., & Ibrahim, A.A. (2017). Accessible and Inclusive Public Space: The Regeneration of Waterfront in Informal Areas, *Urban Research & Practice*, and DOI:10.1080/17535069.2017.1340509
- [6] Avendaño, D., & El Gamal, M., (2009). Urban Biodiversity conditions in two distinct ecological contexts A comparative analysis of Cairo-Egypt & San José-Costa Rica.Report. Retrieved from https://www.academia.edu/4805184/Urban_Biodiversity_conditions_in_two_distinct_ecological_contexts_A_comparative_analysis_of_Cairo-Egypt_and_San_Jos%C3%A9-Costa_Rica
- [7] CAPMAS., Central Agency for Public Mobilization and Statistics (2017), *Statistical Yearbook 2017*. http://www.capmas.gov.eg/Pages/ShowPDF.aspx?page_id=/Admin/Pages%20Files/2017104122258.pdf
- [8] Cengiz, B., (2013). Urban River Landscapes. In Özyavuz, M. (Ed) *Advances Landscape Architecture*. Retrieved from <https://www.intechopen.com/books/advances-in-landscape-architecture/urban-river-landscapes>
- [9] CG: Cairo Government, (2017). Population count report. Retrieved from <http://www.cairo.gov.eg/Statistics/2015>.
- [10] Clark, P. (2016) Urban green space in a globalizing world in Clark, P. & Niemi, M. & Nolin, C. (Eds), *Green Landscapes in the European City, 1750–2010*, Volume 39 of *Routledge Studies in Modern European History*.(pp. 191-193).Taylor & Francis.
- [11] EEAA: Egypt Environmental static report 2017. Retrived from http://www.capmas.gov.eg/pdf/new_Pdf/2017917173312_Untitled.pdf
- [12] El Zafarany, A.M.,(2011). Urban Regeneration Project for Historic Cairo Sector Study: Environmental Risks Facing Historical Cairo. Report. Retrieved from http://www.urhcproject.org/Content/studies/2_zafarany_environmental.pdf
- [13] Everard, M., &Moggridge, H.L. (2012). Rediscovering the value of urban rivers. *Urban Ecosystem* 15 (2): 293-314.
- [14] Findlay, S. J., & Taylor, M.P. (2006). Why rehabilitate urban river systems? *Area*, 38(3) 312–325
- [15] Gabr, H. S. (2004). Perception of Urban Waterfront Aesthetics Along the Nile in Cairo, Egypt. *Coastal Management* 32(2):155-171.

- [16] Hashim, H. K. (2005) Environmental characteristics and spatial reorganization strategy in the Helwan region. First Ain Shams University international conference on environmental engineering April 2005
- [17] Hoath, R., (2009). A Field Guide to the Mammals of Egypt. American University In Cairo. Press Series.
- [18] Jauhainen, j. S. (1995) . Waterfront redevelopment and urban policy: The case of Barcelona, Cardiff and Genoa. *European Planning Studies* , 3(1), 3-21,Routledge
- [19] Jones, A. L. (2006). on the water's edge: developing cultural regeneration paradigms for urban waterfronts. In Smith, M. K. (Ed) *Tourism, Culture and Regeneration* (pp. 143-150): CABI.
- [20] Kondolf G.M., et. Al, (2011). Connecting Cairo to the Nile: Renewing Life and Heritage the River. IURD Working Paper No. WP-2011-06. Department of Landscape Architecture and Environmental Planning, University. of California, Berkeley.
- [21] Kondolf, G.M. , Marzion, R., Mozingo, L., Balakrishnan, K. & Goher, A. (2013). connecting cairo to the Nile : opportunities for public access and alternative transportation. SB13-cairo conference proceedings.
- [22] Kondolf, G.M., & Pinto, P.J. (2016).The social connectivity of urban rivers, *Geomorphology*, volume 227:182–196
- [23] Kostopoulou, S., (2013). sustainability ,On the Revitalized Waterfront: Creative Milieu for Creative Tourism, *Sustainability* ,5(11), 4578-4593
- [24] Lei , Z., & Guanghe, W. (2010). Urban River Plays Key Role in City Landscape Planning-Culture Legacy and Ecological Development, *Proceedings of International Conference on Regional Management Science and Engineering*
- [25] Lawton, J.S. (2007).The urban environment: twenty-sixth report,Great Britain: Royal Commission on Environmental Pollution(pp. 56-57). Stationery Office
- [26] LPS: Landscape Performance Series, Shanghai Houtan Park – Shanghai, China Methodology for Landscape Performance Benefits, Retrieved from <https://landscapeperformance.org/sites/default/files/Shanghai>
- [26] May, R., *Technology in Society* 28 (2006) 477–488. Connectivity” in urban rivers: Conflict and convergence between ecology and design
- [27] Moggridge, H.L., Hill M. J., & Wood, P.J. (2014). Urban Aquatic Ecosystems: the good, the bad and the Fundam. *Appl. Limnol.* 185(1):1-6
- [28] Mohamed, A.G., & El Safty, A.M., & 2Siha, M.S. (2013). Current situation of water pollution and it's affect on aquatic life in Egypt. *Egyptian Journal of Occupational Medicine*, 37 (1), 95-119.
- [29] Mouad, A. (2013) Multi-Functional Urban Waterfronts Case study – The Nile River in Central Cairo. Master Thesis, Ain Shams University, Egypt, University of Stuttgart University, Germany.
- [30] Newman, P. & Matan, A. (2013). *Green Urbanism in Asia: The Emerging Green Tigers*(pp.129-135). World Scientific.
- [31] Niemann B. & Weber S. (2013) The particular case of urban waterfronts. In S.S. Zubir, C.A. Brebbia (Eds.), *The Sustainable City VIII*, Vol.1(pp 561-566), WIT Press.

- [32] NRBA: 4th National report on biodiversity, (2009). Retrieved from <http://www.eeaa.gov.eg/portals/0/eeaaReports/protect/flora>
- [33] Otto, B., McCormick K., & Leccese M., (2004) Ecological Riverfront Design: Restoring Rivers, Connecting Communities. American Planning Association, Planning Advisory Service Report (pp 518-519), Chicago, IL
- [34] Redeker, C., Fouad, H. & El Ghayesh, H. (2013) Wasta Beni Suef Nile km 82.5-87.5 km, encroachment mechanisms, consequences and possible solutions. SB13-Cairo conference proceedings.
- [35] Said, R., (2013). The River Nile: Geology, Hydrology and Utilization (1st ed., pp. 253). New York: Pergamon
- [36] Saunders, W.S. (2013) Designed Ecologies: The Landscape Architecture of Kongjian - Yu. (pp. 164-170). Birkhäuser
- [37] Smith, H., & Ferrari, M. (2012). Waterfront regeneration, experiences in city-building (pp. 6-10). London: Routledge
- [38] Sutton, K. & Fahmi, W. (2002). The rehabilitation of old Cairo. Habitat International 26 (1): 73-93.
- [39] Vollmer, D. (2009). Urban waterfront rehabilitation: can it contribute to environmental improvements in the developing world? Environ. Res. Lett. 4 024003 (7pp)
- [40] Wantzen, K.M., et al. (2016). River Culture: an eco-social approach to mitigate the biological and cultural diversity crisis in riverscapes. Ecohydrol. Hydrobiol
<http://dx.doi.org/10.1016/j.eco-hyd.2015.12.003>