Ain Shams University
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Germany

Multi-Functional Urban Waterfronts

Case study – The Nile River in Central Cairo

A Thesis submitted in the Partial Fulfillment for the Requirement of the Degree of Master of Science in Integrated Urbanism and Sustainable Design

by

Ayham Mouad

Supervised by

Prof. Antja Stokman
Professor of Landscape Planning and Ecology
University of Stuttgart

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Associate Professor of Urban Planning
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Dr. Ahmed Sami Abd Elrahman
Assistant Professor of Urban Design and Planning
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Disclaimer

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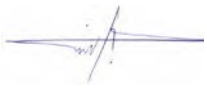
The work included in this thesis was carried out by the author in the Year 2013.

The candidate confirms that the work submitted is his own and that appropriate credit has been given where reference has been made to the work of others.

31/07/2013

Ayham Mouad



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Abstract

Rivers are considered the magnetic hub of all cities. The Nile River in Cairo has been the life artery for all Egyptians since the time of the Pharaohs. It has been used for multiple functions such as agriculture and irrigation, transportation network for trading purposes and recreational space in addition to its spiritual role in religious beliefs in the Pharaohs era. However, after the industrial revolution, hasty urban and economic growth, building streets along the river, exploitation of waterfront for private and governmental uses, and the lack of public spaces and recreational activities, difficult accessibility for the public to the riverbanks has resulted and extreme dis-integration with human interaction has emerged. Thus, the Nile River has begun to lose its connection with the city of Cairo after it was an integral part of it.

Therefore, the research aims to achieve a clearer understanding of the potential of the integration of the Nile waterfront with the public and urban activities in Central Cairo in order to bring the river back to the city. To achieve that aim, the research introduced the multi-functional urban waterfront as an approach for creating integrated public spaces along the Nile River in Central Cairo, where by this integration, a better connection to the river will result and thus bringing the river back to the city.

Accordingly, the research depended on three sequential studies: empirical, theoretical and design which were distributed in four chapters. The first chapter presented a generic overview of the urban waterfront. Then, in the second chapter, an empirical study of the Nile waterfront in Central Cairo was displayed. This study enabled to define the core problems of the selected area, and which in turn helped in the third chapter along with the 'Placemaking' approach to define two case studies as best practices in the developed countries which dealt with similar problems. Finally, a number of design proposals were developed in the fourth chapter and a set of recommendations and suggestions for further development were displayed.

Key Words: Multi-functional- Urban Waterfront- Nile River -Central Cairo

Table of Contents

List of Figures

List of Diagrams

List of Tables

CHAPTER 1

Generic Overview of the Urban Waterfront

1.1- Introduction:

Rivers are considered the magnetic hub of all cities. Besides, the riverbanks have been the first place where cities start growing. The connection between the city center and the river is one of the most important features of the city.

The Nile River in Cairo has been the life artery for all Egyptians since the time of the Pharaohs. At that time, it functioned as a main attractive element for all local inhabitants from various categories, where most of them were working in agriculture. Then it has been used as a transportation network for trading purposes. The river was easily accessible with an effective role as a recreational space since Pharaohs era. However, after the industrial revolution, emergence of commercial ports, hasty urban and economic growth, building streets along the river, exploitation of waterfront for private and governmental uses and the lack of public spaces and recreational activities, difficult accessibility for the public to the riverbanks resulted and extreme dis-integration with human interaction has emerged. Thus, the Nile River has begun to lose its connection with Cairo after it was an integral part of it.

Cairo is one of the most crowded cities in the world with about 11 million inhabitants and very little public spaces. As (Highness the Aga Khan in AKTC 2008) mentioned, "*Cairo was one of the cities which had the highest density of people, and the lowest square meters of public space*". The Nile waterfront, particularly in Central Cairo, is one of the most attractive areas economically, politically, socially, environmentally and recreationally because of its strategic location. However, public spaces along the Nile waterfront are even fenced off and charge admission or if they are open to the public, they are in a very bad situation and offer mono-functional activities.

Urban waterfront, by definition, is "*the water's edge in cities and towns of all sizes, the water may be a river, lake, ocean, bay, creek or canal*" (Breen and Rigby 1994: 10). However, this does not mean that waterfront is considered as a line; rather it has to be visualized as a link network of spaces, functions and nexus between the shore and the public.

To sum-up, nowadays the Nile waterfront, particularly in Central Cairo, was changed from an interactive edge to a sharp boundary that stops human interaction with the river. Therefore, a drastic need of multi-functional spaces with smooth accessibility to the public along the Nile waterfront has escalated, in order to bring residents and visitors back to the waterfront.

1.2- Research Aims and Objectives:

The overall aim of this research is to achieve a clearer understanding of the potential for the integration of the Nile waterfront with the public and urban activities in Central Cairo in order to bring the river back to the city. To achieve that aim, the research will introduce the multi-functional urban waterfront as an approach for creating integrated public spaces along the Nile River in Central Cairo, where by this integration; a better connection to the river will result, thus bringing the river back to the city.

1.3- Research Questions:

A key question was formulated, which can be subdivided into a series of further sub-questions as the following:

Key Question:

- In Central Cairo, how can the use of multi-functional urban waterfront along the Nile River promote the human interaction with the river?

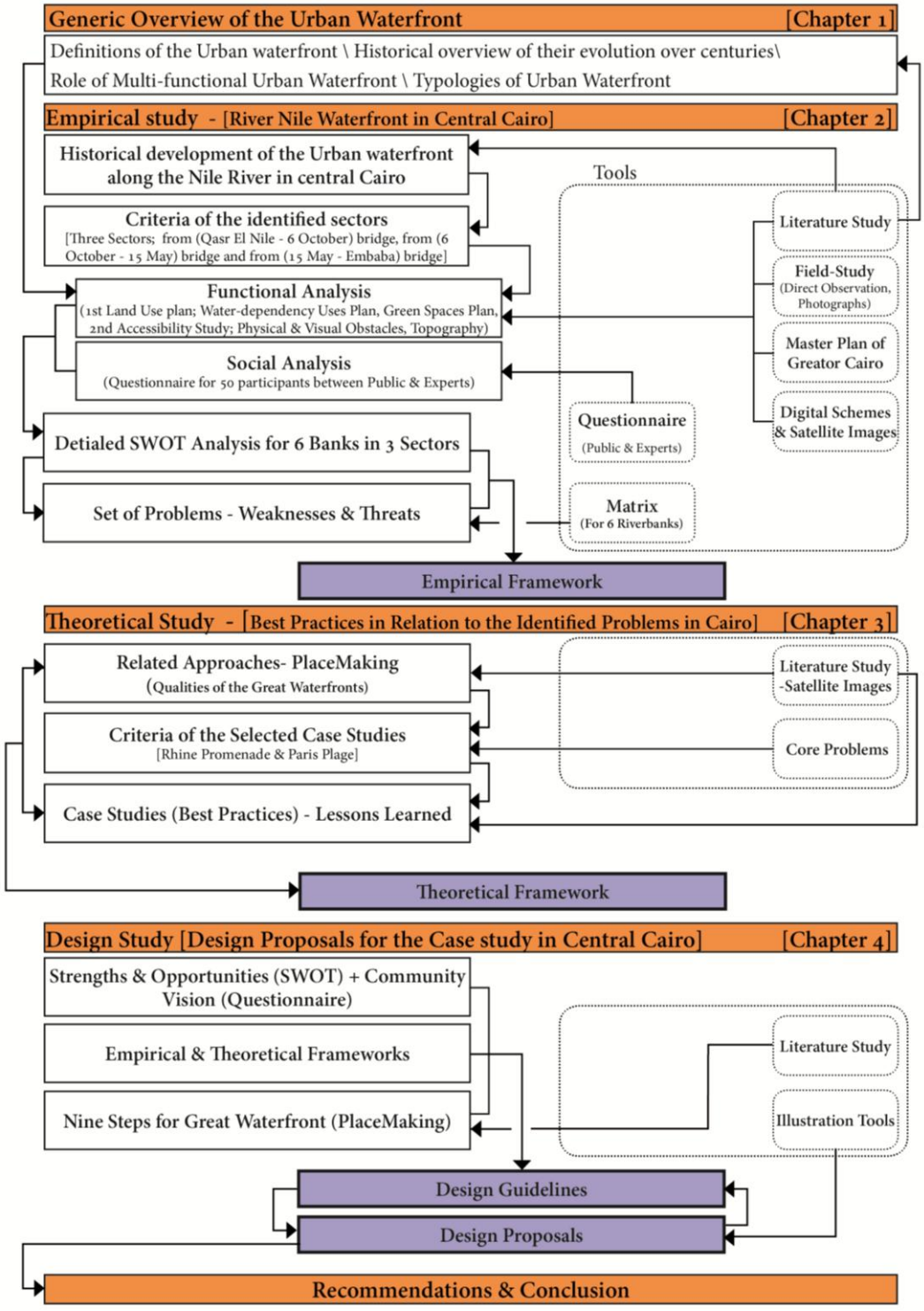
Sub-Questions:

- What is the multi-functional urban waterfront? What is the role of multi-functional waterfront within cities and particularly in Central Cairo and why is it important? (Chapter.1)
- What are the typologies of multi-functional urban waterfront that we can identify? (Chapter.1+2)
- What are the core problems that affect the Nile River in Central Cairo, and what are the site potentials and assets that we can identify? (Chapter.2+4)

- How can the design of waterfront with multi-functional activities and smooth accessibility to the public create dynamic interface, with a permeable perimeter? (Chapter.3)
- To what extent can we create an interactive multi-functional waterfront in Central Cairo in order to respond to people's needs? (Chapter.4)
- How can the use of multi-functional waterfront transform our sharp boundaries along the river from dividers to connecters? (Chapter.4)

1.4- Research Methodology:

The research methodology will be taken by the researcher in an attempt to answer the research questions as each chapter will answer at least one question. It is mainly divided into three focal parts; empirical, theoretical and design - distributed in four chapters. The right section of the coming diagram refers to the tools that were used during the research along all chapters, while the left section represents the sequential processes during the research and shows via arrows how they are connected with all other chapters and within the chapter itself. Finally, this research tried to use a comprehensive methodology that combines three kinds of studies: empirical, theoretical, and design using multiple tools to support these studies in order to achieve the pursued goal.


Generic Overview of the Urban Waterfront [Chapter 1]
Definitions of the Urban waterfront \ Historical overview of their evolution over centuries\
Role of Multi-functional Urban Waterfront \ Typologies of Urban Waterfront
Empirical study - [River Nile Waterfront in Central Cairo] [Chapter 2]
Historical development of the Urban waterfront along the Nile River in central Cairo
Criteria of the identified sectors
[Three Sectors; from (Qasr El Nile - 6 October) bridge, from (6 October - 15 May) bridge and from (15 May - Embaba) bridge]
Functional Analysis
(1st Land Use plan; Water-dependency Uses Plan, Green Spaces Plan, 2nd Accessibility Study; Physical & Visual Obstacles, Topography)
Social Analysis
(Questionnaire for 50 participants between Public & Experts)
Detialed SWOT Analysis for 6 Banks in 3 Sectors
Set of Problems - Weaknesses & Threats
Tools
Literature Study
Field-Study
(Direct Observation, Photographs)
Master Plan of Greator Cairo
Digital Schemes & Satellite Images
Questionnaire
(Public & Experts)
Matrix
(For 6 Riverbanks)
Empirical Framework
Theoretical Study - [Best Practices in Relation to the Identified Problems in Cairo] [Chapter 3]
Related Approaches- PlaceMaking
(Qualities of the Great Waterfronts)
Criteria of the Selected Case Studies
[Rhine Promenade & Paris Plage]
Case Studies (Best Practices) - Lessons Learned
Literature Study -Satellite Images
Core Problems
Theoretical Framework
Design Study [Design Proposals for the Case study in Central Cairo] [Chapter 4]
Strengths & Opportunities (SWOT) + Community Vision (Questionnaire)
Empirical & Theoretical Frameworks
Nine Steps for Great Waterfront (PlaceMaking)
Literature Study
Illustration Tools
Design Guidelines
Design Proposals
Recommendations & Conclusion

1.5- Definition of the urban waterfront:

The term 'urban waterfront' by definition takes several forms in the literature. Whereas these forms converge at some times in content, they diverge in the point of view at other times.

Breen and Rigby (1994: 10) considered the urban waterfront as an edge correlated with water when they clarified that *"by urban waterfront we mean the water's edge in cities and towns of all sizes, the water may be a river, lake, ocean, bay, creek or canal"*. Also, Bruttomesso[1] defined the urban waterfront as a sort of unique boundary of urbanized area which is considered both a part of the city and in touch with an important water-body, while Carr[2] perceived the term as one type of modern urban public space which refers to open space along waterways in cities and contains riverfronts, harbours, beaches and lakefronts (Al-Ansari, F. 2009). Similarly, Trancik (1986: 105) considered it as a *"linear open space system"* that passes along areas, forms edges and connects between places. According to Karvinen, "*the urban waterfront acts as a borderland between the controlled urban structure and the uncontrolled nature*" (Sairinen and Kumpulainen 2005: 132). Moreover, the US Coastal Zone Management Act (1972) linked the urban waterfront with the usages and functions via the definition of urban waterfront and port as "*any developed area that is densely populated and is being used for, or has been used for, urban residential, recreational, commercial, shipping or industrial purposes"* (Section 306A)[3]. Furthermore, Hoyle (1989: 439) stressed on the interplay between the port and the centers of the city, particularly, the "*port city interface"*.

Based on the previous definitions, it became clear that some defined the term as an edge or a border, and some described it as an open space or a borderland, while others tried to link it with urban functions. Accordingly, considering the

[1] Architect and professor of Urbanism at the School of Architecture, at IUAV University of Venice, Scientific Director of the Themed Park "Cities of Water" of the 2008 Exhibition in Zaragoza

[2] Principal Agriculturalist and an author of public space book in Cambridge University Press and many other books

[3] http://www.dnr.illinois.gov/cmp/Pages/grants.aspx

term 'urban waterfront' as a combination of all previously mentioned definitions will promote its value because it cannot be seen as a line, edge or a separated component. Rather, it should be seen as a network of places, spaces and functions connect the shore with the city and its overall activities. These activities can be cultural, recreational, and environmental with permeable perimeter. As PPS[4] (n.d.) stresses, activities and uses of the urban waterfront "*creates a whole that is greater than the sum of its uses.*"

1.6- Historical overview of the evolution of waterfront cities:

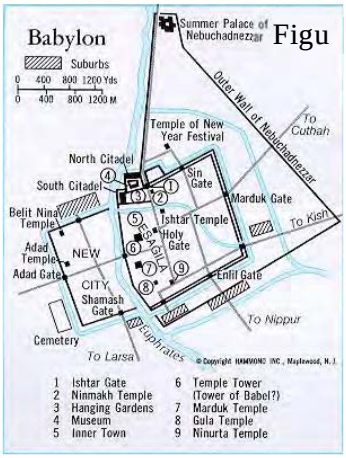
To study the urban waterfront, a historical overview on their functional evolution will be introduced starting from the birth of waterfronts along the banks of ancient civilizations and passing through the important historical eras over centuries and finally, trying to find out the core reasons for the deterioration of these waterfronts cities after the industrial revolution. This is to understand how these cities were formed, emerged, functioned and grew its sequential urban fabric on the banks of water bodies. In addition, this overview aims to recognize the relationship between waterfronts and the centers of cities taking into account the various reasons that linked the residents of these cities with their water bodies. This part will focus more on the functional evolution of the riverine cities.

1.6.1- The emergence of waterfront cities:

Water has been the key element in the human settlements since ages and it is believed that man first settled by the edge of water (Moughtin 2003; Mumford 1961). In addition, as Torre (1989) and Kostof (1992) mentioned, the majority of the great civilizations, ancient cities and ports thrived on the borders of water bodies, particularly, on the banks of rivers (Al-Ansari 2009), and that what distinguished the city with its generic form.

[4] PPS; "project for public space is a nonprofit planning, design and educational organization". http://www.pps.org/reference/approach-2/

All evidence and the available historical and archaeological studies proved that ancient human civilization were highly linked to the rivers, seas and oases (Aly 2008), where it depended mainly on agriculture as a primary resource for living. Also, the standard irrigation system relied mainly on the river which leaves after flooding a fertile land appropriate for agriculture. In addition, the planning of the riverine cities depended on the water axes for two purposes: firstly, as a defensive element which was represented in moats that surround the city and secondly, as major traffic axes for transportation and commerce [Figure.1] such as 'Euphrates River' in the city of Babylon, which ran through the city as an active axis for transport, trade and it gave the value of utility for the city [Figure.2].



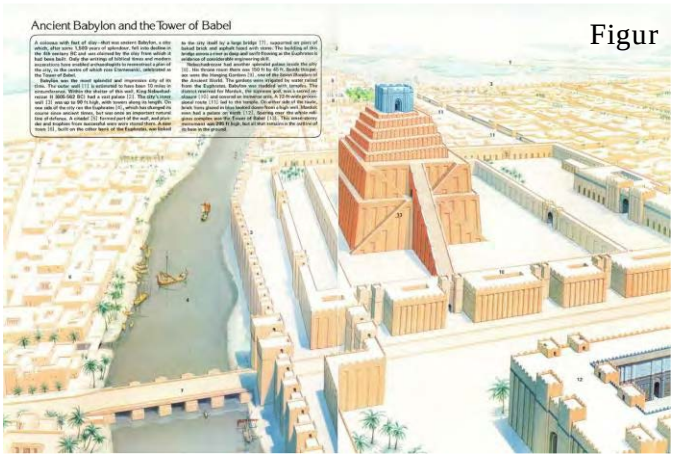


Figure.1: Babylon map shows Euphrates River divided the city into two parts and serves as life artery. Source: Jarrett Library, n.d. Figure.2: The use of Euphrates River in transport and trade activities. Source: Mitch, 2012.

Assyrians built their temples and public buildings on the banks of the river due to its metaphysical symbol (Wylson 1986), in addition to its necessary importance to agriculture. However, the Pharaonic civilization emerged on the banks of the Nile River, which was considered the symbol of ancient Egyptian civilization. In the past, the Nile had a spiritual dimension which gave life and immortality for Egyptians and it related to the concept of resurrection after

death. Therefore, temples, tombs and pyramids were erected on the west bank of the Nile to symbolize the death where the sunset, while houses and palaces of kings and princes were built on the east bank of the Nile to symbolize life where sunrise (Hamouda 1994([Figure.3]. Furthermore, Pharaohs worked in agriculture as a major source of living, especially in the fertile Delta, also they made their celebration and festivals on the banks of the river, such as Easter Holiday and Bride of the Nile [Figure.4].

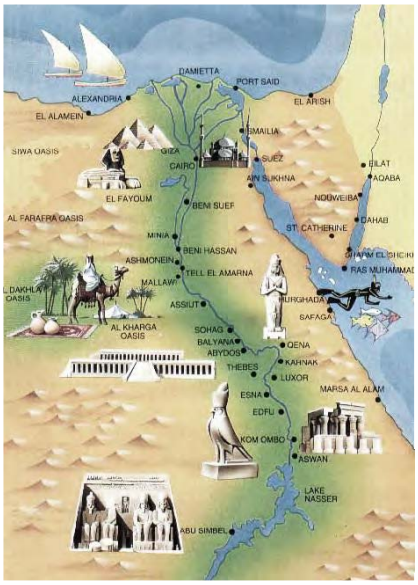


Figure.3: Map for Egypt shows how Egyptians built their monuments regarding to the spiritual belief of the River Nile. Source: www.ancient-egypt.info

Figure.4: Drawing shows Egyptians working in agriculture. Source: Seidel, et al. 1991, with modification by author.

In China, riverbanks were the favored sites for Chinese towns. They reflected their location in reference to the river on their towns names (Kostof 1992). For example, Kostof stated that the "*word P'u*" which means the "*bank or reach of a river*" was often added to town names, like Chang-P'u city (1992: 39). Moreover, Chinese built their human settlements to the North of the rivers never to the south, because of cosmological beliefs. On the other hand, Indians built their legendary temples on the highland areas adjacent to the Ganges River in order to link them up visually with the river and to carry out water-based public activities because it had mythical and ideological significance. While Greeks built their cities in a harmony with their land topography 'geomorphic architecture' (Aly 2008) and 'Agora' was the most unique element as a common public space adjoining the river.

As a result, it can be seen that the topography of the natural land and its water bodies had a strong influence on the formation of cities and its urban growth distribution, particularly along the riverbanks, such as the old civilizations and empires like the Pharaonic, Assyrian, Greek and Romanian where each one had its cultural identity and its own philosophy in dealing with water bodies, whether they were for utilitarian purposes, aesthetic or to express rites and religious rituals.

1.6.2- The growth of waterfront cities in Europe:

In Europe, most waterfront and port cities emerged during the Greek and Romanian empires and medieval centuries (Aly 2008: 19). These cities are characterized by a network of canals and waterways that created distinctive urban planning for commercial and residential areas, the canals were used as major axes for the growth of the city as Amsterdam and Delft in Netherlands. As well as during the 15th and 16th centuries, these cities were used as European commercial shipping lines. Furthermore, people built fortifications and walls around them for the purpose of defense in the case of wars like 'Portovenere City' in Italy, which is considered one of the most prominent defense cities [Figure.5].

Figure.5: The fortifications around the city of Portovenere in Italy. Source: www.virtualtourist.com

Later on in the Renaissance era, the world trade witnessed a prosperous phase. Kostof (1992: 40) described this period by stating: "*now the river was a convenience, principal highway, source of drinking water, and power of industry (e.g., to operate grain or timber mills)*". Therefore, many riverine cities were rebuilt and opened up to the water (Wylson 1986) with the removal of several fortifications, and a lot of towers, marinas, ports and warehouses added due to their particular importance of Maritime and vice versa. Wylson mentioned (1986) that a new environment appeared by a functional approach dominated by Mercantilism and later by Capitalism. Additionally, the concept of utopia appeared and many philosophers explained their ideas like Alberti in his comprehensive concept about utopia represented in the selection of the site to be attractive, distinctive and relevant to water sources, also the planning of streets network should create positive relationships between building heights and space interfaces, with an emphasis on character and harmony between buildings (Aly 2008). Aly cited from Wylson (1986) that this period resulted from two philosophical directions for city planning and they are represented by:

1- The Dutch experiment where urban growth and expansion were according to a network of water canals which act as axes for transportation and disposal of water like the city of Amsterdam.

2- The concept of utopia where the linear and geometric composition with expressive large scales masses and systematic visual image of architecture and urbanism.

One of the planners at that time was Simon Stevin, who combined among the concept of utopia, the principles of operational planning and the Dutch experience, where he relied on a combination of residential buildings and public spaces that are compatible with the network of water channels (Aly 2008). Finally, it became clear that the importance of the port cities during Renaissance period was drawn from the high value of commerce and the control that merchants performed on cities.

1.6.3- The development of waterfront cities:

In the 17th century, the urban planning of port cities targeted the formulation of urban structure in line with the investment potentials of the site and its relationship with sea and river. However, during the 18th century, these ambitions coincided with the beginning of the deterioration of port cities and losing their importance. Two main functions for communities and societies overlooking water bodies appeared; firstly, the economic and financial activities and secondly, the interest in the world of navigation and maritime transport (Aly 2008). Also, Aly mentioned that during the 17th and 18th centuries, the waterfronts became in close relationship with water bodies such as Dutch cities, while in the mid-19th century it was difficult to achieve connection and correlation between urban communities and waterfronts due to the establishment of factories and warehouses on the shores of water bodies. Thus, waterfronts were characterized by the industrial features.

At that time, the Northern Europeans started to build trading companies and military commercial marine fleets. Simultaneously, the largest communication networks between waterfront cities on riverbanks in Italy, Germany, France, the shores of the Baltic Sea and the Mediterranean Sea originated (Aly 2008). This led to the formation of a very large trade system, amplified industrial and

services areas surrounding ports and directed to the establishment of rail-lines which reduced the cost of shipping. Consequently, the priority of the economic perspective came at the expense of environmental and humanitarian considerations, and it became widely known that *"ports created cities, and big ports created big cities"* (Norcliffe, G. et al. 1996) and vice versa (Knapp and Pinder 1992: 155).

1.6.4- The Industrial revolution of waterfront cities:

The Industrial Revolution was a great motive of the spread and growth of the world trade, particularly in Britain. Also, the applications of steam for power generation, the increase of cargo of the vessels, the expansion of railways, and eventually the major dependency on maritime transport to connect the world trading activities required the establishment of huge ports and shipping docks along waterfronts areas in compatible with the development of transport (Aly 2008).

Then during the first half of the 20th century, a tremendous expansion of urban industrial areas occurred and was quickly followed by elevated highways which led to the separation of cities and communities from their rivers (El-Menshawy 2011). Besides, the land adjacent to the rivers became a cheap place due to the wastewater treatment plants or drainage upon it directly, particularly during the floods, the great enemy for many waterfront cities; therefore, people tried to protect their industrial buildings by deepening and digging canals, removing vegetation from the territory of the flood and building fences and walls as bumpers to river flooding. This led to create a boundary between the city and waterfronts. Moreover, the development in the size of vessels and shipping docks and its working techniques transformed the old shipping docks and warehouses to untapped abandoned areas such as shipping docks of St. Catherine in London, the port of Baltimore and San Francisco.

1.6.5- The Deterioration of waterfront cities:

At the end of mid-20th century, the technological development made a crucial change in the uses of coastal areas particularly along rivers. This is because of the transformation of the river ports into deteriorated and deserted areas like many coastal areas in industrial riverine cities. They were separated structurally, socially and economically from most parts of the city (El-Menshawy 2011). Also, these areas tend to be contaminated and need direct re-development. The most important reasons that had contributed in this deterioration were:

- the transformation of transport modes from travel by ships to travel by planes across continents. Add on the local level, people had shifted from the use of water transport across the river like ferryboats to use their own cars;
- the contribution of using container and modern mechanisms in the transformation of loading and unloading shipping areas along waterfront from the city center to other areas less expensive;
- the shift from the traditional ways in fishing activity to the use of giant fishing vessels;
- the high increase in the volume of cargo ships that need more depth of the riverbeds. Hence, they turned to seas and oceans (Breen 1994: 12-13);
- creating railways, which were considered more efficient, faster and less expensive than water transportation, encouraging to leave many water transport in several areas;
- the extreme pollution of waterfronts due to the sewage and wastes of factories thrown directly into rivers;
- creating highways networks along the water bodies, especially near cities centers;
- and building factories and warehouses in rural areas due to the low costs, besides the abundant and low cost labor and the existence of roads network.

As a result, the need to invest spaces along waterfronts and structures dating back to the period of industrial prosperity had appeared, and thinking in reviving these areas that pose strategic, vital and historic importance for the centers of the city started to take place. Therefore, several European, American and Asian cities started to make huge investment projects to convert these places into recreational, residential and commercial areas open to the public.

1.6.6- Conclusion:

The riverine cities are settlements overlooking the river and all the available evidences on these cities throughout history pointed out that the presence of the river led to their inception. Due to this fact, the majority of first human settlements worldwide originated on the banks of water bodies, such as Egypt, China, England, Italy and America. For example, 447 out of 935 cities in America (about 47%) are located next to water bodies (Zhang 2002: 9).

The linear growth of cities along the rivers was the most common form of riverine cities as in Sweden. Therefore, important buildings appeared as unique landmarks next to the borders of water such as the temples in ancient civilizations. These cities were initially just small villages which depended on agriculture and fishing as in Egypt, but they evolved by time into large industrial cities that relied on industry and trade like in China. Later on they began to deteriorate after the industrial revolution which in turn led many countries to think about revitalization of their waterfronts and linking them with the city centers. Finally, it became clear that the characteristic of the place, the form and the style that had launched human settlements on the banks of water bodies gave the distinctive character of the urban form of the city.

1.7- The role of Multi-functional waterfront in cities:

For ages, the waterfront has played a vital role to urbanize areas all over the world as we saw in the previous historical overview (1.6). This role varied according to the adjacent water element (like river, bay, sea, canal, stream or lake) and the geographical nature of the site. Many cities were originated along waterfront spaces which were in turn used as a source of living via agriculture and fishing, and also as a means of transport, trade and industry. However, with the development of waterfront spaces, a high competition between the trade and tourism industry emerged and the Waterfront has become the venue of main investments, which may change the image of the city as a whole - like the waterfront in Dubai (Mártires 2007).

Nowadays, cities have turned to apply the multi-functional concept on the new waterfront development in order to increase their value by their citizens and to strengthen their connectivity with the city. The term 'multi-functional' - basically means "*having or able to perform many functions*" as defined in Collins Dictionary[5] , or "*something that is multifunctional does several different things or has several different uses"* as defined in Macmillan Dictionary [6]. Whereas 'multi-functionality' in landscape according to Brandt and Tress means "*the co-existence of different spheres such as ecology, economics, culture, history and aesthetics*" (2000: 112). On the other hand, Land Use Consultants in England defined the term as "*the ability to provide multiple or 'cross cutting' functions, by integrating different activities and land usage, on individual sites and across a whole green infrastructure network*" (2009: 70).

Consequently, the role of multi- functional waterfront spaces can be shortly summarized by using them; first, as settings of public delectation with a maximum visual and physical access to the water banks all day long, throughout

[5] http://www.collinsdictionary.com/dictionary/english/multifunction
[6] http://www.macmillandictionary.com/dictionary/british/multifunctional

the year, second, as ecological awareness and prosperity symbols via applying an environmental developing strategy and creating eco-friendly projects, third, as economic boosts when developed with proper facilities and attractive investments, and finally, as focal cosmetic resources altering the image of the city (Mártires 2007). Therefore, when waterfronts turn out to be multi-functional spaces fulfilling more than one specific task, they will develop to be spaces coveted by its residents, where they can live, work and play in a common space and thus, support the social, cultural and economic aspects.

To conclude, waterfront spaces are the key to the adequate and sustainable use of land, particularly in a dense and clamorous city like Cairo where pressures on land are extremely drastic. Therefore, the waterfront of Cairo, with the Nile River, has great opportunities, despite of the numerous obstacles between the city and the river. Moreover, the application of this approach will create a great interaction between the waterfront of the city and the public via generating multiple related activities with an easy accessibility to the public along the watercourse.

1.8- Typology of the urban waterfront:

Many researchers, engineers, architects and urban planners tried to classify these typologies in different contexts like (Moughtin 2003; Morris 1994; Owen 1993). However, one of the most comprehensive classifications was that of Prof. Cliff Moughtin's[7] which was used by many doctoral researchers like (Abdul Latip 2011; El-Menshawy 2011; Aly 2008). Therefore, creating a combination between Moughtin and Owen classifications can cover a broader range of waterfront typologies. Hence, nine common types of urban waterfronts can be clustered as the following:

[7] Cliff Moughtin; a professor in architecture and urban planning in the Queen's University Belfast and Nottingham University

Type 1: The Vertical Cliff Edge

This type was mainly used in the 19th century and characterized by rising utter multi-storied buildings by the edge of the water like storied warehouses, mansions and religious buildings, with an extreme use of land. These warehouses were privately owned and did not offer any public access to the banks of water. Besides, their facades were open towards waterway for loading and unloading merchandises [Table 1]. All this created visual and structural obstacles between locals and water bodies. Nowadays, this type can be seen only in exceptional conditions for buildings conservation of architectural note, like the waterfronts of Nottingham Canal in UK [Figure.6] and Venice in Italy [Figure.7] (Moughtin 2003).

Figure.6: Rehabilitated Warehouse in Nottingham Canal, UK. Source: Zabulis, 2013

Figure.7: The vertical cliff edge – Waterways canal in Venice, Italy. Source: www.wordpress.com

Type 2: The Fishing Village

This type was known as "*perforated edge*" and it is an example of the traditional fishing village, with an extension of narrow public walkways guided to the dock and waterfront (Owen 1993) [Table 1]. The gradual growth was sheltered via

using tightly grouped buildings, with narrow twisted streets in-between to avoid the strong coastal wind and to ensure weather protection [Figure.8]. Today, the functional necessity of the customary fishing village is not used in waterfront anymore. However, when it is used as an extension of waterfronts, it ensures a good public accessibility. As Bentley (1985) stated, it would improve the "permeability" to the area, such as Degli Uffizi Piazza in Florence, Italy [Figure.9].

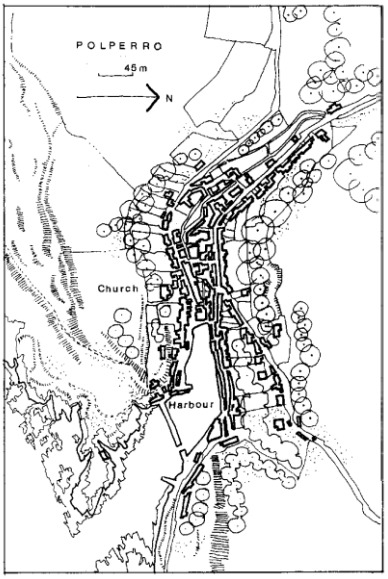


Figure.8: Waterfront Forms: The Fishing Village – Polperro, UK. Source: Moughtin, 2003.

Figure.9: The Degli Uffizi Piazza in Florence, Italy. Source: JL, 2012 (www.flickr.com).

Type 3: The Natural Bank or Beach

This type is characterized by the soft relationship of water surfaces with a natural bank or mild slope [Table 1]. It is mainly found in coastlines, river in countryside or urban waterfront areas where the primary function is linked with sustainability and environmental pollution control or recreational area of a city park. Also, it had a diverse kinds of flora like trees, plants, and greenswards which gave it an extraordinary value and a high priority for people (House 1993), such as the Dee River in Chester [Figure.10] or the Avon River in Stratford, England [Figure.11].

Figure.10: The Dee River in Chester, England. Source: Thomas, 2009.

Figure.11: The Avon River in Stratford, England. Source: Morris, 2011

Type 4: The Dockside Quay

This type is usually used for port settlements in a sheltered location as a treatment for water edges like the waterfront in Lamu on the Kenyan coast [Figure.12], Hong Kong and New York. It is in contrast with 'the Natural Bank' in (Type 3) due to the hard formal constructed water's edge [Table 1]. Canals in Amsterdam also applied this type through a two-sided dock running in parallel along both sides of the waterway, followed by an organized line of multi-story buildings with pathways for public access in-between to link with the inner district of the city [Figure.13]. In addition, many bridges were constructed to connect both watersides.

Figure.12: The waterfront in Lamu on the Kenyan coast. Source: Google Earth Pro.

Figure.13: Canal with double docksides in Amsterdam, Holland. Source: (Left photo: Obal, 2008)- (Right photo: www.wikimedia.org).

Type 5: The Bay or Open Square

In this type, the water bank encloses the water in the form of a bay or an open square [Table 1]. One of the best examples of this type is Albert Dock in Liverpool where the water performs as an enclosed square, and is surrounded by arcaded buildings to unify the structure [Figure.14]. Another example is the city of Belfast in Northern Ireland where it is surrounded by mounds on both sides of the bay and protected by a green belt policy to prevent the extension of the buildings.

Figure.14: Albert Dock in Liverpool, UK. Source: www.aboutliverpool.com

Type 6: The Pier

This type is represented by extended right-angled piers into water bodies [Table 1]. Thorburn (1990) pointed out that piers are basically used to plan and design the structure of waterfront and it considered as the suitable structure for

recreational activities such as cafes, kiosks and shops. Therefore, the structure is commonly designed to be floating in conformity with the water tide for proper access to the water bank all day long. However, it requires a lot of maintenance to keep it work. One of the prominent resorts is BlackPool in England [Figure.15].

Figure.15: The Pier - BlackPool in England.
Source: (Left photo: Hermes, 2011)- (Right photo: Curator, 2008)

Type 7: The Turning Back to the Water

This type formed a negative relationship between the waterfront structure and the water bodies because of channelizing the river and using it as a concrete culvert, an open storm drain, or a dumping ground [Table 1]. Also, the buildings turned their back to the waterways. It was chosen in the development of many cities all over the world and particularly in cities that used water as a pathway for transport like Westport in County Mayo, Ireland [Figure.16] or Venice in Italy. Moreover, it is considered as an engineering custom to enhance the sanitation and public health (Moughtin 2003).

Figure.16: Canal, Westport, County Mayo, Republic of Ireland. Source: www.westporttourism.com

The last two types of the urban waterfronts were extremely popular in many waterfront cities according to Owen (1993).

Type 8: The Setback Building

This type is considered as a common form of a treatment of most waterfront cities. It is characterized by a separator space between the water bodies and the neighboring buildings in the form of passageway, highway, or quay (Abdul Latip 2011) [Table 1]. This space might destroy the relationship between the waterfront and the water bodies, particularly if it is too wide such as many cities that had huge ports, roads, or expressways like Waterfront of Nile River in Cairo, Egypt [Figure.17].

Figure.17: Waterfront of Nile River in Cairo, Egypt. Source: Author.

Type 9: The Bridge

The Bridge was also a well-known type of a treatment of waterfront cities, basically aimed to link two banks or to be used for loading and unloading merchandises especially when it had an enough width [Table 1], like Ponte Vecchio in Florence – Italy [Figure.18] (Abdul Latip 2011).

Figure.18: Ponte Vecchio in Florence, Italy. Source: www.wikimedia.org

Conclusion:

To sum up, seven of the previously mentioned types of urban waterfronts have positive mutual relation with the water bodies, particularly in terms of the functional and physical aspects, with exception of types (7 and 8). Nowadays, types (1, 2 and 7) are not applied in the treatment of waterfront cities anymore because there were used in historical urban structure (Andini 2011). While the other types of waterfronts are still applied and have evolved in many developed cities to revitalize and reconnect the banks with the city, via creating multi-functional activities and flexible accessibility for public to the water banks like the Seine in Paris.

1.9- Conclusion:

This chapter discussed many significant themes starting from the definition of urban waterfronts and passing through their evolution across centuries, then highlighting the role of multi-functional waterfront within cities, and finally ending up with a comprehensive classification of the waterfront typologies. Overall, this chapter created a great foundation for a better understanding of the waterfront along the Nile River in Central Cairo and assisted to know its various typologies without forgetting its important role.

Owen (1993) mentioned that perhaps we can talk about the use of spaces or buildings along the waterfronts or the intensity of that use, which makes it complicated to explore due to the change over time. However, it is much more reasonable to study the current form of waterfronts with reference to history (Abdul Latip 2011). Thus, chapter2 will consider Owen's opinion as a starting point to study the current situation of the Nile waterfront in Central Cairo in relation to history in order to identify the treatment of the waterfront form.

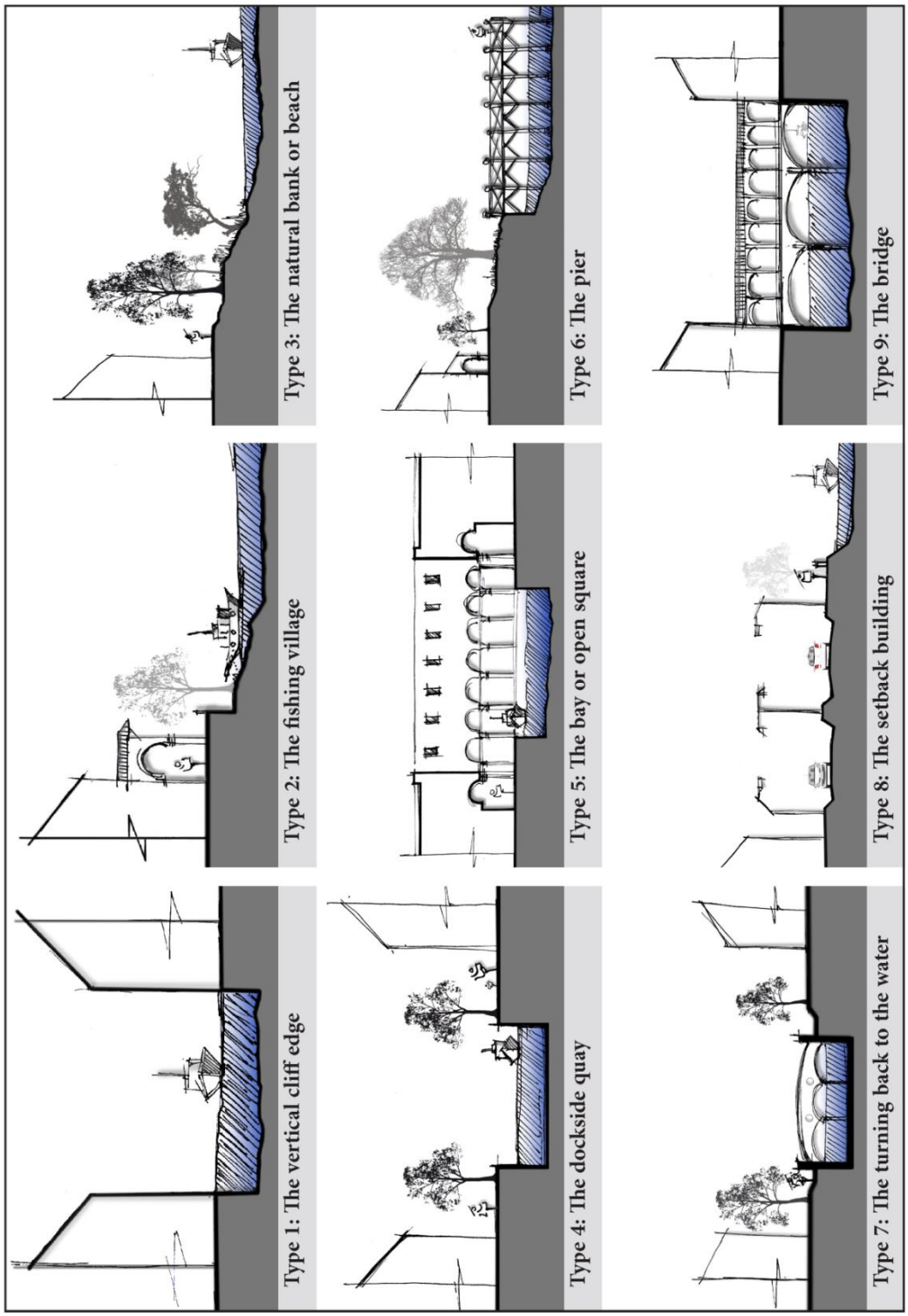


Table.1: Typologies of the Urban Waterfront. Source: Author

CHAPTER 2

Empirical Study

River Nile Waterfront in Central Cairo

2.1- Introduction:

This chapter is concerned with the empirical case study of the River Nile waterfront in CBD[8]. Therefore, it will start with the explanation for the historical development of the urban waterfront along the Nile River in Central Cairo referring to Owens' opinion in the conclusion of chapter.1. After that, a certain area in CBD based on specific criteria will be selected and two functional and social analyses will be applied on it in order to understand this area and its main problems from the functional and social perspectives. Finally, these two analyses will be used as a cornerstone for a detailed SWOT analysis- which will lead to the identification of the core problems and will be used with the former one to pinpoint the empirical frameworks [Diagram.1].

In order to do that, a set of tools was used starting from: first, many field visits to the site depending on observations, photographs, and questionnaires with public and experts as a main skeleton for the gathered database, second, the Master plan of Greater Cairo, digital schemes (CAD plans) - CAPMAS, and satellite images - Google Earth as supportive aids and finally, literature study for doctoral and master researches as reference and verification tool.

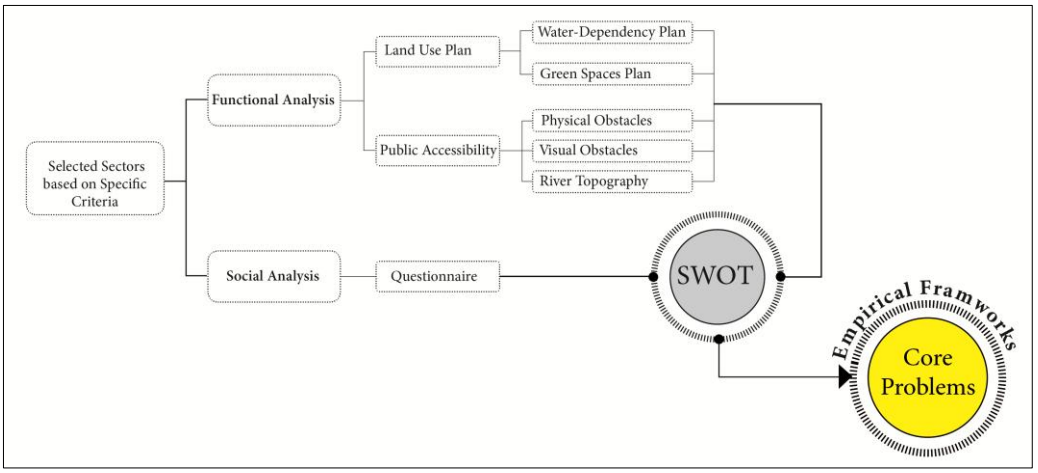


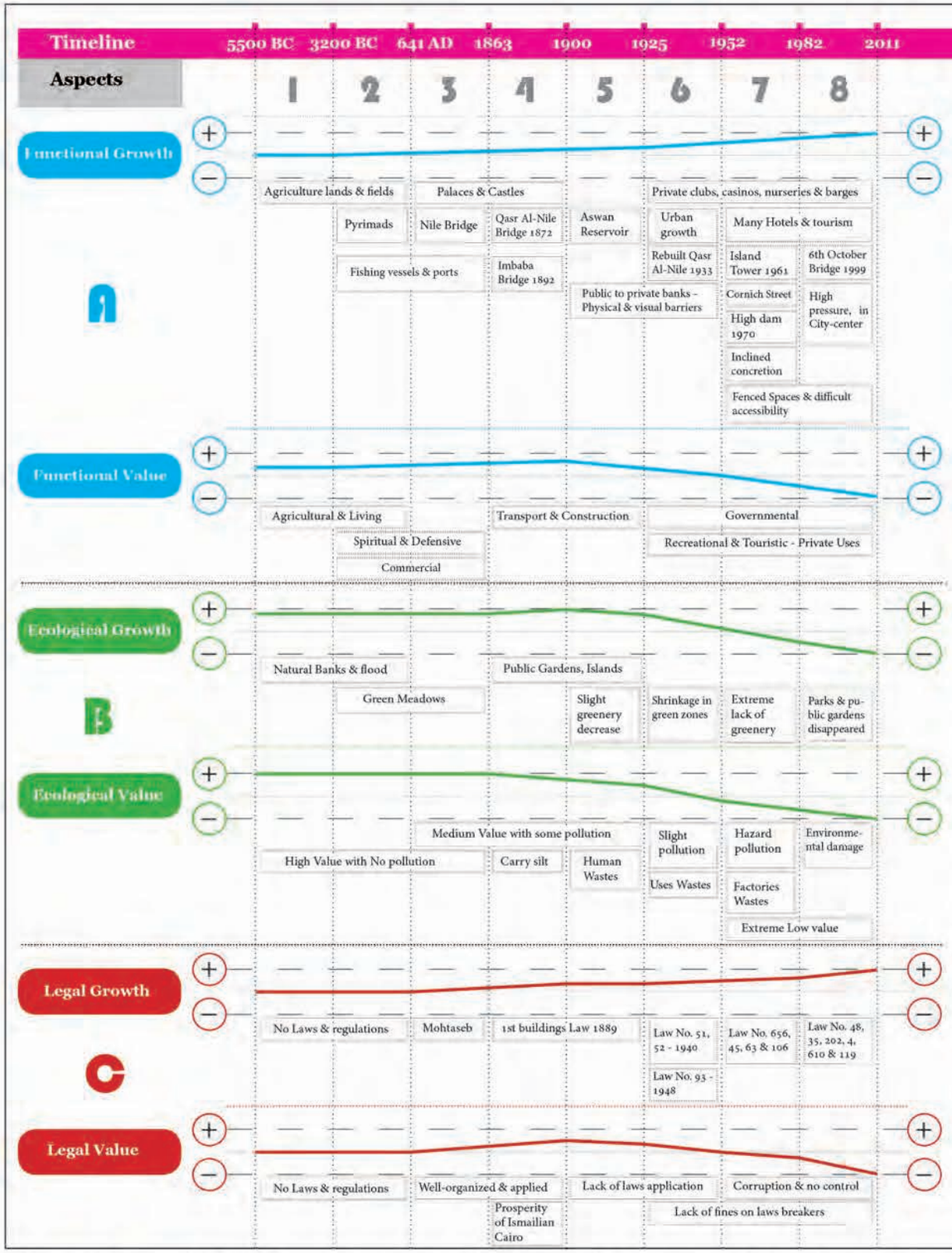
Diagram.1: The used methodology in chapter.2 to reach the empirical frameworks. Source:Author

[8] CBD: City Business District – Central Cairo

2.2- Historical development of the urban waterfront along The Nile River in Central Cairo:

This part presents a brief overview of the development of urban waterfront along the Nile River in Central Cairo through history in the period from 5500 B.C. till 2011 before the revolution. Therefore, eight divisions were identified according to the changes in reigns and governance across centuries or as a result of significant events (like the revolution) which were in turn reflected negatively or positively on functional, ecological, and legal aspects of the waterfront along the Nile River in Cairo. Moreover, the eight divisions were adopted by many doctoral and master researchers (Sami 2011; El-Menshawy 2011; Sami 2006; Sowaidan 1997) to explain the urban development along the River Nile in Cairo through historical changes.

At the beginning, a summary chart is created in order to first have a comprehensive overview on the functional, ecological, and legal aspects during the eight time periods, and second to show the mutual relationships among all aspects and how they affect each other through time, which will be discussed further by the end of this part. Two indicators for each aspect (growth and value) are set to express the increase and decrease rate through time. Besides, all periods are linked with the most important events respectively [Figure.19]. Afterwards, the research will discuss these periods in more details from the three former aspects in order to understand which functions evolved during these periods and how these functions affected the ecological aspect of the River Nile and also to know what the main laws and regulations issued to organize these functions were.



Trends Analysis

The functional growth along the river banks started to increase gradually from 641 AD with a rapid increase after 1925 till 2011, particularly after controlling the flood. While in the first two periods there were no buildings along the river banks to avoid the river flood.

The functional value was moderately good in the first four periods and increased gradually to reach the peak in 1900 where the banks used for agriculture, commercial and water-transportation purposes. Then after 1900 a steep decline occurred due to: firstly, the extreme urban growth [Figure.20] which increased the transportation via erected bridges and parallel streets, and secondly, the inclined concretion of riverbanks have created difficult accessibility to the watercourses, and finally, the transformation of public banks to private property as hotels with fenced spaces for touristic uses manily after the establishment of the high dam in 1970.

There was no ecological growth during the first 3 period where the river banks remained natural. However, between 1893-1900 many public gardens were built and people started to care about Islands. Later on, a sharp decline in green spaces occurred, particularly after 1952, due to the high urbanization along the banks [Figure.20], building on agricultural lands, lands encroachment, building streets and economic openness.

The ecological value of the river and its banks was high in the first three periods, as there was no pollution. Then a slight decrease in the value was happened due to the human wastes and some water pollution. later on, in the last three periods there were a steep decline in the ecological value because of factories and uses wastes along with the extreme lack of green spaces.

There was not any regulations during the first two periods where there were no buildings beside the river to avoid flood, then in the third period Al-Mohtaseb was the responsible person for lands and roads arrangement, later on a set of laws and regulations enacted, particularly in the last three periods.

The legal value reached its peak in the fourth period where laws and regulations were applied strictly which led to the prosperity of the Ismailia Cairo. Then, a steep decline in legal value was happened due to the lack of laws application, deterrent fines and the prevalent corruption, particularly in the last period.

Timeline Overview

These 8 periods started from the Pharaonic era in the pre-dynastic period (5500 - 3200 BC) where the life of Egyptians became stable after they worked in agriculture and used the river for irrigation and drinking water. Then the dynastic period to the Islamic conquest (3200 BC - 641 AD) occurred, where Egyptians used the Nile as linking and overlooking space and they sanctified it as a God. After the Islamic conquest in 641 AD, Al-Fustat became the capital of Egypt, and the construction begun to growth on the east bank of the Nile and increased gradually along the river like bridges, ports and buildings from Abbasids, Mamluk, Ayyubid, and Ottomans till the rule of Khedive Ismail between (1863 – 1900), which he wanted to turn Cairo into Paris of the East and transfered the Nile to the center of the capital to simulate the Seine River in Paris. Afterwards, between (1900-1925) the beginning of urban development occurred where new tram systems with many bridges to connect both riverbanks in Cairo were established, and then between (1925-1952) an extreme urbanization along the Nile was appeared, new buildings regulations were legislated to organize the construction along the riverbanks, and the Egyptian industry begun to grow. Later on, between (1952-1981) after the revolution of July in 1952 and October war in 1973, the government intervened in the urban development along the Nile and enacted many new laws. In addition, the capital during that period witnessed a large urban renaissance and economic openness. Finally, between (1981-2011) the beginning of economic oppenness and the president Hosni Mubarak took the reins of government, many agriculture lands along the river banks were built up and the current corniche-highway has been considered the main street in Grater Cairo.

Figure.19: Summary chart shows an overview for the historical development of the urban waterfront along the Nile in central Cairo from functional, ecological & legal aspects from 5500 BC till 2011. Source: Author.

As mentioned previously, a more detailed explanation for the urban waterfront along the Nile River in Central Cairo from the functional, ecological and social aspects between 5500 BC till 2011 can be discussed as the following:

A. Functional aspects:

1. From 5500 to 3200 BC- the pre-dynastic period:

– In this period, there were not any constructed buildings adjacent to the river. However, buildings were on the upland areas to avoid river flood. These areas were followed by agricultural lands with no clear relation with the river. Also, there were not any built paths or routes and the purpose of the daily movement was to collect drinking water (El-Menshawy 2011).

2. From 3200 BC to 641 AD- the dynastic era to the Islamic conquest:

– Many roads parallel to the coast of the river emerged, and upon it orthogonal lanes were used in agricultural activity while the river was exploited in transport. Also, the Pyramids of Giza were built close to the west bank of the Nile due to the spiritual belief and the labor was limited to fishing vessels and ports (Sami 2011).

3. From 641 AD to 1863- the Islamic conquest to the rule of Khedive Ismail:

– At that time, the Nile Bridge was the main road in the city of Fustat. It was made of compacted floating boats. It linked the city with the west bank and 'Roda Island' and it was used simultaneously as a path and a park. Besides, many important buildings were placed along it (El-Menshawy 2011). Sami (2006) mentioned that the hallmarks were the homes of folk elders and castles and the predominant businesses at that time were trade, fishing vessels and ports.

4. From 1863 to 1900- the rule of Khedive Ismail till the end of 19th century:

– The exploitation of the eastern axis on the riverbank in transport increased with the onset of river-related uses such as palaces and parks. Also, river

crossings were built with a distinctive architectural character like Qasr El-Nile Bridge (1872)[9] and Imbaba Bridge (1892)[10] (Coptic History Encyclopedia n.d.). Moreover, a large number of laborers worked in the port of Boulaq and fishing vessels (Sami 2011).

5. From 1900 to 1925- the beginning of urban development:

- The development of transportation affected the need to develop transport paths parallel to the river and the spaces adjacent to the Nile started to transform from public to private ownership like Zamalek (Aly 2008; El-Menshawy 2011).
- Accessibility between Cairo and Giza evolved, across bridges such as Abbas, Abu El-Ola, Zamalek and Mohammad Ali. Cairo was linked with a network of trams. Also, luxury villas and palaces emerged with the beginning of the establishment of 'Garden City' area and two clubs (Al-Jazeera and Al-Ahly) in Zamalek Island.
- Construction labor expanded on the entire side of the river and wholesale trade activities originated at Boulaq, in addition to some industrial uses such as the 'Water Company' and workshops (Sami 2006).
- Aswan Reservoir was an attempt to control the water tide and to exploit the land left by the river (El-Menshawy 2011).

6. From 1925 to 1952- the extreme urbanization along the Nile and the enactment of new laws and regulations:

- The urbanization on the riverbanks increased due to the impact of the Nile bridges on the flow of urban growth of the capital [Figure.20]. Also, a prosperity of manufacturing and real estate sectors occurred (Aly 2008). However, Sami (2011) stated that some uses like casinos on the west bank formed physical barrier that hindered the relationship between the Corniche and the water course. In 1933, Qasr El-Nile Bridge was rebuilt by the King Fuad the 1st and he called it 'Khedive Ismail Bridge' (Coptic History Encyclopedia n.d.).

[9] "http://www.coptichistory.org/new_page_7457.htm"
[10] "http://www.coptichistory.org/new_page_7011.htm"

7. From 1952 to 1982- after July Revolution and October War:

- The Corniche Street was established on the east bank of the Nile as one of the longest street in Cairo in order to connect the north-south city along the river, and 6th of October Bridge was constructed to connect the west-east river banks. Besides, many cross axes were used to link the riverbanks together (El-Menshawy 2011).
- In 1961, the first distinct landmark Island Tower was constructed on the river and it was followed by many hotels that occupied a huge space along the riverbanks and it was the boost for tourism. Also, doubling the price of the construction lands led to the emergence of slums, and the demolishing of many ancient palaces and villas and replacing them with towers (Sami 2006).
- In 1970, the high dam was built (Sharf 2003) to control the river tide with fluctuation only about 1-2 m (Kondolf G.M., et. al. 2011) which in turn motivated the exploitation of many lands that were adjacent to the riverbanks and several buildings were constructed.
- It is worth mentioning during this period that the formation of the riverbanks via inclined concretions led to the prevention of the public from reaching the watercourse. Besides, several visual barriers on the riverbank appeared as a connected strip with industrial and commercial uses and represented by privately-owned activities, recreational uses and buoys. All of that led to the deterioration of the physical permeability between the river and the Corniche in many areas (Sami 2011).

8. From 1982 to 2011- the rule of Hosni Mubarak and the economic openness:

- Nile Corniche became the major street in Cairo and extended along 97.5% of the total coast of the River in Greater Cairo. It represented a tremendous obstacle because of the rapid movement of cars and the closeness of the city center to the Nile which in turn deprived the Nile River of its importance as a natural outlet and led to high pressure along the riverbanks (El-Menshawy

2011). In 1999, 6th of October Bridge opened after cessation for 10 years because of economic problems (Al-Nasr 2006).

- According to Aly (2008): most of the riverbanks became private properties and were used for casinos, private clubs, nurseries and inappropriate uses;
- pedestrian paths along the river abated and if found they were mostly two-meter width with no chance to sit or enjoy the view of the river. Bridges structure formed visual and architectural barriers, and turned the squares below to abandoned and neglected areas;
- and land encroachments, informal buildings and inappropriate uses like governmental and educational buildings increased along the riverbanks as a result of conflicting laws and the lack of legal control systems.

B. Ecological aspects:

1. From 5500 to 3200 BC:

- The Nile had natural banks and it flooded freely. Also, it did not have any contaminated elements.

2. From 3200 BC to 641 AD:

- The land on the riverbanks was green meadows and the water was clean without any contamination.

3. From 641 AD to 1863:

- Sami (2011) stated that in this period, flood and topography affected the buildings construction along the river, and the configuration of the Nile islands launched without any activities polluted the water.

4. From 1863 to 1900:

- There were many private and public gardens scattered everywhere around the banks of the river, and the largest green area was 'Roda Island' and the northern part of 'Zamalek Island'. Additionally, the river was carrying silt without any real contaminated items (Sami 2006).

5. From 1900 to 1925:

- There was not risky pollution in the Nile River because the drainage in the river course was restricted to the human wastes. Besides, the industrial

activities did not create any dangerous pollution. However, green zones slightly decreased in some areas such as 'Roda Island' and some fields turned into recreational activities like 'Al-Ahly and 'Al-Jazeera' clubs in Zamalek Island (Sami 2011).

6. **From 1925 to 1952:**

- The main axis parallel to the River Nile was planted. Nevertheless, green zones shrank, because of the construction caused by urban development and the issued laws No. 52 and 93 which in turn helped to increase the division of land intended for construction. Besides, little water pollution resulted due to the thrown wastes in riverbed (Sami 2006).

7. **From 1952 to 1982:**

- Hazard pollution of the River Nile happened as a result of dumping wastewater factories in Shubra Al Khaimah, Helwan and Imbaba and an extreme lack of green zones resulted due to the urban development along the riverbanks (Sami 2011).

8. **From 1982 to 2011:**

- The public stayed away from the river due to water pollution, lack of interest in sports and recreational activities, water transport, and Nile cruises. Besides, the establishment of private floating marinas, hotels and fixed barges hindered the public from the enjoyment of water view, and blocked the vision of the river in many areas. Furthermore, the existence of industrial uses near the river and draining the wastes directly into it led to an extreme environmental damage to the river.
- Public gardens and parks disappeared and many fences were built around buildings which blocked the relationship between the pedestrian and water, and resulted in turning the public to stand on bridges to see the water (Aly 2008).

C. Legal aspects:

1. From 5500 BC to 641 AD:

- There were no regulations or legislations related to the Nile and its functions (Aly; 2008; Al-Summari 1984).

2. From 641 AD to 1863:

- In this period, the term 'Mohtaseb' emerged and was used to refer to the person who arranged all roads and lands to a certain standard to ensure that they functioned well (El-Menshawy 2011; Sowaidan 1997).

3. From 1863 to 1900:

- The first buildings law and its executive regulations were released in 1889 in the name of 'Dekreto' or 'the provisions of organization service' in order to organize streets performance, straightness and plantation (El-Menshawy 2011; Sowaidan 1997).

4. From 1900 to 1925:

- The same 1889 law and regulations were still valid and applicable (Aly 2008).

5. From 1925 to 1952:

- The most important enacted laws were:
- Law No. 51 – 1940 - lands regulation,
- Law No. 52 – 1940 - the division of land intended for construction,
- and Law No. 93 – 1948 - buildings regulation (El-Menshawy 2011; Sowaidan 1997).

6. From 1952 to 1982:

- Law No. 656 – 1954 - buildings regulation,
- Law No. 45 – 1962 – buildings regulation,
- Law No. 63 – 1962 – drainage of liquid wastes,
- and Law No. 106 – 1976 – organizing the construction works (Sami 2011).

7. From 1982 to 2011:

- Law No. 48 – 1982 – protection of the Nile River and waterways from pollution,

- Decree No. 35 – 1984 – mentioned that the quality of activities along the river has to be restricted to gardens and parks, tourist marinas, sports activities or Nurseries,
- Decree No. 202 – 1994 – imposed a waste treatment unit and water purification for all tourist installations,
- Law No. 4 – 1994 – Biosphere Protection,
- Decree No. 610 – 2003 - Protection of the River Nile and its beaches,
- and Decree No. 119 – 2008 - Uniform Building (Sami 2011; El-Menshawy 2011; Aly 2008).

Conclusion:

To sum up, according to the chart [Figure.19], it can be seen that there is a bunch of mutual relationships between the growth and value for each aspect among the functional, ecological and legal growth and their overall values, and among the values themselves. For instance, the increase in functional growth of uses along the Nile River, particularly, in 1925 led to steep decline in the functional and ecological values despite the massive numbers of laws and regulations to control the urban development along the river banks. Thus, it can be concluded that the balanced development between the functional uses, the natural environment and urban activities along the river banks with strict applied legislations will raise the level of the whole values which in turn will be reflected positively on the public interaction with the river and its spaces.

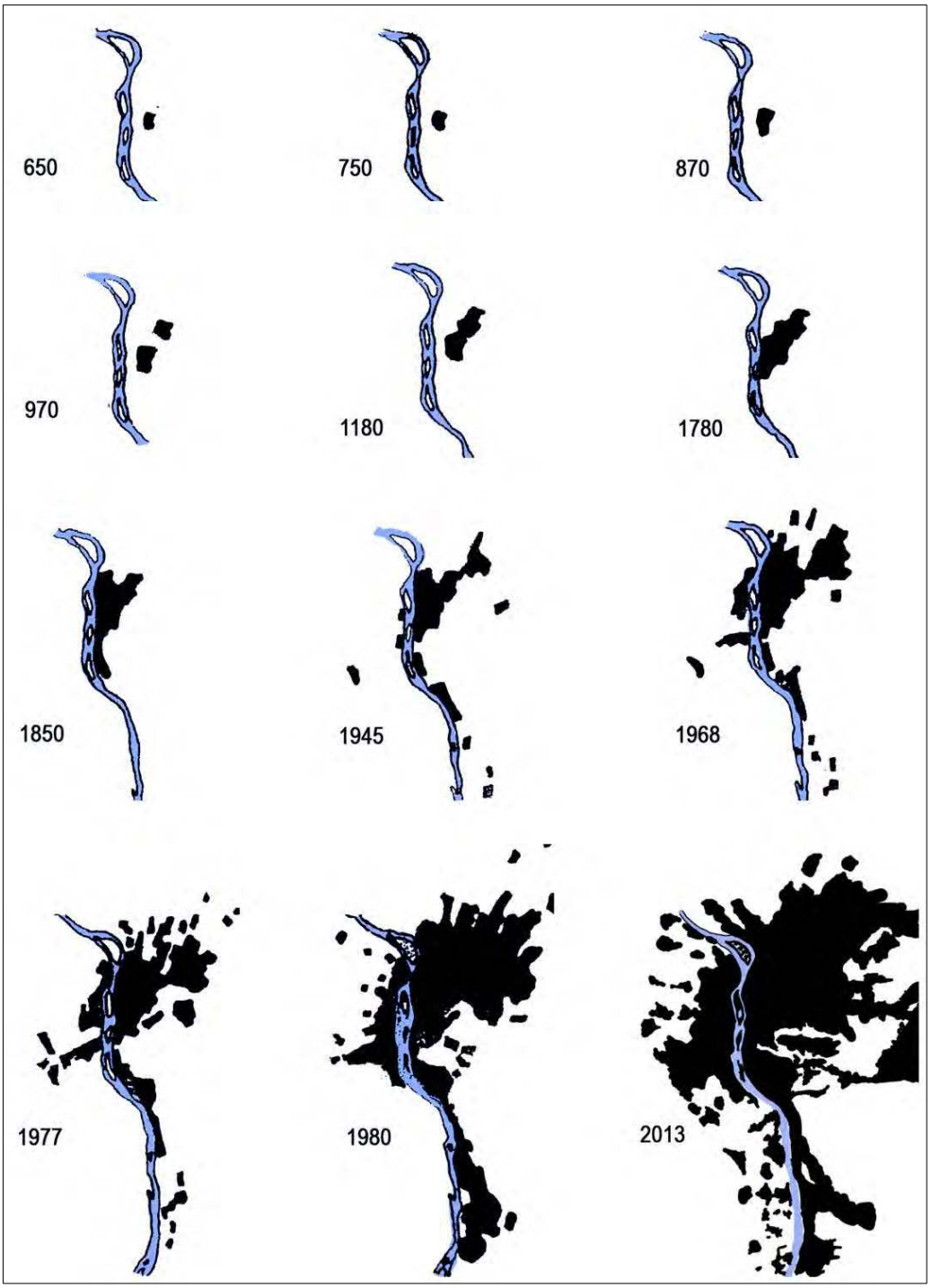


Figure.20: The sequential urban evolution for the city of Cairo from 650 AD till 2013. Source: El-Menshawy, 2011 with modification by author.

2.3- Criteria for the selection of the studied area in Central Cairo:

To study the urban waterfront in Central Cairo, the city business district area (CBD) was selected [Figure.21]. This area is considered as one of the most significant and attractive areas in Central Cairo economically, politically, socially, environmentally and recreationally, particularly, because of its strategic location that connects it with the main axes and squares and which has a strong impact on the functional aspect of the land uses along the Nile. Therefore, promoting it will enhance the public interaction with the river from all precedent aspects, thus bringing the river back to the city- believing that small interventions can make great effects. Another reason for this selection is that, many studies and researches tried not to interfere directly in the CBD due to the sensitive relation with the river, limited options and the very little opportunities to make a radical intervention.

The identified area extended on around 3.5km length south-north starting from Qasr Al-Nile Bridge to the south till Imbaba Bridge to the north and about 100m width offset from east and west banks in order to include the first row of urban functions with their riverbanks. Thus, the borders are as the following: [Figure.22]

1- North side: Imbaba Bridge.
2- East side: east bank of the Nile River in Cairo Governorate with 100m width.
3- South side: Qasr Al-Nile Bridge.
4- West side: east bank of Zamalek Island with 100m width.

After defining the area, it was divided into three sectors and each sector covered a certain zone and was bordered also by two bridges from the north and south with a bank offset of about 100m width to the east and similarly to the west. This sectorial division was adopted in order to define, study, and analyze the area easily in general and to identify the strengths, weaknesses, opportunities

and threats of each sector via SWOT analysis in particular. Furthermore, many researchers and studies used this approach for the analysis process (Sami 2011, El-Menshawy 2011, the Research and Consulting Center and Urban Studies 2005).

The three sectors extended respectively from: [Figure.22]

1. Qasr Al-Nile Bridge till 6th of October Bridge (1st sector).
2. 6th of October Bridge till 15th of May Bridge (2nd Sector).
3. 15th of May Bridge till Imbaba Bridge (3rd Sector).

To conclude, after the definition of the studied sectors based on the above criteria, a detailed functional analysis in the next part will be created.

Figure.21: Map shows the City Business District in Cairo with the main surrounded areas. Source: Google Earth with modification by author.

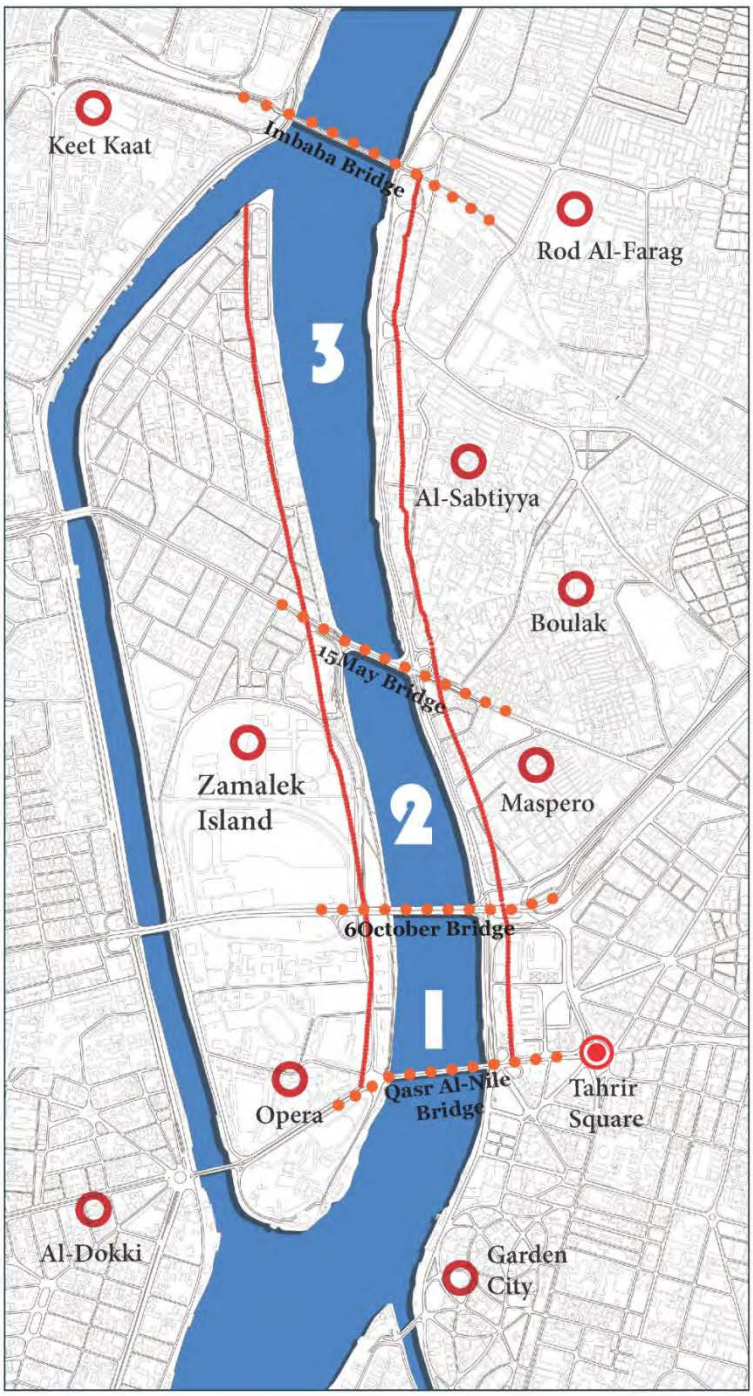


Figure.22: Map shows the studied area with the 3 identified sectors along the Nile in Central Cairo. Source: Author based on CAD map- CAPMAS

2.4- Functional Analysis:

This section deals with the functional analysis of the selected sectors in Central Cairo which will be used as a main key to conduct a detailed SWOT analysis of these sectors. Therefore, after many site visits, direct observation and literature study on the selected area, two main issues were selected in order to fulfill this analysis. They are: first, studying the land uses and functions along the riverbanks, and second, studying the public accessibility to the riverbanks and its obstacles along the shore.

2.4.1- Land Use Plan:

This plan is concerned with a detailed study for the uses of the selected sectors extended on around 3.5km length, starting from Qasr Al-Nile Bridge to the south till Imbaba Bridge to the north with about 100m width offset from east and west banks see [Diagram.2]. This plan considered as a major priority for the recognition of current status of the functions adjacent to the river and its banks as it indicates whether the waterfront is predominantly used for residential, commercial, recreational, administrative, touristic or has a mix of all previously mentioned functions. Later on, it will work as the cornerstone of two more plans studying the water-dependency uses and the green spaces.

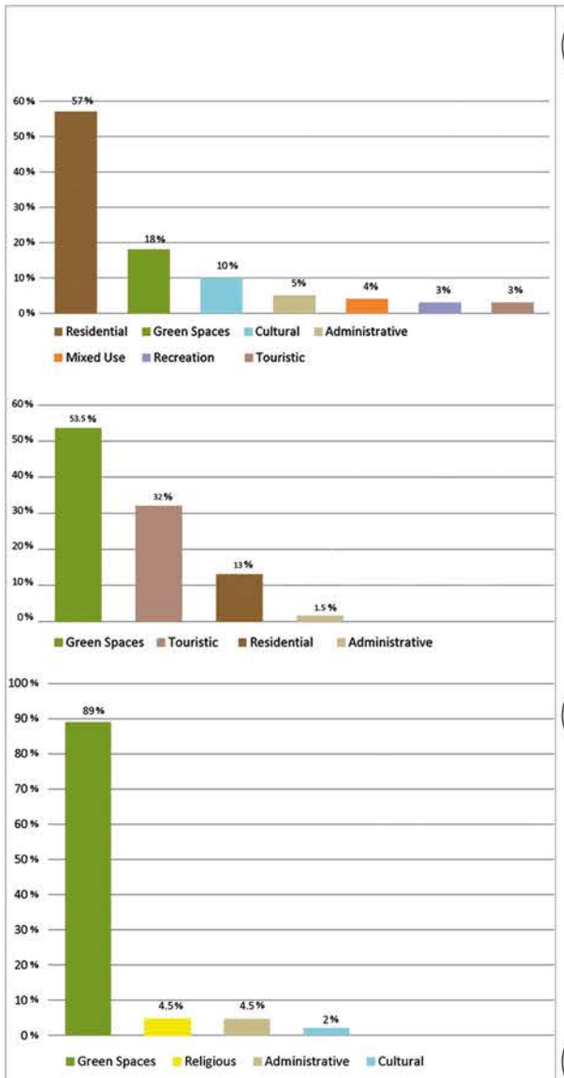
– *How was this plan created?*

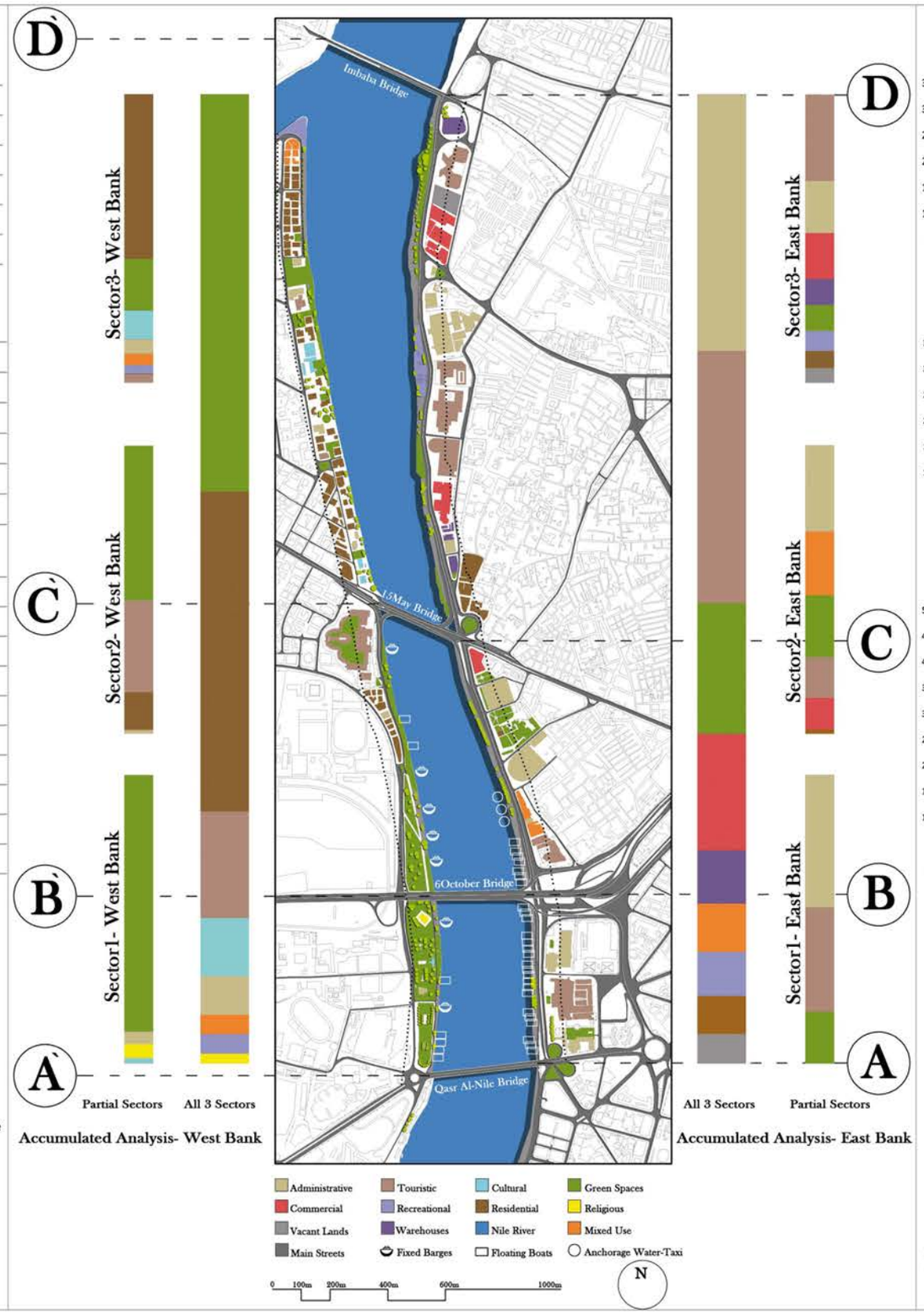
It was created by using three main tools: first, many site visits were made as a main tool in order to get familiar with the site and to gather the required database -depending on observation and taking photographs. Second, digital schemes (CAD plans)- CAPMAS and satellite images- Google Earth were used as supportive aids. Finally, literature study on doctoral and master researches was conducted as a verification tool.

– *Why was this approach used?*

Because using this approach offers many advantages: First, it creates a great opportunity for a huge amount of comparing ways from the functional point of view, such as the overall east side with the west side and also within the same side or any sector with another one and any bank with another bank. Second, it

gives a comprehensive reading of the functions along the river on one hand and a precise one on the other hand. Finally, it enriches the readability of the diagram for experts and normal readers.





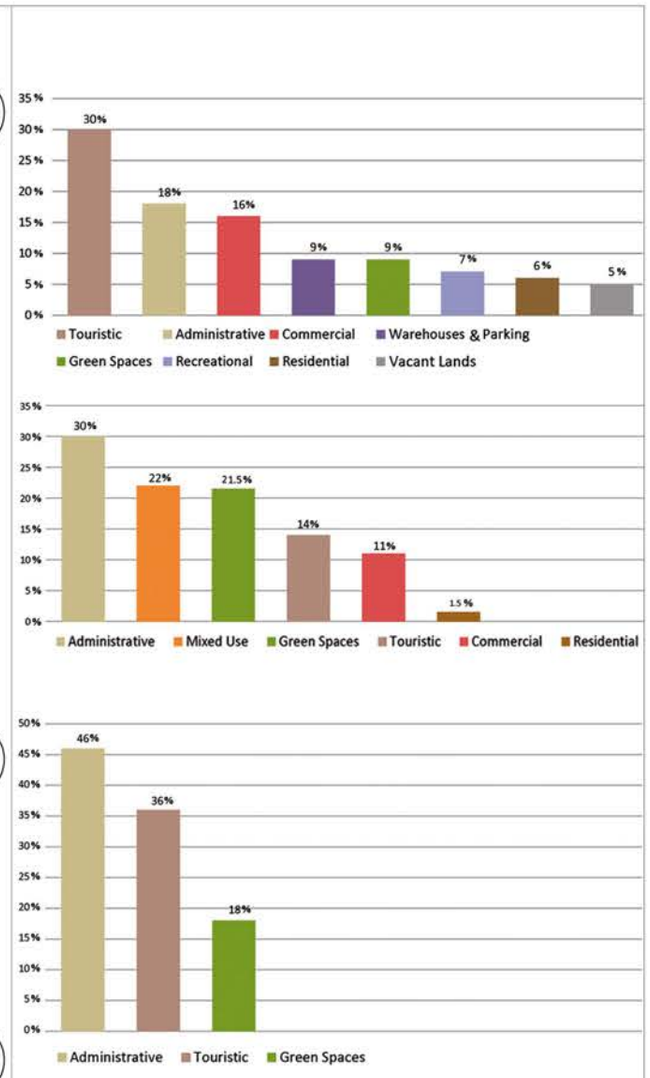


Diagram.2: Land use plan with functional detailed analysis. Source: Author

Detailed Study - reading plan and observations on site:

This section explains the land use plan [Diagram.2] with the observations during many site visits where three main sectors can be seen from south to north (AB-A`B`\BC-B`C`\CD-C`D`) and each sector was divided into two sides; east and west with three banks in each side. To recognize the functions, a stacked column for both sides was created first based on measuring the area for each function in order to have a general overview for the current uses on each side, and second, stacked and clustered columns for each bank were established relying on detailed area calculations for each use in order to identify the land uses of each bank separately and to have a precise survey for the current functions. Accordingly, the detailed study can be explained as the following:

Sector One (AB-A`B`): It is bordered by Qasr Al-Nile Bridge south- till 6th of October Bridge north- with 100m offset width to both east (AB) and west (A`B`) banks. This sector was considered as one of the most important sectors in Cairo compared with the other sectors despite the small linear area which extends along it. This is due to its sensitive location, high pressure and usability, and the direct connection with the main axes and squares like Tahrir and Abdel-Moneim Riyad squares.

- **East Bank (AB):** By looking at the functional detailed analysis in [Diagram.2], it can be clearly seen that nearly half of the current uses along the land adjacent to the riverbanks are administrative, represented by Arab League Building and the National Democratic Party- which was burned and unused- and more than one third are touristic - mainly hotels like Ritz Carlton, while the rest are either private green spaces or small green public areas with lack of amenities that sum up to 18% of the land uses. As for the riverbanks they are mainly occupied by private boats used for the Nile cruises [Figure.23].

Figure.23: The occupied bank by private boats and the main buildings in sector.1. Source: Author.

- **West Bank (A`B`):** From the same diagram it can be clearly seen that green spaces along the bank are dominating 89% of the land uses. However, all these spaces are either fenced gardens with entry fees (like Al-Gezera and Al-Andalus gardens) -which cannot be afforded by many low-income people [Figure.24]- or prohibited areas such as the green areas between the fixed barges and Al-Andalus garden [Figure.25]. Also, the cultural and religious functions were presented via the Egyptian Obelisk and Al-Zamalek mosque which is the only religious use adjacent to the bank along the whole studied sectors.

Figure.24: Al-Gazira fenced Public Garden. Source: Author.

Figure.25: Prohibited area related to the fixed barges. Source: Author.

Sector Two: It is bounded by 6th of October Bridge south- till 15th of May north- with 100m offset width to both east (BC) and west (B`C`) banks. In the past, it was considered as a good example of land use replacements since 1960, which were inhabited by groups of residents to serve the most affluent areas in Zamalek Island (Sami 2011).

- **East Bank (BC):** According to [Diagram.2], nearly one third of the land uses is administrative and is represented by two important buildings (the Ministry of Foreign Affairs and the Radio and Television Building) [Figure.26] and the Brazilian Embassy. Also, mixed use (residential and commercial) and green spaces are almost the same with 22% of the land uses, stressing that nearly all green spaces are private gardens with some linear trees on sidewalks. Whereas the rest of the uses are divided among touristic (Ramses Hilton Hotel), commercial (shops) and residential. As for the riverbanks, they are either occupied by private boats, water-taxi stations or un-used areas [Figure.27].

Figure.26: Panoramic view shows the main buildings- east bank in sector 2. Source: Author.

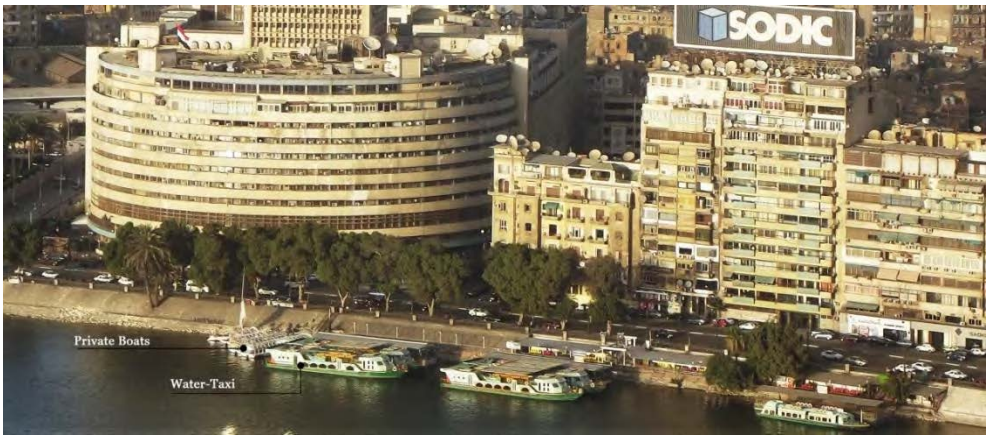


Figure.27: Water-Taxi and private boats- east bank in sector 2. Source: Author.

- **West Bank (B`C`):** It is obvious -like the previous sector (A`B`)- that green spaces are prevalent with more than half of the land uses; however, these spaces are either private nurseries and gardens like (Al-Gezera Club and Youth Center) [Figure.28] or prohibited areas with public utilities like '*rubbish bins*' related to the fixed barges which is a rare thing along the studied area [Figure.30]. Touristic uses are also available and represented by one huge block called (Marriot Hotel) with around one third of the land uses. Besides, there are some residential uses mainly dating back to the first decades of the last century like Nile View and House Pyramid Buildings (Sami 2011) and finally administrative use is represented only by Tunisian Embassy. As for the riverbanks it is mainly occupied by huge fixed and floating barges and boats which are used as luxury restaurants for the rich class [Figure.28] and cause water pollution because of the wastes directly thrown to the river [Figure.29].

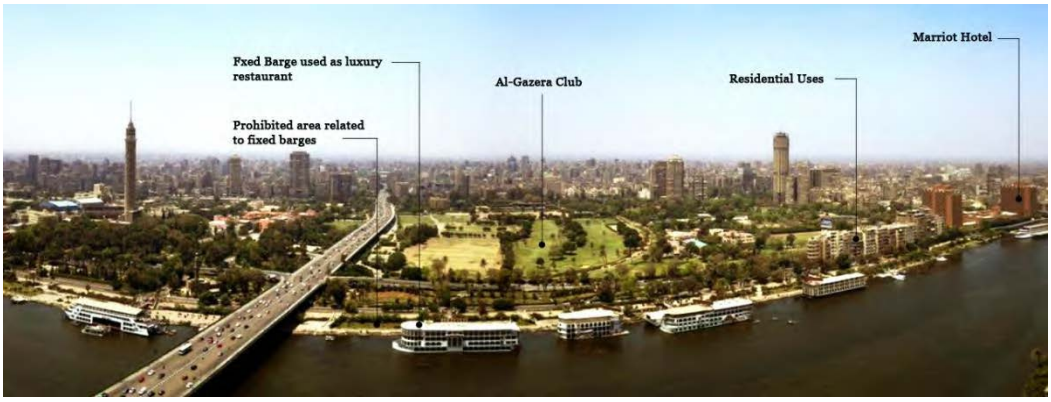


Figure.28: Panoramic view shows the main land uses along west banks in sector 2. Source: Google Earth with modification by author.

Figure.29: Water pollution caused by thrown wastes from fixed barges. Source: Author.

Figure.30: Prohibited areas with public utilities. Source: Author.

Sector Three: It is the longest sector compared with the other sectors. It is bordered by 15th of May Bridge south- till Imbaba Bridge north- with 100m offset width to both east (CD) and west (C`D`). It was one of the most historically linked areas between the Nile River and Greater Cairo region at the time its inception because of the port of Boulaq, which connected the heart of the city by the River Nile. It is also considered one of the first areas where the expansion of urban growth in Cairo occurred (Sami 2011). Today, this sector represents the capital strength due to the important and luxury functions along the riverbanks.

- **East Bank (CD):** based on the clustered column in [Diagram.2]. It is totally clear that it is the most diverse sector due to the different touristic, administrative, commercial, recreational, green spaces and residential uses along both sides, where almost one third are touristic buildings- mainly hotels (like Nile City Towers and Conrad), 18% are administrative uses, such as (The Federation of Egyptian Industries and Egyptian Archives and Library, etc...), about one-sixth are commercial uses mostly banks (like Al-Ahly Bank) [Figure.31]. Besides, warehouses and parking and green spaces are almost the same with 9% of the land uses which appear as longitudinal strips along the riverbank like nurseries and linear trees on some pedestrians routes. Moreover, recreational uses are represented only by Al-Shajarah Casino with a small garden for children along the bank in addition to some residential uses and vacant lands. As for the banks it is either used by nurseries and casinos or deteriorated and un-used with inaccessible random greenery with no pedestrian sidewalks [Figure.32].

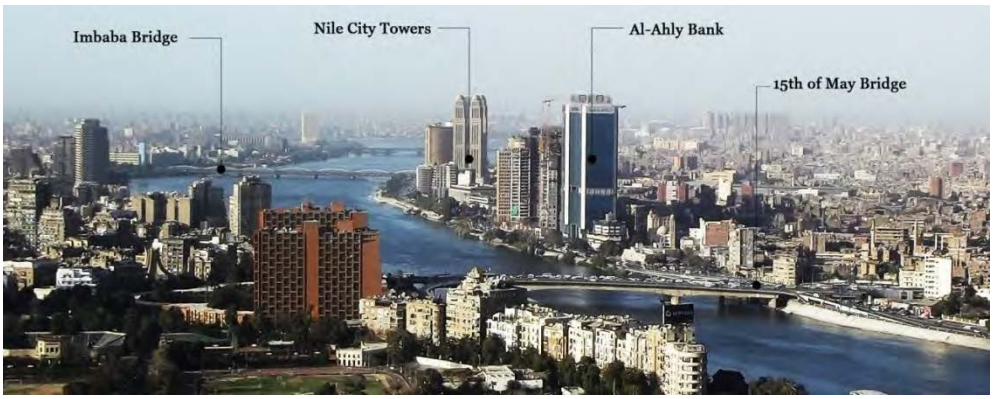


Figure.31: Panoramic view shows the main land uses along east banks in sector 3. Source: Author.

Figure.32: Deteriorated and un-used bank with inaccessible random greenery and with no pedestrian ways- sector 3. Source: Author.

- **West Bank (C`D`):** It has also various uses with a clear domination of residential uses and more than half of the land uses. As for green spaces, they are mostly private and related to residential, cultural or administrative uses with some linear trees along the pathways [Figure.33]. Additionally, there are some mixed uses: cultural (like Cairo Public Library and Center of Arts), administrative- mainly embassies like (Vatican, India, Sweden, Lithuania and Hungary), touristic (like Al-Safeer Hotel) and recreational (only one casino in the upper corner of Al-Zamalek Island).

Figure.33: Panoramic view shows the main land uses along west banks in sector 3. Source: Google Earth with modification by author.

Finally, from the analytical doughnuts in [Diagram.2], a massive difference in the proportion of green spaces and public spaces between CBD area and Zamalek Island can be seen, and this significantly indicates the absence of environmental and social justice between both sides.

2.4.1.1- Water-Dependency Uses Plan:

The term 'water-dependency' by definition is used to specify to what extent waterfront uses and activities are functionally water-dependent (Al-Ansari 2009). It is also used by a number of specialist institutes as a tool to measure the quality of the accessibility of the waterfront (i.e. New York State Department of State 1999). Many experts and researchers (Craig-Smith 1995a; Wernn et al 1983) classified water-dependency into three main categories as the following:

1- Water-dependent uses: are the uses that are mainly dependent on the water to function and without which they cannot function. Thus, waterfront is indispensable (like marina, ferry, water-taxi station, boathouse and all water sport uses).

2- Water-related uses: are those uses that will get a high advantage if they are adjacent to the water but they can also function elsewhere (like hotels, parks, restaurants, resorts, open spaces and aquariums).

3- Water-independent uses: are the one which can function similarly elsewhere in the city without the water (such as administrative and residential buildings, warehouses, parking, shopping malls, banks, offices, schools, mosques and hospitals).

– *How was this plan created?*

Building on the previous definitions and using the land use plan as a reference point, all functions in the studied sectors can be classified into three categories; water dependent, water related and water independent [see Diagram.3].

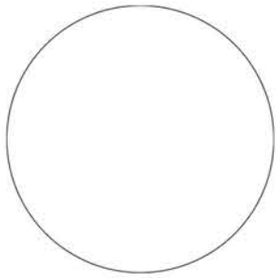
Therefore, by reflecting on the current functions, they can be classified as the following:

- Water-dependent uses are (fixed and floating barges -used as luxury restaurants and bars with separated entrances from the banks, many small ferries for Nile cruises and two water-taxi stations (Masbero and Aljalaa) ,that rarely function, in sector2.
- Water-related uses are touristic (like hotels), green spaces (like gardens) and recreational (like casinos).

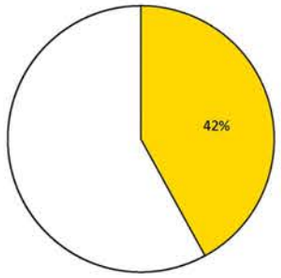
- Water-independent uses are administrative (like ministries and embassies), commercial (like banks and shops), cultural (like opera houses), religious (like mosques), residential, mixed uses and warehouses.

– *Why was this Diagram used?*

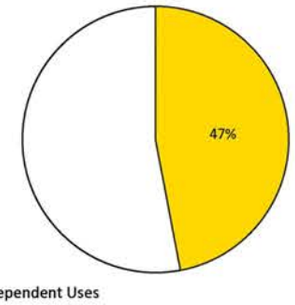
Because using this diagram introduces many advantages. First, it explains the types of the functions for each bank in relation to water-dependency. Second, it gives a comprehensive overview of the water-independent and water-related uses in general and a detailed overview of the water-dependent uses in particular. Finally, it offers a great opportunity for a vast amount of comparison ways that were mentioned previously.



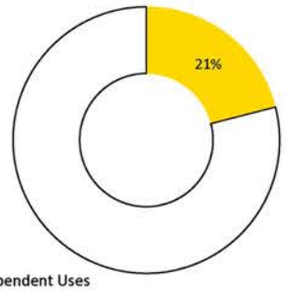
There are No water dependent uses Only for two villas



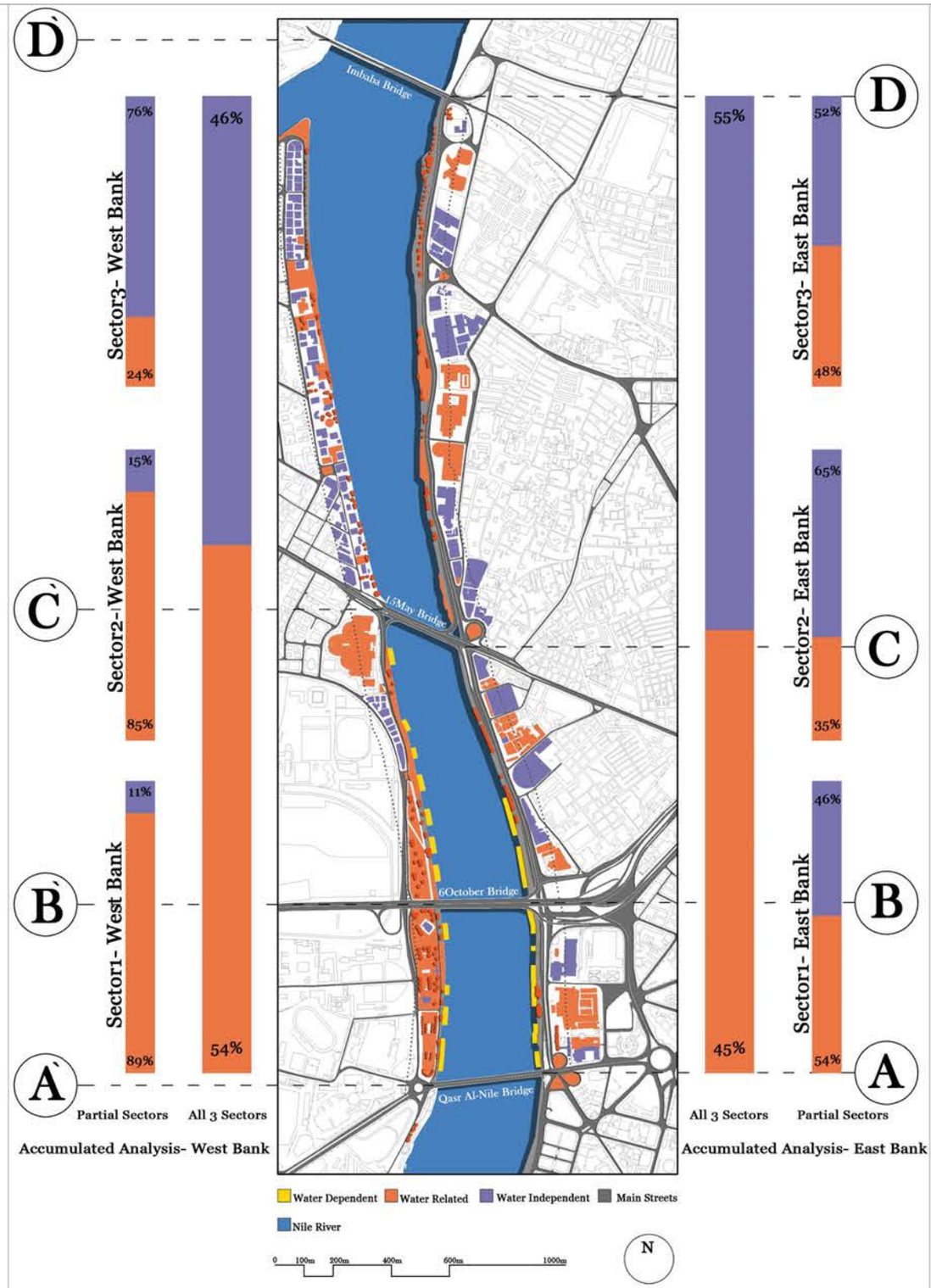
42%Water Dependent Uses of the bank and they are mainly fixed barges

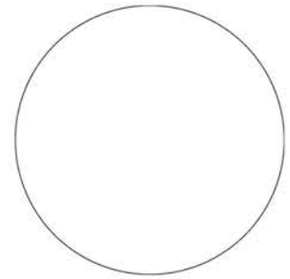


47%Water Dependent Uses of the bank and they are fixed berges & private boats for Nile cruises

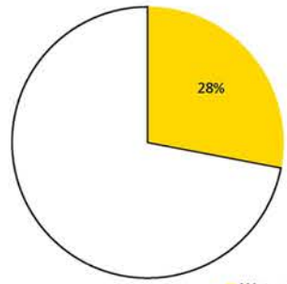


21%Water Dependent Uses of the all west bank

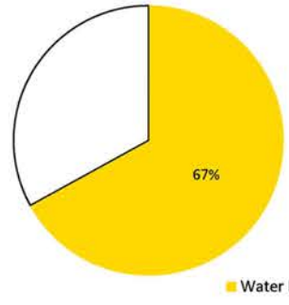




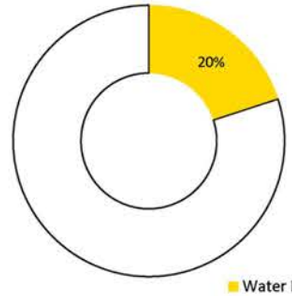
There are No water dependent uses



28%Water Dependent Uses of the bank and they are boats marinas for Nile cruises & Water-Taxi stations



67%Water Dependent Uses of the bank and they are mainly marinas boats for Nile cruises



20%Water Dependent Uses of the all east bank

Diagram.3: Water-dependency Uses Plan with analyses. Source: Author

Detailed Study - reading plan and observations on site:

This diagram explains the water-dependency of the current functions along the selected area with the observed features during the field study. Consequently, the areas of water-related and water-independent uses were calculated together as they are represented by buildings while the water-dependent uses are mainly fixed and floating barges and boats. Another aim is to see how many water-dependent uses exist and how long they cover from each bank.

In [diagram.3] - from the overall stacked column, it can be seen that the water-independent and water-related uses for both sides are nearly opposite where the water-independent uses for the east side are almost the same of water-related uses for the west one and vice versa. Also, it is obviously visible that sector2 in the east side has the highest amount of water-independent uses while it is so in sector3 in the west side. This is mainly due to the high amount of administrative and residential uses respectively. Both sectors 1 and 2 in west bank have the highest amount of water-related uses; this is due to the large expanse of green zones. As for the water-dependent uses, it can be clearly seen that they are absent in sector3 despite the very high diversity in activities along both sides while sector1 in the east bank has the highest amount of water-dependent uses despite the domination of administrative uses. These water-dependent uses are mainly private boats for Nile cruises with usually costly fees for tourists. As for sectors 1 and 2 in west bank, they have convergent percentages of water-dependent uses which are mostly fixed and floating barges and boats.

2.4.1.2- Green Spaces Plan:

Before explaining the green spaces plan, a quick overview of the portion of greenery per capita (m2) in Egypt will be presented, particularly in Cairo compared with some developed and developing countries [Table 2].

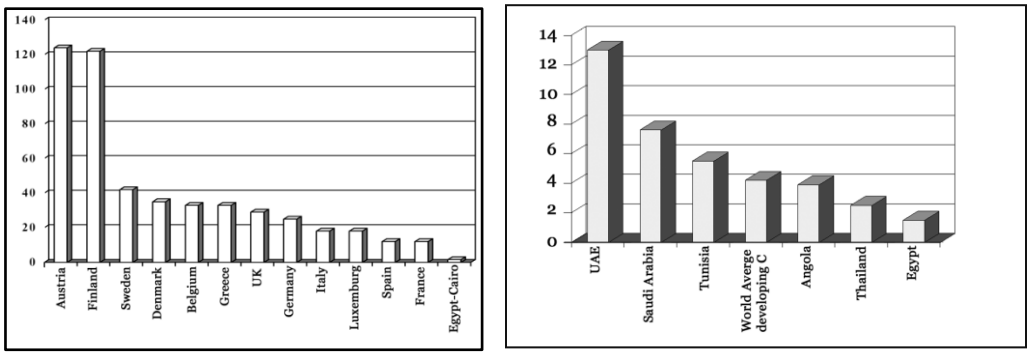


Table.2: portion of greenery per capita (m2) in developed and developing countries. Source: Master Plan 0f Greater Cairo, 2005

From both tables, extreme lack of green spaces in Egypt can be clearly seen and particularly in Cairo with about 1.5m2 greenery per capita (Master plan of Greater Cairo 2005-R.2). Accordingly, creating the green spaces plan will help to illustrate these types of greenery where it aims firstly, to show how many public spaces within the studied area are available via sorting the current greenery types and secondly, to define the nearest public parks and green spaces from the studied area and the walkable distance to reach them. Therefore, the previous land use plan was used as preliminary layer to define the overall green spaces, and then the current greenery types were sorted to private, public and nurseries [Figure.34].

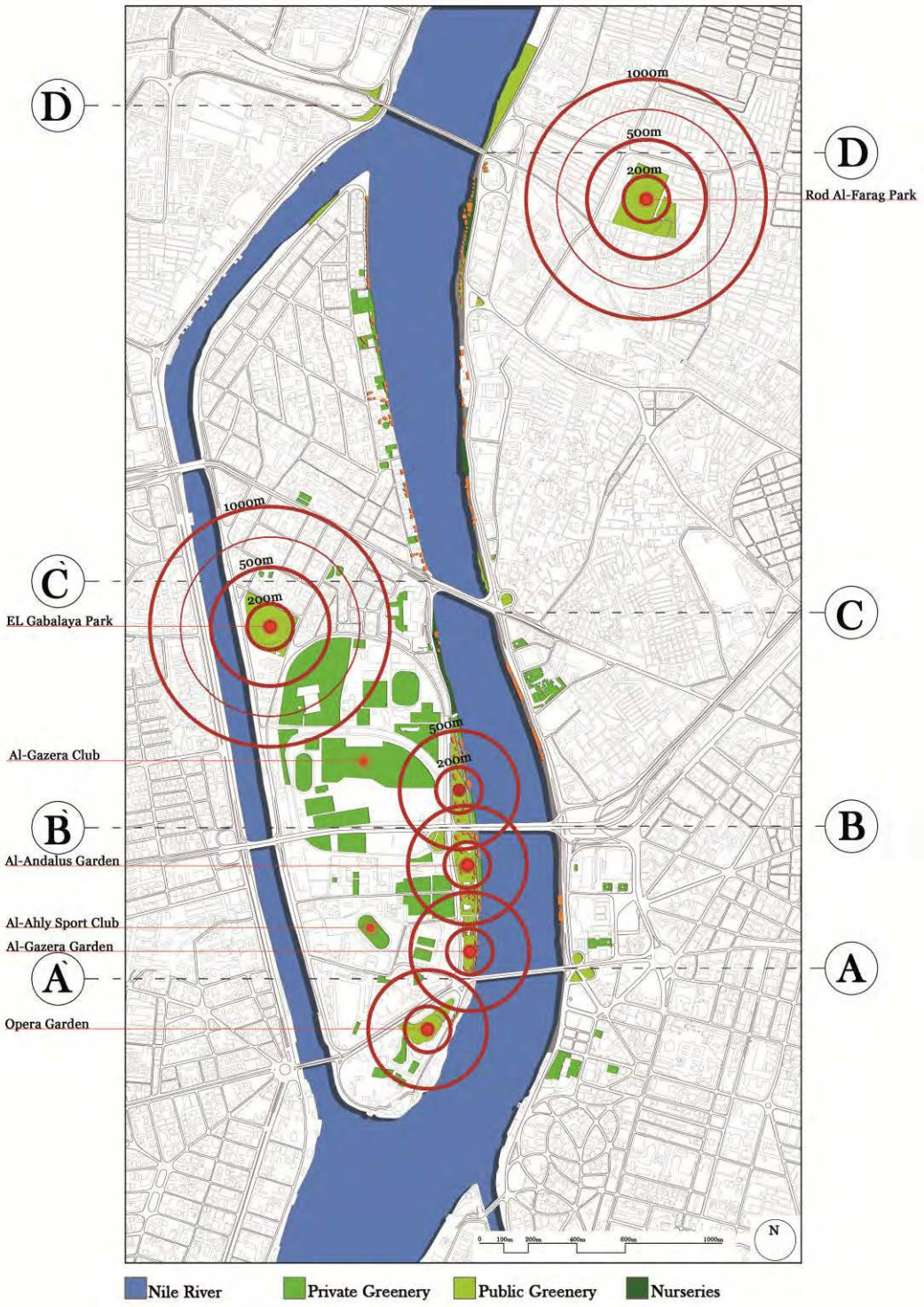


Figure.34: Green Spaces Plan and the walkable distance of public green spaces. Source: Author.

Detailed Study - reading plan and observations on site:

Based on the above plan, extreme lack of public green spaces can be observed, particularly along the east side where there is only Rod Al-Farag Park with a walkable distance of about 1300m from the waterfront while along the west side there are three public gardens close to each other; Al-Gazera, Al-Andalus and Opera and one park (El-Gabalaya). And by drawing a circle with 200-500m diameter for the existing public gardens and 500-1000m for the parks to see the walkable distance and what area do they cover (IAU 2009), it can be concluded that they are only covering a small area in the west side and very little area in the east. Furthermore, all these spaces need an entry fee, and if not, they are extremely small and surrounded by roads with no any amenities [Figure.35]. As for the private green spaces, they are mainly dominating in the middle of Zamalek Island and mainly represented by Al-Alhly and Al-Gazera clubs. As for the nurseries, they are privately owned and particularly located in east side [CD] with small part in west side [B`C`].

Figure.35: Public green area surrounded by roads without any amenities. Source: Author.

2.4.2- Public Accessibility:

The main aim of studying the public accessibility along the riverbanks in the selected area is to define the major physical and visual obstacles that prevent people from using the river and its banks while taking into account the river topography which can affect any futuristic proposals that would facilitate the public accessibility. Therefore, after many field visits for east and west sides trying to observe the main reasons that hinder people accessing the Nile and using its banks actively, a set of obstacles were defined and divided into physical

and visual obstacles along east and west sides [Figure.36] with a glance in the end at the river topography.

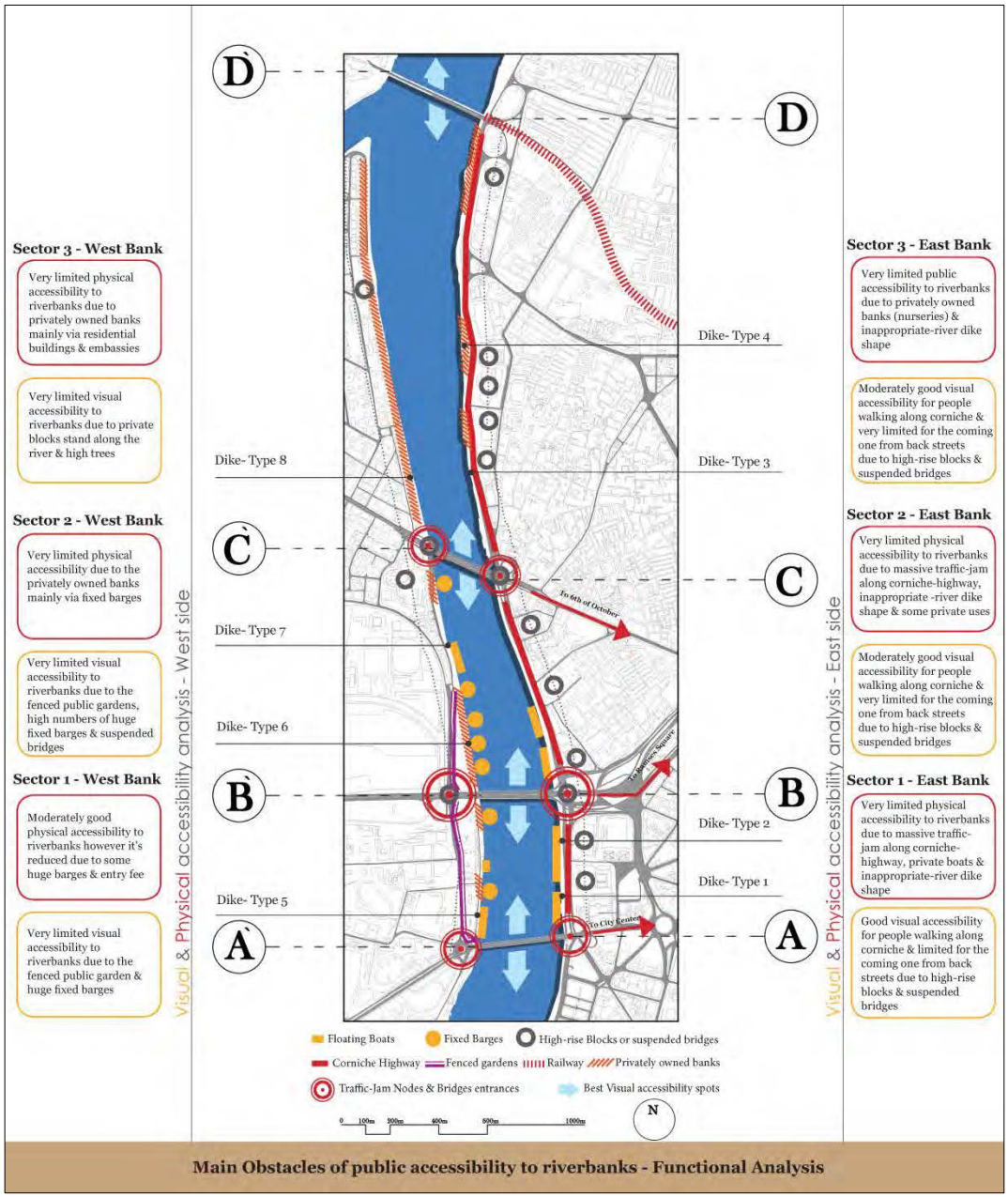


Figure.36: Plan explains the main physical and visual obstacles of public accessibility along Nile riverbanks in the studied area. Source: Author.

2.4.2.1- Physical Obstacles:

- **East side**: Two main physical obstacles can be seen. First, the Corniche Highway, this is extended along the east bank with a massive traffic jam hinders people to get to the pathway adjacent to the river and creates undesirable environment for strolling [Figure.36], particularly the nodes where bridges meet the Corniche [Figure.37], aside from the lack of amenities along pedestrians pathways. Also, the Master Plan of Greater Cairo (2005-R.1) stresses on a massive traffic jam problem along east-bank in both sectors 1 and 2. Second, the shape of river dikes and its stiff material, which forms a rigid barrier, prevents people to reach the watercourse and interact with the river changes. Therefore, the main typologies of the river dikes were defined by creating eight dikes sections in different places in the studied area along both east and west sides in order to recognize their shape, the utilized material, direct usage and relation with pedestrians and water levels and they also allow for direct comparison among all banks [Table.3+Table.4]. Besides, by linking these types with the main waterfront typologies (1.8) in chapter.1, three types can be seen; first, 'the Setback' as Type.1 in Cairo by having a highway along the whole east side, and second, 'the Natural Bank' as Type.3 in some areas in sector.3 along the east-bank; however, it has no access with a very steep slope. Finally, in the west banks, 'the Pier' is somewhat like Type.6 in sector.1 and 2, particularly in areas between the fixed barges and the pedestrian sidewalks.

Figure.37: Massive traffic jam in Abdel-Moneim Riyad square connected with 6th of October Bridge. Source: Author.

- **West side**: Also, two main physical obstacles can be detected: first, the high number of privately-owned riverbanks used by residential, administrative and touristic uses mainly in sector3 which prevent the public accessibility to riverbanks, and second, the fixed barges which occupied large areas from the overall shore and public gardens mostly in sectors 1 and 2 [Figure.38].

Figure.38: Fixed barges block the physical and visual public accessibility due to the occupation of spaces adjacent to the river. Source: Author.

2.4.2.2- Visual Obstacles:

- **East side**: The visual accessibility is moderately good for the people walking along the Corniche. However, it is very limited for people coming from back streets due to the high-rise blocks which stand along the lands adjacent to the river with close spaces in between especially sector 2 and 3 [Figure.26+Figure.31]. Also, bridges crossing the Nile play double role; positive as they offer panoramic view up and down the river and result in

heavy public uses of the bridges for this purpose and negative as they form a suspended barrier for people on site [Figure.39].

Figure.39: 15th of May Bridge blocking the river view. Source: Author.

- **West side:** The fenced public garden is surrounded by a dense gazon wall [Figure.40] and also the huge fixed barges in sectors 1 and 2 in Zamalek Island work as a visual barrier for the public alongside the river [Figure.38].

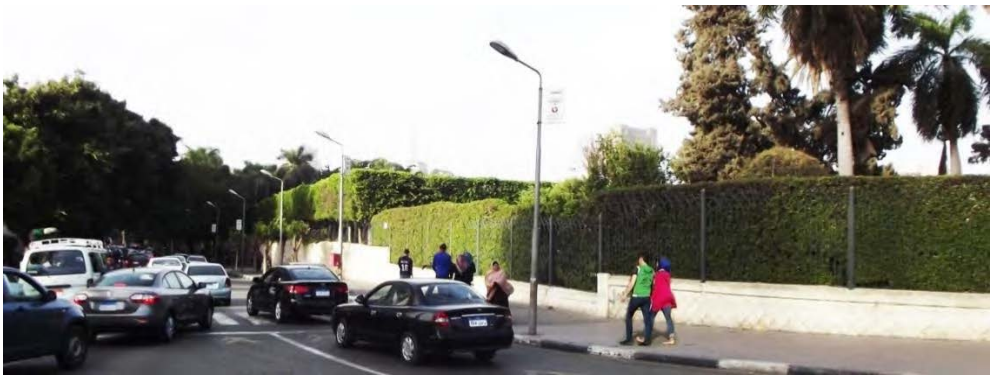


Figure.40: Dense gazon wall for public garden blocking the river view. Source: Author.

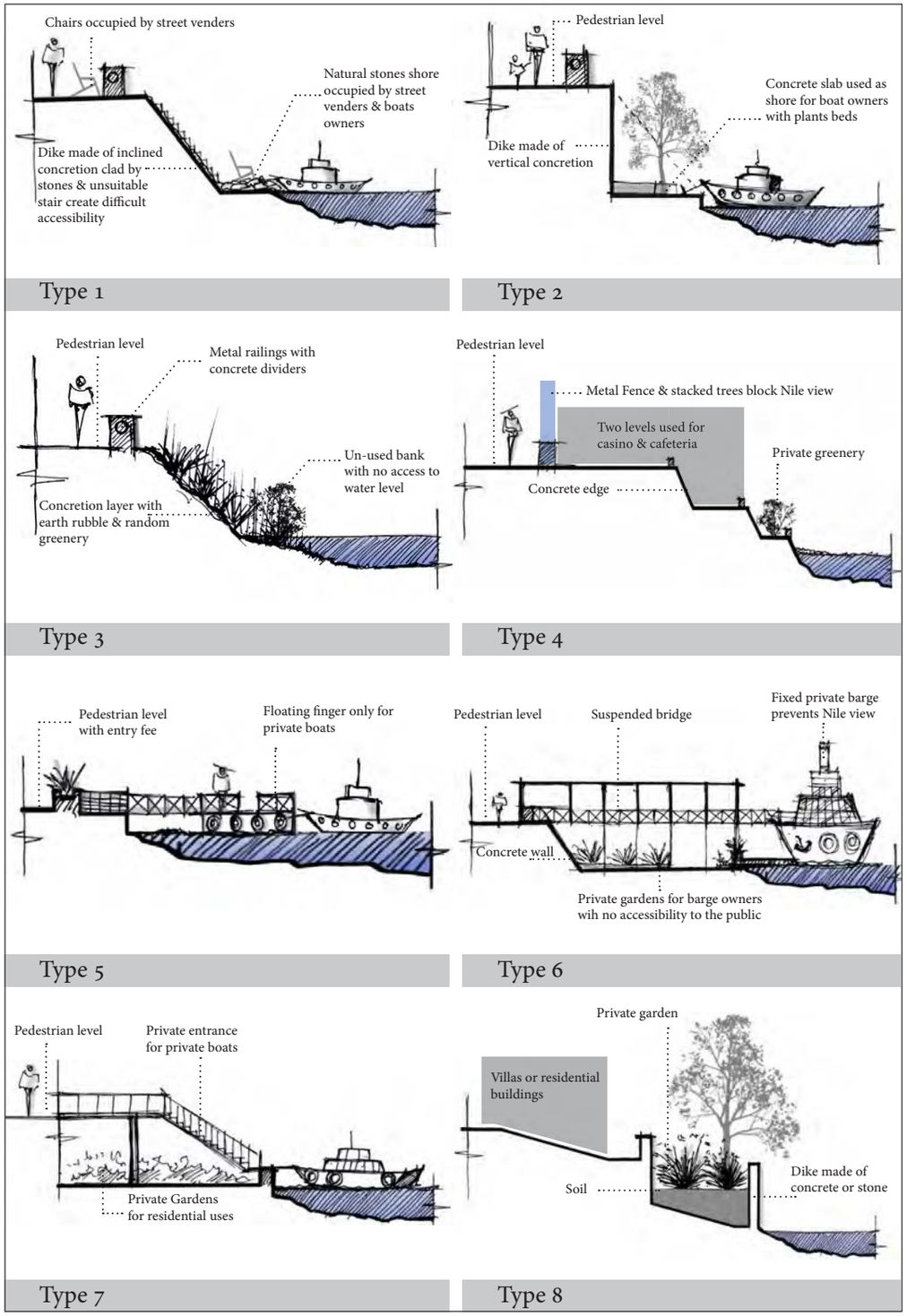


Table.3: Sketches explain the main typologies of the river-dikes alongside the studied area. Source: Author

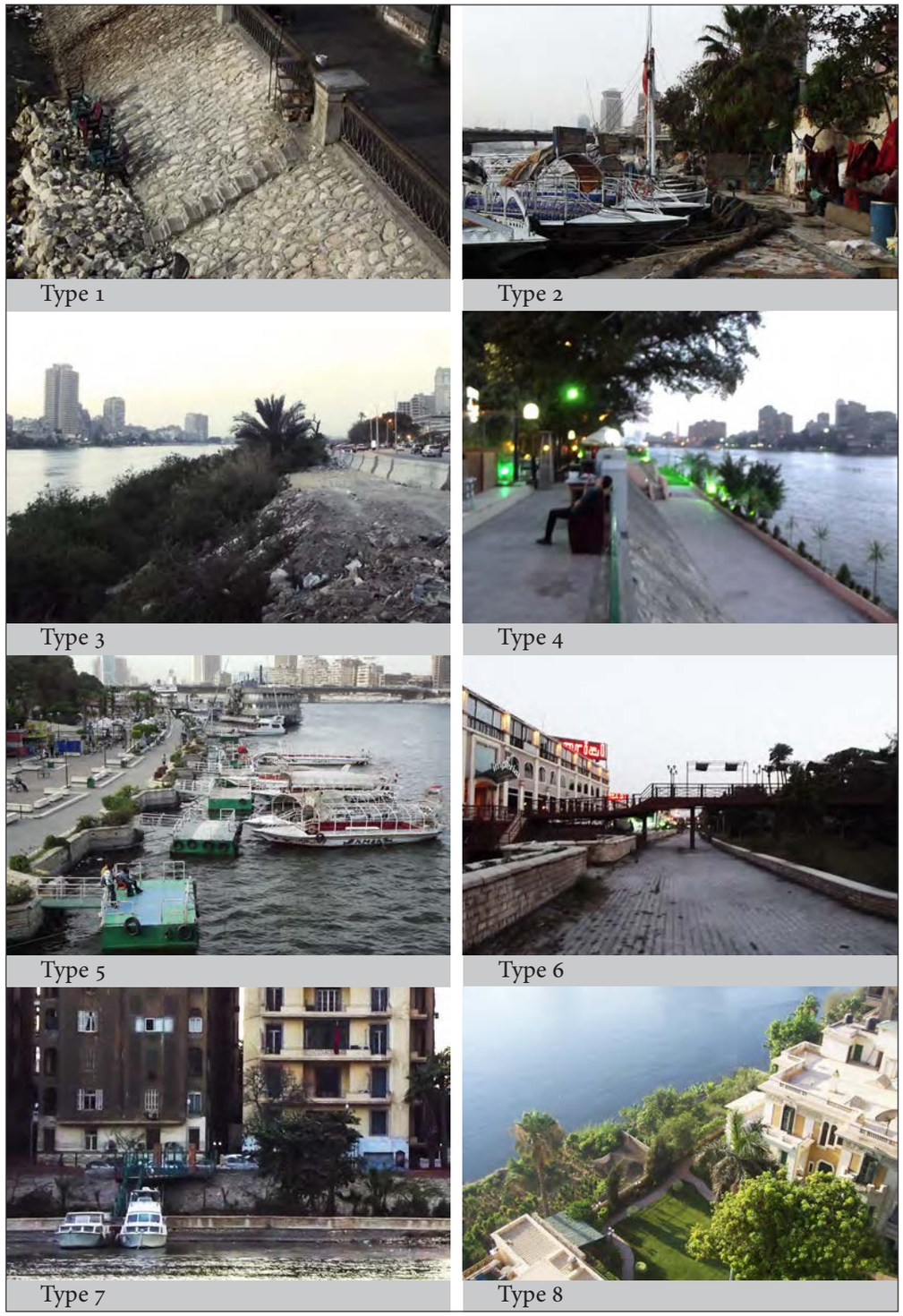


Table.4: Photos show the main typologies of the river-dikes alongside the studied area. Source: Author

2.4.2.3- River Topography:

The main aim of creating a glance about the river topography is to know three important issues these are: first, the height of the river dike in the selected area ,second, the flood level, and third, the water depth (riverbed). Therefore, the researcher uses literature studies, the Master Plan of River Nile in Greater Cairo, and satellite images from Google Earth Pro.

Based on [Figure.41] it can be seen that the height of the river-dike is about 6m (Hussin, M. 1996: 120) which is the pedestrian level. As for the height of the river flood in Cairo it was 25ft (7.6m) before building the high dam in 1970 (Budge, Wallis E A 1895). However, after building the dam it declined to range between (1-2m) (Kondolf G.M., et. al. 2011) and the highest flood level reached about the half of the river-dike mainly between June and mid-July. While the highest water level doesn't exceed the level of water-dependent activities.

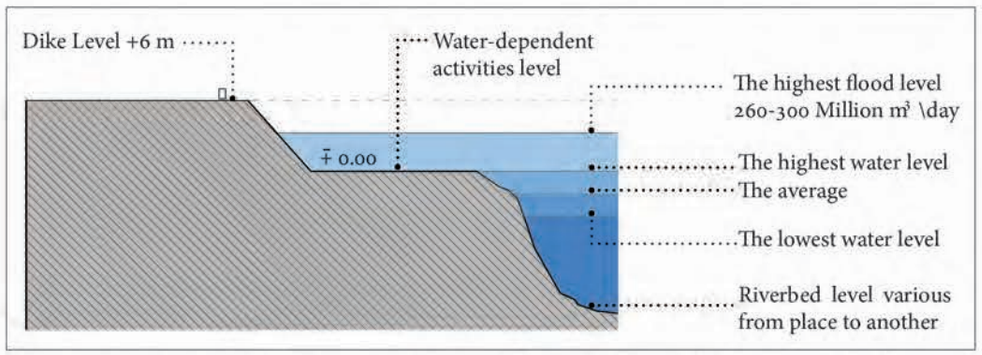


Figure.41: Cross-Section in the river Nile. Source: Author based on the Master Plan of the River Nile in Greater Cairo.

As for the water depth (riverbed), four cross sections were made in different places along the studied area using satellite images from Google Earth Pro [Figure.42]. Based on these sections, it can be seen that the depth of the riverbed range from 21ft to 55ft or about 7m to 17m where it increases gradually from south (1st Sector) the the north (3rd Sector).

Finally, according to all analyses two main issues have to be taken into consideration during the design proposals, the flood level with the water-table fluctuation, and the river profile.

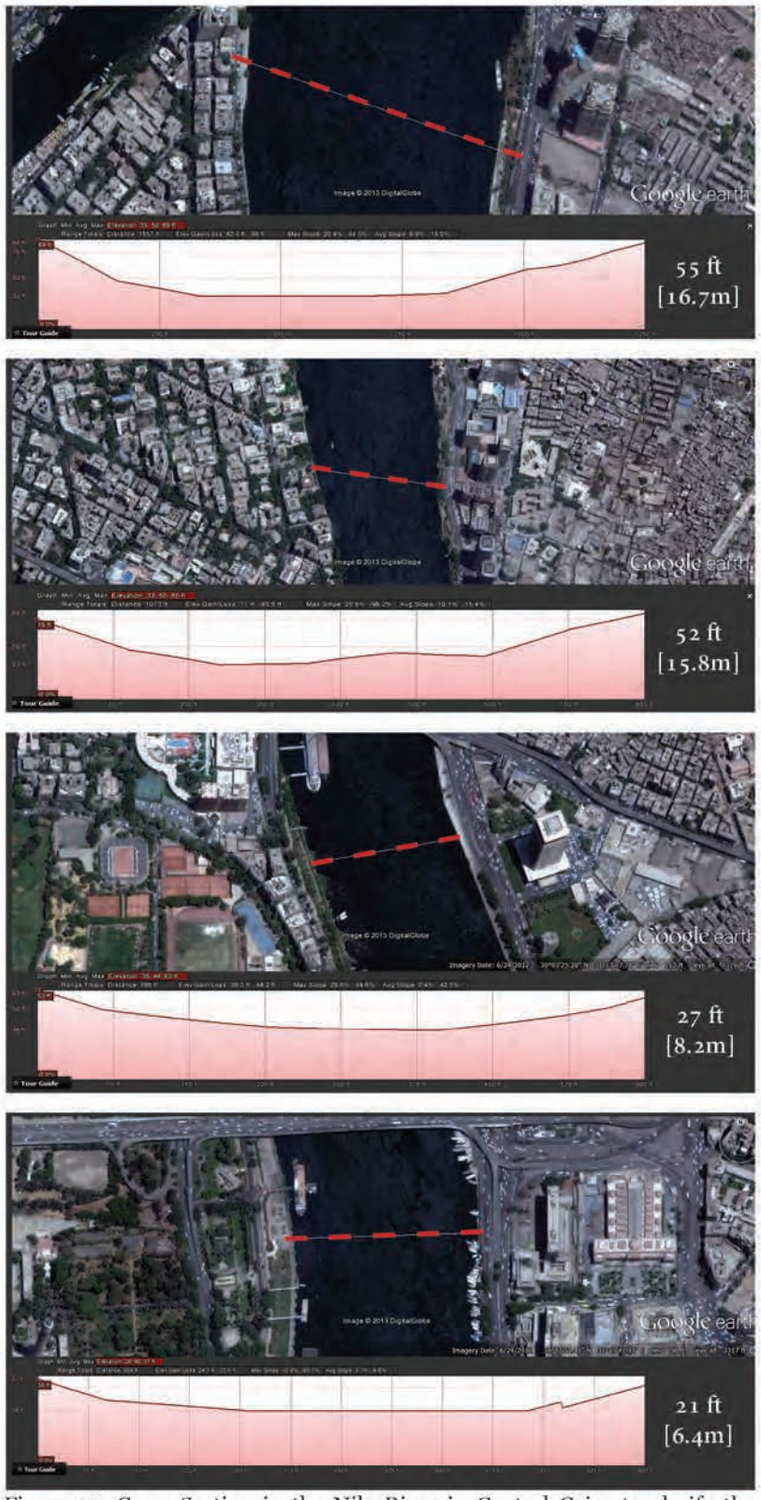


Figure.44: Cross-Section in the Nile River in Central Cairo to clarify the depth of the riverbed . Source: Author based on Google Earth Pro.

2.5- Social Analysis:

This section deals with the social analysis of the selected sectors which will be used in parallel with the functional analysis to the SWOT analysis. Therefore, a questionnaire was designed to find out the opinion of the public and experts in relation to the selected area [Figure.22]. This questionnaire has three main aims; firstly, to identify the core problems that affected the Nile waterfront in Central Cairo based on experts and public's point of views, second, to define the main related functions to the riverbanks that the public would like to have and experience and the experts will see as appropriate for the waterfront in CBD, and finally, to look for the public and experts' vision and needs in order to guide the proposed design approaches in Chapter 4.

2.5.1- Groups Identification:

There are two groups; public and experts. These groups will include both genders, different specializations and several age groups and particularly the young people group which represents 40% of Egyptian society - aged between 10 to 29 years old (the seventh day 2009).

1. The public group: contains two kinds of people;
- People who use the space permanently like (workers and residences).
- People who use the space temporarily from different areas in Cairo (like people coming for recreational or any other activities).
2. The experts group: includes also two categories;
- Experts who have great knowledge about the Nile River in Cairo like (professors, architects and urban planners).
- Academics like Master students in Ain Shams University who are studying and doing their research about the waterfront development of the Nile River in Cairo.

2.5.2- Questionnaire Analysis:

The 50[11] questionnaires were made for 30 public individuals and 20 experts, asking them the same questions and in the same order. The distributed questionnaire included closed-ended questions where quantitative data were needed, and open-ended questions where people could write whatever they wanted and which were flexible to be formulated in different ways. Questions were asked in an understandable and direct local language (Arabic) in order to obtain the intended information. The questionnaire has three general questions at the beginning and then three main parts. Each part has seven questions that cover the three previously mentioned aims (see Annex I).

2.5.2.1- Main Findings: As a result of the used questionnaire (Annex I), the main findings of the focal questions referring to the highest selected choices in percentages form the multiple-choice or yes-no questions and the significant repetitive answers of the open-ended questions can be introduced as the following:

- **General Questions:**

- Question (2): 50% of the participants from both groups were going to the Nile waterfront for recreational activities.

- **Part One: Deals with the identification of the core problems along the riverbanks in Central Cairo**

- Question (1): 50% of the participants from both groups answered that the main core problem affecting the Nile riverbanks in Central Cairo is the traffic pressure along the Corniche Highway and the difficult physical and visual accessibility to the riverbanks has given the second priority.
- Question (2): Participants also mentioned other problems mainly like the lack of shaded places and huge numbers of privately owned banks.
- Question (3): As proposals for the core problems in Question (1), participants, particularly experts, suggested providing an efficient public

[11] 75 copies had been distributed between public and experts. However, around 25 people refuse to do it or answer part of the questions. Therefore, this led the researcher to take the complete 50 copies and neglect the other.

transportation system and water-taxi networks along the Corniche to connect the Nile waterfronts with the city center and increase accessibility for public via transferring the Corniche Highway into public spaces and changing the traffic to alternative streets.

- Question (4): 80% of the experts and 61% of the public said that it is difficult to reach the riverbanks in Central Cairo and both groups mentioned that this is mainly due to the traffic pressure along the Corniche, privately owned banks, the dike shapes and the land uses, and inappropriate functions.
- Question (5): 63% of the experts and 51% of the public answered that the current pedestrian sidewalks located along the riverbanks need to be expanded and separated from cars.
- Question (7): 95% of the experts and 80% of the public answered that amenities and public utilities along the riverbanks in terms of type, numbers and location are either bad, or bad and unsuitable.

– **Part Two: Concerned with the definition of the main related functions to the riverbanks in Central Cairo**

- Question (2): The participants mentioned that the limited recreational activities in some public gardens and open spaces, difficult strolling along pedestrian sidewalks with unsuitable amenities, Nile cruises, limited and inappropriate fishing and cycling places are the currently used activities along the riverbanks and that they would like them to be developed.
- Question (3): More than half of the experts and the public answered that they reach the riverbanks by car. Nevertheless, 64% think that public transportation as (metro and bus) are the appropriate ways to get there. And around a quarter of the public said that they use the bike despite the absence of paths along the Corniche.
- Question (4): the boulevard along the riverbanks for pedestrians and cyclists was given the highest priority use by public then recreational activities and public gardens as a second priority. While experts selected the

aforementioned first and then they prefer to have plazas with proper amenities.

- Question (6): Almost 70% of both groups answered that the current public spaces and recreational areas along the riverbanks are inadequate. Besides, as proposed solutions the experts suggested replacing the private ownership of some places or buildings, particularly the administrative ones, with public spaces and linking them with recreational activities.
- Question (7): Nearly half of the public would like to have spaces along the riverbanks that are free and only for the public. On the other hand, 84% of the experts liked to have some spaces for public and other for private, whereas the majority went for this second option.

– **Part Three: Looks for the public and experts' vision of the Nile riverbanks in Central Cairo**

- Question (1): The participants answered for the selection of non-existent functions along the riverbanks that they aspire to have in the future; active recreational areas such as gardens and public spaces, fishing areas, water sports and activities such as rowing, places for sailboat competitions, popular celebration areas, cafeterias and restaurants and open air cinema.
- Question (2): Almost 70% of both groups answered that the design of the riverbanks should create a balance among recreational, environmental, cultural and historical aspects via using a multi-functional approach.
- Question (3): The participants defined the most attractive places as destinations in their opinion along the riverbanks and neighboring areas like Tahrir Square, Qasr Al-Nile Bridge, public gardens in Zamalek Island, opera and Egyptian Museum and the Nile cruises places and floating restaurants.
- Question (4): 58% of the public chose that they prefer to have a sandy shore along the riverbanks and 50% of the experts shared the same desire with them.

- Question (5): Around 70% of both groups chose to answer that the most appropriate way to build along the riverbanks is to use the Corniche Highway as recreational area and public gardens for pedestrians and cyclists and digging tunnels for cars underneath then build; however, some experts found that it can be a costly solution.
- Question (6): The most selected activities that the public would like to practice are sitting along the riverbanks, strolling, relaxing with 21%, 18% and 15% respectively. While the experts mainly selected enjoying the natural scenes, strolling and relaxing with 14% for all selected choices.
- Question (7): The public and experts' vision for the Nile waterfront was explained as: the Nile waterfront should be an accessible, clean, multi-functional green space with all proper amenities and should be open for all people, attractive for tourists, and connect the authenticity of the Nile with the surrounding civilization.

2.5.3- Conclusion:

Based on the previous findings, it can be seen that the main answers of the public and experts are extremely close to each other. In the first part, the public and experts defined the traffic pressure along the Corniche and the difficult accessibility as the core problems and they agreed that amenities and pedestrian sidewalks besides the riverbanks are bad and unsuitable and the aforementioned one need to be expanded and separated from cars. Besides, the second part shows that they are convinced that the public transportation is the appropriate solution along the Corniche and they agreed that the current public spaces and recreational areas along the riverbanks are inadequate and need to increase and be linked with proper activities. Finally, in the third part, it can be seen that they have approximately similar desire in terms of the design, destinations and activities that they would like to have and practice as well as the final vision of the Nile waterfront.

2.6- SWOT Analysis - Analytical Study:

This part deals with the SWOT analysis using both functional and social analyses in order to know the weaknesses and the threats affecting the studied sectors which will be used as an essential method for the identification of the core problems, in addition to define the strengths and opportunities for the purpose of guiding the design proposals.

Sectors	Sector One	
Banks	**East**	**West**
Strengths	– Site location in CBD adjacent to the main axes & squares (Tahrir & Abdel-Moneim Riyad) & significant landmark (Egyptian Museum). – Nearly 70% of the banks occupied by water-dependent uses (Nile cruises via private boats). – Good visual accessibility for walking people along corniche sidewalk.	– The highest amount of water-related uses mostly public gardens with almost 90% of land uses. – Almost half of the banks occupied by water-dependent uses (fixed barges- as floating restaurants and private boats for Nile cruises). – The possibility to reach the watercourse. – Moderately good physical accessibility to riverbanks.
Weaknesses	– Extreme lack of functional diversity - nearly half uses are administrative (water-independent uses) which create undesirable environment for public to come. – Massive traffic-jam along corniche-highway. – Extreme lack of public & green spaces and the scarcity of amenities & public utilities along pedestrian sidewalks. – Very limited physical accessibility to riverbanks due to the massive traffic-jam along corniche-highway, private boats & inappropriate river-dike shape. – Extreme amount of banks occupied by private uses mainly private boats. – Lack of diversity in water-dependent uses where it's only limited to private boats. – Occupation of pedestrian sidewalks by street-venders. – Lack of shaded places for promenading. – Noise pollution caused by heavy traffic. – 6th of October act as visual barrier hinder people from seeing the river.	– Green spaces are either fenced gardens with entry fees– can't afford by many low-income people- or prohibited areas –reduce the physical accessibility. – Lack of functional diversity– despite the high amount of green spaces that offer proper environment. – High amount of banks occupied by private uses mainly fixed barges & private boats. – Lack of diversity in water-dependent uses & where they're only limited to fixed barges & some private boats – Very limited visual accessibility due to the huge private barges, suspended bridges crossing the Nile and fenced public gardens surrounded by dense gazon wall. – Water pollution caused by wastes thrown from water-dependent uses (fixed barges).
Opportunities	– Replacing the water-independent uses by water-related & dependent uses will bring more people to the river. – Re-coordinating the water-dependent uses (private boats) and linking them with water-related uses can revitalize the area. – Re-shaping the current rigid dike can ensure flexible physical accessibility to riverbanks. – Provide an efficient public transportation system & water-taxi networks to connect the Nile waterfront with the city center. – Changing privately owned spaces along riverbanks by public gardens will increase the public accessibility. – Replacing the burned National Democratic Party building by a water-related use can enhance the area. – Increasing the green public spaces with proper amenities along the river can create vital public spaces.	– Allowing public to use the private green spaces like Al-Ahly & Al-Gazera Clubs & prohibited green areas will maximize the public vital spaces. – Purifying the wastewater of water-dependent uses and its wastes will reduce the water pollution. – Linking the green areas with the proper activities (fishing & water activities) can promote these areas. – Creating multi-functional activities will bring more people to the river.
Threats	– Keeping people far of their Nile riverbanks, particularly, in CBD will create reluctance for the next generations.	

Sectors	Sector Two	
Banks	**East**	**West**
Strengths	– Site location in CBD adjacent to the main axes & square (Abdel-Moneim Riyad). – Nearly 28% of the banks occupied by water-dependent uses (water-taxi & private boats for Nile cruises). – The existence of water-taxi stations let people relink with the river. – Linear trees along some sidewalks. – Moderately good visual accessibility for walking people along corniche sidewalk.	– High amount of water-related uses - with about 85% of land uses. – More than half of land uses are green spaces- mainly public gardens. – Nearly half of the banks occupied by water-dependent uses (fixed barges- used as restaurants and private boats for Nile cruises).
Weaknesses	– Almost two third of land uses are water-independent due to the high amount of administrative & mixed uses. – Massive traffic-jam along corniche-highway. – Extreme lack of public & green spaces where most of them are private gardens and the scarcity of amenities & public utilities along sidewalks. – Lack of diversity in water-dependent uses where it's only limited to private boats & some water-taxi stations. – Very limited physical accessibility to riverbanks due to massive traffic-jam along corniche-highway, some water-dependent uses & inappropriate -river dike shape. – 6th of October, 15th of May Bridges act as visual barrier hinder people from seeing the river. – Lack of proper shaded places for promenading. – Occupation of pedestrian sidewalks by street-venders. – Noise pollution caused by heavy traffic.	– Green spaces are either private nurseries and gardens (Al-Gezera Club) or prohibited areas-fixed barges. – Lack of diversity in water-dependent uses where they're only limited to fixed barges & some private boats. – Extreme amount of banks occupied by private uses like fixed barges. – Very limited visual accessibility to riverbanks due to the huge private barges, fenced public gardens and suspended bridges crossing the Nile. – Lack of functional diversity. – Water pollution caused by wastes thrown from water-dependent uses (fixed barges). – Very limited physical accessibility to riverbanks due to the privately owned banks mainly via fixed barges.
Opportunities	– Activating the un-used banks can give great opportunity for more public spaces. – Provide an efficient public transportation system & water-taxi networks to connect the Nile waterfront with the city center. – Maximizing the green public spaces via opening the existing private gardens to the public & link them with proper activities, will bring people back to their river. – Replacing the water-independent uses by water-related uses will enhance the people interaction. – Increasing the green public spaces with proper amenities along the river can generate vital public spaces. – Re-designing the current rigid dike will ensure flexible public accessibility to riverbanks. – Provide the existing greenery along sidewalks with proper amenities & public utilities.	– Maximizing the green public spaces via opening the prohibited green area related to the fixed barges to the public, will bring people back to their river. – Linking the green areas with the proper activities (fishing & water activities) can promote these areas.
Threats	– Keeping people far of their Nile riverbanks, particularly, in CBD will create reluctance for the next generations.	

Sectors	Sector Three	
Banks	**East**	**West**
Strengths	– The most diverse bank in uses. – Almost half of land uses are water-related. – Some recreational uses adjacent directly to the river. – Represents the capital strength due to the important and luxury functions along the riverbanks. – Linear tree along some sidewalks. – Moderately good visual accessibility for walking people along corniche sidewalk.	– High diverse uses along the bank. – Some recreational uses adjacent directly to the river.
Weaknesses	– The absence of water-dependent uses. – Extreme lack of public & green spaces with the scarcity of amenities along pedestrian sidewalks. – High amount of banks occupied by private uses like nurseries. – More than half of land uses are water-independent. – Very limited physical accessibility to riverbanks due to privately owned banks (nurseries) & inappropriate-river dike shape. – Green spaces are mainly nurseries. – 15th of May and some private uses act as visual barriers hinder people from seeing the river. – About half of the bank has no pedestrian-sidewalks due to the construction works. – Lack of shaded places for promenading. – The high ratio of built-up areas.	– The absence of water-dependent uses. – The highest amount of water-independent with about 75% of land uses due to residential uses. – Very limited physical accessibility to riverbanks due to privately owned banks mainly via residential buildings & embassies – Extreme amount of banks occupied by private uses like private residential gardens. – Green spaces are mostly private and related to residential, cultural or administrative uses. – Extreme lack of public spaces. – Very limited visual accessibility to riverbanks due to private blocks stand along the river & high trees. – River dike shape doesn't allow for people interaction.
Opportunities	– Using the un-used banks & lands as public green spaces. – Replacing the existing warehouses & parking by public spaces will promote the area. – Benefiting from the diverse uses in creating more activities & water-dependent uses. – Linking banks with water-taxi network & provide the existing greenery with proper amenities & public utilities will revitalize the area.	– Benefiting from diverse uses in creating more activities & water-dependent uses. – Opening parts of the private gardens of the residential uses to the public. – Linking the bank with public via replacing some of water-independent uses with water-dependent & water-related uses.
Threats	– Keeping people far of their Nile riverbanks, particularly, in CBD will create reluctance for the next generations.	

2.7- Definition of the Core Problems:

Based on SWOT analysis and particularly the weaknesses of the three sectors, the main core problems that are repeated more than once along the six banks

can be clustered accordingly [Figure.43]. As a result, the research focused on the higher frequent ones, considering that some low repetitive problems can directly influence other main problems and sometimes they are the reason for generating them, like the massive traffic jam along Corniche Highway and its huge impact on the physical accessibility to riverbanks, in addition to the mutual relation of some problems with another one.

Sectors			Sector 1		Sector 2		Sector 3		Repetition
Banks			East	West	East	West	East	West	
Definition of the Core Problems	1	Very limited physical accessibility	■		■	■	■	■	5
	2	Massive traffic-jam along corniche-highway	■		■				2
	3	Inappropriate-river dikes shape	■		■		■	■	4
	4	The absence of water-dependent uses					■	■	2
	5	Lack of diversity in water-dependent uses	■	■	■	■			4
	6	High amount of water-independent uses	■		■		■	■	4
	7	Lack of functional diversity	■	■		■			3
	8	Scarcity of amenities & public utilities along pedestrian sidewalks	■		■	■	■	■	5
	9	Extreme lack of public spaces	■		■		■	■	4
	10	Extreme lack of public & green spaces	■		■		■		3
	11	High amount of banks occupied by private uses	■	■		■	■	■	5
	12	High amount of privately owned green spaces along riverbanks		■		■	■	■	4
	13	Visual Barriers along corniche due to suspended bridges & some private uses	■		■		■		3
	14	Lack of shaded places	■		■		■		3
	15	Sidewalks occupied by street venders	■		■				2
	16	Very limited visual accessibility		■		■		■	3
	17	Noise Pollution	■		■				2
	18	Water pollution		■		■			2

Figure.43: Matrix shows the core problems with the number of repetition in all banks. Source: Author.

2.8- Empirical Frameworks:

Building on SWOT analysis and the previous core problems, the empirical frameworks can be defined and will be taken into consideration in chapter.4 as guiding benchmarks for the design proposals. These frameworks are represented via two main policies as the following:

1- **Regenerate and Revitalize**: this policy will focus on benefiting from the existing site potentials and strengths of the studied area and reactivating them effectively with the public in order to attract residents and visitors coming back to the waterfront.

2- **Create and Reconnect**: this policy will focus on creating new potentials and opportunities and then reconnecting them with the existing ones in order to create a vital network that will transform the waterfront from an undesirable static area into a preferable dynamic one for all people and thus a true regional destination.

Each problem will be subjected to one or two policies during the design phase in chapter.4 [Figure.44].

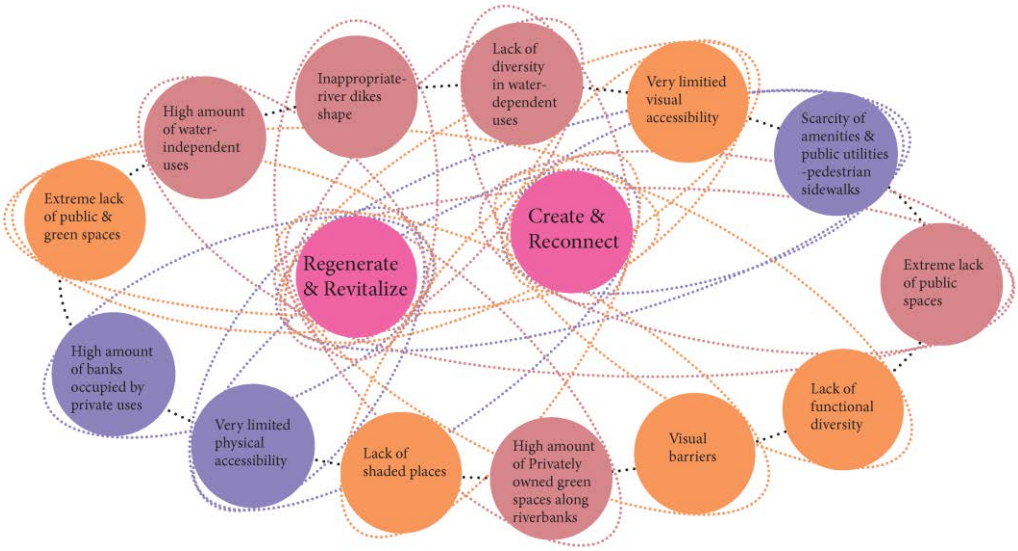


Figure.44: Figure shows the relationship between the core problems and the guiding polices. Source: Author.

2.9- Conclusion:

This chapter aimed first to pinpoint the core problems that influence the studied area along the Nile waterfront in Central Cairo and second, to define the empirical frameworks that will be used as guiding benchmarks in chapter.4. To reach that aim, many sequential analyses were created- the most notable ones are the functional, social and SWOT analyses. Accordingly, a set of core problems was defined and they in turn led with the SWOT analysis to the empirical frameworks. As a result, these problems will be used to look for case studies in cities that had nearly similar problems even in different context in order to learn how these cities dealt with such problems to solve, and to have a look on the adopted strategies applied as successful solutions. This will be sought in the next step in chapter.3.

CHAPTER 3

Theoretical Study

Best Practices in Relation to the Identified Problems in Central Cairo

3.1 Introduction:

This chapter is concerned with the theoretical study, starting by presenting some supported concepts and approaches for the urban waterfront regeneration. It will mainly focus on the 'Placemaking' approach and highlight the characteristics of great urban waterfronts determined by PPS[12]. Then, definite case studies will be chosen - as best practices- to deal with similar predefined core problems in Cairo. Finally, based on placemaking approach, great waterfronts characteristics and the case studies, the main theoretical frameworks will be identified to be used in chapter.4. To reach that aim, literature study in different languages and some official websites were used basically as main sources, in addition to doctoral and master researches and satellite images - Google Earth- as supportive aids [Diagram.4].

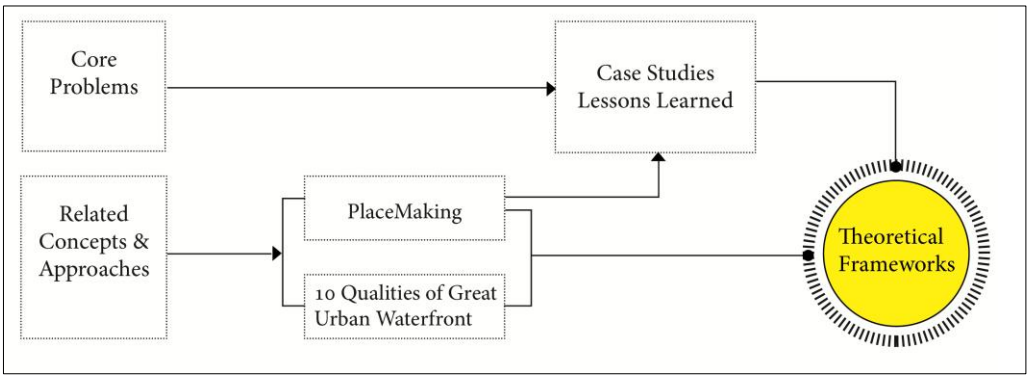


Diagram.4: The used methodology in chapter.3 to reach the theoretical frameworks. Source: Author.

[12] Project for Public Spaces (PPS) is a nonprofit, educational and technical assistance organization with in international reputation for its success in the creation of more livable communities. www.pps.org

3.2- Related Concepts and Approaches:

Many concepts, theories and approaches related to urban waterfronts regeneration were found during the research like: '*The Spine concept*'[13] by Jan Gehl (Smith, H. and Soledad, M. 2012), '*Theoretical Study of the Urban Water Development*' by David Gordon (El-Menshawy 2011) and '*Conceptual frameworks for waterfront regeneration*' by Rinio Bruttomesso (Smith, H. and Soledad, M. 2012). However, one of the main approaches that linked between multi-functional public spaces and urban waterfronts redevelopment is called "PlaceMaking". Thus, this section will focus mainly on this approach, and then ten qualities that characterized the great waterfronts destination in cities will be introduced. They both together with the coming case studies will contribute in forming the theoretical frameworks by the end of the chapter. Moreover, Placemaking has defined nine guiding steps to have a great waterfront and to achieve the former qualities where multi-functionality is a key point for its success. These steps have been applied in many waterfront cities and in different contexts in order to transform their gloomy waterfronts into a great one full of vitality. However, they will not be presented in this chapter, rather in chapter.4 because they are more design oriented.

3.2.1- Place-Making Approach:

The notion behind this concept was generated in the 60s by pioneers such as Jane Jacobs and William Whyte when they created innovative ideas about how to design cities devoted for people with walkable streets and vital public spaces, not only for cars and commercial centers (PPS n.d.). At that time, their ideas were not named; however, this approach was gradually developed and it took its primary form in 1975 in order to support societies in creating their lively public spaces, whereas waterfronts consider one of the most important public spaces in riverine cities (PPS n.d.). Accordingly, this approach has been adopted by many mega waterfront cities (like Hong Kong, Tokyo, Vancouver, etc...) (PPS,

[13] Focused on public space development, employing a unique methodology labeled 'city life development' citied from Smith, H. and Soledad, M. Waterfront regeneration (2012: 121).

2008) which aspired to transform their gloomy waterfront into a vibrant public space with diverse activities derived from people themselves. In 2010 *"PPS have worked in more than 2,500 communities, in 50 US states and 40 countries around the world"* (WFS 2010: 20).

- *What does 'Placemaking' mean?*

  The *'Placemaking'* term has various definitions, but one of the most notable was by Matthew Ackerman[14] (1990: 1): *"Placemaking is the process by which people transform the locations they inhabit into the places they live"*. Also, PPS' President-Fred Kent claimed that *"Placemaking is turning neighborhood, town or city from a place you cannot wait to get through to one you never want to leave"* (Crossley, D. 2010). Another definition by (PPS and MPC[15]. 2008: 5) states that *"Placemaking- is both an overarching idea and a hands-on tool for improving a neighborhood, city or region. It has the potential to be one of the most transformative ideas of this century*". All the previous definitions emphasized the livability of the place with stressing on the main role of the public to turn these spaces into active ones in the first definition, while the second one focuses on place vitality as a main way of attractiveness. The last definition expresses the inclusiveness of this concept.

- *How were spaces evaluated by this approach?*

  'Placemaking' as an approach evaluates the public spaces by using four key attributes (DYP[16]. 2013; PPS and MPC. 2008) these are briefly:

1- Access and Linkage: They basically deal with the physical and visual accessibility of the public space and its linkage with the neighboring places and public transportation, where a successful public space has a permeable perimeter to get into and to pass through.

[14] Designer in the international urban-design office of Benjamin Thompson and Associates (BTA) of Cambridge, Massachusetts, also team member in numerous sustainable, mixed-use waterfront and marketplace design commissions.

[15] MPC: The Metropolitan Planning Council

[16] DYP: Detroit Young Professionals

2- Comfort and Image: They mainly focus on the realization of safety, cleanliness, and the availability of amenities and public utilities for people to use the space.
3- Uses and Activities: They are considered as the key cornerstone of the places where giving people something to interact with and to use can bring them back again and vice versa.
4- Sociability: it is considered as a difficult attribute for a place to fulfill; however, once achieved it becomes a clear feature. Therefore, when people see other people meet and use the space, they feel comfortable about it and their belonging to their community increases.

3.2.2- Ten qualities of great waterfronts destinations in cities:

There are ten qualities that characterized the great urban waterfronts published by PPS* (2009) and used by many researchers and Councils (like Evans, S. 2013; Alexandria C.C. 2011; Andini, D. 2011). Also, these qualities gave a deep understanding of the application of the Multi-functionality along waterfronts in the ideal meaning. And they can be listed as the following:

1. Neighboring buildings improve public spaces:

Buildings alongside the waterfront, particularly high-rise towers, should have mixed-use activities, especially in the ground-levels in order to encourage people to interact with the public space inside and outside the building.

2. Restrictions for residential growth:

Residential growth has to be limited along the waterfront because these are vibrant places throughout the day with diverse activities (like markets, performances, public events, etc...) and the domination of the residential uses will hinder the diversity of waterfront uses and prevent nocturnal activities from growing.

3. 24 hours lively activities and during the whole year:

Having activities round the clock and throughout the year, and integrating them with seasonal events will promote the relation between the public and their Waterfronts and ensure the economic benefits. Besides, using adaptable amenities can afford protection from harsh weather.

4. Flexible design promotes adaptability:

Great waterfronts have to adapt to several modifications in order to attract many people at different times, where flexibility is a crucial issue that have to be taken into account in the space design. Also, having storage for temporary materials (like parasols, seats, etc...) on site is significant for direct interaction.

5. Creative amenities stimulate people's pleasure:

Using creative amenities whether permanent or temporary in the suitable places will definitely boost the people delectation and will change their perception and the way they deal with the space.

6. Facile access via water-transport, bike and foot:

Ensuring an easy access to the waterfront by means other than private transportation will extremely promote its overall value from users, particularly when using boat, bike and foot. Constructing more streets will increase their impact on pedestrians' safety and prevent the direct contact with their waterfront, unlike constructing pedestrian promenades and bicycle paths which provide an appropriate environment for fun.

7. The local identity is showcased:

Cities that have great waterfronts are mainly the one oriented directly to the water and show their local identity, history and culture as attractive points for people to visit (like Venice and Amsterdam). Besides, using folk arts and music will draw more visitors around the waterfronts.

8. The water itself garbs attention:

Using the water as the heart of the periodic events and activities (like kayaking, floating cafés, fishing, sightseeing boats, etc…) and in relation with regular uses (fish-markets, restaurants and ferry stations) will draw the visitors and bystanders' attention and support the local identity.

9. Iconic buildings serve multiple-functions:

Iconic buildings can be a supportive element to the waterfront and a vibrant place when they comply with human scale and harmonize with the urban context (like City-Hall in Stockholm).

10. Good management maintains public vision:

Successful waterfront is totally linked with a good management where it is significant to ensure maintaining the community vision, sustaining multi-functional activities and events during the year and partnering between all stakeholders and organizations at different levels and nearby districts.

3.2.3- Conclusion:

To conclude, from the previously mentioned qualities, it can be clearly seen that they mainly focus on the vitality of waterfronts via using diverse multi-functional activities, flexibility and adaptability of the design and its interaction with neighboring districts under the umbrella of the rational management. PPS (2009) stresses that the main "*key to a successful waterfront is developing a vision where the layering of activities and uses creates a whole that is -greater than the sum of its uses"*. Finally, PPS defined 'the successful space' to be first a significant public space and second a part of a broader destination network at community and city levels.

3.3- Criteria for the selection of the case studies:

The case studies will be selected: primary, according to the predefined core problems in the main case study in CBD- Cairo in order to recognize how these cities respond to similar problems and second what methodologies are applied for the purpose of seeing the possibility of their application as proposed solutions in Cairo, and secondary, according to a group of reasons that can be listed as the following:

1- Big cities in developed countries with high population densities and pressure.
2- Different geographical locations and along different rivers.
3- Used permanently or temporally and have activated vital projects.
4- Considered by Placemaking approach as one of great and successful waterfront developments.
5- The availability of good references and information.

There is a quite good number of case studies related to the waterfront regeneration worldwide that can fulfill the above criteria. However, having a sensitive situation like the dense CBD in Cairo and its crucial location gives the boost to think about permanent and temporary riverfront transformation. Therefore, two leading successful case studies were chosen in Düsseldorf-Germany along the Rhine River and in Paris-France along the Seine River- which I visited last year. Both cases have activated vital projects along their waterfronts and they are considered by Placemaking as great and successful waterfront transformation. However, the first one was implemented and used permanently while the second one has been used temporally.

3.4- Case Studies:

The case studies will be discussed using three main points; a brief historical background, defined problems and then an explanation about the executed solutions, where both cases will be evaluated by 'Placemaking' approach with a focus on the physical accessibility, uses and activities, and public amenities instead of image and comfort as it is a broad term, while sociability was the result of a successful combination of the three former attributes.

3.4.1- River-Rhine Promenade\Düsseldorf- Germany

– **Background:**

In 1900, the Rhine was built and the riverside was divided into two levels, the upper level used for people as a promenade while the lower one used for shipping purposes [Figure.45+Figure.49]. Then after the second world war and the increased number of automobiles, the whole promenade in the upper level was converted into a multi-lane federal highway like many other riverine cities and "used by 50,000 vehicles a day" [Figure.46] (Fritschi, N. et al. 1995), effectively separating the city-center from the waterfront north-south, while the lower level was transformed into huge parking lots for "1000 cars" (Rahman, M. A. 2010: 27) [Figure.47].

Figure.45: The promenade and riverbank uses along the Rhine in 1900-1930. Source: www.bilderbuch-duesseldorf.de

Figure.46: Shows the highway and the parking lots along both levels. Source: Fritschi, 2009

Figure.49: Banks occupied by shipping uses. Source: Volks, 2011

Figure.47: Parking along lower level. Source: Volks, 2011

Accordingly, a steep drop in the function of the riverfront as an urban public space occurred and the area became the back of the city simultaneously. Due to the city development as an administrative capital and the loss of its importance as an industrial center, many under-used areas along the former waterfront had resulted (Fritschi, N. et al. 1995).

Altogether, led the German authorities in 1984 to create a new development along the area in order to reconnect the city-center with the river and bring the people back to the Rhine. Therefore, a new project was initiated and it was called River-Rhine Promenade. The project extended about 1.5 km alongside the Rhine River starting from Oberkassel Bridge along the old city district till the parliament house of Nordrhine-Westfalen on an overall "area 80,000 m^2"

(Fritschi[17], N. et al. 1995[18]) [Figure.48], and the adjacent buildings were mainly residential and offices.

Figure.48: Map shows the project location with the main neighboring areas. Source: Google Earth with modification by author.

- **Defined Problems:** Based on the above background and historical photographs a set of problems can be identified. These are:

1. **Physical Accessibility**: very limited physical accessibility due to the highway along the Corniche in the upper level and the parking lots in the lower one where they created noise and air pollution.
2. **Uses and Activities**: lack of functional activities and pedestrian ways alongside the Corniche due to the water-independent uses along the

[17] Niklaus Fritschi: is a local German architect and Professor at the University of Applied Sciences in Düsseldorf, and designer of the Rhine promenade- http://www.velux.ro/ro-RO/Documents/Arhitecti/Atelier_FSB.pdf
[18] http://www.publicspace.org/en/works/w013-rheinufer-promenade

riverbanks (parking lots, residential and offices) and the occupation of the bank by some private uses (like shipping) [Figure.49]. Besides, the lack of water-dependent and water related uses and public and green spaces.

3. **Public Amenities:** lack of amenities and shaded places along the Corniche due to its use as parking lots [Figure.46].

– **Solutions:**

In 1990, the project was initiated and designed by Niklaus Fritschi, a local architect, and his partners according to the residents' need on a very limited budget. The total cost was "9,714,550 €" Fritschi stated (1995).

1. Physical Accessibility:

The highway in the upper level was placed in underground tunnel with a four-lane section running nearly along 2000m [Figure.50]. Also the tunnel provided access to 950 underground car parks (Fritschi, N. et al. 1995). Therefore, a new car-free public space resulted and a new bike path was created.

Figure.50: Tunnel entrance beside the esplanade along the riverbank. Source: Fritschi, 2009.

As for the lower level, the parking lots were completely removed from the area and replaced by many water-related uses, and was linked with the upper one through double stairs [Figure.51]. Both the car-free surface and the underground tunnel made the vehicular access restricted and limited in the area and ensured easy and safe access to the riverbank, in which the promenade was earmarked to be mainly open for pedestrians and cyclists for free. However, the dike shape did not allow people to reach the watercourse and touch the water [Figure.52]. The esplanade was also used by other people like employees and office workers in the nearby buildings and it was linked with public transportation via nearby tram and U-Bahn stations (Rahman, M. A. 2010) [Figure.48]. All of that, contributed to reduce the air and noise pollution.

Figure.52: The river-dike and two pedestrian levels along the riverside. Source: Addicks, 2008

Figure.51: Double stairs to link both levels. Source: www. Panoramio.com

2. Uses and Activities:

Due to the limited budget, the designers followed a short-term strategy via establishing temporary and tentative uses along the riverfront (PPS 2009). Many of the residential and office buildings adjoining the new riverside have lively ground-floors (Bauer, M. n.d.) and many water-related uses and activities are distributed along both levels (like strolling, cycling, relaxing and enjoying the scenery) alongside the upper level [Figure.53], while the lower one is used for (several temporary[19] restaurants, beer-gardens with flashy sunshades

[19] Permanent structures are prohibited due to occasional flooding (PPS 2009).

integrated with flood-wall, skateboarding, sunbathing and occasional public events- skiing competitions in winter, exhibitions and markets) [Figure.53], and they all draw crowds day and night (Bauer, M. n.d.). The southern part of the project is wider and has a new park towards the river, called the Rhine Park where it preforms as a green-lung for a dense built-up area [Figure.54] (Fritschi, N. et al. 1995). Whereas, the northern part is more urban and has a historical public square, called Burgplatz or Castle-Square, with large steps overlooking the river (Rahman, M. A. 2010). This is a place where people gather in hot weather, sitting on steps and enjoying the river-scene with passing-by ships and street performers. Besides, is used for an open-air cinema, fireworks, concerts and night parties) [Figure.55]. The new promenade allows for activities throughout the day straight to the river considering that the old city in Düsseldorf is one of the most vibrant nightlife areas in Germany (Bauer, M. n.d.). The design also comprises extending the promenade southwards via establishing a new theater under the Rheinkine Bridge to revitalize the unattractive space and motivate pedestrians to go further (Rahman, M. A. 2010) [Figure.56].

Figure.54: Recreational activities in Rhine Park beside the river. Source: www.panoramio.com

Figure.55: People enjoying the scene in Burgplatz beside Rhine River.

Source: www.duesseldorftourismus.de

Figure.56: New Theater under the Rheinknie Bridge. Source: Fritschi, 2009.

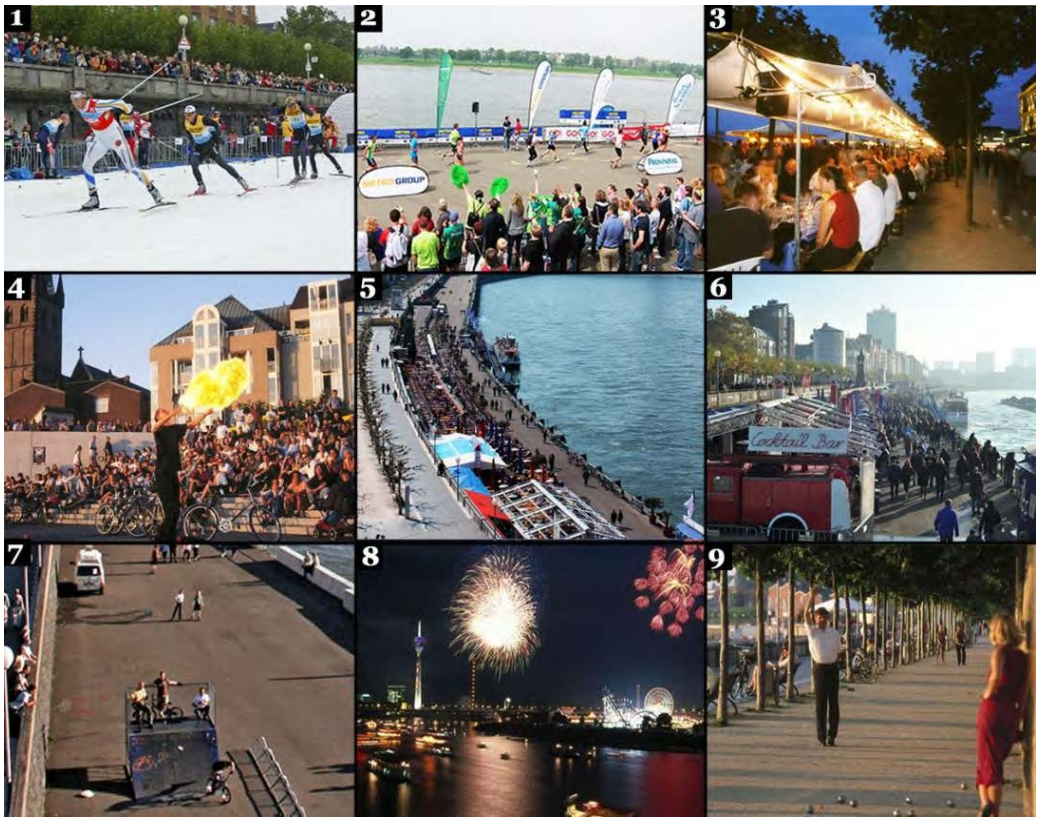


Figure.53: Some activities at both the upper and lower levels along riverside. Source: (Photos [1, 3, 4, 8, 9]: Fritschi, 2009)- (Photos [7, 6]: www.panoramio.com)- (Photos [2,5]: www.nuku.de).

3. Public Amenities:

It is proper, clean and well maintained; on the upper level, a new boulevard with a double row of plane trees and "120 seats in-between" were created and a new cyclist path is separated from pedestrians by the former trees [Figure.57] (Rahman, M. A. 2010: 28). Rubbish-bins and simple street lighting is distributed regularly along the sidewalks. The lower level is totally paved by tarmac[20]- appropriate material for skateboarders and cyclists besides railings along the shipyard (PPS 2009).

[20] 100% recycled and sustainable pathway "material that consists of crushed stone rolled and bound with a mixture of tar and bitumen, especially used for road or airport runway" http://www.thefreedictionary.com/tarmac

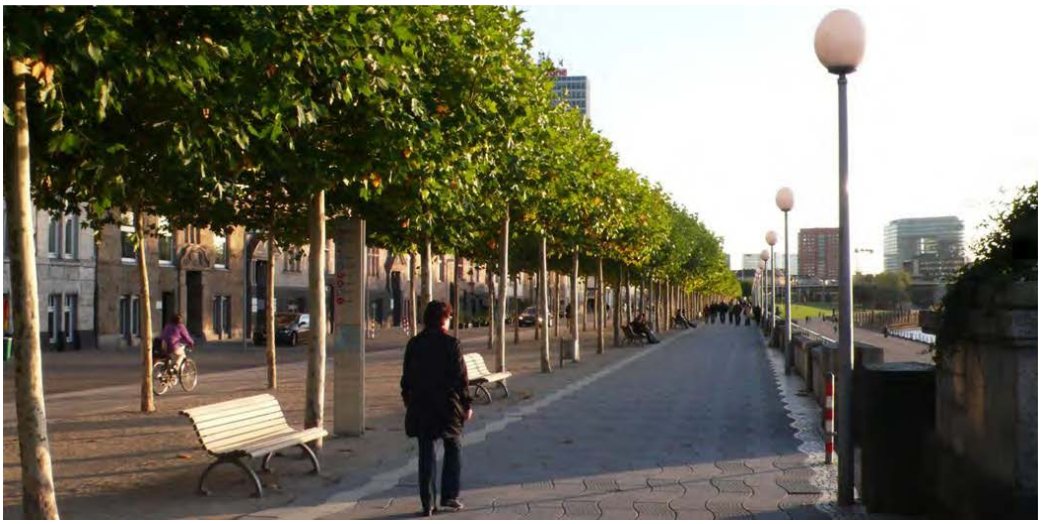


Figure.57: Boulevard with a double row of plane trees, pedestrian and bike paths and public amenities. Source: Fritschi, 2009.

In 1995, the regained promenade is open to the public to experience a lively place where they can relax and enjoy the river and about 1 million individuals celebrated[21]. Since its construction, it has been as *"one of the most successful waterfront transformations in Germany or anywhere else in Europe"* (Bauer, M. n.d.; PPS[22]).

- **Conclusion:**

To sum-up, this project offers a bold example of the integration between the city-center and the riverfront with vibrant activities around the year where simplicity and practicality were the main keys for success. Despite the budget limitation, Dusseldorf has used regular programming and plenty of sellers stand to convert its riverfront into a world-class destination for visitors and locals not only for recreation, but also for culture and trade. Thus, the River Rhine was once again given a new era of revival.

[21] http://www.duesseldorf-tourismus.de/en/sights/

[22] PPS: Project for Public Space\Official website;http://www.pps.org/great_public_spaces/one?public_place_id=848

3.4.2-Paris Plage- Seine River\France

– **Background:**

In the 18th century, it was impossible to be in Paris without going to the Seine River, where there was a variety of recreation and trading activities [Figure.58] as well as many other uses (like laundry boats, craftsman, water carriers and kiosks were abundant and activated the river) [Figure.59]. Moreover, Seine was the main source of drinking water at that time and it was used also for bathing, personal hygiene and a place for fireworks on the occasions of marriage, victory and sport events (Fleur de Lire 2011). In the mid-18th and late 19th century, the boats left the Seine after a conflict between the city atheistic values and economic. Simultaneously, activities and events along the river reached the peak and resulted in massive crowds along the river (Fleur de Lire 2011). In 1867, the tourism via riverboats (Bateaux-mouches) and universal exhibitions appeared [Figure.60] and around 3.5 Million passengers were hosted on the River (Fleur de Lire 2011). In the 19th and 20th centuries the banks changed to wharfs and the river was channelized as wall around the river was erected to serve the Seine port-activities and to work as a flood protection (Vadepied, F. 2013) [Figure.61].

Figure.58: Recreation along the Seine. Source: Sadovy, n.d.

Figure.59: Laundry boats and water carriers along the Seine in 18th Century. Source: Viollet,

The recent river-profile resulted from deepening the riverbed and extending the height of the dike where it was divided into two levels; the upper level was almost 9m above the water-level and used as a balcony for people, booksellers, street performers, cafeterias and shops while the lower one was about 4m and

used for river-port activities like sightseeing boats, transports and fun [Figure.62], and these two levels are mainly defined the relation between the inhabitants and the Seine (Vadepied, F. 2013). Furthermore, the visual accessibility to the watercourse was quite difficult for the pedestrains on the upper level except from bridges due to the deep river topography and dike height.

Figure.60: Sightseeing boats.
Source: www. Secretofparis.com

Figure.61: Flood protection wall in 1900.
Source: www.photographium.com

During the late 60s and early 70s, the construction of highways along the lower level of the East riverbanks started, which in turn created a physical barrier between the Parisians and their river after being a quiet place for people to entertain (Fleur de Lire 2011). One of the main highways along the east-bank is Georges Pompidou[23] [Figure.63]; the Premier of France in 1962 and an extreme lover for cars, he claimed “les Français aiment leurs bagnoles- the French love their cars” (Preservation Institute 2012). Therefore, a new highway was built with 2 lanes along 13 km of the east-bank. It was finished in 1967 and used by nearly 70,000 cars a day traveling back and forth to the center of Paris (Garrick, N. and Billings, J. n.d.) [Figure.64]. As for green spaces, there were quite good numbers; however, they were not in contact with the River. As a result, the Parisians started to spend their vacations outside Paris and away from their river. In 1988, the Mayor of Paris, Jacque Chirac, stated that "In five years, we will be able to swim in the Seine" and after 25 years of political promises, the

[23] “Premier of France from 1962 to 1968, under the Presidency of Charles De Gaulle”, then a president from 1969 till 1974 (http://www.preservenet.com/freeways/FreewaysPompidou.html).

problem was not about the water-quality, but it was how to access it (Vadepied, F. 2013:77).

Figure.62: Current river-dike profile.

Source: Author.

Figure.64: Georges Pompidou highway.

Source: Garrick and Billings, n.d.

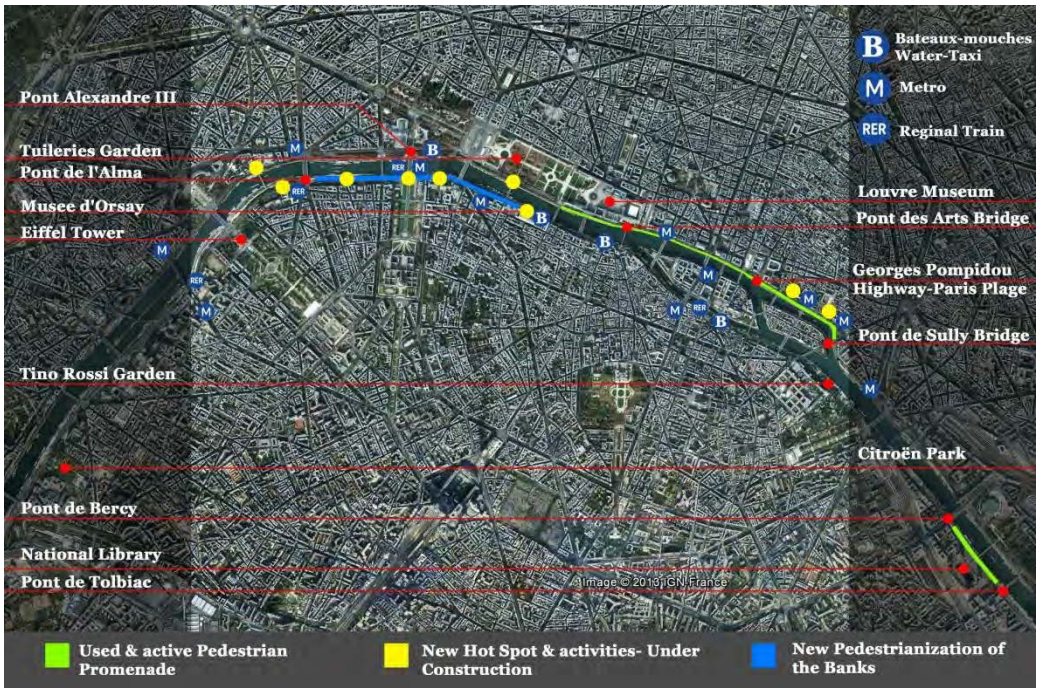


Figure.63: Map shows the current and future interventions along the Seine. Source: Google Earth with modification by author.

- **Defined Problems:** Based on the previous background, a set of problems can be defined, these are:

1- **Accessibility:** Physical accessibility was very limited due to the highway alongside the Corniche on both levels and the rigid dike shape or the tightness of the lower bank when existed, in addition to limited visual accessibility to watercourse because of the river depth and the dike height and shape [Figure.64].

2- **Uses and Activities**: The lack of functional activities and pedestrian sidewalks alongside the Corniche due to the occupied banks by highways, limited water-dependent uses and public spaces with regular attractive activities along the banks.

3- **Public Amenities:** The lack of amenities because of the placed highway alongside the Corniche.

Furthermore, air and noise pollution coming from automobiles where the new Mayor of Paris Bertrand Delanoë said; "the air of Paris is so bad that I always boil it before breathing[24]" (preservation Institute 2012).

- **Solutions:**

Paris, like many other mega cities, fell a victim for the increased number of vehicles. However, it started to work to crack the tide. Therefore, in 2002, the new Mayor- Bertrand Delanoë decided to close temporary about 3 km of Pompidou Highway from Louvre till Pont des Sully Bridge[25] [Figure.63] and transformed it to an annual recreational urban public space for the Parisians with various vital activities despite the criticism from drivers and some governmental parties. While 66% of the Parisians approved the idea, 56% of them did not have cars (Preservation Institute 2012). The total cost was about €2 million- funded by the City, several public organizations and private firms (Gale, T. 2009). It was called Paris Plage (Paris Beaches).

[24] "L'air de Paris est si mauvais que je le fais toujours bouillir avant de respire" (Bertrand Delanoë: 2012).

[25] Mayor of Paris- Official Site; "http://www.paris.fr/english/visit/highlights/paris-plages/rub_8208_stand_34146_port_18969"

1- **Accessibility:** Closing the highway for one month annually in summer (20 July-19 August), transferring it to a vibrant pedestrian promenade with a sandy beach (Plage) and the enormous number of activities free of charge maximized the accessibility [Figure.65:4], as 600,000 visitors used the space from the first open day in 2002 to reach 3 million visitors in 2007 during the month[26] with gradual increase every year (Garrick, N. and Billings, J. n.d.). All beaches were designed to be accessible for all people even in wheelchairs via facile ramps. Defining this time was extremely suitable as road pressure was reduced due to vocational seasons, particularly high-income people. This approached people who cannot afford to spend their vacation outside Paris (Michaelson, J. 2005). Concerning the dike-profile, it was transformed in the wider spaces into slopes and steps for people to approach the watercourse and increase the river view like the dike next to the National Library [Figure.66]. Furthermore, banks had very strong connection with public transportations like tram, metro and water-taxi (batobus) where the water-terminals were also linked with the historical monuments and landmarks with stop times in order to let people enjoy the visit [Figure.63]. Besides, underground parking-lots were implemented.

Figure.66: Renovated dike-profile next to the National Library in Paris.
Source: (Left photo: Vadepied, 2013) - (Right photo: Mruk, 2010).

2- **Uses and Activities**: The promenade represents a privilege example of multi-functional inclusive urban riverfront as it is divided into various activity zones that are renewed annually according to the community needs. 'Paris Plages' is not only a group of sandy beaches, but it also includes

[26] Wikispaces; Paris Plages http://streetswiki.wikispaces.com

tremendous facilities and water-dependent activities for all ages with a well-organized timetable (like swimming pool beside the river for 200 people-mainly for children, aqua-gym sessions for youth, misting fountains, rowing, climbing walls, volleyball, sunbathing, rollerblading, bicycle rental services, dancing and tai chi classes, picnic tables, cafes, free-books library, shady palm trees and umbrellas), in addition to an open-air concert stage and a large screen for shows, free movies and performances at night (Chiu Yin, L. 2012; Gale, T. 2009; Horn, C. 2003) [Figure.65]. Moreover, new green spaces were implemented or developed to be in direct contact with the Seine River like Citroën Park and Tino Rossi Garden (Vadepied, F. 2013) [Figure.63].

Figure.65: Some activities of Paris-Plage along the Seine River in Paris.

Source: (Photo [1, 2]: www.untappedcities.com)- (Photo [3]: www.paris.fr)- (Photo [4, 8]: www.urbanplanet.info)- (Photo [5]: www.lesitedelevenementiel.com)- (Photo [6]: blog.naver.com) – (Photo [7]: Nemorin, n.d.)

3- **Public Amenities:** Many public amenities were designed mainly for the promenade in order to support the lively activities which included: 3000 tons of sand-beach, 240 parasols, 300 lounges, 40 hammocks, palm trees and many water facilities like showers and sprinklers (Horn, C. 2003) [Figure.65].

Nowadays, after the extreme success of 'Paris Plages', the research department of Paris (APUR) suggested converting the east-bank of the river into a boulevard with cycle paths and traffic lights [Figure.67:2], pedestrianizing the west-bank permanently, and creating several hot-spots to attract public into the river along both banks (like five floating gardens[27] and open-air cinema, etc...) (Vadepied, F. 2013) [Figure.67]. The project was approved in 2012 and it is under construction nowadays and is extended on "35 acres" and with total costs of about "$50 million". Delanoë argued that, "*It is about reducing pollution and automobile traffic, and giving Parisians more opportunities for happiness. If we succeed in doing this, I believe it will profoundly change Paris*" (preservation Institute 2012). Thus, reduce the Co2 emission and noise pollution.

[27] Mayor of Paris- Official Site; http://www.paris.fr/english/english/what-s-new-in-paris-in-2013/rub_8118_actu_125540_port_19237

Figure.67: Under-construction projects of the new development of the Seine riverbanks in Paris. Source: (Photo [1]: Right: Google Earth – Left: www.parisinfo.com)- (Photo [2]: www.lostincheeseland.com)- (Photo [3]: bergesdeseine.paris.fr)- (Photo [4]: Preservation Institute, 2012).

– **Conclusion:**

Paris-Plage is not only a recreational space, rather it has social, cultural and environmental values as it proves two of public spaces' main values- "people oriented and equal" (Chiu Yin, L. 2012). It is astonishing how small temporary interventions with public support can convert a crowded riverside highway into a vibrant refuge promenade. This can explain the desire of people for any attempt that approaches them to the river. Nowadays, Paris-Plage gives the summer in Paris its unique brand where many cities (like Amsterdam, Rome, Tokyo and Berlin) adopted the idea in order to revitalize their riverfronts and bring them back to their communities.

Finally, Paris-Plage can be considered as a great example of how to create a living-space alongside the riverfront temporarily with multi-functional activities and a superior division of the street among vehicles, cyclists and pedestrians with proper space for greenery. Besides, it gives an effective method of how streets can be gradually reclaimed for people in order to be permanent afterwards. The same can be applied in Cairo, if the decision makers in Egypt such as Delanoë intend to value people more than cars.

3.5- Theoretical Frameworks:

Building on Placemaking approach, the qualities of the great waterfronts and the previous case studies, a group of theoretical frameworks can result in order to be used beside the empirical frameworks as guiding benchmarks for the design proposals in chapter.4. These frameworks are represented via five main points and they can be listed as the following:

1- Ensuring easy access for all the public along the riverfront, particularly on foot and bike as the Rhine promenade and allowing people to interact directly with watercourse like rowing in Paris-Plage, and if this is not possible in some places, another kind of water activities nearby should be created (like swimming pools and misting fountains also like Paris Plage).

2- Providing diverse water-dependent and related uses with multi-functional activities that go round the clock and throughout the whole year, and linking those with neighboring districts like cafes, fish markets and exhibitions in the morning and firework and festivals along the waterfront at night as the Rhine promenade.
3- Reclaiming streets for the public gradually by eliminating the car movement along the waterfront via closing some streets temporarily and opening them to the public as Paris Plage with proper activities or permanently by transforming them into an underground tunnel as the Rhine promenade. Besides, linking the waterfront with an efficient public transportation system and water-taxi network to serve the area (like Tram, Metro, Batobus) in both former case studies.
4- Revitalizing and creating vital and flexible public spaces that are embraced with nature and showcase the local identity (like Burgplatz, the Rhine Park, boulevard and cafes) along both pedestrian levels in the Rhine promenade, and providing both of them with adaptable proper amenities.
5- Fulfilling the community needs and visions and ensuring the public participation through design processes like both case studies when people are asked about their desires and activities that they want to practice. In addition, an erudite management in order to maintain this vision and link it with a broader network.

3.6- Conclusion:

This chapter aimed first to find out a suitable approach that combines between the multi-functionality of public spaces and the urban waterfronts regeneration (Placemaking), and second to learn how developed cities dealt with similar predefined core problems (like in Central Cairo), and how people responded to the implemented interventions to solve such problems. Accordingly, a set of theoretical frameworks represented in five main points resulted at the end which in turn will be used with the empirical frameworks and the community vision in Cairo as a baseline for the design proposals in chapter.4.

CHAPTER 4

Design Study

Design Proposals for the Case study in Central Cairo

4.1- Introduction:

This chapter deals mainly with the design study of the Nile River in Central Cairo where some design proposals for the selected sectors will be suggested. Also, it aims to answer two main questions regarding the case study in Central Cairo. The first was to what extent an interactive multi-functional waterfront in Central Cairo can be created in order to respond to the peoples' needs. And the second was how the use of multi-functional waterfront transforms the sharp boundaries along the river from dividers into connecters. Therefore, to achieve this aim, a number of design guidelines was developed to lead the design proposals along the selected sectors in Central Cairo based on the former analyses and studies accompanied by a group of guiding steps for great waterfront which will be presented next [Diagram.5.].

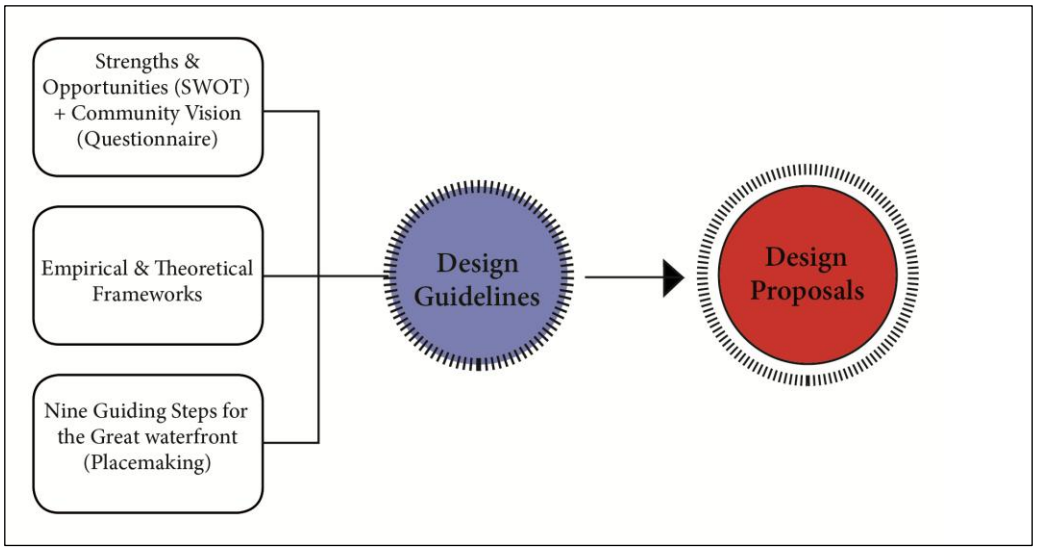


Diagram.5: The used methodology in chapter.4 to reach the design proposals. Source: Author.

4.2- Nine guiding steps for creating a great waterfront:

As mentioned previously in chapter.3[28], nine guiding steps for creating a great waterfront in cities were defined by the 'Placemaking' approach, and they have been adopted by many waterfront cities, researchers and associations for waterfront development (like Ekistics Planning and Design 2011; Evans, S. 2013; WFS 2010; PPS 2008) and in different contexts in order to transform their lifeless waterfronts into great ones full of vitality. These steps will be used as a supportive element for the design guidelines afterwards and they can be listed as the following:

1. Start by looking at the public space:

The starting step is visualizing a network of multi-functional and well-connected public spaces fit with the public aims. Besides, revitalizing waterfront in relation to public spaces and creating new proper interventions *"will result in a whole that is greater than the sum of its parts"* (PPS 2008). Finally, the highest priority should be given to the pedestrians' accessibility alongside the waterfront.

2. Set the public goals as the main objective:

Private investors must not be allowed to take over a valuable place that is fundamentally specified for the public, such as the waterfront. However, this does not mean that private investment should be stopped because it is necessary for keeping a healthy waterfront. Accordingly, putting public aims first with supportive private investments would be the ideal solution.

3. Build on existing assets and context:

After creating the new public spaces network taking public aims as a priority, it is time to use the existing site assets and context where historical places have priority in order to emphasize the local identity via creating multiple uses. Also,

[28] Back to 3.2-Supported concepts and approaches in (Chapter.3) – 'Placemaking' approach.

integrating neighbors with the waterfront will foster the connectivity with the destination.

4. Create a common community vision:

Creating a community vision does not limit the development into a restricted solution like the master plan dose. On the contrary, it allows residents to think boldly and gives them the possibility to set their goals for the waterfront and strive to achieve them. This is due to the adaptability of the vision and its gradual achievement through small interventions and strengthening it during the time.

5. Create multiple-use destinations via using the power of ten:

A bold way to boost the visioning development is to create 10 destinations alongside the waterfront set by people themselves, and then let them generate in these destinations 10 things they like to do [Figure.68]. This approach is originated by PPS in 2004 and called 'the power of ten'. The concept takes its importance when it shows people how small things can generate great effects; besides, it involves the residents in selecting the most appropriate destinations and lets them strive for their selection. The number is not compulsory but what essential is the concept itself by generating multifunctional uses and activities along the waterfront (PPS and UN Habitat 2012). It is essentially a grass-root approach where fulfilling people' desire via the diverse multi-functional activities and transforming the waterfront into a vital place go round the clock.

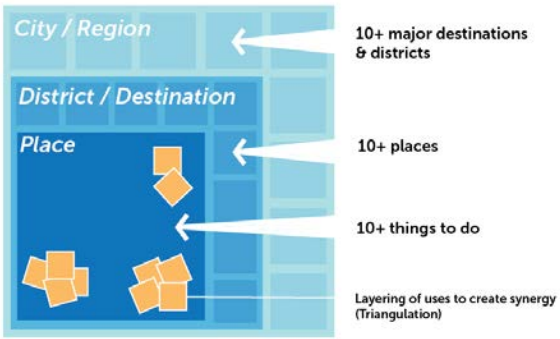


Figure.68: The Power of Ten Concept: How 'Placemaking' Scales Up. Source: PPS

6. Link destinations alongside the waterfront:

After defining the destinations, they should be connected together and merged into the waterfronts' vision where a walkable waterfront with continuous multiple activities will definitely link these destinations. Having parks as connective elements among the destinations can describe the ideal situation of great waterfront cities. Another paramount element is accessing the waterfront on foot or by bike rather than private vehicles.

7. Maximize opportunities for the public access:

It is extremely significant to make the waterfront accessible for all people to the greatest extent possible and the continuity of this accessibility along the waterfront is also essential. Accessibility also means allowing people to interact with water (like swimming, rowing, and fishing). However, if this is not possible, another kind of a nearby water surface should be created (like swimming pool, misting fountains as in Paris Plage).

8. Balance environmental benefits with human needs:

It is valuable to create a mutual relation between the nature and the human through the destinations. Today, environmentalists and biologists urge to restore the natural banks and improve the water-quality and organisms without forming obstacles that prevent the people interaction. Uses like playgrounds and sunbathing areas can be integrated without harming the environment.

9. Start small to make big changes:

Creating a vital waterfront with a good public space does not happen instantly or overnight, and nobody in the beginning has entire cogent answers for place enhancement. Many creative plans failed because they were too huge, very expensive, or needed long time to be implemented. Actually, *"Placemaking is about doing more than planning"* (Evans, S. 2013: 8), and having actions in short-term like floriculture not only to examine ideas, but also to get the people' confident that their ideas can happen.

4.3- Design Guidelines:

The design guidelines were established in order to lead the design proposals which will be developed accordingly. This guideline resulted basically from three main themes: first, the predefined strengths and opportunities (SWOT analysis) and community vision (Questionnaires) in Chapter.2, and second, the identified empirical and theoretical frameworks in both chapter.2 and 3 respectively, and finally, the nine guiding steps for creating a great urban waterfront- mentioned previously ('Placemaking' approach). The design guidelines primarily emphasize defining the existing site potentials and assets of the studied area in order to use them as a cornerstone for the design proposals. Besides, a group of guiding points was set and distributed mainly in terms of accessibility, uses and activities, and public amenities as focal points as the following:

1. **In terms of Accessibility:**

- Reclaiming the Corniche Highway for public and public transportation systems gradually and linking it with vibrant multi-functional activities along the river dike showcase the local identity.
- Re-designing the river dike along the east bank and taking advantage of the level difference between pedestrians and water levels, and the low river fluctuations.
- Maximizing the public accessibility along the riverbanks on foot, by bike and particularly through water and connecting them with multiple activities.
- Increasing the visual accessibility of the River Nile along both banks and ensuring an easy access to the watercourse.

2. **In terms of Uses and Activities:**

- Increasing the green and public spaces along the entire east bank, while opening the existing green spaces along the west bank to the public with easy access.
- Replacing the water-independent uses by water-related and water-dependent ones gradually for a long-term development.

- Creating multiple-use destinations according to the people' desire and linking them together with a broader network.
- Re-organizing the Nile cruise boats along the riverbanks in spots and linking them with the neighboring activities.
- Creating continuous mixed-use axes open to the public along the riverfront are extremely significant.
- Providing diverse water-dependent and water-related uses with multi-functional activities that go round the clock if possible and throughout the whole year.
- Balancing between the environmental benefits and the human needs is highly important.

3. In terms of Public Amenities:

– Creating shading places along the corniche sidewalk and the river dike is extremely crucial in an arid hot city as Cairo.
– Providing flexible and adaptable amenities with the high-temperature and water level changes during the year along the river dike and the corniche sidewalk (as lighting, benches, rubbish bins, trees types, and paving and texturing materials).
– Ensuring a sequential maintenance for all amenities and public utilities throughout the whole year.

4.4- Design Procedures and Proposals:

The design procedures for the coming proposals are mainly based on the previous design guidelines where some facts will be introduced first. And then, a plan representing the existing site potentials and assets of the studied area will be identified. Finally, a number of design proposals will be displayed.

4.4.1- Facts:

- The width of the Corniche Highway is on average about (18-22m) (satellite image-Google Earth).
- The width of the River Nile in the studied area is ranges between; maximum (420m) near Imbaba Bridge and minimum (240m) near 6th October Bridge (satellite image-Google Earth).
- The height of the river dike is about 6m (Hussin, M. 1996: 120).
- The height of the river flood fluctuates between (1-2 m) (Kondolf G.M., et. al. 2011).
- The water depth or the riverbed in the studied area ranges between (7-17m) in the middle of the river (Sections-Google Earth Pro.).

4.4.2- Site Assets and Potentials Plan:

The aim of this plan is to define the main existing site potentials and assets along the studied area in order to utilize and re-activate them gradually through the design process as a part of the suggestions for the existing problems. These potentials vary from small ones like using the current trees along the sidewalk as shaded places for public by adding amenities, to bigger potentials like replacing the burned National Party Building in sector.1- east bank by a green public space [Figure.69].

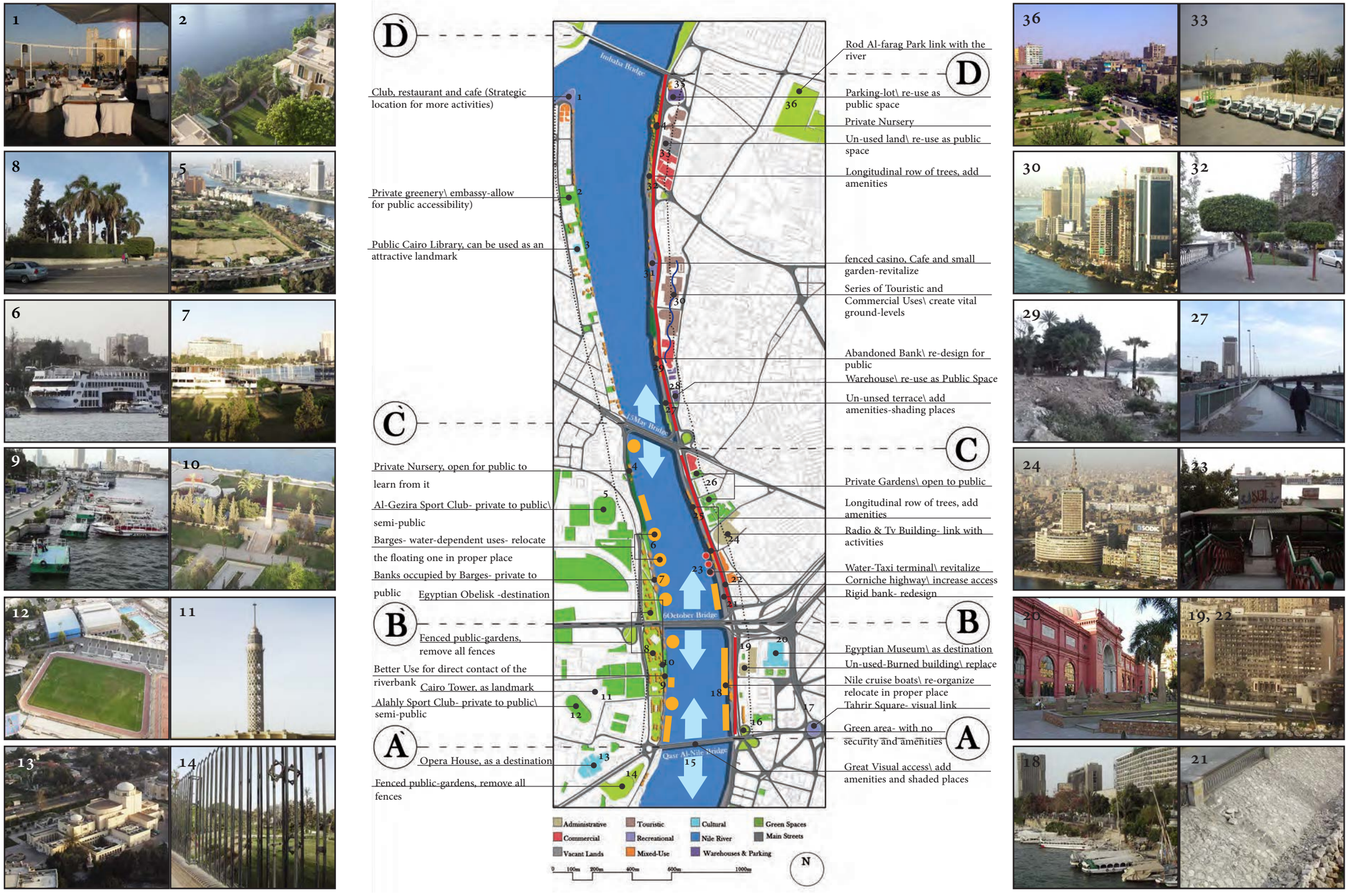


Figure.69: Site Assets and Potentials Plan based on SWOT and Field Study. Source: Author.

4.4.3- Design Proposals:

Based on the predefined assets and according to the design guidelines, a set of interventions will be displayed for each bank in each sector separately in order to have a detailed overview of what can be done in that regard. To do that, a design proposals plan was developed in relation to the site potentials [Figure.70]. This plan represents the suggested interventions for both sides along the studied area in terms of accessibility, uses, and activities and public amenities. However, the following design proposals will focus more on the east side of the riverbank along the three sectors as it is more crowded, less greenery, and more difficult to access in comparison with the west side[29] (Zamalek Island). Furthermore, these proposals will be linked with the timeline[30] through short-, mid- and long-terms to show what can be done first and to present the sequential design processes through time [Table.5].

[29] See the functional analysis in Chapter.2

[30] The timeline is mainly based on approximate assumptions by the researcher.

Sector.3 - West Bank: contains

1. Mixed- Used Buildings- Connected Ground-levels \ Cafes
2. New Water-Taxi Station
3. Boats Cruises Spot
4. Public Pier\ events
5. New Plateform Extention
6. Cairo Public Library as Destination
7. More Public Spaces (relocate some embassies re-open to public)

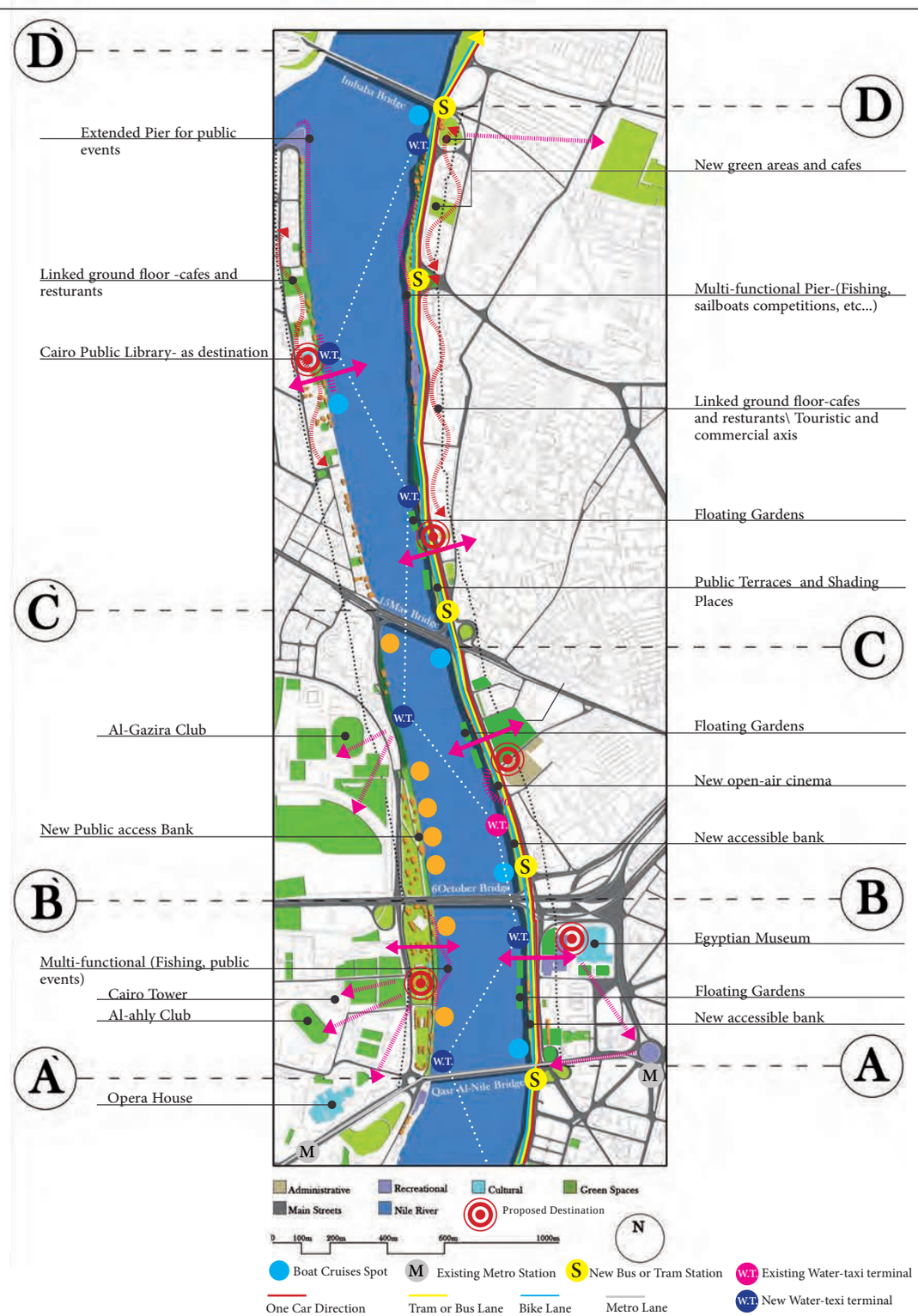
Sector.2 - West Bank: contains

1. More Public Spaces -Increased Visual Accessibility (removed fences around gardens)
2. New Public Banks (Private Barges Banks to Public)
3. New Water-Taxi Station
4. Nursery as Educational and Recreational Axis
5. Al-Gazira Club as destination
6. Shaded Places

Sector.1 - West Bank: contains

1. More Public Spaces -Increased Visual Accessibility (removed fences around gardens)
2. New Public Banks (Private Barges Banks to Public)- Cafes
3. New Water-Taxi Station
4. Multi-functional Pier used for (Fishing, Events and competitions)
5. Boats Cruises Spot
6. Opera-House, Al-ahly Club and Cairo Tower as Destinations

West Bank Proposed Interventions



East Bank Proposed Interventions

Sector.3 - East Bank: contains

1. Three (Metro-Bus or Tram) Stations
2. Two Water-Taxi Stations
3. Boats Cruises Spot
4. New Green Public Spaces with Shaded Places
5. Floating Gardens - Sand Beach
6. Connected Ground-levels
7. Multi-functional Pier used for (Fishing, Events and competitions)
8. New Accessible Bank - Natural terraces/
9. New Boulevard and Bike Lane

Sector.2 - East Bank: contains

1. One (Metro-Bus or Tram) Station
2. Revitalized Water-Taxi Station
3. Two Boats Cruises Spots
4. New Green Public Spaces with Shaded places- from private to public
5. Floating Gardens
6. Open-air Cinema
7. New Accessible Bank - Floating Platform (Water-Sport activities) - Cafes
8. New Boulevard and Bike Lane

Sector.1 - East Bank: contains

1. One (Metro-Bus or Tram) Station
2. New Water-Taxi Station
4. Boats Cruises Spot
5. New Green Public Spaces with Shaded places
6. Floating Gardens
7. New Accessible Bank -Floating Platform- (Kayaking- Rowing) - Cafes
8. New Boulevard and Bike Lane

Figure.70: Design Proposals Plan in Relation to the Site Assets and Potentials. Source: Author.

Tasks		Time		
		Short Term (1-2 Years)	Mid Term (3-5 Years)	Long Term (10-15 Years)
Accessibility	Add traffic lights along the Corniche Highway	→		→
	Close one cars direction (9-13m width) adjacent to the river and open it for pedestrians- temporarily every weekend	○		
	Redesign parts of the river dike with integrated activities			→
	Revitalize the current water-taxi stations	○		
	Close two car lanes (6m) adjacent to the river permanently			
	Create public transportation system (Metro-Bus) (4m width) with 5 stations in between		→	→
	Create bike lane next to the sidewalk (2m width)		→	→
	Create public transportation system (Tram) along the Corniche			
	Create floating platforms & extended piers to the watercourse			→
	Create six new water-taxi terminals		→	→
	Ensure a sequential maintenance	→	→	→
Uses & Activities	Create various temporary activities along the close street every weekend as (exhibitions, fish markets, competitions, etc...)	○		
	Remove fences around the public gardens	○		
	Replace the burned National Democratic Party building by a green public space			→
	Transform the unused lands and banks to green public spaces			→
	Add new cafes and restaurants in the ground level for the adjacent buildings			→
	Create floating gardens as open public spaces			→
	Create open-air cinema close to the Radio and Television Building		→	→
	Transform the warehouses and parking lots into open public spaces			○
	Create boulevard with double rows of trees		→	→
	Ensure a sequential Maintenance	→	→	→
Public Amenities	Add amenities (benches, lights, rubbish bins, pavements) benefiting from the existing trees	○		
	Planting trees gradually along the sidewalk			→
	Add amenities for the newly boulevard like (lights, benches, parasols, rubbish bins, etc...)			→
	Create shading places along the sidewalk and the new re-designed dikes			→
	Ensure a sequential maintenance	→	→	→

○ Finish Action → Continuous Action

Table 5: Timeline shows the design processes in terms of accessibility, uses and activities and public amenities. Source: Author.

Based on the previous plan [Figure.70], the design interventions will be discussed in terms of accessibility, uses and activities, and public amenities in order to maximize the social interaction with the river as the following:

A. **In terms of Accessibility:** The limited pedestrian accessibility along the Corniche Highway to the riverbanks are represented on two levels: first, from the city to the riverbanks as cars have the major priority and people crossing at every point which in turn threatens their life, and second, from the riverbanks to the watercourse and vice versa due to the rigid river dike [Figure.71]. Therefore, a set of design proposals will aim to increase the social interaction with the riverbanks through maximizing accessibility and giving pedestrians the highest priority instead of cars.

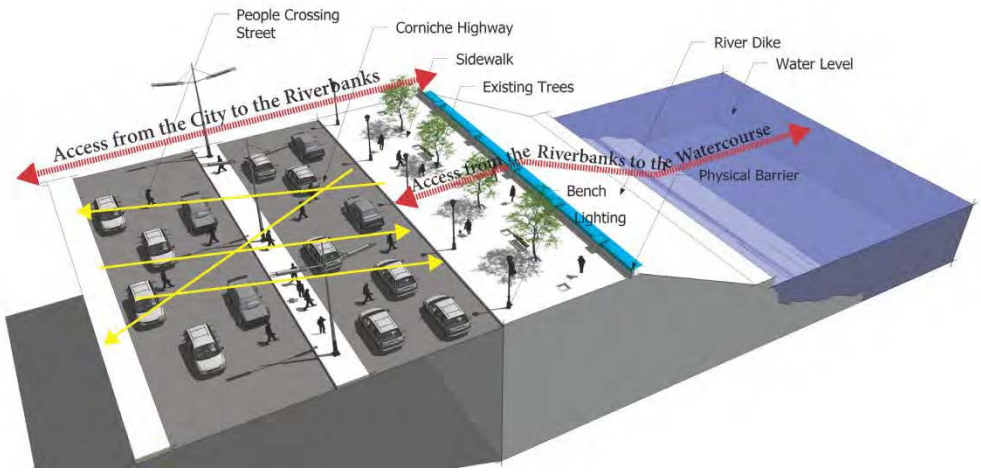


Figure.71: The current situation of the Corniche Highway along the east bank of the Nile.
Source: Author.

Accordingly, pedestrian accessibility is increased on the two predefined levels as the following:

1. From the city to the riverbanks: Three design proposals were created in order to increase pedestrian accessibility from the city to the riverbanks [see Figure.72]. However, the first two proposals have many disadvantages and the most notable ones are the social disconnection due to the indirect

relationship with the riverbanks, the high priority for cars movement, the high cost, and time consuming.

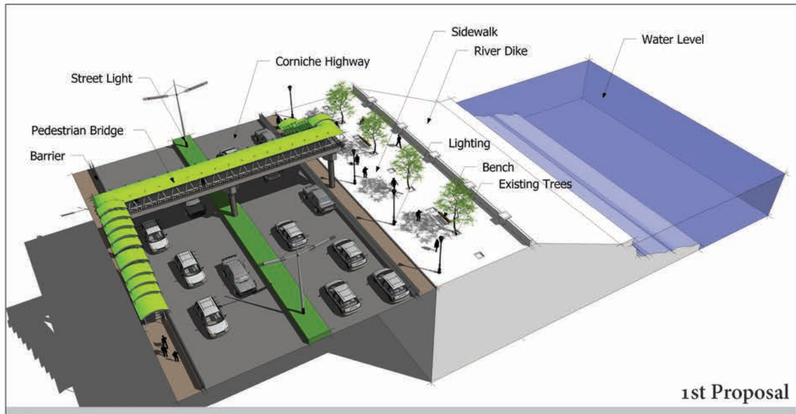
On the other hand, the third proposal has many advantages and the most notable ones are the people direct interaction with the riverbanks and the high priority for pedestrians. Besides, it can be implemented directly through sequential stages over time with a gradual cost increase. These stages are developed gradually through time as they were started from small interventions (like adding traffic lights) to bigger and advance one (like creating tram system along the Corniche)[31]. Therefore, this proposal was selected as the preferred one for the current situation of the east side along the Highway Corniche in Central Cairo considering that this proposal requires a detailed study of the traffic and transportation system.

2. From the riverbanks to the watercourse and vice versa: Most of the current riverbank spaces along the studied area are rigid, disorganized, static, and hardly accessible, and particularly, when it comes to reaching the water and touching it [Figure.73][32]. Therefore, the proposed designs aim to transform the riverbank spaces into vital, organized, dynamic, and easily accessible ones, with full of life activities and social interaction as they were derived mainly from the people needs[33] to achieve a strong interrelation between them and their river. Accordingly and based on the design proposals plan [Figure.70], several proposals are displayed as an approach to increase pedestrian accessibility from the riverbanks to the watercourse and vice versa, and the most notable ones are: an efficient water-transportation system with floating terminals on both banks along the three sectors, open-air graded terraces, a sand beach, an extended pier, and floating platforms to allow for direct and easy access [Figure.74].

[31] Back to the main findings of questionnaire (Part.2-Q.3) in chapter.2: 64% of participants prefer to have public transport system (as Metro or Bus). Also, the Ministry of Housing, Utilities and Urban Development creates a construction plan for monorail public transport system along the Corniche Highway (2009).

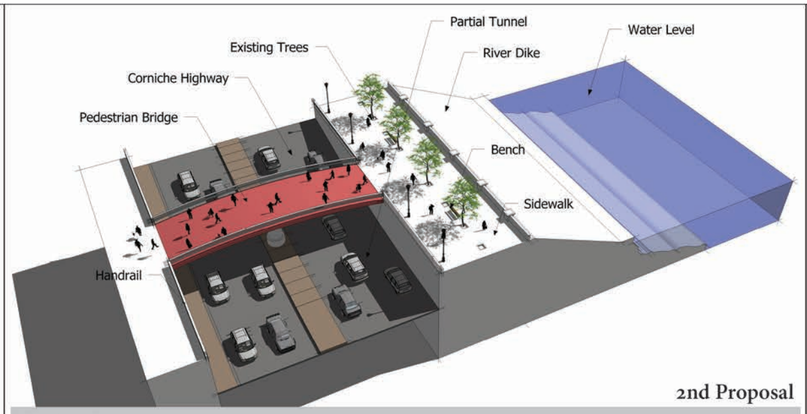
[32] Back to the public accessibility (2.4.2) in chapter.2

[33] Back to the main findings of questionnaire (2.5.2.1) in chapter.2



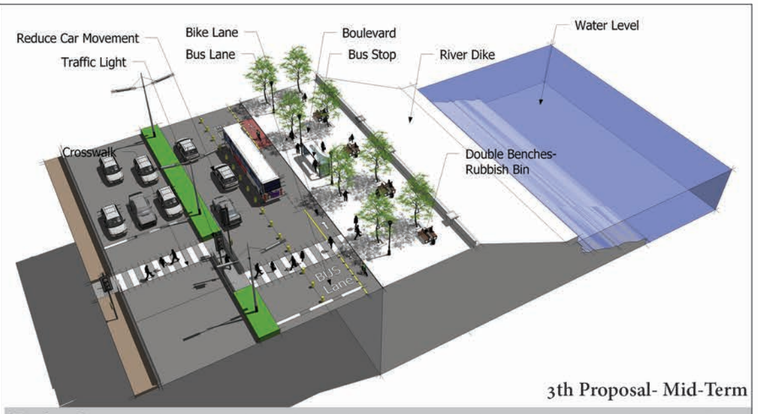
1st Proposal

Design Concept: Create pedestrian bridges along the Corniche Highway to connect both sides, ensure safe access for people, separate cars and pedestrians over two levels which lead to maintain the traffic flow. On the other hand, it creates a social disconnection due to the indirect relationship with the riverbanks, a high priority for cars movement, a difficult crossing for elderly people and handicapped and visual barrier along the Corniche. Besides to the time consuming and moderate cost.



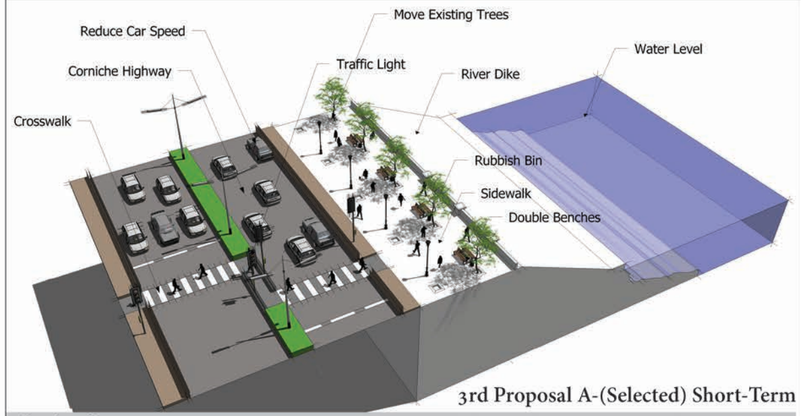
2nd Proposal

Design Concept: Digging partial tunnel for cars in specific areas and linking both sides through extended bridges in order to ensure safe and direct access for people, separate cars and pedestrians over two levels which lead to maintain the traffic flow. On the other hand, it has many technical problems (as groundwater), very time consuming and high cost. Besides, it gives a high priority for cars movement



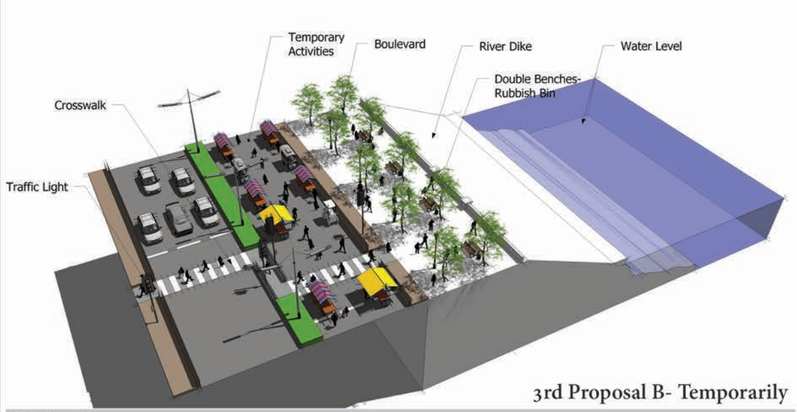
3th Proposal- Mid-Term

Design Concept: Close two car lanes of street direction permanently (6m width) and replaced it by first, a metro-bus lane (4m width) with five stop stations in between Qasr Al-Nile and Imbaba Bridge, and second, a bike lane (2m width) next to the sidewalk. This stage aims to reduce the traffic pressure, encourage people using public transportation system and cycling, saving time and energy, and reduce the Co2 emission. Also a new boulevard along the sidewalk was created with proper amenities to provide shaded places and promote people interaction.



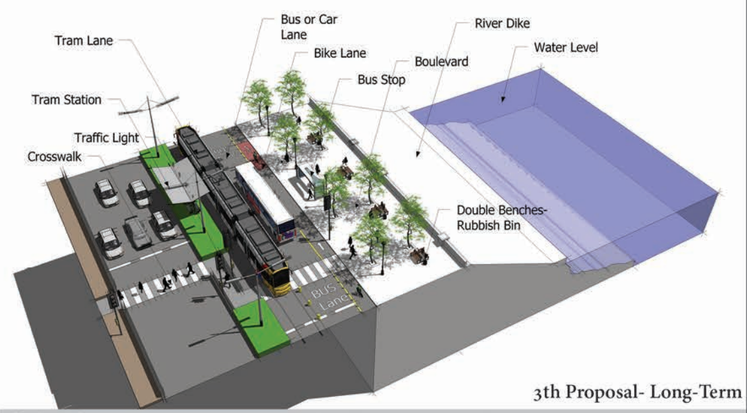
3rd Proposal A-(Selected) Short-Term

Design Concept: Implement a number of traffic lights on specific distance along the Corniche Highway to allow for direct people interaction with the riverbanks with a high priority for pedestrians, and safe, easy and direct pedestrian crossing to the banks and also, to reduce the cars speed along the Highway. Besides it can be implemented immediately with a low cost which allows for further development. On the other hand, this proposal can slow down the traffic flow.



3rd Proposal B- Temporarily

Design Concept: Close one car direction adjacent to the river temporarily on the weekends and open it for pedestrians as multi-functional space contains (markets, exhibitions, entertainments, cafes, etc…) in order to attract people and increase their social interaction with the public space along the riverfront, and to reduce the cars movement along the highway. Besides, it can offer a temporary job opportunities for many people. On the other hand, a traffic jam in the other streets on the weekends can be resulted.

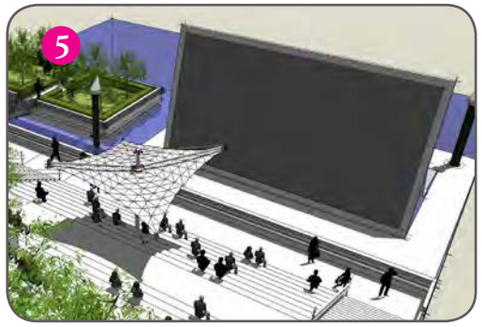


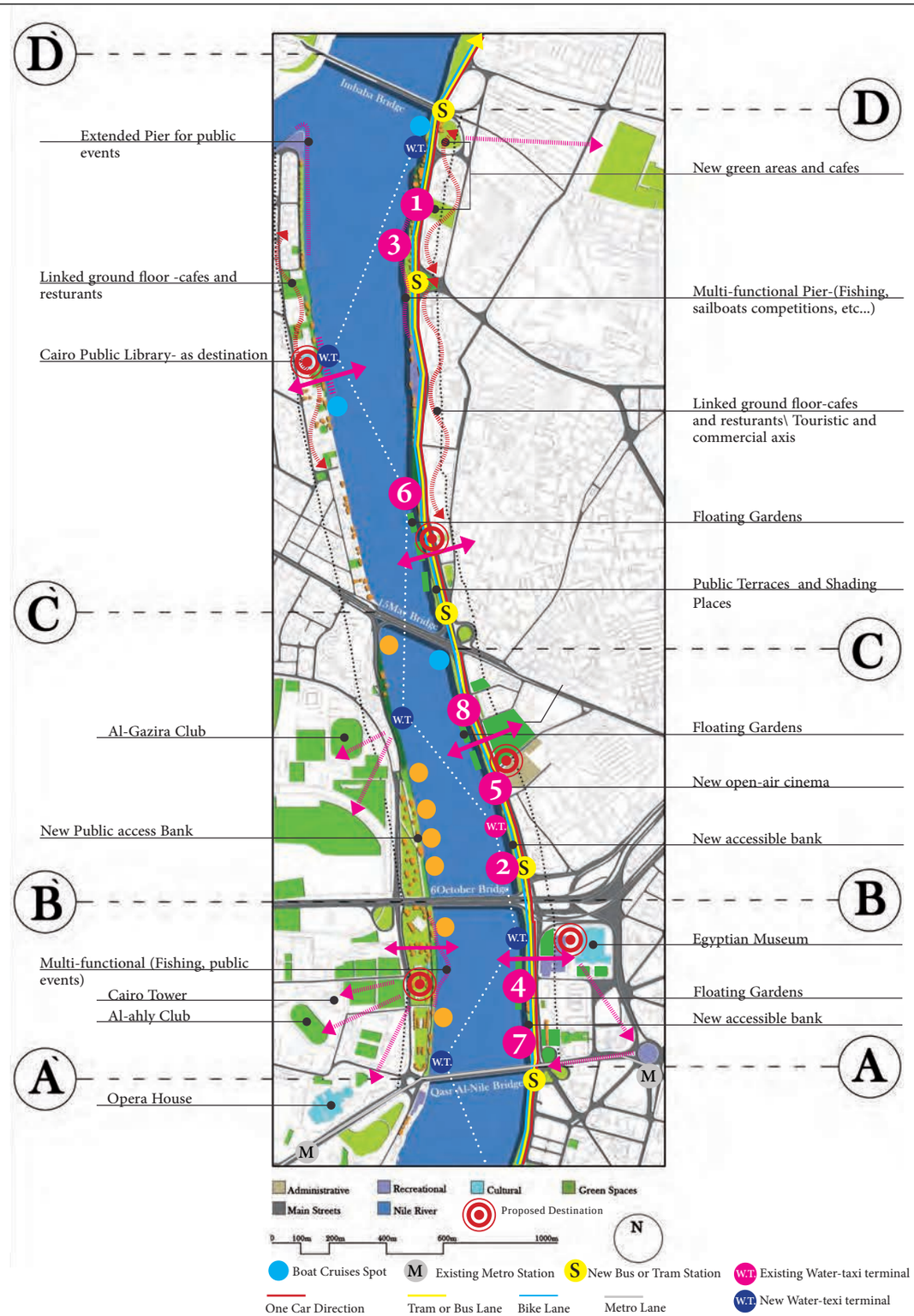
3th Proposal- Long-Term

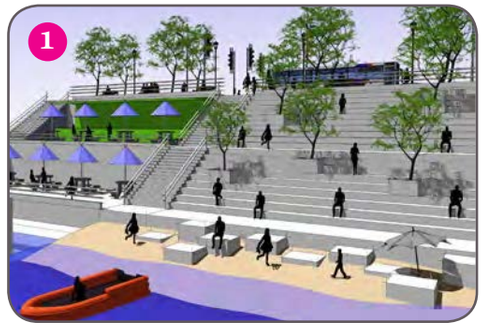
Design Concept: In this stage, an efficient friendly environment public transportation system (tram) were implemented beside the metro-bus lane (width 3m path+ 4m platform station) with a possibility to use the former lane for cars or to keep it for metro-bus. This maximize accessibility using multiple modes of transportation and limit vehicular access, balance environmental benefits with human needs, saving time and energy and create vital space.

Figure.72: Design Proposals for the Corniche Highway and the adjacent sidewalk. Source: Author

Figure.73: The current situation of the riverbanks spaces along the east side of the Nile River. Source: Author.







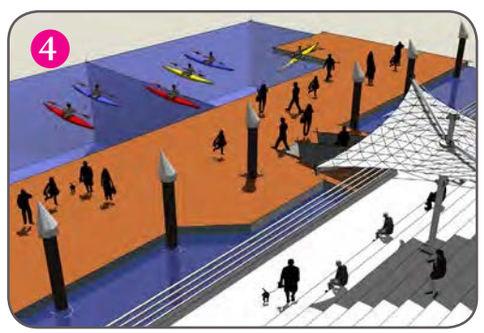


Figure 75: Some of the Proposed Designs along the Three Sectors in the East Bank. Source: Author

B. Uses and Activities: Due to the limited recreational activities, water-related and water-dependent uses along the riverbank as they are confined mainly to the Nile cruise boats and particularly along the east side[34], in addition to the mono-functional river dike as a flood protection element [Figure.75+78 (Status-Quo)], and the increased social disintegration with the riverfront, a number of design proposals for the riverbanks will be presented in order to restore the life of the Nile River as the largest main natural outlet to the public in Cairo incorporated with multi-functional activities that respond to the people's desires. To achieve this aim, the riverbank was divided into two levels: the upper one which includes the sidewalk and the adjacent land and buildings, while the lower level contains the river dike and the adjacent space to the watercourse [Figure.75].

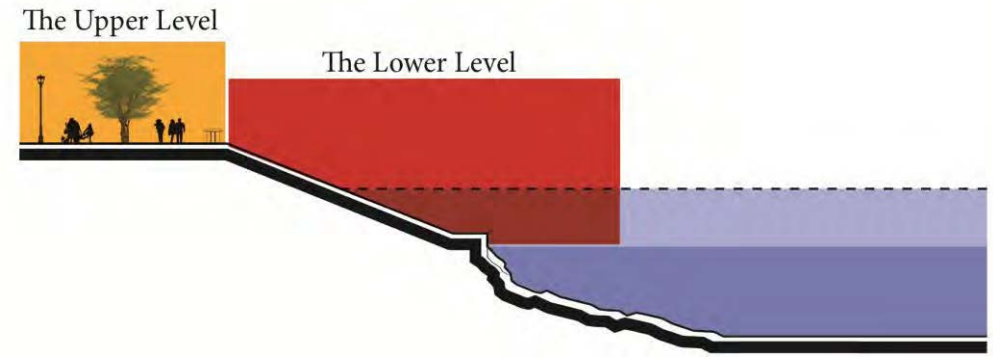


Figure.75: The current situation of the Nile riverbank along the east bank of the Nile.
Source: Author.

Accordingly, the proposed interventions on both levels can be displayed as the following:

1. The upper level interventions: Based on the proposals plan [Figure.70] and the site potentials plan [Figure.69], several uses and activities were proposed and the most notable ones are:

– Increasing the public green spaces along the three sectors via: first, replacing the warehouses, parking lots, un-used buildings (like the burned

[34] Back to the land use plan (2.4.1) in chapter.2

National Democratic Party in sector 1) by green open spaces, and second, removing fences around the public gardens and prohibited areas, particularly in Zamalek Island, to allow for physical and visual social interaction [Figure.70].

- Creating a new shaded boulevard with double rows of un-deciduous trees[35] along the sidewalk as it creates a perfect environment for pedestrians to stroll, run, and enjoy the river scenery, and for cyclists to ride their bikes. [Figure.74- Photo (2+8)].
- Creating vibrant touristic and recreational axes on the ground levels along the riverbanks and the adjacent water-related buildings (like cafes, restaurants, fish markets and entertainment places) [Figure.70].

2. The lower level interventions: Due to the mono-functional river dike as a flood protection element, the limited water-dependent uses where they are confined mainly to the Nile cruise boats and the loss of the social interrelation with the river, a large number of diverse, multi-functional and water-dependent activities and uses, showcase the local identity are offered, taking advantage of the height level of the dike and dealing with the water level changes. Therefore, the dike was divided into two levels [Figure.76]: the upper one, can be used for permanent[36] recreational activities (like open-air cafes and graded terraces for relaxing, sitting and enjoying the river scene, small restaurants with integrated sunshades, or as natural green terraces) [Figure.77- Proposal (A)+ Figure.78].

[35] The climate of Cairo is hot and dry most of the year; therefore, greater period of shading is needed.
[36] Permanent because the water fluctuations cannot reach the upper level.

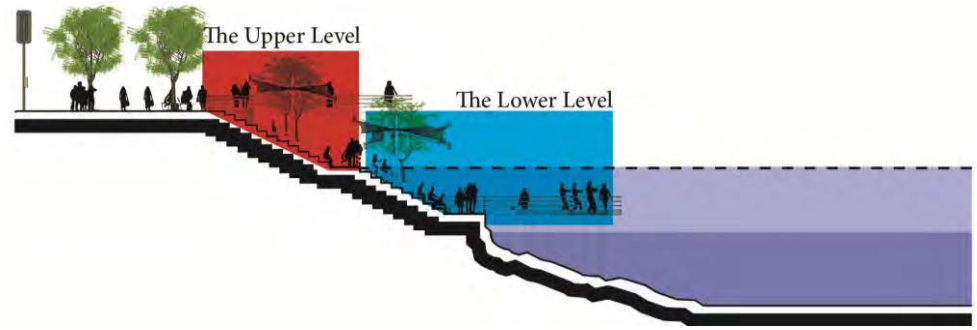


Figure.76: The Nile river dike divided into two levels along the east side. Source: Author.

On the hand, the lower level can be used for temporary[37] recreational activities that are mainly water-dependent. Besides, these activities can vary during the day[38] strolling, sitting and enjoying the natural scene, attending sailboats competitions, kayaking, and sunbathing in the daytime to relaxing, fishing, watching movies in the open-air cinema, attending festivals and events, and sitting in cafes at night. Besides, many new floating platforms were added (as floating gardens and cafes, water-taxi terminals and Nile cruise boats docks) in addition to an extended pier (which is used for fishermen, people gatherings, and social events and festivals) in order to maximize the direct contact of the public with the riverside [Figure.79 +Figure.80].

C. **Public Amenities:** Due to the high deficiency of amenities and public utilities along the riverbanks [Figure.81+82], where if they exist, they are bad and unsuitable[39] and due to the fact that the existence of proper amenities promotes the value of space and maximizes its use by people, a number of amenities were suggested along the riverbanks and the proposed boulevard on suitable distances (like benches, tables, rubbish bins, lighting) with many shaded elements (like parasols, trees and integrated sunshades) [Figure.81+Figure.82].

[37] Temporary as they can be flooded throughout the year.

[38] Classification of the proposed activities through time was according to the author's observation for the people behavior.

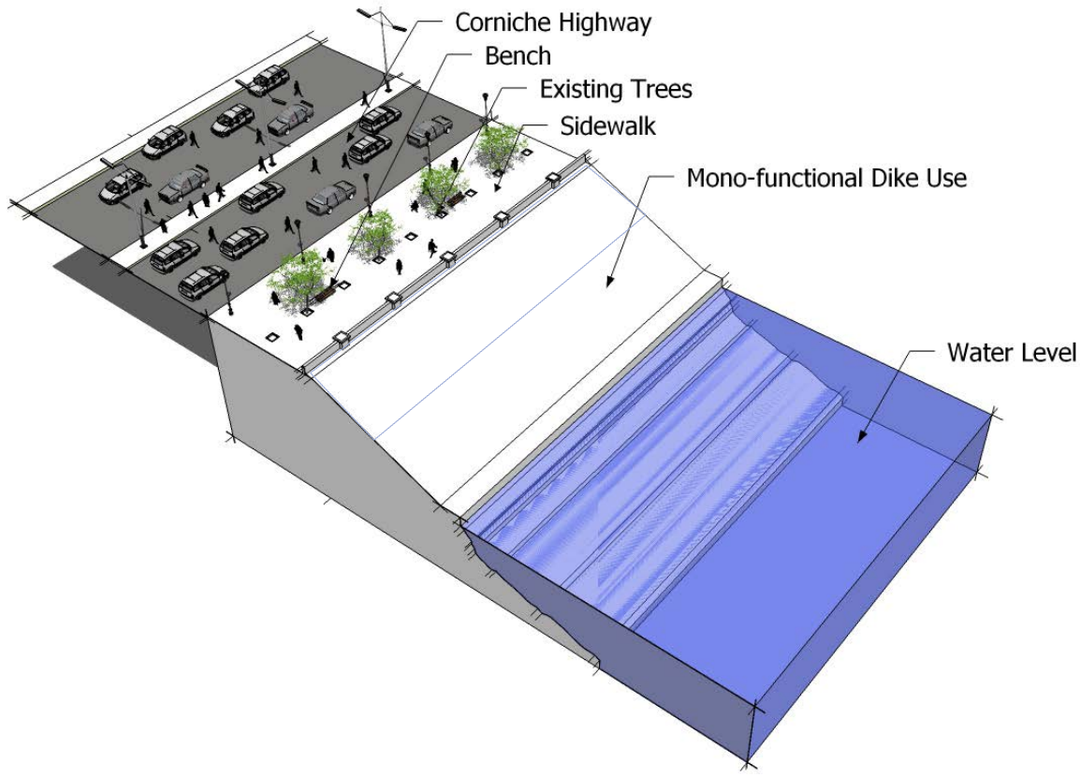
[39] Back to the main findings of questionnaire (Part.1-Q.7) in chapter.2: 88% of participant approved that.

Also, the used materials along the lower level should be water-proof to resist the flooding days.

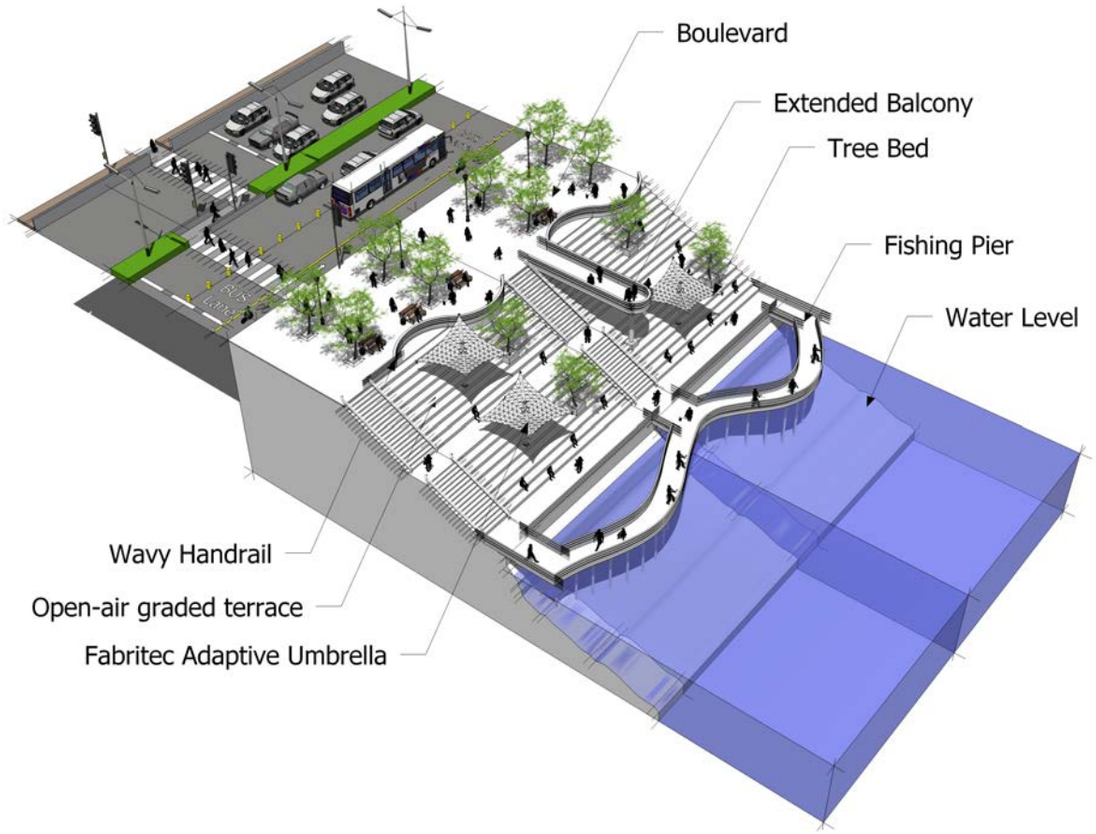
Figure.81: The riverbanks occupied by street vendors with no public amenities or services.
Source: Abdul Rauof, 2013.

Figure.82: Public sitting on pillar as there are no amenities along the current sidewalk.
Source: Hauger, n.d.

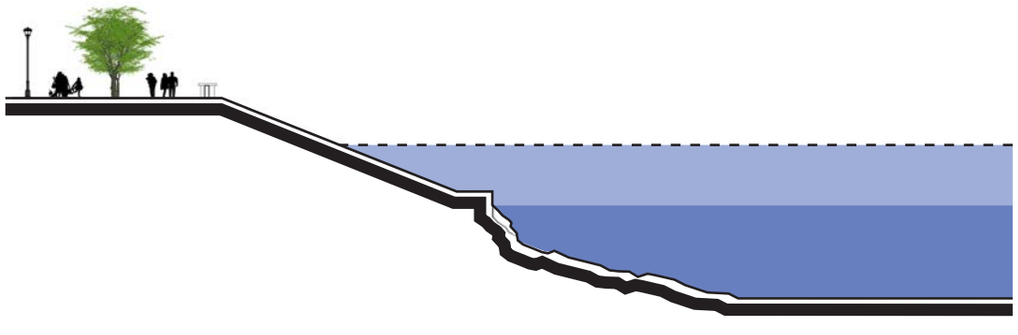
Figure.83: Amenities along the proposed boulevard. Source: Author.



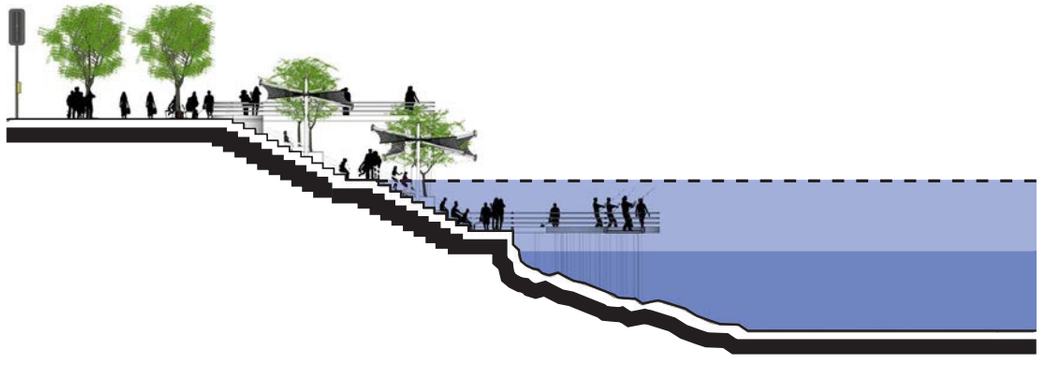
The Status-Quo of the Riverbanks - Mono-function



Design Proposal A- of the Riverbanks

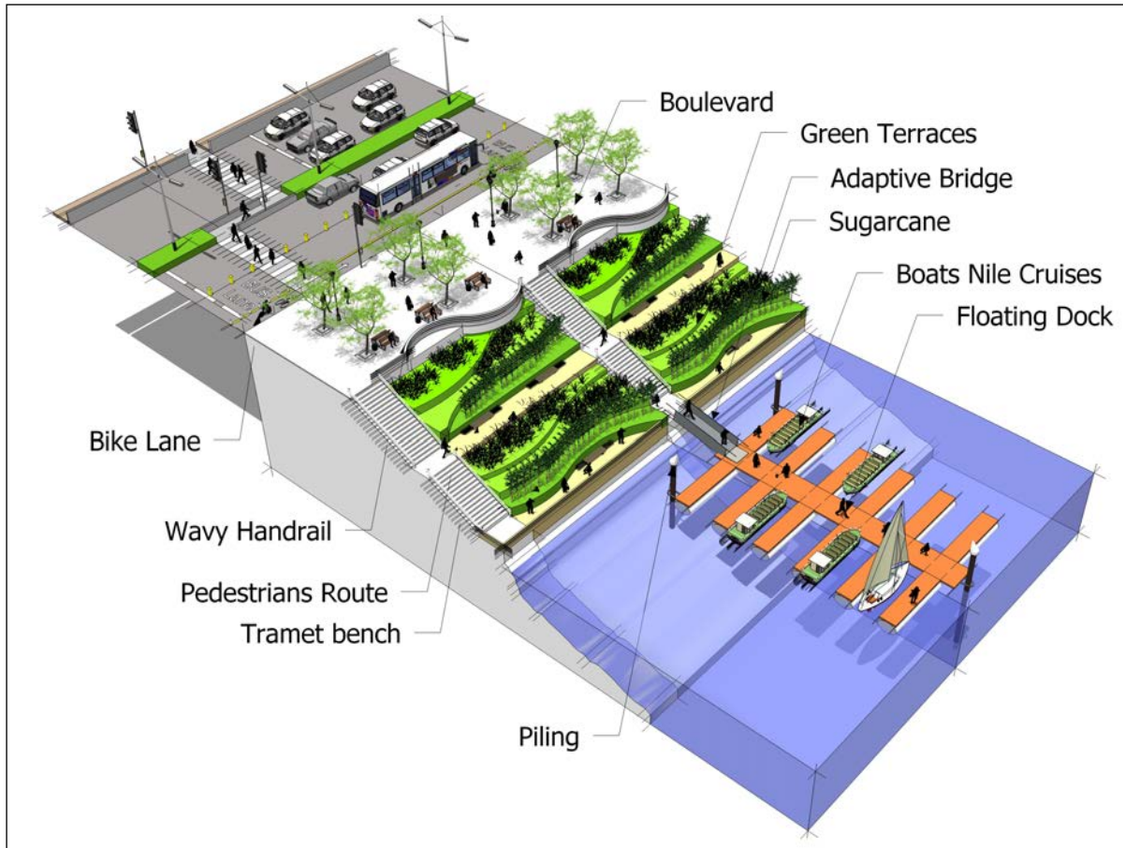


Cross Section for the Current River Dike

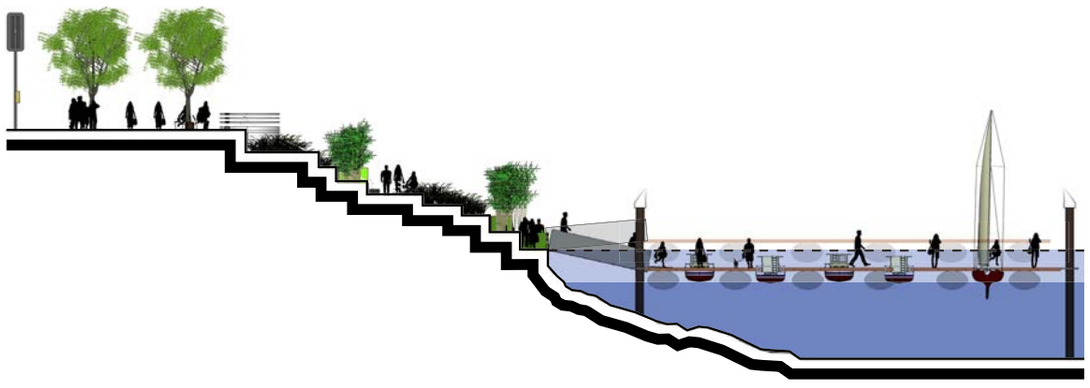


Cross Section shows the Proposed River Dike and Water Changes

Figure 77: Design Proposals for the River Dike along east side in sectors 1, 2 and 3. Source: Author.

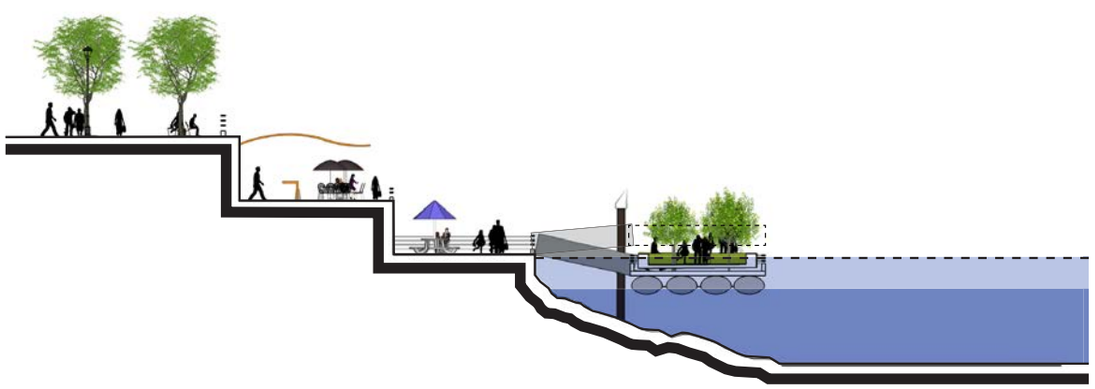


Design Proposal B - of the Riverbanks



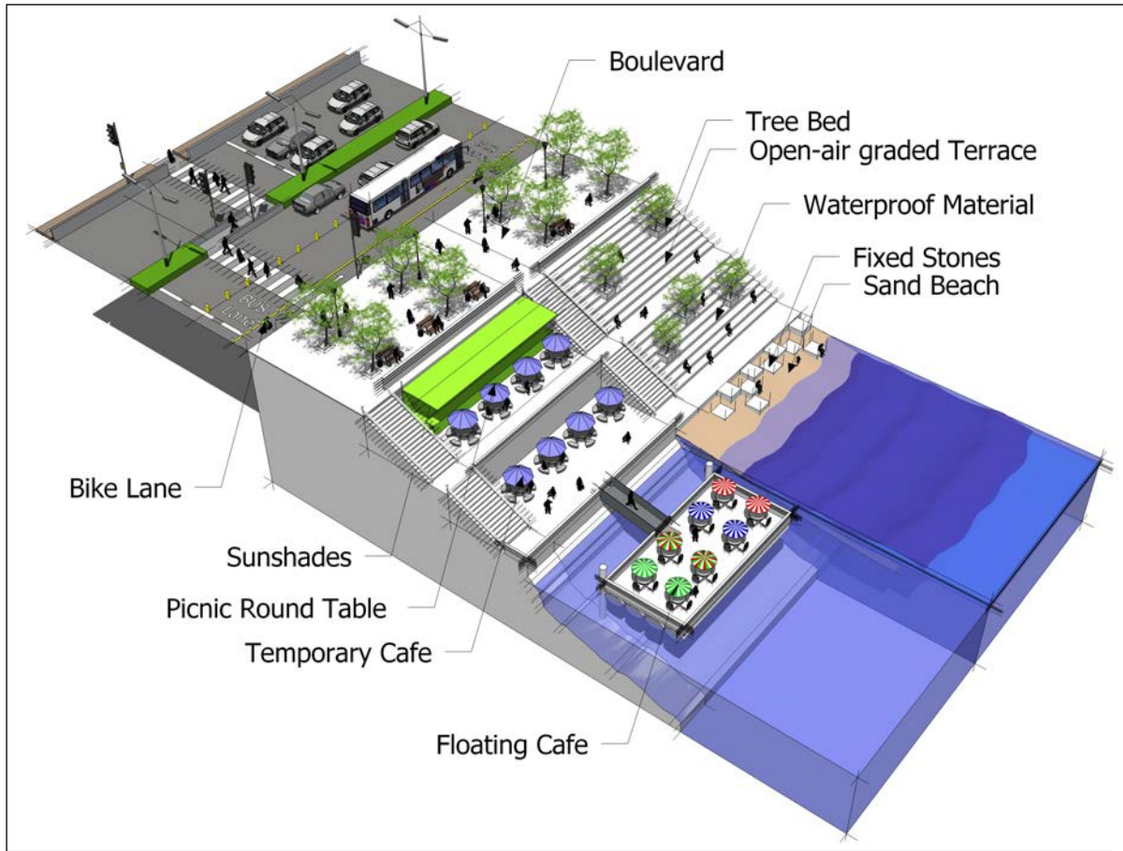
Cross Section shows the Proposed River Dike with Water Changes

Design Proposal C - of the Riverbanks

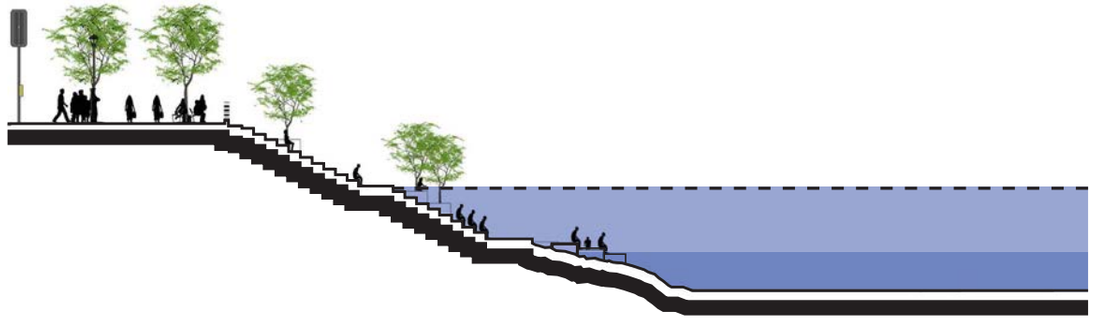


Cross Section shows the Proposed River Dike with Water Changes

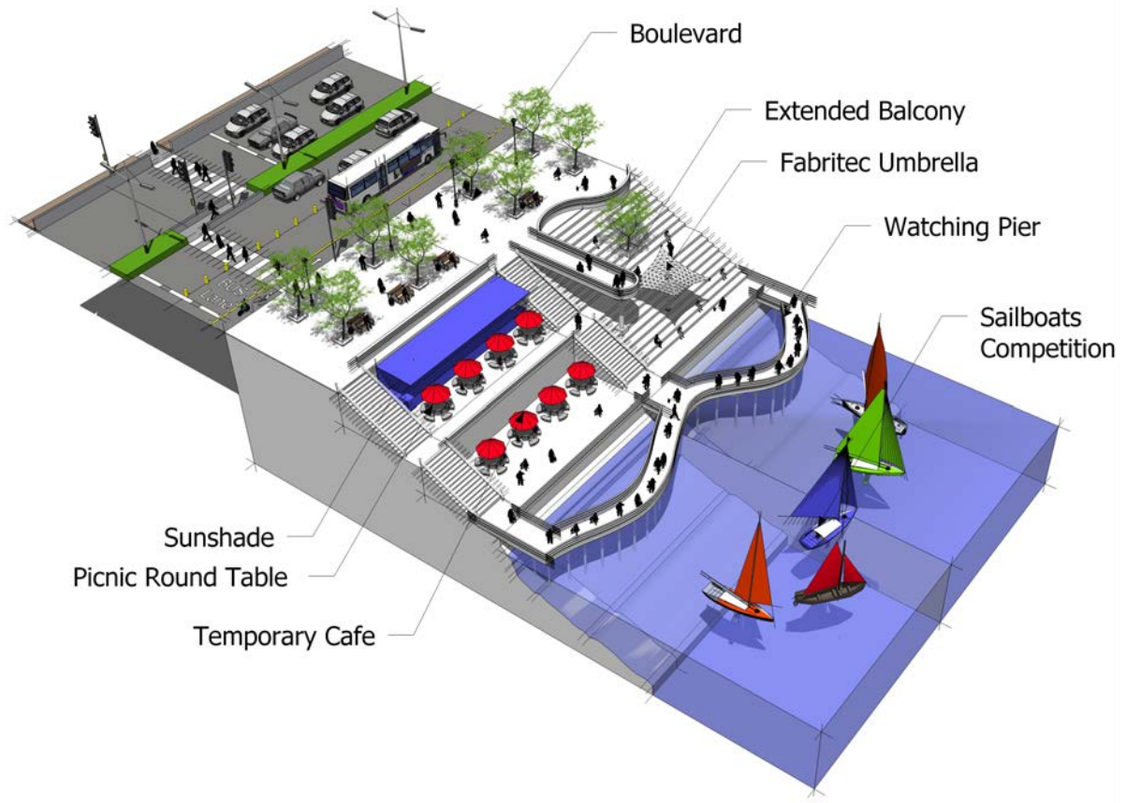
Figure 78: Design Proposals for the River Dike along east side in sectors 1, 2 and 3. Source: Author.



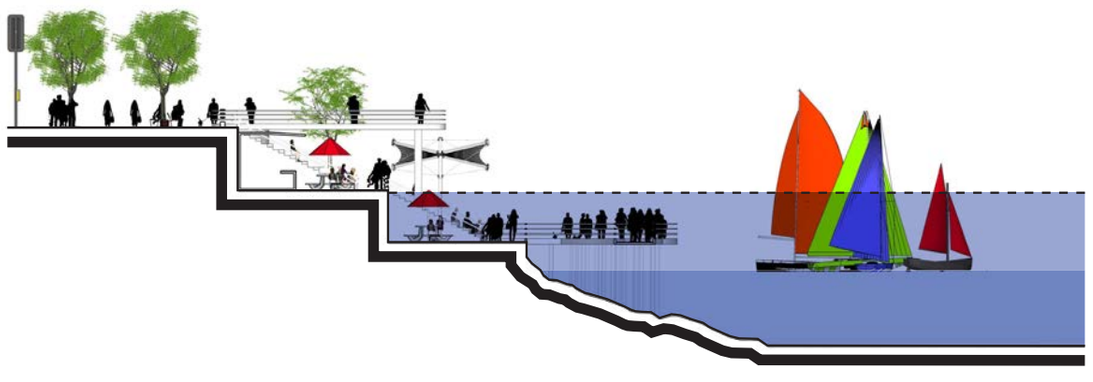
Design Proposal D - of the Riverbanks



Cross Section shows the Proposed River Dike and Water Changes

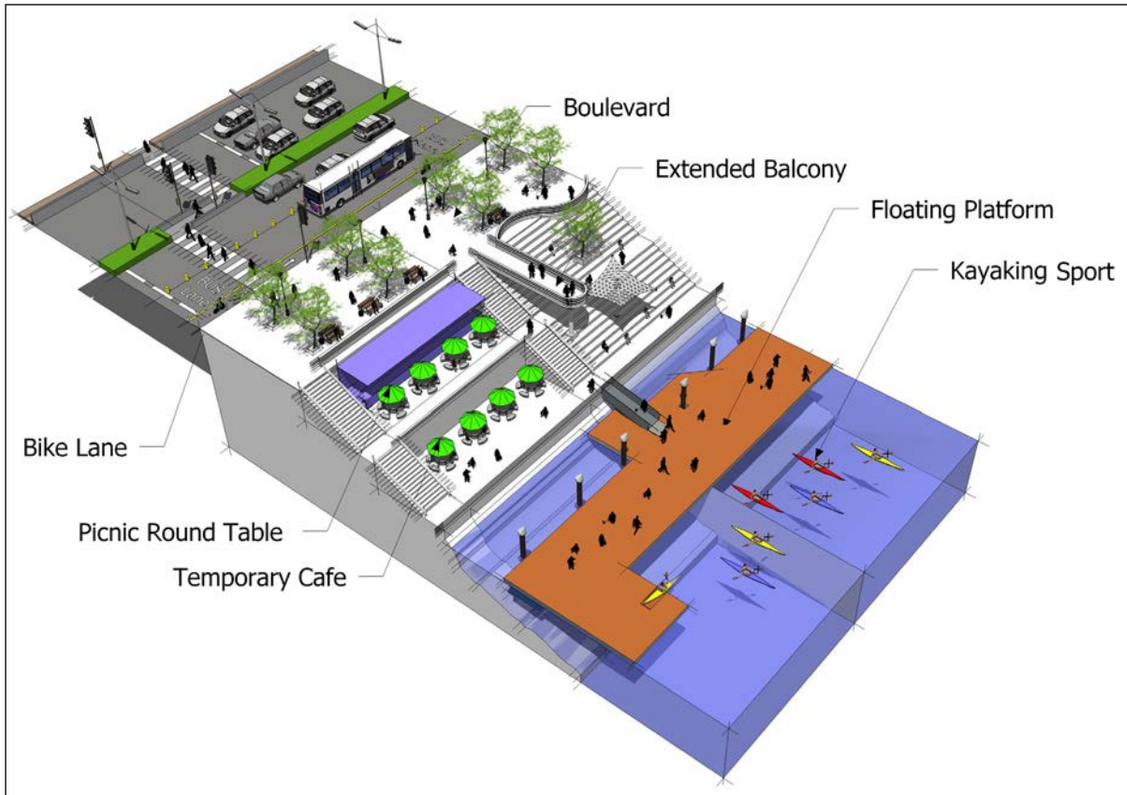


Design Proposal E - of the Riverbanks

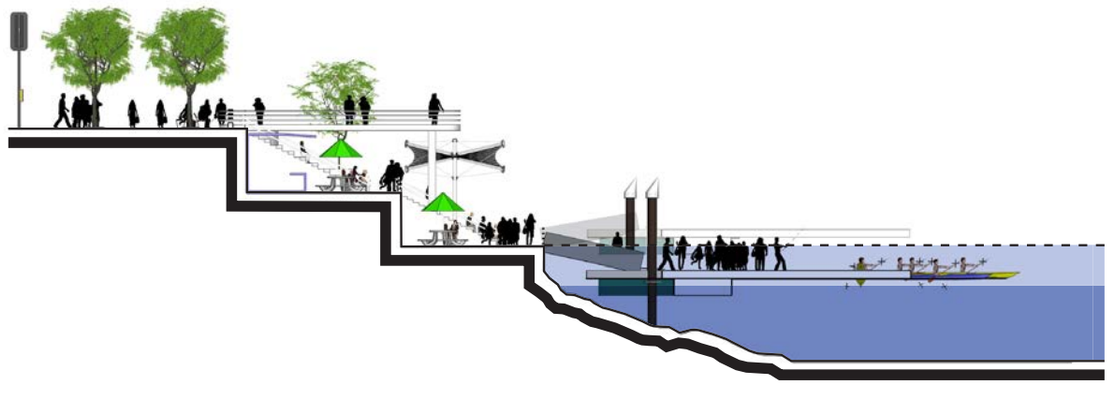


Cross Section shows the Proposed River Dike and Water Changes

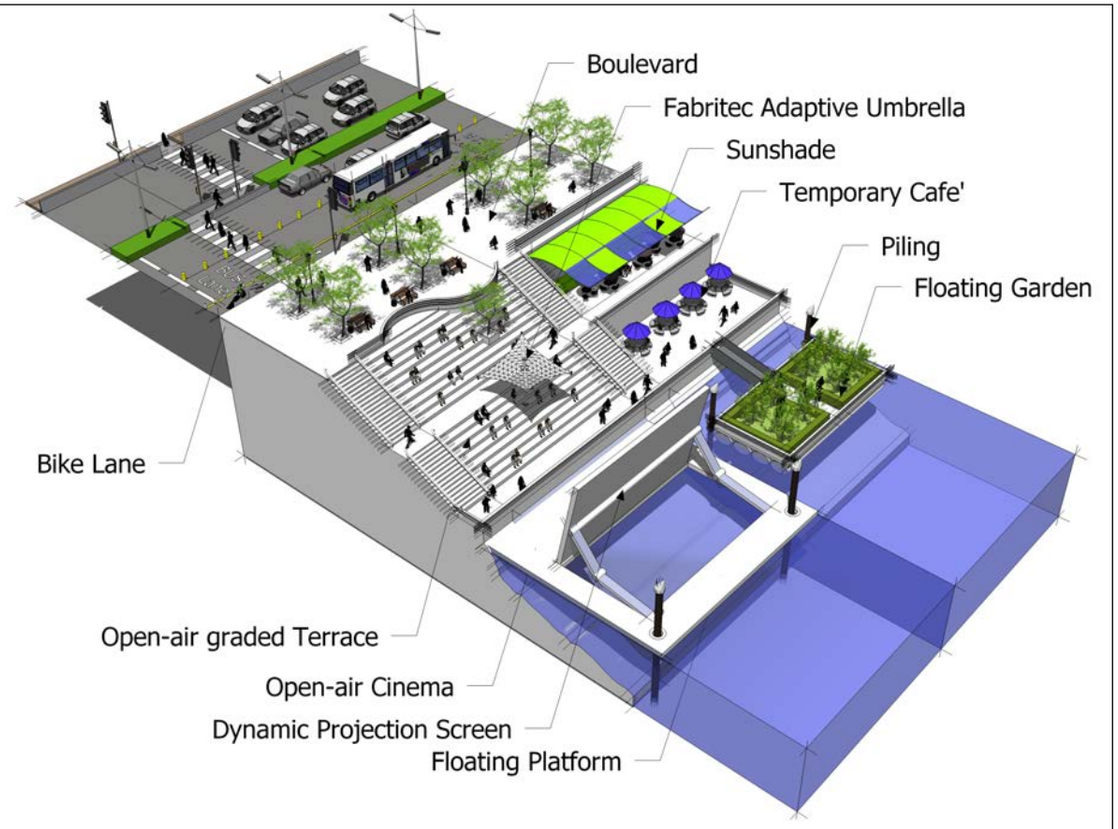
Figure 79: Design Proposals for the River Dike along east side in sectors 1, 2 and 3. Source: Author.



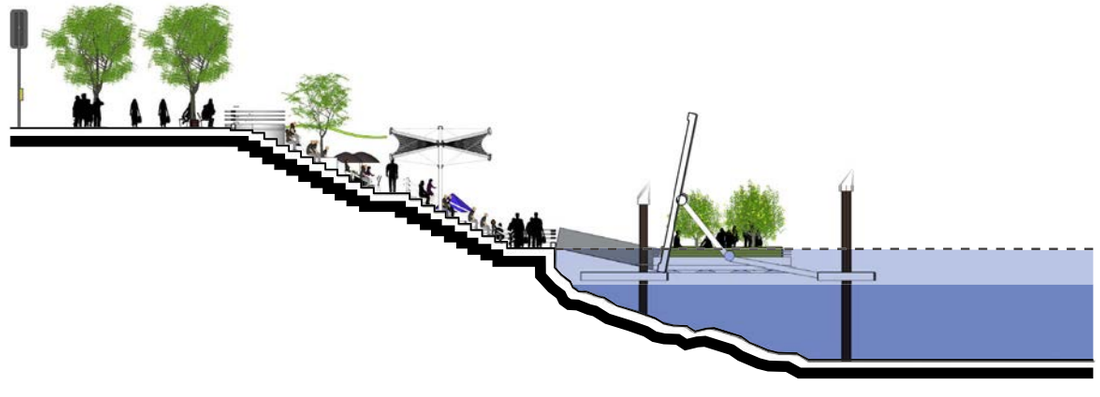
Design Proposal B - of the Riverbanks



Cross Section shows the Proposed River Dike with Water Changes



Design Proposal C - of the Riverbanks



Cross Section shows the River Dike and Water Changes

Figure 80: Design Proposals for the River Dike along east side in sectors 1, 2 and 3. Source: Author.

4.5- Conclusion:

The is the concluding chapter of the research. It aimed mainly to suggest a number of design proposals for the main case study in Central Cairo in terms of accessibility, uses and activities, and public amenities. To achieve this aim, a set of design guidelines was developed according to a number of precedent analysis and frameworks mentioned in the former chapters. Finally, it is worth mentioning that the proposed designs tried to prove how a multi-functional approach along the waterfront can maximize the human interaction with the river and create a vital environment that attracts all society groups to one place.

Research Recommendations:

The following points are some recommendations proposed by the research:

- The research recommends using the proposed designs in chapter.4 as an approach for creating an interactive multi-functional waterfront along the Nile River that comprises all age groups and attracts tourists in order to maximize the human interaction with the river.
- It is highly recommended to develop an efficient public transportation system (as tram, water-taxi) along the corniche in order to limit the vehicles access and which in turn enhances the efficiency of the adjacent public spaces and sidewalks.
- The research recommends using the 'Placemaking' approach for waterfront development and particularly 'the power of ten' to create destinations and ensure that the community achieves its vision via the bottom-up approach which will help to rebuild the city identity.
- It is recommended to activate the enacted Law No. 48 in (1982) to protect the Nile River and waterways from pollution and preserve the natural life. In addition, it is recommended to enact the laws that regulate the waterfront development and prevent any kind of illegal and inappropriate uses.
- To overcome the dilemma of institutional overlaps, the research recommends that tenure, control and administration of the waterfront should be committed to one official organization that depends mainly on the public consultation for any waterfront development.
- It is highly recommended to use the water-dependency approach in zoning in order to reclaim the land and reallocate the water-independent uses. As well as to limit the private ownership of the riverbanks as they are originally devoted for the public.
- When designing the waterfront, it is significant to maximize the water accessibility (particularly the physical and visual ones), increase the green

public spaces and recreational activities, and provide appropriate amenities in order to get the highest benefit of that unique location.

Suggestions for Further Research:

1- The incremental development of the waterfront in Central Cairo.
2- The traffic and transportation system along the Corniche in Cairo.
3- The environmental system of the River Nile in Central Cairo in terms of flora and fauna and the water quality.
4- The Mechanism of the policy implementation for the waterfront development.
5- Sustainable waterfront in the riverine cities.
6- The successful transformations of the waterfront in riverine cities.
7- The waterfront development in the Islamic city and the typology of the adjacent public spaces.

Conclusion:

This is the concluding section of the master thesis. This research has addressed the issue of multi-functional waterfront as an approach to achieve a clearer understanding of the potential for the integration of the Nile waterfront with the public and urban activities in Central Cairo in order to bring the river back to the city and to increase the social interaction with the river.

Consequently, the research depended on a set of sequential studies through three focal parts: empirical, theoretical and design, and was divided into four chapters as the following: Starting in chapter.1, a generic overview of the urban waterfront was presented where it covered the waterfront definition, its evolution and role, and the most notable typologies. Then in chapter.2, an empirical study was conducted on a selected case study along the Nile River in Central Cairo in order to define the core problems of the selected area, depending mainly on SWOT analysis and then ending by empirical frameworks. Afterwards, in chapter.3, a theoretical study was carried out using the 'Placemaking' approach which helps along with the core problem to define two case studies as the best practices in the developed countries in order to learn how these cities solve such problem, and later a number of theoretical frameworks resulted, and which in turn was used with the empirical frameworks and the community vision in Cairo as a baseline for the design proposals in chapter.4, where a number of design guidelines was developed to lead the proposed designs along the selected sectors in Central Cairo. Finally, a set of general recommendations was identified and suggestions for further developments were displayed.

To conclude, this research stresses that a glorious river like the Nile River, particularly in a compact dense city as Cairo, should be a vessel that integrates people from all age groups and guarantees them a natural outlet with multi-functional activities all day and throughout the year.

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ANNEXES

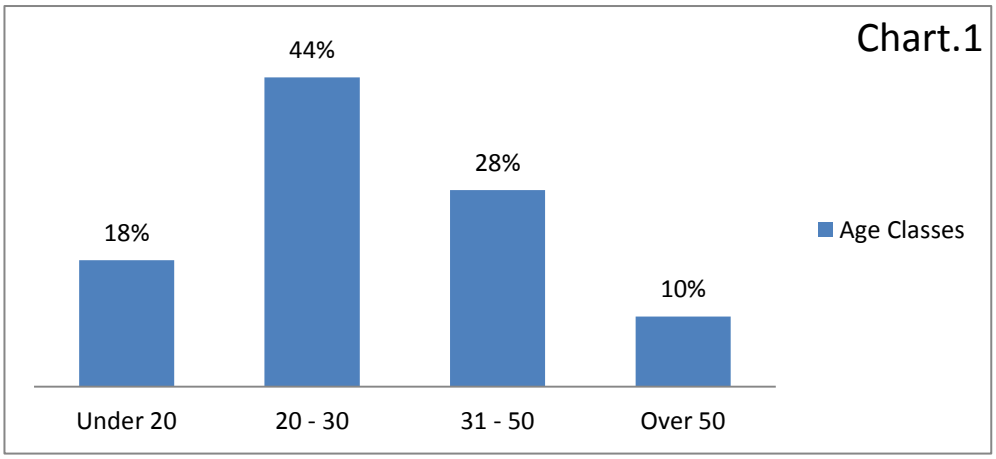
Annex I: Questionnaires Analyses

The questionnaire has three general questions at the beginning and then three main parts, each part has seven questions cover the three previously mentioned aims and distributed as the following:

- **General Questions:** (Will be moved to the Annex, only main finding will be written here)

– **Questions 1:** Are you a resident of Cairo? ☐ Yes ☐ No

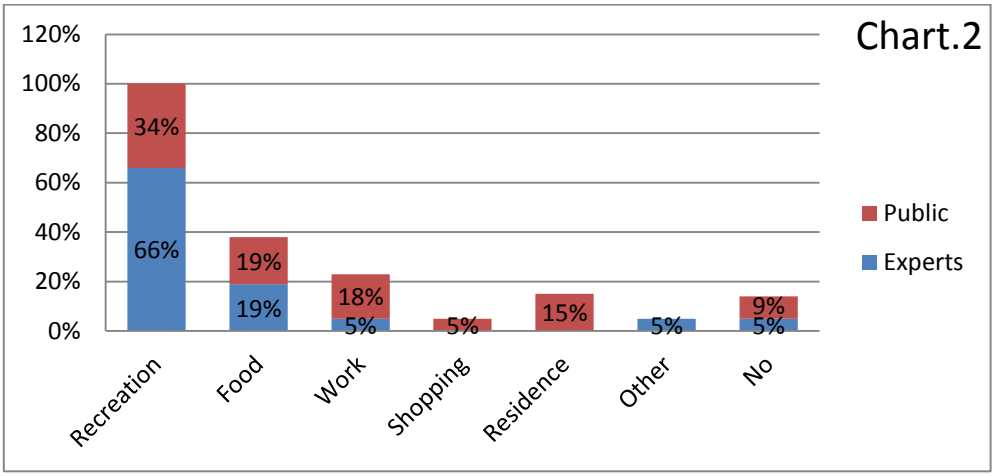
– **Answer 1:** 96% of people that answered the questionnaire are residents of Cairo, and they were from different ages groups, particularly, young people from (20-30) years old [Chart.1] and from different specializations like (professors, master students, architects, urban planners, residents, workers, lawyers, accountants, employees, street venders, horse riders and photographers).



– **Questions 2:** Do you go to the Nile riverbanks in Central Cairo, and why?
☐ Yes ☐ No

Recreation	Residence	Work	Food	Shopping	Other

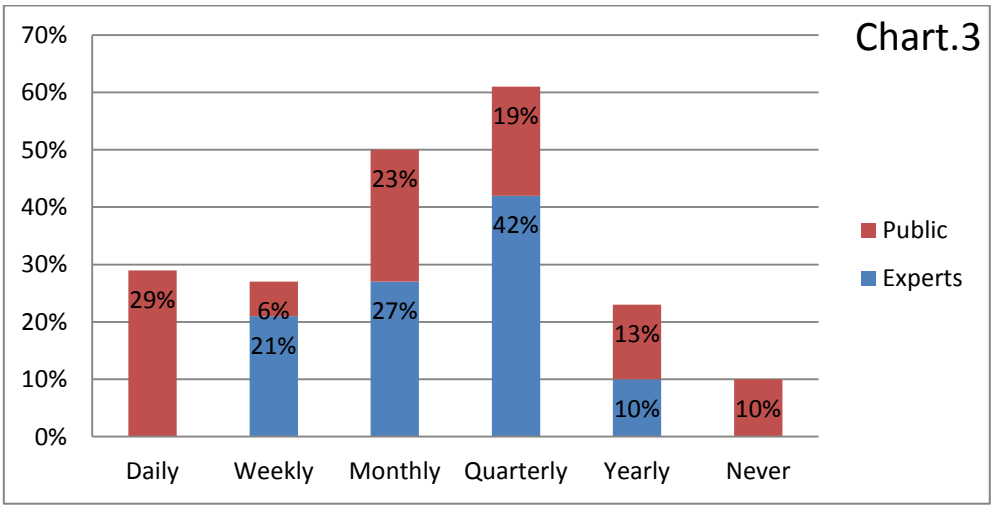
- **Answer 2:** mainly people from both groups go to the Nile riverbanks in CBD for recreation [Chart.2]. A Controversial comment from a guy in the public group is "why I should go there if I have nothing to do or to see".



- **Questions 3:** What is the average of your visit to the Nile riverbanks in Central Cairo?

Daily	Weekly	Monthly	Quarterly	Yearly	Never

- **Answer 3:** the highest amount for public was daily while quarterly was for experts [Chart.3].

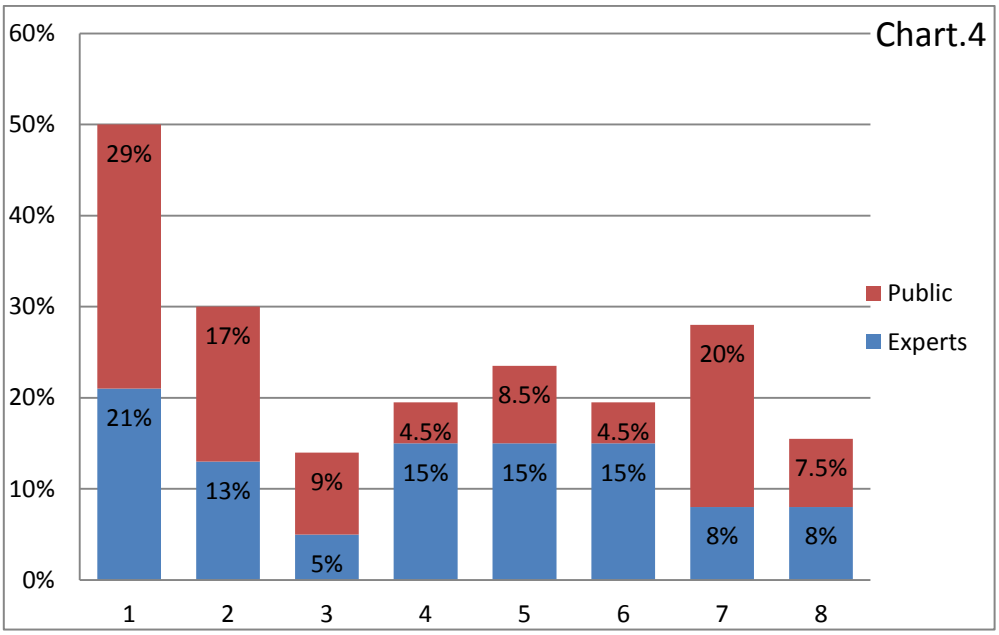


- **Main Parts:**

Part one: deals with the identification of the core problems along the riverbanks in Central Cairo

- **Questions 1:** Choose from 1 to 10 the options that are causing problems along the Nile River in Central Cairo from Qasr Al-Nile Bridge till Imbaba Bridge [Figure.22] and then classify the selected ones according to your priority?
  1- Traffic pressure along the Corniche Highway
  2- Difficult physical and visual accessibility to riverbanks
  3- The quality of the current private activities on the riverbanks like fixed and floating barges and casinos adjacent to the Nile
  4- Lack of the appropriate activities along the river
  5- Lack of green and recreational spaces
  6- Lack of public spaces and amenities and their bad quality if exist
  7- Environmental pollution (air and water pollution - noise and visual pollution)
  8- Deteriorated beaches and riverbanks due to the inclined concretions and the current form of the dike
  9- Brownfields and unused lands
  10- The unrelated historical landmarks with the riverbanks

- **Answer 1:** Numbers (9 and 10) were deleted because of the extreme lack of selection by both groups. The major problems for both groups were traffic jam along the Corniche Highway, difficult accessibility and environmental pollution to riverbanks. Besides, the lack of green and recreational spaces, public spaces and amenities and appropriate activities [Chart.4].



- **Questions 2:** Are there any other problems not mentioned previously along the Nile River in Central Cairo? Explain please.

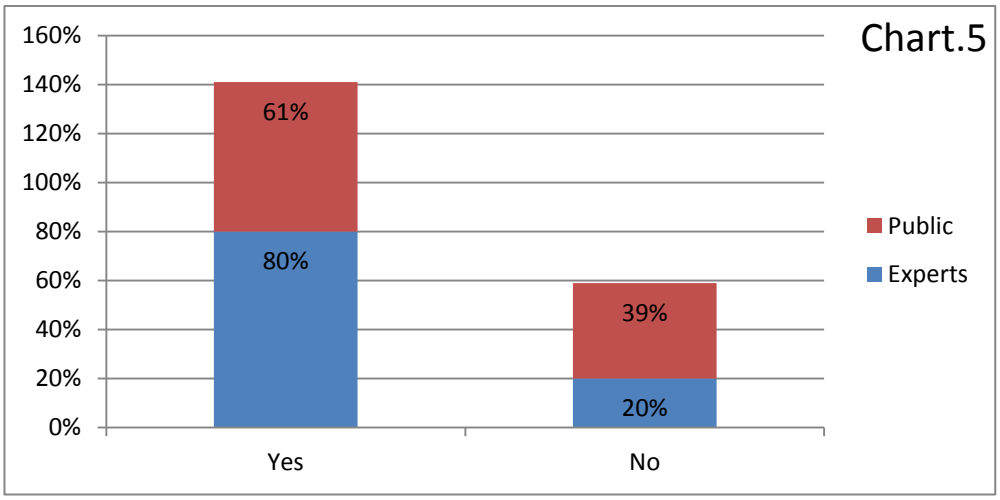
- **Answer 2:** other problems like:
  - Street venders
  - Lack of amenities, public utilities, particularly, shaded places for pedestrians
  - Huge privately owned spaces and banks
  - Safety issue

- **Questions 3:** what do you think are the proposed solutions to the existing problems?
- **Answer 3:** main Suggestions were:
  - Change part of the traffic along Corniche Highway to alternative streets and transform them into public green spaces with an easy access.
  - Redistribution of land uses adjacent to the river and their connection with the city.

- Provide an efficient public transportation system and water-taxi networks to connect the Nile waterfront with the city center.
- Study the visual accessibility for all usages to allow seeing the river and prevent the establishment of any high-rise buildings along the river.
- Increase the open public spaces via redistribution of usages and provide more pedestrians sidewalks.

– **Questions 4:** Do you find it is difficult to reach the riverbanks in Central Cairo? If yes why? ☐ Yes ☐ No

– **Answer 4:** 70% answered said yes [Chart.5].



– **Why?**

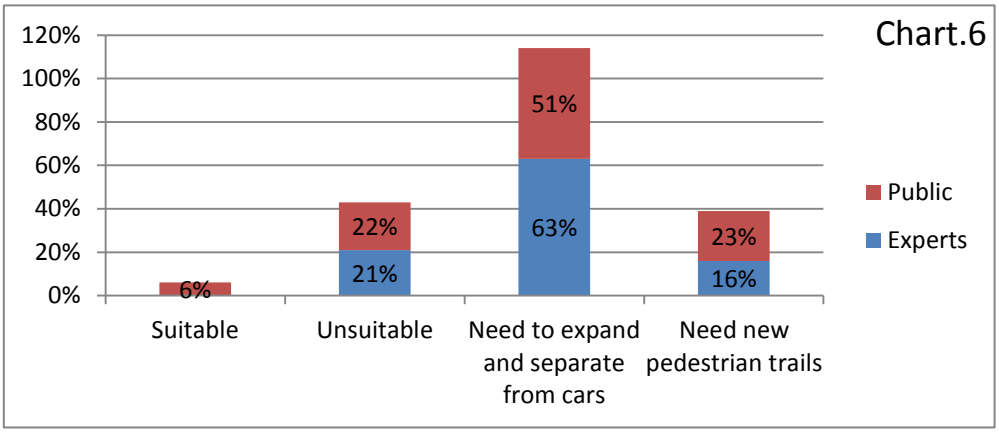
– Main answer were due to:

- Traffic pressure along the Corniche Highway.
- Privately owned banks and dike shapes.
- Land uses and inappropriate functions.

– **Questions 5:** Are the current pedestrian sidewalks located on the Nile riverbanks in Central Cairo;

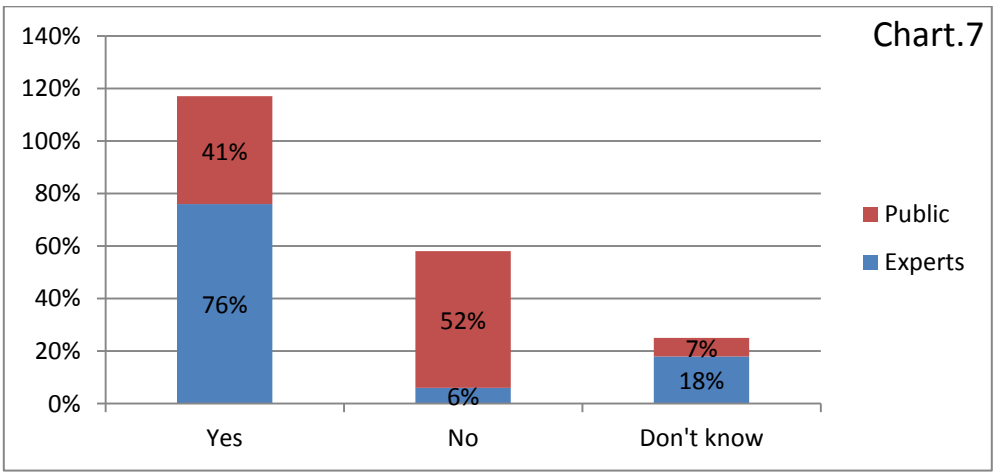
Suitable	Unsuitable	Need to expand and separate from cars	Need new pedestrian trails
Other			

– **Answer 5:** around 60% said need to expand and separate from cars [Chart.6].



– **Questions 6:** Are there brownfields or unused lands along the Nile in Central Cairo in the selected area? ☐ Yes ☐ No. If yes where are located?

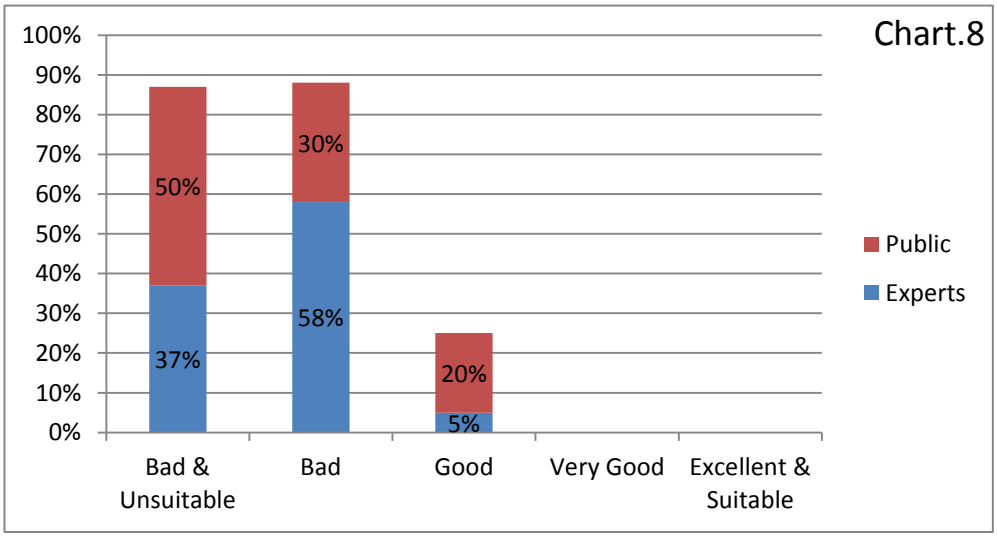
– **Answer 6:** around 60% said yes and mainly in Rod Al-Farag area and Imbaba [Chart.7].



- **Questions 7:** Do you think amenities and public utilities along the riverbanks in Central Cairo in terms of type, number and location are;

Bad and Unsuitable	Bad	Good	Very Good	Excellent and Suitable

- **Answer 7:** both groups said it is bad and unsuitable or it is only bad [Chart.8].

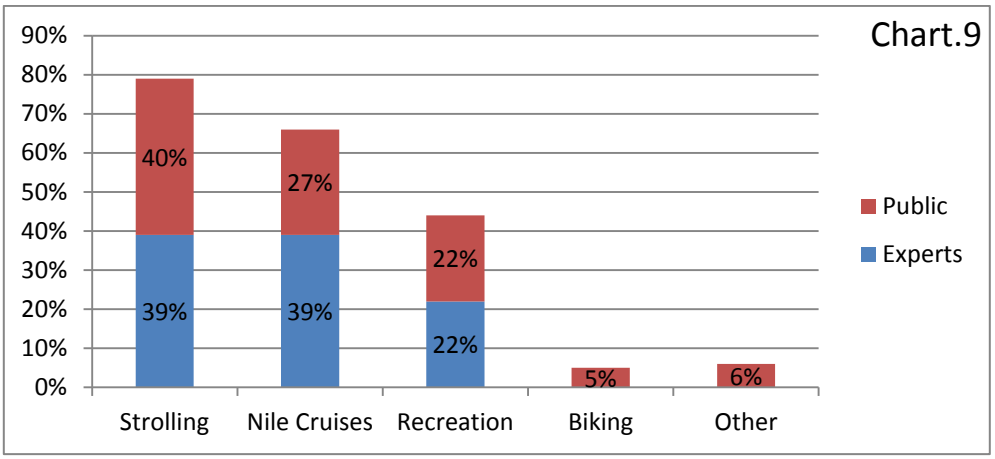


Part Two: Concerned with the definition of the main related functions to riverbanks in Central Cairo

- **Questions 1:** What are the activities that you were practiced along the Nile or attracted you to the riverbank?

Strolling	Nile Cruises	Recreation	Biking	Other

- **Answer 1:** both groups said mainly walking, Nile cruises and then recreation [Chart.9].

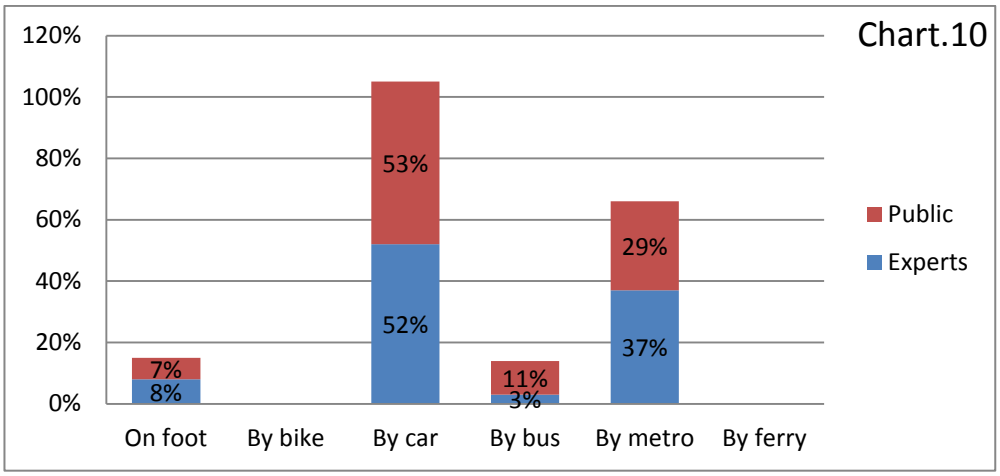


- **Questions 2:** What are the currently used activities along the riverbanks in Central Cairo and you would like to develop?
- **Answer 2:** the main answers were:
  - The limited recreational activities in some public gardens and open spaces
  - The difficult strolling along pedestrian sidewalks with unsuitable amenities
  - Nile cruises
  - limited and inappropriate fishing and cycling places

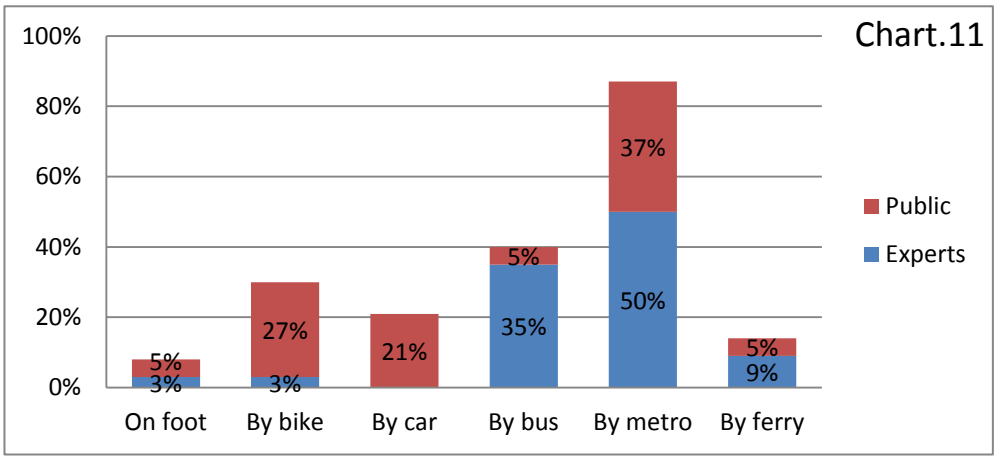
- **Questions 3:** Which way of transportation do you use to reach the Nile riverbanks in Central Cairo? And what is the most appropriate way to get there in your opinion?

On foot	By bike	By car	By bus	By metro	By ferry

- **Answer 3:** more than half of both groups said by car and around one third said by metro [Chart.10].



– The most appropriate way was public transport mainly metro and bus and around a quarter of public said by bike despite the lack of suitable paths [Chart.11].



– **Questions 4:** Choose from the following uses what you think appropriate to the riverbanks in Central Cairo in your opinion and classify the selected ones according to your priority;

- ☐ Recreational activities and public gardens
- ☐ Plazas and proper amenities
- ☐ Boulevard for pedestrians and cyclists
- ☐ Restaurants and cafeterias

- ☐ Marinas boats and fishing places
- ☐ Sports and rowing clubs
- ☐ Kiosks for sale and shopping
- ☐ All mentioned previously with a balanced percentage
- ☐ Other.....

– **Answer 4:** mainly public like to have boulevard for pedestrians and cyclists, then recreational and public gardens, while experts put the aforementioned first then plaza with proper amenities [Chart.12].

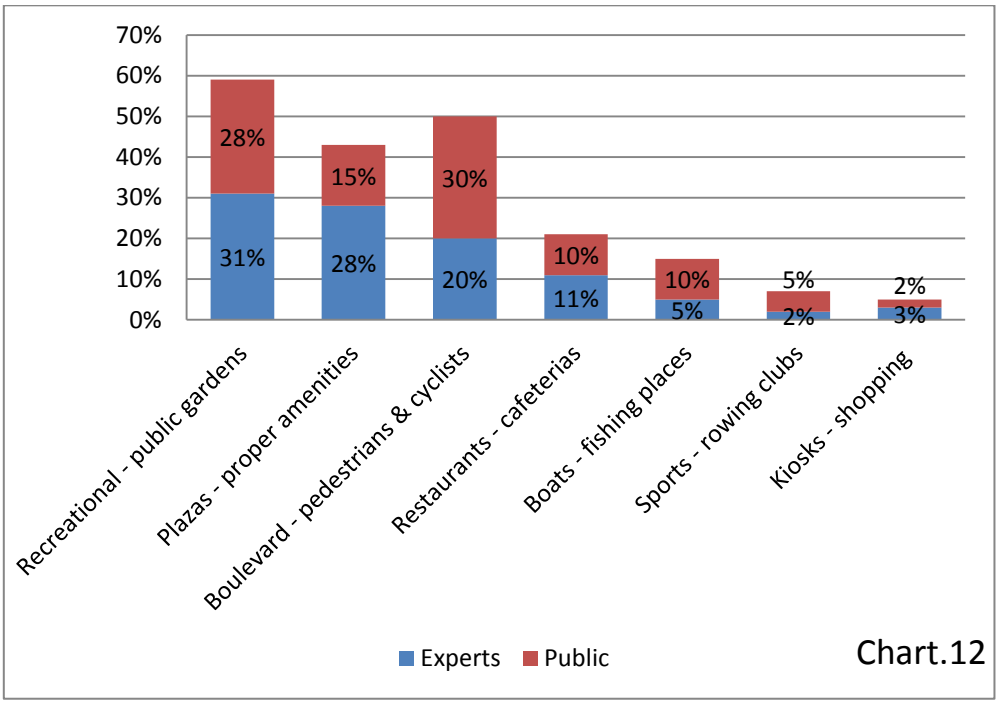
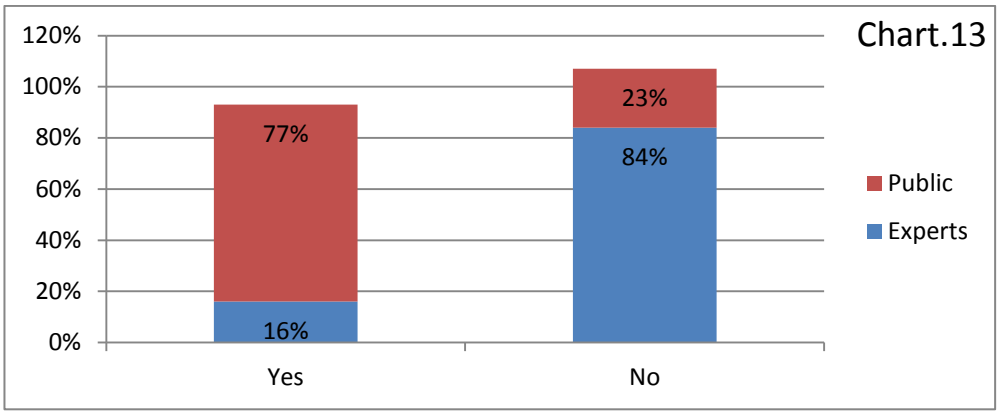


Chart.12

– **Questions 5:** Is there an appropriate relationship between the historical landmarks in Central Cairo and the Nile riverbanks? ☐ Yes ☐ No. If No, Why?

– **Answer 5:** 84% of experts said No while 77% of public said yes [Chart.13].



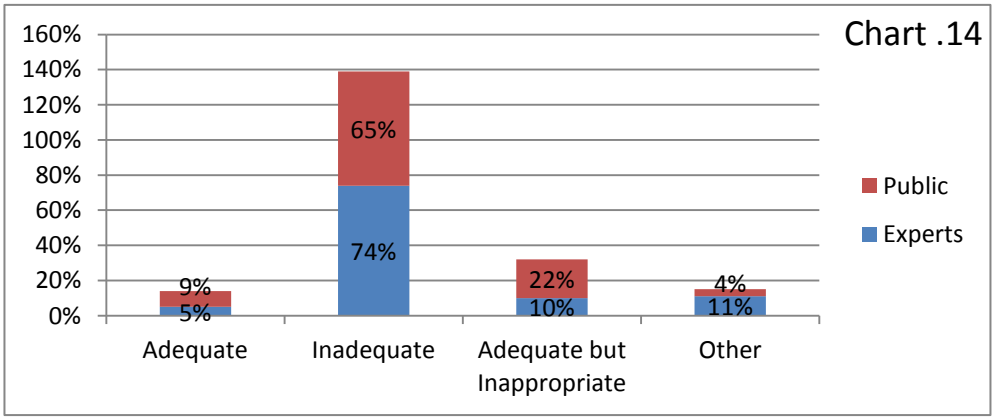
- **Why?**
- Main answers were due to:
  - Difficult visual and physical accessibility from the riverbanks
  - All the functions along the river do not belong to these buildings
  - No clear connection between these buildings and riverbanks

- **Questions 6:** Are the current public spaces and recreational areas along the riverbanks;

Adequate	Inadequate	Adequate but Inappropriate

- If they are inadequate or inappropriate, what do you think are the proposed suggestions?

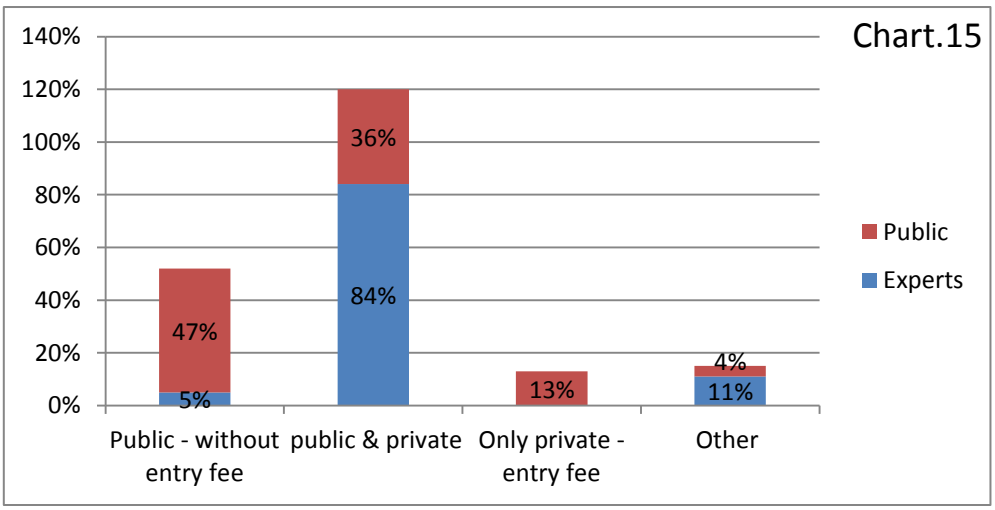
- **Answer 6:** almost 70% of both groups said it is inadequate [Chart.14].



- The proposed suggestions were mainly:
  - Increase the public spaces like (gardens) and recreational areas and open them to the public.
  - Replace the private ownership of some places or buildings, particularly, (administrative) with public spaces linked with recreational activities.

- **Questions 7:** Would you like spaces along the Nile riverbanks in Central Cairo to be:
  - ☐ Open to the public without an entry fee
  - ☐ Some public and other private
  - ☐ Only private with entry fee
  - ☐ Other

- **Answer 7:** around half of public said they prefer to be public without entry fee while 84% experts said they prefer to be some public and other private and in total it is the dominant choice [Chart.15]. As for other choice they prefer it open to public with very cheap entry fee like (1 EGP) in order to maintain them.



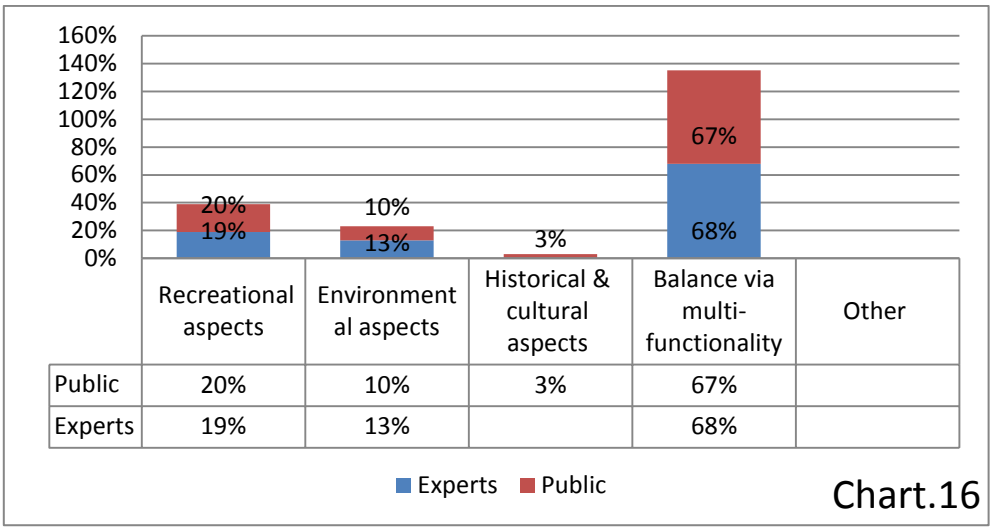
Part Three: Looks for the public and experts' vision of the Nile riverbanks in Central Cairo

- **Questions 1:** What are the non-existent functions along the Nile River in Central Cairo and you aspire to have in the future?

- **Answer 1:** main answers were:
  - Active recreational areas mainly gardens and open public spaces
  - Water sports and activities like rowing
  - Sailboats competitions places
  - Fishing areas
  - Popular celebrations and festivals areas
  - Cafeterias and restaurants
  - Open air cinema

- **Questions 2:** What do you think the design of the Nile riverbanks in Central Cairo should take into account;
  - ☐ Support the recreational aspects with the river and its banks
  - ☐ Support the environmental aspects with the river like (water quality and flexible relationship with the riverbanks)
  - ☐ Support the historical and cultural aspects and their relation with the riverbanks
  - ☐ Create a balance between all the previous aspects via using multi-functional approach
  - ☐ Other

- **Answer 2:** main answer for both groups were to create balance via using multi-functional approach with around 70% [Chart.16].



	Recreational aspects	Environmental aspects	Historical & cultural aspects	Balance via multi-functionality	Other
Public	20%	10%	3%	67%	
Experts	19%	13%		68%	

Chart.16

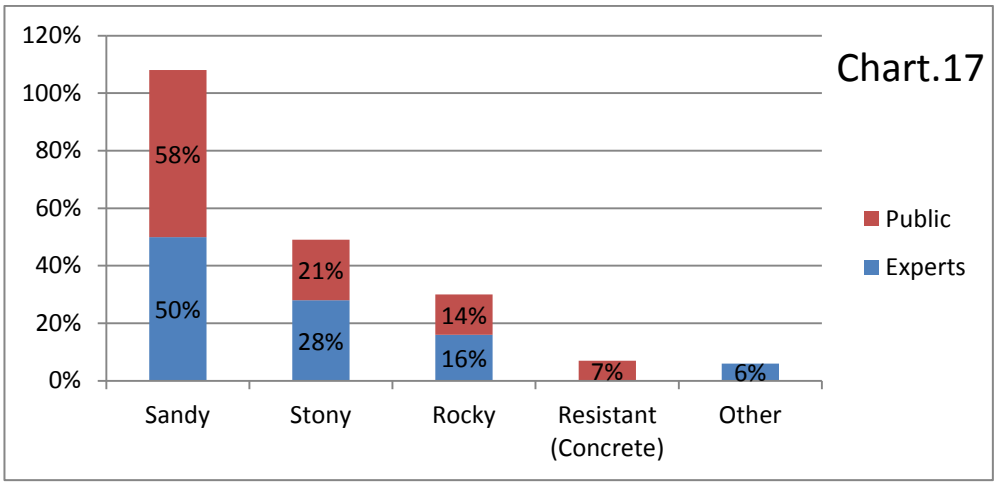
- **Questions 3:** Define the most attractive places like (destinations or hot spots) in your opinion which are located along the Nile River in Central Cairo and its neighboring areas?

- **Answer 3:** main answers were:
  - Tahrir square
  - All bridges, particularly, Qasr Al-Nile Bridge
  - Nile cruises places and floating restaurants
  - Public gardens in Zamalek Island
  - Opera and Egyptian museum

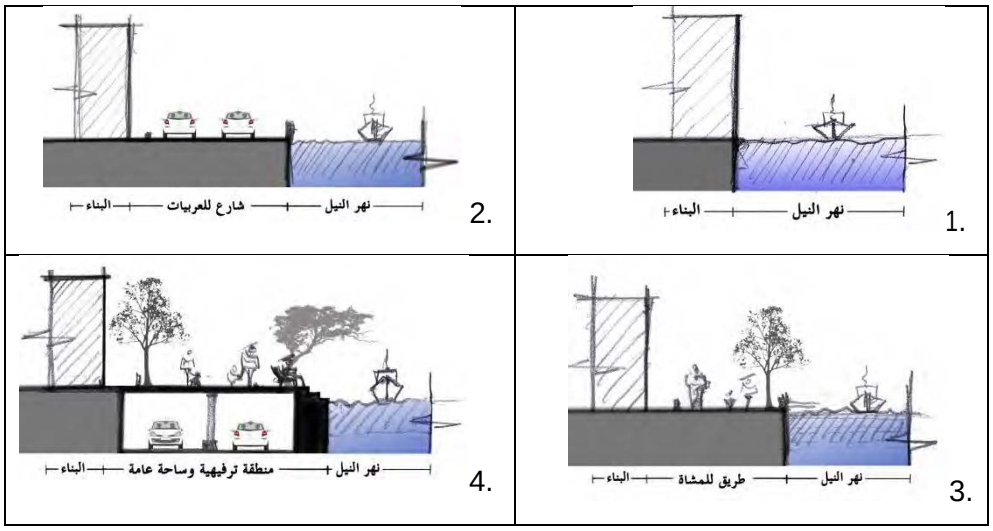
- **Questions 4:** What is the type of your preferred shore for the riverbanks:

Sandy	Stony	Rocky	Resistant	Other

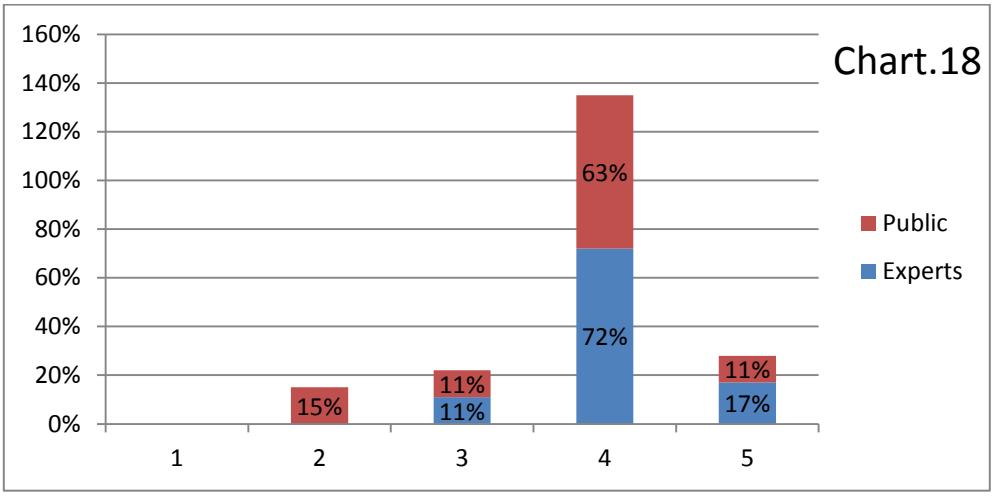
- **Answer 4:** more than half of both groups prefer sandy shore while quarter likes to be stony [Chart.17]. As for other it was made of wood.



- **Questions 5:** What is the most appropriate way to build along the riverbanks (see figures below):
  1. Building directly on the river without any setback
  2. Create a street between the river and the building (current situation)
  3. Create a pedestrian trail between the river and the building
  4. Use the Corniche Highway as recreational area and public gardens for pedestrians and cyclists and digging a tunnel for cars underneath then building
  5. Other



- **Answer 5:** both groups highly recommend choice no.4 [Chart.18] however; some experts found that it can be costly solution. As for the other choice some said to find alternative streets for the current Corniche Highway instead of digging tunnel.



- **Questions 6:** Choose the most preferred activities that you want to have and classify them according to your preference: from (1) A Great Deal till (5) Non-preferred, you can use the same number for more than one activity when the degree of preference is similar.

1	Relaxing	2	Fishing	3	Eating	4	Biking	5	Walking	6	Enjoying Natural-scene
7	Swimming	8	Shopping	9	Running	10	Sitting	11	Boating	12	Other

- **Answer 6:** as for both groups it was mainly sitting, strolling and relaxing [Chart.19].

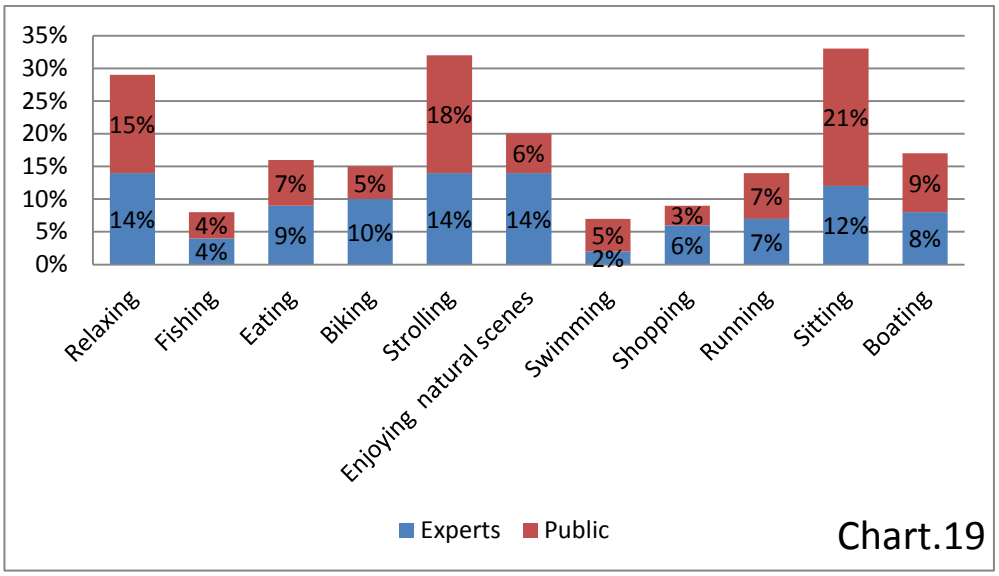


Chart.19

– **Questions 7:** What is your futuristic vision for the Nile waterfront and how you would like to be?

– **Answer 7:** the common collective answer were:
  - The Nile waterfront should be an accessible, clean, multi-functional green space with all proper amenities and should be open for all people, attractive for tourists, and connect the authenticity of the Nile with the surrounding civilization.

ملخص البحث

تعتبر الأنهار المركز الجذاب لجميع المدن. حيث إن نهر النيل في القاهرة كان شريان الحياة لجميع المصريين منذ عهد الفراعنة. حيث تم استخدامه لوظائف متعددة مثل الزراعة والري، وكشبكة نقل لأغراض تجارية، وكفراغ ترفيهي، بالإضافة إلى دوره الروحي في المعتقدات الدينية في عصر الفراعنة. ولكن بعد الثورة الصناعية، والنمو الحضري والاقتصادي السريع، وبناء الشوارع على طول النهر، واستغلال الواجهة البحرية للاستخدامات الخاصة والحكومية، ونقص الأماكن العامة والأنشطة الترفيهية. أدى ذلك إلى صعوبة وصول الجمهور إلى ضفاف النهر مع ظهور انفصال واضح للعلاقة بين النيل ومستخدميه. وهكذا بدأ نهر النيل يفقد ارتباطه مع القاهرة بعد أن كان جزءا لا يتجزأ منها.

وبناءً على ماسبق، يهدف هذا البحث إلى تحقيق فهم أوضح لإمكانية ربط الواجهة المائية لنهر النيل مع الجمهور والأنشطة الحضرية في وسط القاهرة من أجل إعادة النهر مرة أخرى إلى المدينة. لتحقيق هذا الهدف، قدم البحث "الواجهة المائية الحضرية ذات الوظائف المتعددة" كوسيلة لخلق فراغات عامة متكاملة على طول نهر النيل في وسط القاهرة، حيث سيؤدي هذا التكامل إلى ارتباط أفضل مع النهر، وبالتالي عودته مرة أخرى إلى المدينة.

ووفقاً لذلك، فإن البحث اعتمد على ثلاثة دراسات متسلسلة: تجريبية ونظرية وتصميمية موزعة على أربعة فصول. حيث عرض الفصل الأول نظرة شاملة عن الواجهة المائية الحضرية. ثم في الفصل الثاني تم عمل دراسة تطبيقية للواجهة المائية لنهر النيل في وسط القاهرة حيث مكنت هذه الدراسة من تحديد المشاكل الأساسية للمنطقة المحددة والتي ساعدت بدورها في الفصل الثالث إلى جانب المفهوم النظري "صناعة المكان" على تحديد حالتين دراستين كأفضل التجارب لحل مثل هذه المشاكل في البلدان المتقدمة. وأخيرا، تم وضع عدد من المقترحات التصميمة في الفصل الرابع وعرضت مجموعة من التوصيات والمقترحات لمزيد من التطوير.

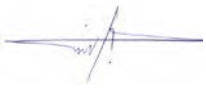
الكلمات المفتاحية: تعددية الوظائف - الواجهة المائية الحضرية – نهر النيل – وسط القاهرة

إقرار

هذه الرسالة مقدمة في جامعة عين شمس وجامعة شوتجارت للحصول على درجة العمران المتكامل والتصميم المستدام. إن العمل الذي تحويه هذه الرسالة قد تم إنجازه بمعرفة الباحث سنة 2013

هذا ويقر الباحث أن العمل المقدم هو خلاصة بحثه الشخصي وأنه قد اتبع الإسلوب العلمي السليم في الإشارة إلى المواد المؤخوذة من المراجع العلمية كلاً في مكانه في مختلف أجزاء الرسالة.

وهذا إقرار مني بذلك،،،

التوقيع: 

الباحث: أيهـم معـاد

التاريخ: 31/07/2013

الواجهات المائية الحضرية ذات الوظائف المتعددة

دراسة حالة : نهر النيل في وسط القاهرة

مقدمة للحصول على درجة الماجستير في العمران المتكامل والتصميم المستدام

إعداد: أيهـم معـاد

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2013