List of thesis committees

Thesis Advisor: Stanford Anderson  
Title: Professor of History and Architecture

Thesis Reader: Robert Cowherd  
Title: Associate Professor of Architecture
Open to the Public!
A New Network of Communal Recreational Waterfront Space in Bangkok

by

Apichart Srirojanapinyo

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Abstract

Physically and historically, Bangkok has been shaped by its relationship to its waterfront. Flowing 370 kilometers through Thailand, the Chao Phraya River is more than the nation’s lifeline. It was a principal waterway that largely determined the expansion of this former agricultural city. With the advent of industrialization, the focus shifted to the establishment and consolidation of man-made infrastructures such as roads and highways, leaving the waterfronts as large areas of underused land, deteriorated ports, warehouses, and informal settlements. With recent developments turning their backs onto the waterfront, the diminishing public exposure and access to the Chao Phraya River means it is quickly losing its historic role as an valuable asset and resource for the capital. This thesis proposes the establishment of a green network along the Chao Phraya River by opening up and developing selected underused areas, and connecting them with the new systematic water transportation.

Open to the Public! presents a series of open space networks that offer new public areas to the city by (i) improving the river accessibility to reconnect it with the city, (ii) opening up and creating a new network of public recreational waterfronts that also addresses the existing flooding problem, and (iii) activating the use and access of the hidden Bangkrachao peninsula, a 14.4-million-square-meter jungle located just over two kilometers from the Bangkok Central Business District. As the ports and industrial zone are gradually being moved to new locations, this thesis aims to explore the plausibility of reconnecting this large preservation area back to Bangkok.

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Introduction and Statement

Bangkok Metropolitan Area (BMA), home to 15 million people,¹ is one of many modern cities that discarded the traditional socio-economic systems and developed themselves toward industrialization, resulting in permeating problems of air and water pollution, environmental degradation, as well as habitat destruction. Realizing that environment is a critical issue of the city, in 1999,² the BMA planned to increase the public green space from 1 sq.m. to 10 sq.m. per capita. Ten years later, there has been only a slight increase to an average of 1.46 sq.m. per capita.

Generally, the public space in Bangkok is insufficient comparing to the population, while many are difficult to be accessed. Very few parks are connected to major transportation routes. The Lumpini Park is the most well known and the most used park in Bangkok because it is situated in the densest part of the city and is accessible by the subway. However, a survey conducted by Suan Dusit Institute shows that only 5% of the Bangkok population prefers to spend their free time in parks or public open spaces rather than in shopping malls.³ The low interest may be due to the inaccessibility of these open spaces and the absence of attractive conditions such as natural, entertainment, and cultural facilities. One scheme that Bangkok proposed is to purchase some small private pieces of land in the city and convert them into public parks. However, in a high-density city such as Bangkok, finding and transforming underused spots in the inner city to provide more public spaces can be both problematic and extremely expensive. With the problems of accessibility, size, and parking space, these small spaces scattering around the city do not generate uses, and could not create enough impact to magnetize the users.

Faced with this deadlock, authorities and urban planners are beginning to turn their attention back to the city’s riverfront, which has intrinsically shaped Bangkok – both physically and historically – since its establishment more than two hundred years ago. Flowing 370 kilometers through Thailand, the Chao Phraya River is more than the nation’s lifeline. It was a principal waterway that largely determined the expansion of this former agricultural city. In the past, everyday life, community space, and cultural events were tied to and centered around Bangkok’s rivers and canals.

Figure 1.1 (left page): The Chao Phraya River and Bangkok⁴

¹ Including unregistered residents. According to the Ministry of Interior, the total number of registered population in Bangkok Metropolitan Area is 10,100,964 people.
² Fraser, Evan. Urban Ecology in Bangkok, Thailand: Community Participation, Urban Agriculture and Forestry, 2002
³ Data from http://dusitpoll.dusit.ac.th
⁴ Source: Google Earth
With the advent of industrialization, the focus shifted to the establishment and consolidation of man-made infrastructures such as roads and highways, leaving the waterfronts as large areas of underused land and industrial ports, warehouses, and informal settlements. In the initial stages of industrialization, the ports and warehouses were presumably important. The issue is a shift in scale of a location of such facilities to the south leading, now, to both the problem and opportunity of the leftover deteriorated area along the waterfront. With recent developments turning their backs on the waterfront, the diminishing public exposure and access to the Chao Phraya River means it is quickly losing its historic role as an asset and resource for the capital. This main focus of thesis is the proposal to create an open recreational space network along the Chao Phraya River by opening up these underused areas, and connecting them with an expanded system of water transportation.

A focal point in this network is a promising hidden oasis of 1440 hectare (14.4 million sq.m.) barely two kilometers from the Bangkok CBD. Bangkrachao is a jungle that lies in an oxbow curve of Bangkok’s Chao Phraya River. With the edges of the industrialization along the waterfront blocking all accesses across the river, together with the complexity of different political municipality, many city dwellers are unaware that this urban oasis even exists. As the ports and industrial zone on the South boundary of Bangkok are being moved to new locations, the potential for reconnecting this large preservation area back to Bangkok as the new accessible regional park is both practicable and consequential.

Open to the Public! proposes a series of open space networks that intend to offer new public spaces for the city by (i) reconnecting the city to the river by improving accessibility, (ii) opening up and creating a new network of public recreational waterfront that also addresses the flooding problem, and (iii) activating the use and access of the hidden Bangkrachao peninsula and exploring the plausibility of reconnecting this large preservation area back to Bangkok.

**Space, Place, and Culture**

Space, as Henri Lefebvre has clarified, is not an abstract or a neutral void but is the fact defined by relations between activities, processes and elements in the environment. The abstract term “space” is often best characterized in terms of specific dimensions and functions for application to particular conditions as in urban space, social space, public space, and symbolic space. Place is a space made distinct through particular activities. Place is the ongoing interaction between people, their activities and space. In this thesis, we are working on creating public places in two ways: Public places that extend and enhance the use by existing communities, and public places that engage in the dialogue with other global cities.

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5 Lefebvre, Henri, 1991:36-46 (Quoted in Askew, Bangkok: Place, Practice and Representation, 2002: 6)
6 Askew, Mark, Bangkok: Place, Practice and Representation, 2002: 6
The importance of Water to the Modern Cities

Many important cities, perhaps most, are located near water: Mumbai, Shanghai, London, Boston, and New York City, for example. Especially in Southeast Asia, all its important cities are developed near the water, particularly along the Chao Phraya River and the Mekong River. Over the centuries, the main capitals and major cities have moved nearer to the sea: from Angkor to Phnom Penh, from Hue to Ho Chi Minh, and from Ayutthaya to Bangkok. Even though the Chao Phraya River still constitutes a means of important transportation, the city of Bangkok, during its development, has ignored it. Thus, the Chao Phraya River has become a long-neglected natural asset. Jean Labasse says that after the time of “sacrificed rivers” comes the time of “the rehabilitation of the rivers”.7 This change in perspective arises with an increasing awareness of the environmental issues and the quality of life in the city.

The first chapter of this thesis covers the historical development of Bangkok in association with the Chao Phraya River and its canal system. It explains the reasons behind the rise and fall of the importance of the Chao Phraya River, as well as support the arguments why the riverfronts are the opportunity sites for this redevelopment project. The second chapter analyzes the present-day Bangkok via research and mapping. The third chapter presents a series of precedent studies examining the revitalization process on rivers and waterfronts. The fourth chapter discusses the meaning of urban waterways from the hypothesis of case studies and researches, which is necessary for creating a set of criteria for the proposed development. The fifth and sixth chapters present the design project on the regional scale and the site scales respectively.

Figure 1.2: Bangkachao and Port area. 8

7 Association Les Atelier Internationaux de Maitrise d’ Oeuvre Urbaine, Bangkok – River City, 2008: 20
8 Source: Royal Forest Department, http://web1.forest.go.th/forest/biodiversity/Activities/bankajao.php
Part I: Bangkok Geography

Bangkok is the capital and economic center of Thailand. It has evolved from a walled city situated on the eastern bank of the Chao Phraya River to one that in the past few decades reaches outward in all directions\(^9\). The expansion had been first determined by its natural setting: the river. Its concentration was later shifted to the man-made infrastructures such as roads and highways. New residential and industrial developments have expanded from the city center and have grown along the major arteries, such as the north-south axis toward the Don Muang airport during the 1980s, and more recently eastward in the direction of the new Suwannabhumi Airport.

The first chapter discusses the relationship between Bangkok and its waterway in a historical aspect. It highlights the important role the riverfront had played in the past, particularly how it had reflected the communal life, as well as the events that gradually led the city to turn its backs to the river. In order to understand and solve the existing problems of the lacking of the open space and the underused riverfront, the second chapter analyzes Bangkok in the present through mapping and research. The study aims to discover the relationships between riverfront and other systems of the city, such as green space, water transportation system, and infrastructure, for locating the strategic redevelopment sites in the latter chapters.


\(^{10}\) *Source*: Author. Base map from Google Earth.

\(^{11}\) *Source*: Author. Base map from Google Earth.
Chapter One: Historical Bangkok.

The Evolving Metropolitan Area

The Bangkok Metropolitan Area (BMA) is the center of the metropolitan region, containing a large fraction of the area’s population and economic activities. All the development plans in this area are under the Bangkok Planning Authority. However, urban development has spilled over the administration boundaries of the BMA.

The Bangkok Metropolitan Region (BMR) comprises the area under the authority of BMA and its five adjacent provinces, which are Samut Prakarn, Nonthaburi, Pathumthani, Nakhon Pathom, and Samut Sakhon. The total area of the BMR is approximately 7,758 sq.km. (2,995 square miles), of which around 1,565 sq.km. (604 square miles) is the BMA. Despite the identification of the BMR, there is no single planning authority that oversees the urban planning of the region. Instead, each of the districts develops and carries out its own proposal independently.

Bangkok and Water: Historic Urban Development

The consequences of population growth can be perceived quite dramatically in the physical growth and spatial dispersion of Bangkok. Water transportation was initially the principal means of travel in Bangkok for almost a century since the establishment of Bangkok in 1782. With a rather comprehensive waterways network in this water transportation era, Bangkok earned its reputation as “Venice of the East”. With a advent of industrialization and motorization, as in the case of other canal towns around the world, many of Bangkok’s canals have been neglected and filled in. Also, the main river has transformed from the main open space to a secondary means of cargo and passenger transportation. The physical growth of Bangkok and the changing relationship between the city and its waterway are explained in the following diagrams and studies:

Figure 1.5 (left page): BMA and BMR

12 Rujopakarn, Wiroj, Bangkok Transport System Development: What Went Wrong?
13 Hack, Gary, 1996: 1
15 Source: Author. Base map from Google Earth
1782: The emergence of the water city.

Bangkok, situated on the low-lying flood plain of the Chao Phraya River, was founded in 1782 as the beginning of the Chakkri dynasty of Rattanakosin period. After a decline of the 400-year-old city of Ayutthaya, Bangkok was reconstituted as the extension of Thailand’s power. In order to replicate the Ayutthaya model, King Rama I ordered canals to be dug as the city’s defense and transportation routes, thus creating the well-utilized canal network for Bangkok.

Everyday life in Bangkok centered on and around rivers and canals. People preferred to build their homes, sometimes boathouses, along the riverbanks and on the water. Thai culture, living standards, and life styles were naturally based on the economic production and access provided by the river. Therefore, the densest area of the city developed along the river and thinly dispersed into the hinterland. The rivers and canals served the city as the main barrier protecting the young capital. Mainly, canals were dug for economic and transportation purposes. Several canals – Rop Krung and Padungkrungkasem canals, for instance – were dug for defense purpose, while others, including Mahanaga canal, provided recreational uses.

Figure 1.6 (left page): Bangkok 1784
Figure 1.7: Bangkok 1784

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16 Askew, Marc, 2002: 15
17 Gajaseni, Supapim, 1998: 13
18 Source: Author. Base map from Google Earth
19 Source: Askew, Marc, 2002: 21
1850: The enhancement of the canal system.

Under the reigns of King Rama IV and V between 1851 and 1910, although land transportation started to multiply, the canal system was not neglected but, indeed, expanded to its full extent. Twenty-five new canals were dug in parallel with the construction of the roads along them, which were built by the canal-dug dirt. The landscape along the canals was filled with trees and communal spaces along the side. The governments of King Rama IV and V also imposed a number of laws to protect the canals for efficient use and developed traffic rules for the waterways. However, the eminence of the water-based transportation faded out later in this period. Boats were quickly replaced by the faster-speed road-based transport system, such as the introduction of the rickshaw in 1871 and the horse-drawn tram in 1888. Bangkok obtained its first railway and electric tramway in 1891 and 1894 respectively, approximately ten years prior to the first motorcar in Bangkok.

1910: The advent of the road transportation system.

To avoid colonization, Thailand modernized the country by embracing the western concepts and technologies that facilitated them. During this period, the authorities started constructing roads and bridges throughout the city. Bangkok expanded

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20 Gajaseni, Supapim.
21 Rujopakarn, Wiroj.
22 Source: Author. Base map from Google Earth
into rural areas and people began to build their houses along roads instead of along the riverbanks. Reliance on water transport gradually gave way to a road-based transport system.

Since 1910, no canals have been excavated in the Bangkok urban area nor have they been regularly repaired. Bangkok was developing towards an automobile-dependent city without realizing it. Urbanization without proper planning or regulation accompanied road constructions, resulted in ribbon development. The Chao Phraya River, as well as numerous canals in Bangkok, has been used only as a means of transportation. Moreover, the role of canals was reduced to serve as giant open sewers and surface runoff collectors.

The Bangkok lifestyle that was primarily tied with the waterfront had turned into treating the river as a back boundary of the city. The water edge, as well as the area outside the old city wall, had turned into the outer border of the cultural and historical zone of the city. These areas have been occupied mainly by governmental institutions, row houses, and warehouses, which are not accessible for public uses. Many areas along the waterways were also overrun by informal settlements.

Figure 1.10 (left page): Bangkok 1960
Figure 1.11: Housing estate development and the built-up area, Bangkok 1970-1980
Figure 1.12: The historic core and its adjacent riverfront that is occupied by rowhouse

23 Source: Askew, Marc, 2002: 32
24 Source: Author. Base map from Google Earth
25 Source: Askew, Marc, 2002: 65
26 Source: Bell, Barry, Bangkok: Angelic Allusions, 2003: 98
1960: More roads and flooding problem.

Bangkok had no proper city development plan to guide its direction until the 1960s, when Thailand started to produce planning concepts through the implementation of the 1st National Economic and Social Development Plan (1962-1966). The first few development plans emphasized the acceleration of economic growth through basic road infrastructure development without much consideration of land-use, thus converting Bangkok into an “automobile city”.²⁹

Since many canals were filled during the period of road expansion, the drainage capacity of the canal system was vastly reduced. Since then, Bangkok, which situated on the low-lying flood plain of the Chao Phraya River, started to be extremely vulnerable to floods. The city experienced two great floods in 1983 and 1995 that flooded the whole city for over one and three months respectively.

²⁷ Source: Author. Base map from Google Earth
²⁸ Source: Askew, Marc, 2002: 62
2000: The present

From the beginning of the 1980s, the development of Bangkok changes as the growth of its center decreases while that of the suburb expands. The steep increase of land prices in the center, together with the development of the road network in the suburbs, encourages people to move towards the bordering provinces, which expands the city up to 1,568 square kilometers.

The financial crisis of 1997, which largely affected both the real estate market and urban development, ended a decade of the remarkable growth. Numerous unfinished towers can still be seen from the waterfront and throughout the city. The traffic congestion problems, which mainly associated with the absence of a comprehensive land-use plan and uncoordinated transport projects, have become more severe. The average speed of traveling in Bangkok’s streets is down to three kilometers per hour during the high traffic hour. Consequently, the carbon monoxide level in the air has increased remarkably.

The critical level of air pollution in Bangkok could not improved if the number of parks is still very limited. Therefore, this thesis aims to study the possibility of utilizing the waterfront sites as the waterway recreational network along the Chao Phraya River in order to mitigate the problems of air pollution, water contamination, flooding, traffic congestion, and the lack of recreational opportunities.

Figure 1.15 (left page): The present-day Bangkok. 31
Figure 1.16: The Chao Phraya Riverfront in historic area. 32

30 Gajaseni, Supapim, 1998: 17
31 Source: Author. Base map from Google Earth
32 Source: Photos courtesy of http://www.trivago.co.uk/bangkok-519
Chapter Two: Mapping Bangkok

Physical Condition: Three Major Components

This thesis proposes to create a series of open recreational spaces on the existing riverfront in Bangkok, as well as open up the urban oasis Bangkachao, and connect them together with water transportation on the Chao Phraya River. The first part of this chapter is the physical analysis of three major components: The Chao Phraya River, its riverfront, and Bangkachao.

The Chao Phraya River

The ecology of Bangkok Metropolitan Area is the result of an interaction between the Chao Phraya River and the sea. The Chao Phraya originates in the northern mountains of Thailand and flows through the fertile fields of the central plains into the Gulf of Thailand. The Chao Phraya river basin is the most important basin belonging exclusively to Thailand. It is the merger of four big rivers of the North: the Ping, the Wang, the Yom, and the Nan. The extensive Chao Phraya watershed covers an area of 157,924 sq.km., approximately 35% of Thailand, which reaches about 40% of the Thai population.

The Chao Phraya River flows at about 917 cubic meters per second. Throughout its length, the river’s course has undergone several significant transformations of its flow to facilitate the transport, alleviate the flooding problem, and allow the irrigation of the rice fields of the central plain. The commercial activities on the river gradually disappeared during the 1950s. The floating markets, which remain, are merely tourist attractions.

Figure 2.1 (left page): The Chap Phraya River and its course.
Figure 2.2: The Chao Phraya river basin.

33 Hack, Gary, 1996
34 Association Les Atelier Internationaux de Maitrise d’Oeuvre Urbaine, Bangkok – River City, 2008: 14
35 Association Les Atelier Internationaux de Maitrise d’Oeuvre Urbaine, 2008: 14
36 Source: Author. Base map from Google Earth
Water Culture on the river

The Chao Phraya River is also significant for its water symbolism. Similar to other Asian countries, especially India and China, water and river are regarded as of symbolic divinity. Up until the end of the 19th century, the sovereigns of Thailand took the lustral bath in the Chao Phraya waters in a ritual ceremony. In the present day, there are still many water-related cultural activities along the river such as the Royal Barge ceremony and Loy Kratong festival. The waterfront space plays an important role in providing the spaces for such activities.

Royal Barge Ceremony.

The Royal Barge Processions, which has been conducted for 700 years, is a ceremony of both religious and royal importance. This ancient royal ritual dates from the reign of King Ramkhamhaeng of Sukhothai (1275-1316 AD). This event is rarely held to mark special occasions. In the reign of the present King, King Rama IX, the ceremony has been conducted only 16 times in 60 years. The last procession was in 2007 when the Royal Kathin Procession took His Majesty the King from Vasukree Pier to the Temple of Dawn to present new robes to the monks, which mark the end of the three-month Buddhist Rains Retreat, or Buddhist Lent.

Loy Kratong

Loy Kratong is held on the full moon of the 12th month in the traditional Thai lunar calendar, which usually occurs in November in the Gregorian calendar. This festival celebrates the Goddess of Water by floating a kratong, a one-foot diameter ritual banana raft decorated with folded banana leaves, flowers, candles, and incense sticks. This activity is spreading along the river throughout the country on the full moon night.
The Chao Phraya Riverfront

The Bangkok waterfront along the Chao Phraya River consists of 17 districts of BMA and extends approximately 25 kilometers to the West and 40 kilometers to the East. The average height of waterfront is 1-1.5 meters above sea level. A recent study conducted by BMA planning department shows the land-use percentage of the waterfront as listed below. The waterfront area in this study is calculated from the edge of the river to the nearest parallel major streets.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential use</td>
<td>25.6%</td>
</tr>
<tr>
<td>Governmental Institution</td>
<td>17.1%</td>
</tr>
<tr>
<td>Unused Land</td>
<td>15.9%</td>
</tr>
<tr>
<td>Warehouse</td>
<td>12.3%</td>
</tr>
<tr>
<td>Commercial use</td>
<td>10.7%</td>
</tr>
<tr>
<td>Industrial use</td>
<td>6.2%</td>
</tr>
<tr>
<td>Open recreational space</td>
<td>2.2%</td>
</tr>
</tbody>
</table>

This thesis targets to open up and redevelop the governmental institution, unused land, and warehouses for public use. These uses, together with the existing 2.2% of the waterfront park, count at almost 50% of the total waterfront area. This proves that the Bangkok waterfront has a strong potential to be developed as an open space network because there are much unused land, abandoned buildings, and warehouses that can be changed into recreational uses.

Four Zones of the Bangkok Riverfront.

The banks of the river are contaminated by the existence of several deteriorated buildings, informal settlements, warehouses, and former industrial sites, and need to be transformed. These adjacent sites also comprise of different conditions such as historical site, religious heritage, and CBD areas. Determined by their specific urban characteristics, the waterfront sites have been divided into four zones:

1. The residential zone.
2. The historical heritage zone.
3. The high-density commercial and residential zone.
4. The industrial, warehouse, and port zone.

Figure 2.5 (left page): Four zones of the riverfront.

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43 BMA Planning Department, 2008: 13.
44 Source: Author. Base map from Google Earth and BMA Planning Department.
The Residential Zone

Location: From the North of Bangkok to the Rama VIII bridge.
River Width: 250 – 280 meters
Problems: The banks are occupied by informal settlements and warehouses.
Potentials: Presence of important religious sites adjacent to some unused spaces that can potentially be developed. The Rama VIII Bridge and its park, one of the best waterfront parks in Bangkok, are also in this area.

Figure 2.6 (left page): The residential zone. 45
Figure 2.7 and 2.8: Residential and shops along the waterfront. 46
Figure 2.9: Rama VIII Bridge Park. 47

45 Source: Author. Base map from Google Earth and BMA Planning Department.
47 Source: Author.
The Historical Heritage Zone

Location : From the Rama VIII bridge to the Rama I bridge.
River Width : 180 – 250 meters
Problems : Informal settlements, private commercial and governmental zones and deteriorated environment are near important historical heritages. Many piers are poorly maintained and planned.
Potentials : This site consists of many significant history heritages of the city: The Grand Palace, temples, central governmental institutions, and historic communities and architecture.

Figure 2.10 (left page): The historical heritage zone.48
Figure 2.11 and 2.12: The waterfront of the Grand Palace.49
Figure 2.13: Chang Pier.50
Figure 2.14: Arun Temple and its riverfront.51

48 Source: Author. Base map from Google Earth and BMA Planning Department.
49 Source: Author.
50 Source: Author.
51 Source: Author.
The High-density Commercial and Residential Zone

Location : From the Rama I bridge to Bangkok bridge.
River Width : 200 – 300 meters
Problems : This site consists of old damaged buildings, informal settlements, and quays.
Potentials : There is a possibility to improve the commercial zone on the bank. The waterfront has panoramic view and its location is next to CBD, hotels, and residential zones. Some historic buildings can be renovated for proper uses.

Figure 2.15 (left page): The high-density commercial and residential zone.52
Figure 2.16: The waterfront of the high-density zone.53

52 Source: Author. Base map from Google Earth and BMA Planning Department.
53 Source: Association Les Atelier Internationaux de Maitrise d’Oeuvre Urbaine, Bangkok – River City, 2008: 3
The Industrial Warehouse and Port Zone

Location: From Bangkok bridge to the south of the city.
River Width: 500 – 800 meters
Problems: The presence of informal settlements, warehouses, port facilities, and abandoned buildings creates physical barriers that impede the public’s access to the riverfront.
Potentials: This site has a panoramic view of and is possible to connect with the Bangkachao nature reserve. The relocation of the port will open up development opportunities to the area. Many unused buildings and warehouses can be renovated to improve the quality and look of the waterfront space.

Figure 2.17 (left page): The industrial warehouse and port zone. 54
Figure 2.18, 2.19, and 2.20: The waterfront of the warehouse and port. 55

54 Source: Author. Base map from Google Earth and BMA Planning Department.
55 Source: Author.
**Bangkachao**

Bangkachao is the hidden green oasis of 1440 ha (1.44 million square meters) that lies in an oxbow curve of Bangkok’s Chao Phraya River. Barely two kilometers from the central business district, this peninsula has also been named "the lung of Bangkok" because its apt description for this precious space to a traffic-choked, park lacking and polluted capital. With the edges of the industrialization along the waterfront blocking all approaches across the river, many city dwellers are unaware that this urban oasis even exists. The area is accessible either by a single, hard-to-find road or by boat. With the boat transportation in limited operation, currently, people need to walk through the industrial zone and dockside slum to board a longtail boat. The only permanent terminal across the river to the oasis is in the Bangna temple.

Bangkachao is located in Samut Prakarn City, a municipality outside of BMA’s jurisdiction. The complexity of ownership by a different municipality also plays an important role in the disconnection between two sides of the Chao Phraya bank. This peninsula, with a total population of 5,304 people in 1,598 housing units, is now a preservation area for green, recreational, low density residential, and agricultural uses only. The character of this area is similar to a normal rural area with old temples, floating market, and walkways snaking through mango and banana plantations. This area has the strong potential to reconnect to Bangkok when the Klong Toey Port moves to its new location in the next few years. Bangkachao can be established as the new regional park of Bangkok and can serve as the main destination for eco-tourism and recreation.

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58 Source: Google Earth.  
59 Source: Author.
Social and Economic Condition

The population of Bangkok had increased slowly until it reached four million people in 1975. After that, the city has changed tremendously due to international effects, resulting in the instantaneous growth of more than 8.5 million people in 25 years. Today, 69 percent of the urban population in the country lives in Bangkok, where the population density is 3,700 people per square kilometer. The estimated BMR population will be 17 million by the year 2010.60

Economically booming since the 1960s, this former agriculture-based city was directed to the industrial production intended mainly for export. Tourism constituted the second key economic driver of the Thai economy and the first source of currencies.61 Bangkok has been the center of industrialization, foreign trade, distribution network, and the largest consumer market in the country. Half of the total national economic growth in Thailand was due to activities in Bangkok and its vicinity. From the 1980s onward, the industrial activities have gradually relocated to large-scale, well-organized industrial parks in the bordering provinces outside of, such as Samut Prakarn. Nevertheless, some industrial parks and warehouses linked to the Klong Toey Port still remains.

Hydrographic Condition: River and Canal Network

Formerly the main means of transportation, water transportation is now mainly confined to the Chao Phraya River and fewer than ten canals. However, the inland waterway transportation should be reconsidered and the rehabilitation of river and canals can be defined as a protection of a particular heritage, which contributes to the identity of the city. The river transportation has 2 major systems:

1. The express boat along the river
The Chao Phraya Express Boat is the main company that provides shuttle services along the river. The route covers a distance of 21 kilometers from North Bangkok to the Rama IX Bridge. The shuttle service caters to both locals and tourists.

2. The ferry across the river
These ferry piers are operated by different private companies and governmental institutes. They mainly connect the important streets on both sides of the river.

In the present day, the canals are the critical elements of the city’s surface drainage system as they accommodate water while allowing it to be discharged into the Chao Phraya River according to the river’s optimal absorption rates. In the eastern part of BMA, the canals run North-South in order to assist the passage of floodwaters across the delta to the Gulf of Thailand.

Figure 2.18 (left page): Canal network.62

60 Case Study of Bangkok, www.water.tkk.fi/wr/tutkimus/glob/publications.
61 Association Les Atelier Internationaux de Maitrise d’ Oeuvre Urbaine, Bangkok – River City, 2008: 15
62 Source: Author. Base map from Google Earth.
Water control structures such as gates, locks, and pumping stations have been constructed on many canals to regulate water levels and water flows for flood prevention. These structures also assist in preventing salt-water intrusion from the sea or the tidal reaches of the rivers.

Furthermore, rapid urbanization has lowered the capacity that the land surface can absorb and retain rainfall. The increase of impervious surface has greatly increased the amount of runoff into the canals. Moreover, many canals have been filled in to accommodate new road construction and provide building spaces, thus disturbing the drainage network. The flow capacity of the piped drainage systems is generally inferior to that of the canals that the roads replaced.

**Bangkok Flooding Condition**

Flooding in Bangkok occurs because of two fundamental problems:\(^6^3\)

1. The swelling of the Chao Phraya River from high water levels upstream and downstream of Bangkok. Overflow of the Chao Phraya is caused by high rates of discharge from areas upstream and backing up of tidal waters in the Gulf of Thailand.

2. The inability of the city’s flat terrain to drain quickly or adequately during the rainy season and the decrease in canal efficiency as stated above.

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\(^6^3\) **Source:** Author.

\(^6^4\) **Source:** Author. Base map from Google Earth.
Transportation Condition: Road, Highway, Skytrain, Subway, and BRT.

Bangkok Metropolitan Area contains nearly 2,800 kilometers of roads with 5.4 million vehicles, 1.9 million of which are private cars. The road system in Bangkok is described as concentric, meaning it becomes looser as one moves away from the city center. Although road transportation is the most important means of transport in the city, Bangkok is one of the metropolises with least endowed in road infrastructure as measured by length of the streets per urban surface. Compared to the average of 20 – 25% of the surface occupied by streets in most western metropolises, Bangkok has only 6 – 7% of such occupation of the urban surface. This is the result of a division of the plots of land in long strips with little road façade. With these few intermediate ways, the traffic congestion is unavoidable.

The highway system in Bangkok is similar to those in other big Asian cities like Tokyo and Shanghai, where many highways run through the inner-city area. Bangkok is constructing more roads and highways on the big arteries as a solution to mitigate the traffic congestion problem. A noteworthy development is the construction of a ring road to alleviate traffic jams in the industrial zones at the south of BMA.

Figure 2.21 (left page): Urban network.
Figure 2.22: Urban network isometric diagram.

65 Source: Author. Base map from Google Earth.
67 Association Les Atelier Internationaux de Maîtrise d’Oeuvre Urbaine, Bangkok – River City, 2008: 8
68 Source: Author. Base map from Google Earth.
69 Source: Author. Base map from Google Earth.
Since 1990, BMA has been aggressively developed its public transportation system in order to assuage the heavy city traffic. Apart from the tramway that has disappeared, Bangkok has several public transportation networks on different levels: on the ground, above ground, and underground.

**Road public transportation**
Bangkok has around 16,000 buses, managed by Bus Mass Transit Authority, and 65,000 Taxis and Tuk-Tuks (Motor Tricycles).

**BTS Sky Train**
This elevated railway system consists of two lines in a 23 km. network. It was inaugurated in 1999 and managed by a private company named BTSC under concession of the BMA.

**MRT Underground Subway**
The subway system was established in 2004. The single line network spans across 27 km. The extension of the network is in progress, and is expected to extend to 118 km.\(^70\)

**BRT Bus Rapid Transit**
BMA plans to build 12 lines of bus transit system that covers 185 km. The first line of 16.5 km. is current under construction. This debut line will run from the BTS Sathorn station, along the Chao Phraya river, and across the Rama III Bridge to Thonburi district (*see diagram*).

At this point the authorities in charge of public transportation have launched several extension projects such as the airport link, extension of BTS and MRT system.

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70 Association Les Atelier Internationaux de Maîtrise d’ Oeuvre Urbaine, *Bangkok – River City*, 2008: 8
71 *Source*: Author. Base map from Google Earth.
72 *Source*: Author. Base map from Google Earth.
Bangkok Ecological Condition: Public Recreational Space and Green area

Bangkok has fewer parks than any other city of comparable size in the world, with an average of 1.5 square meter of parks space per person. Although there is no international standard in the quantity of green area, World Health Organization suggests that each city should have green area at nine square meters per person for the health of their citizens.

In general, green area always relies mostly on public parks and open spaces. Compared to other cities internationally, Bangkok’s green space is very low, as shown in this table.

<table>
<thead>
<tr>
<th>City</th>
<th>Sq.m. of green area per person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangkok, Thailand</td>
<td>1.5</td>
</tr>
<tr>
<td>Mexico City, Mexico</td>
<td>2.0</td>
</tr>
<tr>
<td>Beijing, China</td>
<td>6.0</td>
</tr>
<tr>
<td>Singapore, Singapore</td>
<td>10.9</td>
</tr>
<tr>
<td>New York City, USA</td>
<td>12.0</td>
</tr>
<tr>
<td>Vienna, Austria</td>
<td>24.3</td>
</tr>
<tr>
<td>Copenhagen, Denmark</td>
<td>43.3</td>
</tr>
</tbody>
</table>

In the former BMA proposal, several of the new projects are landscaping exercises along new roads, which are difficult to reach and are too small to be used effectively as parks. The most well-known and most-used park is the 140-acres Lumpini Park in the center of the city. Other important parks are Chatuchak Park, Queen Sirikij Park, and Benjakitti Park.

However, there are some private green spaces that can be opened to the public. For example, there are several palaces and preserved nobility houses in Bangkok that have already been transformed into museums. These places are usually well preserved and surrounded by large parks. Many governmental institutions along the river can also apply this concept.

In summary, the main problems of the existing parks in BMA are:

- Parks are poorly distributed, and their provision lacks a systematic approach.
- Few developments have publicly accessible open spaces.
- Parks are not used to effectively address urban environmental and flooding problems.
- Canal and river environments are deteriorating.

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73 Hack, Gary, 1996: 105
74 Faculty of Forestry, Kasetsart University, *Sustainable Strategy on increasing and managing the green area in Bangkok*, 2004: 18
75 Hack, Gary, 1996: 106
Part II: Waterway and Waterfront Spaces

This part discusses the important roles of waterway and waterfront spaces. The third chapter presents a series of precedent studies examining the revitalization process along rivers and waterfronts in different cities. Each of the chosen waterfront redevelopment projects has different solutions in approaching its distinctive problems. The first is the Abandoibarra site along Nervion River in Bilbao, a postindustrial that shares similar characteristics with Bangkok’s Klong Toey Port. The second case study, Thames Gateway Project in London, is a series of projects along the Thames River from the inner city to the bay area. It is a redevelopment project of the whole region along the river. The last case study focuses on the compelling section of the Cheonggyecheon canal and its adjacent landscape. The analysis of these successful redevelopment projects, together with the study of the Bangkok waterfront in the preceding chapter, helps draw up an list of the design criteria for Bangkok waterfront redevelopment in the fourth chapter.

Figure 3.1 (left page): Locations of precedent studies.\textsuperscript{76}

\textsuperscript{76} Source: Author.
Chapter Three: Precedent Studies of Riverfront Redevelopment

Case Study 1: Nervion River
City: Bilbao, Spain
Waterway: Nervion River
Size: 60 - 80 meters wide
Opportunity Site: Abandoibarra
Year of development: 1992 - present

1. Historical Background

Located in the Basque Autonomous Community in the northern Spain, the Bilbao Metropolitan Area is situated in a narrow valley and divided in the middle by the Nervion River.\textsuperscript{77} Urban development in Bilbao had been closely tied to local and global cycles in industrialization. From the mid-nineteenth century, the left bank of the river was a major site of iron ore extraction. The profits from mining were invested locally in complementary heavy industries including iron processing, electrical, chemical and paper production, banking, shipping companies and steel manufacturing.\textsuperscript{78}

Abandoibarra is located in the Northwest border of the city, between the river and the Ensanche, the area of the nineteenth century expansion. This site extends over 345,000 square meters in the form of an elongated half-moon. Until recent years, it was sparsely occupied by port facilities and the container station of the National Railroads Company. The rest of the area was occupied by the Euskalduna shipyards, a public sector firm that was closed down in the early 1990s. As a result, the area suffered from a gradual process of abandonment and dereliction. However, there were new infrastructure plans on the part of the railroad company, which opened up the possibility to eliminate the physical barrier created by the railways. In the late 1990s, the public perception of Abandoibarra began to change. The previously ignored and devalued area was rediscovered as an area of opportunity. With its large scale as well as its location near the waterfront and the Ensanche, this site marked a crucial area for the revitalization of the city.

Figure 3.2 (left page): The shaded half-moon shaped area depicts the under construction Abandoibarra Project and the completed Guggenheim Museum (right) and Euskalduna Conference and Concert Hall (left).\textsuperscript{79}

\textsuperscript{77} Siemiatycki, Matti, \textit{Return to the Rails}, 2006: 6
\textsuperscript{78} Uranga, Gomez, and Etxebarria, 2000 (Quoted in Siemiatycki, 6)
\textsuperscript{79} Source: Author. Base map from Google Earth.
2. Problems

Beginning in the early 1970s, Bilbao and the surrounding region experienced a period of steady decline as the previously strong economic foundation based on the traditional manufacturing industries began to erode. This structural crisis was caused by weakened demand for mature industrial products including iron processing, which were associated with an outdated system of mass produced industry. The economic recession was also worsened by a combination of social and environmental problems.

The process of redefining Bilbao began in the late 1980s, as a plan was created to restructure the local economy from being predominantly industrial to becoming more diversified. One catalyst for this change was a new urban revitalization program operated by BilbaoRia2000, a consortium of Basque and Spanish state institutions that aimed to use large-scale and emblematic redevelopment projects to revive the city.80 Four main issues that this redevelopment process intended to overcome are population decline, high unemployment rate, urban deterioration, and lack of competitiveness compared to other European cities.

Population decline

Since 1981, the population of Bilbao has been declining steadily, largely due to the deindustrialization. From 1981 to 1991, the population drop was close to 3.1% of the total population.

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80 Siemiatycki,
81 Source: Guccione, Biagio, A Selection of Advance and River Cities in Europe, 2005.
82 Source: By Author.
Low economic performance and high unemployment rate

A rough measure of the city’s poor economic performance was demonstrated by the pattern of employment. Between 1975 and 1996, Bilbao lost almost half of its total manufacturing employment. Most of this loss was in the traditional industries such as shipbuilding, steel work, chemicals, and electrical equipment manufacturing.

Urban deterioration and environmental degradation

After the industrial decline, Bilbao suffered not only from massive job losses and firm closures, but also from the weakening of its economic foundation. As a result, living conditions worsened dramatically, and the area became vulnerable to decay. A significant portion of the population was living below “poverty thresholds” corresponding to families who suffered from significant income reduction as a result of job loss. The poverty problem remained one of the most urgent problems for decades.

The environment was severely effected by decades industrial activities. A *New York Times* reporter described the condition of the Nervion river in front of Abandoibarra as “brown as sludge and putrid as a sewer” and the air quality of the city as “grey industrial air which gave a raw authenticity and gritty undercurrent.” Therefore, the change of Abandoibarra from an industrial zone to a cultural district indeed marked the beginning of the overall improvement process of the city.

The lack of competitiveness with European cities

In addition to solving the financial, social, and environmental problems, the redevelopment project also aimed to improve the reputation of the city. Since the mid 1980s, many European cities have become increasingly competitive in urban area restructuring to accelerate economic growth. This development has emphasized the central role of local economy in the performance of regional and national economy. The former industrial sites in Bilbao were ideal for the development of a CBD, which would allow the city to “join in the competition among European and world cities to lead technological and economic development through the reconversion of derelict sites.”

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85 The process of producing the new General Urban Plan (PGOUB), 1989: 1
3. Processes and Concept

New governance structures for urban regeneration

The Abandoibarra redevelopment project is under the authority of Bilbao Ria 2000, a new institution operating with public funds, responsible for revitalizing decayed areas or obsolete industrial sites in Bilbao. The creation of Bilbao Ria 2000 was initiated by the Ministry of Public Works, Transport and the Environment (now Ministry of Development) of the central Spanish Government. It represented a new management model for urban planning, in which stakeholders at different levels take part. It was expected that integrating public authorities in one company or authority could create sufficient support for the Abandoibarra Project and minimize bureaucratic problems, and thus speed up the execution of the project.86

The process of development

The City Council of Bilbao launched an international urban planning competition to invite conceptual plans for Abandoibarra in 1992. The competition involved two phases; the first phase opened only to local architects. The winner of this competition entered into the second phase together with three other foreign teams specially invited by the City Council. Although the selection committee argued that none of the proposals could adequately resolve the issues of Abandoibarra, the plan presented by Cesar Pelli’s was eventually selected the winner.87

Cesar Pelli’s proposal called for the development of a new center, which would attract international investments, thereby driving the economic revitalization of the city. However, fewer companies were interested in holding their activities there than expected. Together with the better investment in the luxury housing in this area, the problems forced a change in the original plan, which resulted in the reduction of a series of commercial skyscrapers to only one high-rise office building. In other words, Abandoibarra has been transformed “from a production-oriented development to a consumption-based renovated space catering to the demands of the urban elite.”88

Financing

The financing scheme is one of the key elements in the Abandoibarra project. Although Abandoibarra followed to the logic of large-scale urban renewal operations of the 1980s, its design and implementation was taking place under a rather different macroeconomic context. The recession of the early 1990s and the strict impositions of the European Monetary Union regarding the control of public deficits made it unlikely for these large-scale redevelopments to be financed by the public sector. Moreover, the idea to revitalize Bilbao came after the big redevelopment operations of Barcelona and

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86 Rodríguez, Arantxa, Elena Martinez and Galder Guenaga, Uneven Development, 2001: 171
87 Rodríguez, Arantxa, Elena Martinez and Galder Guenaga, Bilbao ñ Spain: Abandoibarra, 2005:16
Sevilla, which generated massive expenditures and deficits in Spain. As a result, the condition for giving a green light to the redevelopment of Abandoibarra was that it must be a self-financing operation. The cost of redevelopment had to be financed through the revenues generated by the selling of the renewed plots. Given the constraints on financial sufficiency, the project has been developed more by the influence of real estate market than by the community’s need.

4. Result

Bilbao Effect

Abandoibarra is presented by the key actors in urban development in Bilbao as the flagship of a massive restructuring operation of the whole metropolitan area. From this perspective, the physical renewal of this area not only created a new direction for Bilbao, but also helped to project an image of innovation, creativity, and success, which is critical for increasing the competitiveness of the.

The most significant impact of the Abandoibarra development operation can be considered in relation to the pioneer project: the Guggenheim Museum. The so-called “Guggenheim effect” operated in the realm of the symbolic. Before its opening date in October 1997, the museum had already become the outstanding icon for the revitalization of Bilbao. Designed by Frank Gehry, this 24,000-square-meter-museum was soon recognized as an architectural landmark of the city. Together with Abandoibarra area, this museum has been presented as part of an image reconstruction operation and a city marketing strategy. Evidently, from this perspective, the Guggenheim Museum can be considered a complete success.

Population, work, and visitor stimulation

So far, the most important positive impacts of the Guggenheim Museum have to be with the dramatic increase in the number of visitors to the museum and the city. Compared to fewer than 100,000 city visitors per year before the museum was built, the attraction of almost 1,400,000 visitors during the first year of operation of the museum is considered a big success.

Providing the communal space

The Abandoibarra proposal not only extended the green space of the Parque de Dona Casilda de Iturrizar to merge with the whole development, but also added a large plaza in the connection of Abandoibarra and Ensanche district. Together with the extension of three-kilometer waterfront promenade to the old town Casco Viejo, this 120,000-square-meter green area offered the largest open space for the city.

Land use and real estate market

In the approximately four year gap between the beginning of redevelopment works and the first housing project marketing, land prices in Abandoibarra rose up more than double. Real estate price have also increased throughout the city, proportionally higher in Abandoibarra’s adjoining neighborhoods.\(^9^2\) While housing prices in the city increased an average of ten to fifteen percent overall, they had increased from thirty to forty percent in the Abando district.\(^9^3\) By the end of the year 2001, Bilbao had become one of the most expensive cities in Spain, with the average cost of used housing exceeding that of Madrid and Barcelona.\(^9^4\)

5. Observation and Lessons learned from the precedents

The waterfront redevelopment in Abandoibarra tremendously succeeds in generating tourism and increasing city reputation, but inadvertently displaces indigenous city residents who cannot keep up with the higher living costs. The waterfront design neglects the surroundings and lacks the human scale consideration. However, it is the successful example of how a post-industrial port can be revitalized as a major cultural area of the city. This waterfront area also includes the mixed-use compounds in the middle of the site to enable uses throughout the day. The major support of this project is the creation of an absolute governance authority that takes charge over the redevelopment. This new structure avoids complicated bureaucratic problems and facilitates a faster and smoother execution of the projects.

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\(^9^3\) Rodriguez, Arantxa, Elena Martinez and Galder Guenaga, Uneven Development, 2001: 173


\(^9^5\) Source: Author.
Elevated highway
Street
Old canal

96 Source: www.planum.net/4bie/main/m-4bie-bilbao.htm
Case Study 2: Cheonggyecheon

City: Seoul, South Korea
Waterway: Cheonggyecheon Canal
Size: 20 - 40 meters wide
Opportunity Site: The 6 kilometers long canal and its neighborhood
Date of development: 2003 - 2005

1. Historical Background

Cheonggyecheon was a stream running East-West through the downtown of Seoul and linked inextricably to Seoul’s history since the King Taejo moved the capital to Hanyang (today’s Seoul) in 1394. The stream in the canal overflowed every time there was heavy rain, and it was usually polluted in other seasons when it lacked water flow. The concept of covering the Cheonggyecheon canal had been discussed continually but first implemented in 1937, immediately following the nation’s liberation from Japan and the Korean War. The construction to cover the canal with street took 20 years to complete. The construction of the second layer of the elevated highway began in 1967 and was completed in 1976. The street and the elevated highway covered the entire canal and had been the main source of the traffic congestion in this neighborhood for decades.

2. Problems

Deteriorated neighborhood

The neighborhood around the Cheonggyecheon Canal was mostly made up of dilapidated buildings about 40 – 50 years old, and it was rapidly losing its population of permanent residents. This area was becoming a slum and was rapidly losing both the residential and commercial atmospheric appearance.

The safety of the old bridge structures

The structure covering the canal, as well as the elevated highway, was built in the late 1950s and 1960s respectively. By 1990s, the structure was well past their intended life expectancies and was considered unsafe to the neighborhood. Moreover, the bottom of Cheonggyecheon foundation was polluted with heavy metals such as lead, chromium, and manganese, which resulted from the corrosion of the structures by dangerous gases underground.

Figure 3.8 (left page): The highway above Cheonggyecheon canal.
Figure 3.9 (left page): The process of the restoration project.

100 Source: Cheonggyecheon, http://english.seoul.go.kr/cheonggye/
Need of cultural spaces and city image improvement.

The Cheonggyecheon restoration project is significant in helping Seoul rediscover its historical roots and original appearance, which have been long forgotten. Furthermore, the restoration will transform Seoul’s image to an ecological-friendly and human-oriented environmental city.

3. Processes and Concept

Recover the sections of Cheonggyecheon Canal

The main restoration project engendered a master plan to remove the structures covering the stream and the elevated highway and build new facilities to restore the canal, including the sewage system, road, bridges, and landscape. The section to be restored is about 5.84 kilometers from Tawpyeongno to Sindapchelgyo Railway Bridge.\(^{101}\)

Restoration of the stream

The concept of the restoration is to create a human-oriented environment-friendly urban space with a waterfront and walkway along the banks. The proper safety management of the stream, as well as the measure to prevent overflow, is also under careful consideration. The sections of the stream is designed to ensure maximum flood capacity and embankments that can withstand the worst possible flood that is expected to occur every 200 years.\(^{102}\) Main roads were built along the lower level of the left bank of the canal to allow easy access to the water.

Water Supply

Cheonggyecheon is an intermittent canal and it had the problem of a dry stream occasionally. Therefore, it required additional flow to maintain an average depth of forty centimeters throughout the year. The water for the restored project will come from the nearby river with advanced technology to treat wastewater before delivering. The water plant will supply a maximum of 120,000 tons per day. The Jungnang sewage treatment plant, which treats the water to the BOD level of less than 3 mg. per liter, will also supply 100,000 tons a day.

Waterfront Roads

The roads were designed to be as small as possible in order to minimize the flood hazard. They will facilitate the business operations of neighboring stores and supporting parking. The function of Cheonggyecheon roads was changed from the city’s major arteries to be just low speed roads for shops and recreation. The restored canal is accessible at 31 locations, some with handicapped accesses.\(^{103}\)

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\(^{102}\) Kil-Dong, Park, 2007: 3

\(^{103}\) Kil-Dong, Park, 2007: 4
Restoration of Ecological Environment

The waterfront is planted with wild plants that grow well along bodies of water to create natural sceneries. Some parts of the waterside will be restricted from access and created as green areas for insects and birds. Reservoirs will be built to serve as habitats for plants and animals, and also to control water depth.

4. Result

New Development Plan in Downtown

This development formulated a long-term vision for the entire central part of Seoul and the neighborhood of Cheonggyecheon. It is also a plan for vital and healthy change in the area while preserving the unique characteristics of the downtown city. The competitiveness of Seoul has been raised by increasing public sector investment. The neighborhood of Cheonggyecheon, which was neglected despite the prime location in the center of the city, is now managed under a well-organized plan and serves as a main cultural and environmental recreation area.

Figure 3.10-3.13: The comparison of the highway and the existing Cheonggyecheon canal.104

Establishment of the Cultural Center
Following the success of the revitalization plan, many cultural and commercial buildings have been constructed around the project. The new Cultural Center, for example, is a four-storey exhibition hall for permanent and special exhibits. The ground floor and landscape is designed mainly to dedicate for neighborhood recreation.

Historical Heritage Restoration
The Cheonggyecheon restoration project recovers a significant part of a long-forgotten history and culture of Seoul. Traditional cultural activities such as bridge stepping on Supyogyo Bridge and the lantern festival will be revived, and Gwanggyo and Supyogyo Bridges will be restored to the traditional character.105

5. Observation and Lessons learned from the precedents
The Cheonggyecheon project is an example of effective landscape redevelopment along the existing infrastructure. Although this precedent took the development plan to the extreme and costs $900 million, the result is the successful revitalization of the canal, its landscape, and its adjacent neighborhood. This landscape becomes a destination of the city, provides many cultural facilities, and attracts a large number of real estate investments. This project also portrays the example of the continuous walkway at the canal level, which has a better quality comparing to the street level landscape. The lower level landscape including the water treatment system in this project has inspired the redevelopment of canal system in Bangkok discussed in Chapter 5.

Figure 3.14 and 3.15: The Cheonggyecheon canal.106

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105 Kil-Dong, Park, 2007: 6
Case Study 3: Thames River

City     London
Waterway    Thames River
Size    250 - 550 meters wide
Opportunity Site Thames River and its waterfront spaces
Date of development 2001 - present

1. Historical Background

The Thames Gateway is an area of land stretching 60 kilometers east from inner East London on both sides of the Thames River. The area, which covers many brownfield sites, has been designated a national priority for urban revitalization, taking advantage of the development opportunities of the completion of the Channel Tunnel Rail Link. The Thames Gateway is the United Kingdom’s largest regeneration area, which aims to support local businesses, attract investment, build infrastructure, and to strengthen and develop communities.

London Thames Gateway holds the key to the future expansion of London as a world city. It includes 10,000 hectares of land along the riverside of seven east London Boroughs. The London Plan proposes that, over the next two decades, almost half of the capital’s new homes will be built in these districts. The Thames Gateway comprises sections of 16 different local government districts in three regions. It sets out six strategic locations: Stratford City and the Lower Lea Valley, London Riverside, Greenwich Peninsula and Woolwich, Thurrock, Kent Thameside, and Medway.

Figure 3.16: The Thames Gateway area.

109 Source: London Thames Gateway Development Corporation
2. Problems

The Waste of the Prime Location

The Thames Gateway is a strategically important economic location positioned between London and mainland Europe. This project is initiated to use this unique advantage of the area to reach its utmost potential. Its objective is also to establish an Eco-region land with sustainable regeneration concept.

Deprived Neighborhood and Brownfield Land

The area accommodates around 1.6 million people and contains some of the most deprived wards in the country, characterized by lack of access to public transport, services, employment and affordable quality housing. Its boundary was drawn to capture the riverside strip that formerly hosted many land extensive industries, serving London and the South East, whose decline has left many large scale dereliction and contaminated lands.110

The area of brownfield land, farmland, and marsh has been perceived by governments and planners as having potential to act as a catalyst for the regeneration and growth for the social advancement of the area. This project also helps alleviate some of the growth pressures on London and the South East. The government also believes that new private sector housing will reduce house price inflation and the public projects will offer recreational spaces to the communities.

3. Processes and Concept

The Thames Gateway project aims to improve the economy of the region through the development of marshland, farmland and brownfield land, by utilizing major transport infrastructure provision and through the regeneration of existing urban areas.111

Crossrail and High Speed Link

The project includes the new High Speed Link through Stratford and Ebbsfleet to boost the economic prospects in East London and North Kent. The crossrail through Canary Wharf and Stratford and Abbey Wood will also open up new employment opportunities and accelerate housing growth in East and South East London.

The Iconic London Riverfront Redevelopment

The O-Two Concert venue and entertainment complex on the Greenwich Peninsula has opened to revitalize the Thames riverfront in central London. Together with the London Eye, Tower Bridge and other iconic buildings along the river, Thames River has been transformed to be a magnet of cultural tourism of the whole city.

111 London Thames Gateway Development Corporation, Thames Gateway Interim Plan, 2006: 5
The Olympic Park

The London 2012 Games will take place mainly in the new Olympic park, being built in Stratford, East London. The area of the Olympic Park and the Lower Lea Valley will change the perception of the most diverse and deprived communities in the UK tremendously\textsuperscript{112}. The aims of the Olympic Park are to make the UK a world-leading sporting nation, transform the heart of East London, create a blueprint for sustainable living, and demonstrate the UK as a creative, inclusive, and welcoming place to live.

\textsuperscript{112} UK Community and Local Government, http://www.communities.gov.uk/thamesgateway/olympicsvision/

\textsuperscript{113} Source: London Thames Gateway Development Corporation, 2006
4. Result

Jobs, and housing creation
The Gateway project is offering employment and housing opportunity in town centers and in key regeneration areas, aiming first at the local businesses and brownfield sites. So far it has already delivered 24,000 homes and job growth of 4 percent, around 25,000 positions, between 2001 and 2005. By 2016, the project plans to create up to 180,000 jobs and 160,000 dwelling units across the Gateway by enabling the expansion of other sites in the project.114

Create Cultural and Sport District
The project so far creates the Olympic Stadium, Saxon King Museum at Southend, Sporting Village in Basildon, and O2 Stadium adjacent to the Thames River. These projects will support London’s role as a global city with a distinct characteristic.

Regenerate the Historic Environment
The project includes the renovation of the historical Chatham Dockyard as an innovation center for small businesses. The conversion works on the Smithery building for the National Museums at Chatham is also now underway.

Parklands and the Natural Environment Restoration
The Thames Gateway plans to spend over 35 million pounds for parklands in nine projects scattered around the region. It plans to extend the idea of the Green Grids to transform the Gateway environment and create the first low carbon region in UK.

5. Observation and Lessons learned from the precedents
The Gateway project is a series of development space along the waterfront. Each of the selected sites has different existing conditions: brownfield, farmland, depriving neighborhood. The Olympic park is an example of redeveloping sport and cultural facilities in a declining neighborhood to increase the value of its surroundings. The Gateway project is set of several redevelopment projects aimed at creating a substantial impact – both on an individual level and as a whole – to the entire region.

Figure 3.17: The Olympic Park.115

114 Thames Gateway Development Corporation, 2006
115 Source: London Thames Gateway Development Corporation, 2006
Chapter Four: Waterway and Riverfront Criteria

Urban Waterways

In a study of Bangkok canals in 1998, Gajaseni categorized the opportunities and roles for urban waterways in four approaches: waterways as transportation routes, ecological greenways, distinctive characteristic of the city, and development magnets. With the analysis from the historical development, mapping, and precedent studies, this chapter will discuss the criteria to regenerate the Chao Phraya Riverfront in response to the concepts of the waterways and the problems of the Chao Phraya River and its riverfront.

Waterways as Transportation Routes

With numerous waterway networks, the city should attempt to use the water as an alternative urban transportation channel, especially when the road system has been severely congested and there exist limited road expansion capacity. Although solving the traffic congestion has always ranked as every administration’s key agenda, there has yet to be any concrete solution to the problem. Two factors have been identified as the main reasons behind the city’s traffic problems. First, local authorities have not managed to create sufficient road infrastructures to absorb the traffic growth since the development of motorization in the 1980s. Second, the public transportation system is insufficient and ineffective in offering an alternative to the private car.

Bangkok has tried to improve the waterway network, both on the river and canals, to cope with traffic jams. However, in the canal cases, there are many limitations to which the canals can be used effectively for transportation due to the constraints of the width and depth of the canals, the height of the bridges, the water level, and the locks. Of the 250 canals in the city, 100 are navigable but only seven are currently used for transportation.

Express boat services run 21 km. along the Chao Phraya River with a total of 35 stations. This route covers only half of the river in Bangkok and has the potential to expand, connect, and integrate with other means of public transportation and important waterfront places.

Criterion: Maximize the usage of river transportation by improving public access of the nodes, expanding the network, and incorporating it with other transportation systems and recreational programs.

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116 Gajaseni, Supapim, 1998: 59
118 Gajaseni, Supapim.
Waterways as Ecological Greenways

Waterways in urban areas should be unified as “communication links” by providing physical and biological links through the city. In some cases, their location in the city makes the waterways the best routes between destinations. For this reason, the linkage between each node becomes more essential, and should be incorporated in the open space network of the city.

San Antonio’s river walk in Texas, for example, was planned not only to provide shops and restaurants for visitors but also a system of linked shaded walkways. Integrating the park system into the river network would provide a unique atmosphere that hinterland park could not offer. Thus, in Thailand’s hot weather, waterfront is desirable as it helps cool down the temperature and serve as outlets for water-based recreational activities.

Criterion: Some parts of the riverfront must be opened to the public and serve as venues for recreational activities. An integrated network should link these recreational waterfront spaces along the river, while connecting open recreational spaces, parks, and residential communities with pedestrian access.

Figure 4.1: The Chao Phraya River as a distinct character of the city.

119 Hough, Michael, *City Form and Natural process*, 1984 (Quoted in Gajaseni, 66)
120 Source: United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
Waterways as Distinct Character of the City

In the past, Bangkok’s identity had been associated with the waterway. The distinctive character of the city, as well as the historical development, is connected to the Chao Phraya River. In the case of Nervion River in Bilbao and Cheonggyecheon in Seoul where waterways were also symbols of decline, they transformed their deteriorated riverfront and covered canal into a unique element of the city.

The distinctive quality of riverfront space should differ from place to place, depending on the local identity and the relationship with the community. In Chapter 2, I divided the Bangkok riverfront into four zones: the residential zone, the historical heritage zone, the high-density residential and commercial zone, and the industrial port and warehouse zone. The plan suggested on each particular space should express different character of the places.

Criterion: The riverfront redevelopment will emplace the distinct character of the water city. Each riverfront space should incorporate the unique character of its own community and give out the appropriate development for each particular space.

Waterways as Development Magnet

The waterfront is always a major magnet for people and development by its nature. In many cases, large-scale mixed-use projects have been developed along the waterways. These mixed-use developments can utilized the areas and can offer 24-hour activities, making waterways even more attractive. However, there is a problem of coexisting between new development and the existing. In Abandoibarra redevelopment, for instance, large-scale development drove up the cost of living in the area and indigenous inhabitants who cannot afford the higher standard were forced out of the community.

Criterion: A mixed-use approach should be incorporated into the riverfront redevelopment in order to create an actual 24-hour space for people.
Bangkok’s Urban and environmental Problems

Bangkok is confronted with tremendous urban and environmental problems such as traffic congestion, urban sprawl, as well as air and water pollution. Furthermore, numerous studies have shown that port and coastal cities are prone to more environmental problems as a result of the global warming. A recent OECD report places Bangkok among the most exposed cities to the consequences of climate change.\textsuperscript{121}

The Air Pollution

Bangkok and its region have suffered from a strongly degraded air quality because of the traffic congestion and the concentration of industries. This metropolis releases about 26 million tons of carbon dioxide every year, or 20\% of the total emission of the whole country.\textsuperscript{122} Local authorities have recently launched several procedures, such as the promotion for gas-run vehicles and the adjustment of emission standards, in order to improve the overall air quality.

\textbf{Criterion:} The waterfront network should help reduce air pollution by offering more parks for the city. The industrial sites should be reorganized or moved to other locations where the zoning is designed for industrial area.

The Quality of the Water and the Pollution of Surface Water

The Chao Phraya River is the most polluted river of the Chao Phraya river basin with high levels of organic and bacterial pollution due to domestic, industrial, and agricultural discharges into rivers.\textsuperscript{123} Authorities in charge of the water quality launched a comprehensive campaign at the beginning of the 1990s aimed at improving and protecting the quality of the water.

At present, two thirds of the water consumed in Bangkok comes from the Chao Phraya River.\textsuperscript{124} The overexploitation of subterranean waters by the city and private entities led to a significant decline of the level of underground waters and to a corresponding collapse of the ground in some zones. Subterranean water usage needs to be rethought, and the quality of water from the Chao Phraya River will play a critical role in this development.

\textbf{Criterion:} The project should address the method to alleviate the contamination problem of the Chao Phraya River in both aesthetic and functional purposes.

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\textsuperscript{121} Ranking port cities with high exposure and vulnerability to climate extremes, 2007.
\textsuperscript{122} Association Les Atelier Internationaux de Maîtrise d'Oeuvre Urbaine, 2008: 17
\textsuperscript{123} From the study conducted by the Thailand Environmental Institute, 1997.
\textsuperscript{124} Association Les Atelier Internationaux de Maîtrise d'Oeuvre Urbaine, 2008: 17
\textsuperscript{125} Source: Bell, Barry, \textit{Bangkok: Angelic Allusions}, 2003: 10
**Wastewater Treatment and Waste Management**

Bangkok has a main drainage system, but a big part of metropolis’s wastewater is recuperated by septic tanks or poured directly in canals or the river without treatment. Unable to generalize a public network of recuperation of wastewater throughout the BMA, septic tanks still remain a better means than the discharge in canals or river. However, during the monsoon seasons, pits frequently overflow and pour in the canal networks.\(^{126}\)

Most of the garbage, as well as wastewater, is directly thrown in the river or the canals, especially in densely populated zones and informal neighborhoods where proper waste management cannot reach.

**Criterion:** The establishment of a comprehensive wastewater management system should be a key agenda in the redevelopment plan for the riverfront and canal-front. The direct disposal into the waterway should be prohibited by law and the informal settlements that take control over the waterfront should be replaced.

**Flooding Problem**

Bangkok is situated on a flat plain vulnerable to flooding. The flooding season begins in September but torrent rains can cause floods from May. Flooding is most serious in October when the rivers in Northern Thailand fill the Chao Phraya river basin. Furthermore, annual high tides also add to the high water levels at this period. The eastern part of the city is most vulnerable to flood despite the fact that the canal network is considered to be the most developed. During the period of high tides, seawater can penetrate in the city through the canal system and swell the floods.\(^{127}\)

Watergates are the flood control structures that have been put in place to prevent this problem. However, occasionally, the water manages to pass over these watergates into the canal networks. The problem is exacerbated by the deficiently maintained canal network that does not allow efficient drainage.

**Criterion:** The project should provide a strategic plan to reduce the recurring flooding problem. Designing green space together with the flood retention plain is an alternative to manage and control flooding.

\(^{126}\) Association Les Atelier Internationaux de Maitrise d' Oeuvre Urbaine, 2008: 17
\(^{127}\) Association Les Atelier Internationaux de Maitrise d' Oeuvre Urbaine, 2008: 18
Disconnection Between Spaces

In the past, the Thai community was connected with two main urban structures: Temple and Palace. Temples served as both community schools and religious places, while the palace represented the center of the community and city hall. Temples chose to locate near the river for the easy access to boat transportation, which was the main means at that time. Temples had been the main venues for social and cultural activities: religious ceremonies, festivals, bazaars, and weekend markets. In present time, the communal spaces in many temples have been replaces especially in the denser urban areas, mostly by the informal settlements, rowhouses, and warehouses.

Criterion: Temples and palace that have the location near to the riverfront should connect with communal spaces and piers.

Figure 4.3 and 4.4: The communal space between temple, waterfront, and pier is disappeared.128

128 Source: Bell, Barry, Bangkok: Angelic Allusions, 2003: 109
Part III: Open Recreational Space Network

The historical and mapping analysis of the first part of the thesis reveals the potential of the riverfront spaces. The second part investigates selected precedents and studies existing problems of the Chao Phraya River to create a set of design criteria for the riverfront redevelopment project.

Part III (Chapter 5 and 6) is the design proposal of the network of open recreational spaces along the river. It starts with a statement which aims to generate accessible waterfronts, integrate water transportation, alleviate flooding and water contamination problems, and create the global character through a mixed-use riverfront. The fifth chapter proposes the regional-scale riverfront network that derives from these four strategies. The riverfront, together with the new water transportation system, is analyzed for the opportunities flowing from identified site advantages. In chapter six, two key strategic locations, the Klong Toey Port site and the historic core site, are chosen for study in detail.
Chapter Five: Projecting the network

A Strategic Plan

The Development Plan is a strategic plan, which focuses on developing the essential areas for creating an impact on the overall city. Bangkok is a large and dynamic city so the city planner must carefully select specific methodologies to apply on critical locations in order to achieve the selected goals. The main purpose of this project can be simply explained as to offer more open recreational space to Bangkok. However, there are only a few areas left in the BMA where the acquisition of a large regional park is both possible and feasible. Therefore, the parks provision should be thought of as a system. In this thesis, the project concentrates on connecting the developed opportunity sites to the new regional park Bangkachao as the main green network of Bangkok. The Chao Phraya River is proposed as the backbone for new recreational waterfront spaces to emphasize the distinctiveness of Bangkok’s history and natural setting.

The open recreational space network should not just provide the communal spaces but also solve or mitigate the problems as described in preceding chapters. Four main purposes of the series of open space network are to generate accessible waterfronts and accessible green spaces, integrate water transportation with the open space network, alleviate flooding and contamination problems, and create the global character through waterfront and mixed-use public realm. This thesis uses four regional strategies to determine the critical locations for each open space.

Figure 5.1 (left page): Open recreational space network.\textsuperscript{129}

\textsuperscript{129} Source: Author. Base map from Google Earth.
Strategy 1: Pedestrian Access

In order to understand riverfront accessibility, the existing condition has been analyzed, identifying barriers and access through mapping and isometric diagrams. From the study, less than 10% of the riverfront space is available for public uses and nearly all access to the riverfront is possible only in movement perpendicular to the river. This has denied the possibility of linear movement along the river. The riverfront access points are mainly connections from the important streets to piers.

The photos below depict a typical ferry pier along the Chao Phraya River and access to the riverfront from the main road. Row house buildings block the public’s view and access of the riverfront.

Figure 5.2 (Left page): Barrier and Access Diagram.130
Figure 5.3: Barrier and Access Isometric Analysis.131
Figure 5.4: Klong Toey Nok Pier access.132

130 Source: Author. Base map from Google Earth and BMA Planning Department.
131 Source: Author. Base map from Google Earth and BMA Planning Department.
132 Source: Author. Base map from Google Earth.
Rethinking Bangkok Canal Network

This thesis proposes the utilization of canals as major pedestrian gateways to the Chao Phraya riverfront by creating continuous walkways at the lower level of the canals. This “lower level landscape” is a sunken court that generates an approach to the riverfront, serves as a flood detention plain, produces a new water cleansing system, and increases green area. This concept is applicable to the canals that run along the street, e.g., the canal along Rachini and Narathiwat Ratchanakarin Street (figure 5.6 a).

A second type of canal is one that runs through residential communities, e.g., Ong Ang canal (figure 5.6 b). In the latter case, this project proposes the installation of a floating walkway along the canal edge to create an approach to the river. The walkway also acts as a barrier that prevents direct disposal of wastes from the surrounding houses into the canals.

Figure 5.5 (Left page): Major canals as new pedestrian access to the river.  
Figure 5.6: Two sections of canals: along the street and through the community.  
Figure 5.7 (Next page): Canal with street edges.  
Figure 5.8 (Next page): Canal with house edges.

133 Source: Author. Base map from Google Earth and BMA Planning Department.  
134 Source: Author.  
135 Source: Author.  
136 Source: Author.
Sunken canal landscape is a continuous walkway along canal. It is a main gateway to the Chao Phraya Riverfront together with the waterway. This sunken plaza also works as a flood detention zone. It is the flood allowance plain in order to reduce the risk of flooding in the city.
Canal with house edges

Floating deck is a continuous walkway along the canal that runs through the community. It is a main gateway to the Chao Phraya Riverfront together with the waterway. This walkway will also act as a barrier to block the direct disposal from housing and provides a public walkway in the community.

Housing along the canal always release untreated waste water and garbages directly into the canal.

Informal Settlements along the canal

[Informal Settlements that illegally take over the waterfront]

[Community along the waterfront]
Key components of the new canal section

1. Continuous Walkway

The lower landscape serves as a major pedestrian walkway from the inner city to the riverfront. Such walkways, which also include a bicycle lane, is 2.40 meters below the street level and runs under road intersections so as to create a continuous landscape along the canal.

2. Integrated Flood Protection

The Bangkok Plan 1996 proposes the installation of retention ponds in parks to help address the flooding problem in a comprehensive and integrated manner. Although the creation of retention and water storage areas in parks will provide tangible benefits for the public, the vast amount of public space required in the inner city means the project is too expensive to be carried out. The redesigned canal network will create a series of flood plains on both sides of the lower landscape along the canal. Certain sections of the canals will be designed to carry much more water if necessary, while the water retention capacity of this canal is more than double of the existing section.

3. Direct waste disposal deterrence and water treatment concept

The new landscape along the canals that pass through residential areas will prevent direct disposal of untreated wastewater and garbage into the canal. The walkway will be a public boundary that runs along both sides of the canal.

This thesis also proposes the use of the ecologically innovative ‘living machine’ water treatment plant, which is a water recycling plant that mimics natural wetlands to clean wastewater and trains the ecosystem to adapt to influent variations. This unique system is a cheaper alternative to conventional mechanical and chemical forms of water purification and treatment. It also provides another green layer along the canal.

Strategic locations of the canal’s lower landscape walkway are the intersection points between river and canal. The circled areas represent the strategic locations.

Figure 5.9 and 5.10: Strategic locations from the first strategy.\textsuperscript{137}

\textsuperscript{137} Source: Author. Base map from Google Earth and BMA Planning Department.
Strategy 2: Transportation Linkage

One of the main problems of the existing parks in Bangkok is their poor connection with major public transportation. Public transportation plays a key to bring users to the open space. The opportunity sites from this strategy are the locations where the public transportation hubs come across the waterfront spaces. These strategic locations will be the intermodal transit nodes that connect inland public transportation and the water network.

The key connections from each transit node near the riverfront are mapped in the strategic diagram.

Figure 5.11: The immediate transportation network and strategic location.\textsuperscript{138}
Figure 5.12: Isometric diagram.\textsuperscript{139}

\textsuperscript{138} Source: Author. Base map from Google Earth and BMA Planning Department.
\textsuperscript{139} Source: Author. Base map from Google Earth and BMA Planning Department.
Strategy 3:
Strategic locations from underused land and from cultural spaces

The opportunity sites proposed in this strategy are derived from two major concepts: the sites from underused waterfront spaces and the sites from reactivating cultural spaces.

1 The first group of opportunity sites is selected from the waterfront land-use analysis presented in the second chapter. This thesis targets to open the industrial warehouses and port, governmental institutions, and unused land along the waterfront.

2 The cultural space connection between the temple, palace, waterfront, and pier. This space will bring back the religious activities and communal uses along the riverfront. This strategy also takes into account the important water cultural events, such as Royal Barge Ceremony and Loy Kratong, to provide waterfront space to cover the festive and cultural uses.

Figure 5.13: The opportunity sites along the water and the cultural space connection.140
Figure 5.14: Isometric diagram analysis.141
Figure 5.15 (Next page): Absolute strategic locations from three strategies.142
Figure 5.16 (Next page): Open recreational space network.143

140 Source: Author. Base map from Google Earth and BMA Planning Department.
141 Source: Author. Base map from Google Earth and BMA Planning Department.
142 Source: Author. Base map from Google Earth and BMA Planning Department.
143 Source: Author. Base map from Google Earth and BMA Planning Department.
Absolute Strategic locations from three strategies | the existing water transportation system
Existing water transportation
- Express boat runs 21 km. and stops at Rama IX Bridge
- Ferry connects street on one side to another side

Proposed water transportation
- Express boat network extends to cover new waterfronts
- ‘Zigzag-like’ Ferry system connects all open recreational space together
Strategy 4:
Water Network

The immediate strategic locations derive from the integration of the first three strategies, which takes into account land-use opportunity, the cultural space connection, the linkage with inland public transportation, the existing water network, and the major pedestrian walkway from the lower landscape. The new open recreational space network is designed to respond and access the important strategic places. Most of the strategic locations are linked to the ferry terminal to generate daily uses and to the temples to facilitate religious and cultural activities.

The water transportation network is redesigned to integrate two systems. The ferry system will connect one ferry terminal on one side of the river to two terminals on the other side. This new system will create a zigzag-like network that joins all the riverfront open spaces together. The express boat route is now extended, and, with the new revised ferry system, the number of stops can be reduced, hence improving its efficiency.
Chapter Six: Urban Scale Projects

All strategic sites have been studied for their opportunities and uses according to their existing conditions, surroundings, and site advantages. The yellow background of the table represents the priority of the site. The deeper the tone, the higher the priority. The green color in the strategic sites represents the area of open recreational space, whose functions nevertheless differ from site to site. Some selected sites are designated as public parks, some are intermodal transit nodes with high-density mixed use, and some are cultural facilities, for example. These strategic locations are all connected to the water transportation network.

In this chapter, high priority sites are studied in detail while considerable analysis has been carried out to discern how the proposed strategies could be implemented at the site scale. This chapter primarily examines the site where the industrial port and warehouse are located (sites 42 and 45). This large area will be available for new development following the relocation of the Klong Toey Port. The Klong Toey Port is the post-industrial site where it is reasonable to redevelop and replace the existing warehouses and fuel tanks with new programs and functions. In contrast, several strategic locations consist of dense communities and historical buildings; hence the designs need to be humbler and more thoroughly integrated with the existing community. The second urban scale project in this chapter targets such areas in the historic core of the city (sites 10-18).

Figure 5.19: Open recreational diagram with chosen zoom-in site.\textsuperscript{146}

\textsuperscript{146} Source: Author
<table>
<thead>
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<th>Existing Uses</th>
<th>Strategic Points</th>
<th>Opportunities</th>
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<td>Adjacent to Soi Thong Temple, Existing pier</td>
<td>Pier, communal park, religious activity space, playground</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Canal intersection - Existing Pier</td>
<td>Pier, canal lower landscape park</td>
</tr>
<tr>
<td>Warehouses and Temple</td>
<td>- Canal intersection - Adjacent to Kaewfa Chulamanee Temple Pier - Main road</td>
<td>Communal park, high-density transit commercial area, riverfront walkway, pier</td>
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<tr>
<td>Informal settlements</td>
<td>- Canal intersection - Adjacent to Aeuwkekasitaram Temple Pier</td>
<td>Pier, religious activity space, riverfront cultural area</td>
</tr>
<tr>
<td>Governmental Institution Private Space</td>
<td>- Surrounded by two existing piers</td>
<td>Pier connection riverfront walkway with public green space</td>
</tr>
<tr>
<td>Informal settlements</td>
<td>- Adjacent to Thepnaree Temple Pier</td>
<td>Pier, riverfront shops and restaurants, communal space and religious activity area</td>
</tr>
<tr>
<td>Governmental Institution and informal settlements</td>
<td>- Wasuki Pier - Adjacent to the National Library Canal intersection</td>
<td>National Barge Museum at Wasuki Pier, pier, museum park that connect with Library, communal park, playground, pond</td>
</tr>
<tr>
<td>Informal settlements and existing riverfront space of temple</td>
<td>- Adjacent to Bowon Mongkol Temple Pier</td>
<td>Pier, cultural and religious activity space, communal space, waterfront walkway</td>
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<td>Existing Rama VIII Bridge Park</td>
<td>- Connection with Prayasiriyasaawan Temple and Chaturamit praditharam Temple Pier - Rama VIII Bridge</td>
<td>Public park, riverfront walkway, sports field, pier</td>
</tr>
<tr>
<td>Existing park with old preserved fort</td>
<td>- Santichaiprakam Fort - High-density commercial area and pier - Shopping street around the area</td>
<td>Recreational public park with historical preservation concept highlighting at the Santichaiprakam Fort, pier, riverfront restaurants</td>
</tr>
<tr>
<td>Warehouses and informal settlements</td>
<td>- Prha Pinklao Bridge and two piers - Adjacent to Dusitaram Worawihan Temple Canal intersection with large important canal in Thonburi side</td>
<td>Major waterfront park looking at the Grand Palace on the opposite side with high density public program along the edge, communal park, pier</td>
</tr>
<tr>
<td>Governmental Institution building</td>
<td>- Prha Pinklao Bridge Pier - Next to the National Museum</td>
<td>Renovation project: including new public program to the existing building sharing between pier function and art museum, riverfront recreational area, pier</td>
</tr>
<tr>
<td>Train Station</td>
<td>- Train Station Pier - Canal intersection</td>
<td>Intermodal transit node with public park for cultural and event activities</td>
</tr>
<tr>
<td>Moon Pier and Dead End Road</td>
<td>- High-Density usage pier - Connection to Mahathat Temple</td>
<td>Weekend market and bazaar created by removing inner dead-end road, high-density transit node and commercial area, pier</td>
</tr>
<tr>
<td>Two existing piers, Navi Sport Club, Private Waterfront for governmental and military uses</td>
<td>- Adjacent to the Royal Grand Palace - Adjacent to the Emerald Buddha Temple - Adjacent to Prachachonpon Temple - Two existing piers - Existing sport fields</td>
<td>Major water-based cultural activity space - The Grand Palace waterfront - High-density commercial at the edge - Shops and restaurants - Public sport field on the existing Navi sport club Pier connection riverfront walkway</td>
</tr>
<tr>
<td>Royal Navi Association and Auditorium</td>
<td>- Opposite to the Royal Grand Palace - Near Khruuwan Worawihan Temple</td>
<td>Major water-based cultural activity space - The waterfront with the Grand Palace view</td>
</tr>
<tr>
<td>Old preserved fort and existing waterfront parks in front of two temples</td>
<td>- Old iconic fort park - Adjacent to three temples: Arun Temple, Molee Temple, and Kalayanamit Temple - Two existing piers - Canal intersection</td>
<td>Continuous waterfront walkway that link all three temple waterfronts with parks and pedestrian bridge across the canal, old fort park, pier</td>
</tr>
<tr>
<td>Existing Bhudhayodfa Bridge park and flower markets.</td>
<td>- Bridge - High-density commercial area and important flower market - Adjacent to Burapha phrom Temple Canal intersection</td>
<td>A pedestrian waterfront walkway linked from the lower landscape canal park pass the market to the existing park. The riverfront adjacent to the market will improve the physical look of the waterfront in the area.</td>
</tr>
<tr>
<td>Dindaeng port and dense commercial area</td>
<td>- Pier - Strategic location for water connection</td>
<td>A multi-used pier with shops and restaurants. Some public waterfront provided for support recreational use. - Communal space with market and restaurants</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Pier - High-density residential and commercial neighborhood</td>
<td>Religious activity and festival space with shops and restaurants, pier</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Pier - Adjacent to Thong Thammachat Temple Main street</td>
<td>Communal space with market and restaurants</td>
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<tr>
<td>Existing church riverfront use</td>
<td>- Pier - Adjacent to Holy Rosary Church Canal intersection</td>
<td>A river walkway that connects with the lower landscape from the canal. The space will serve the church mainly at the riverfront, pier</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Pier - Adjacent to Klong San night market Main street</td>
<td>Riverfront walkway that connects port, river market, and new bazaar. Sport field, communal riverfront space</td>
</tr>
<tr>
<td>Old preserved historic warehouses</td>
<td>- Pier - Connection with schools and church National historic preservation warehouses</td>
<td>An art district with renovation art galleries from historic warehouses, and outdoor sculpture landscape along the waterfront, pier</td>
</tr>
<tr>
<td>Warehouses and unused spaces</td>
<td>- Pier - Taksin Bridge - Opposite to the skytrain</td>
<td>Main communal park for the area, event space, piers, high-density residential and commercial area</td>
</tr>
<tr>
<td>Industrial port</td>
<td>- Pier - Adjacent to Yamawa Temple</td>
<td>Museums and cultural uses on adaptive warehouses and ports</td>
</tr>
<tr>
<td>Warehouses and informal settlements</td>
<td>- Pier - Connection with Sawetachat Temple</td>
<td>Religious activity and festival space with shops and restaurants</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Pier - Connection with Warachanyaway Temple</td>
<td>Religious activity space with market and commercial programs</td>
</tr>
<tr>
<td>Unused riverfront space</td>
<td>- Large piece of unused land on the riverfront - Connection with Bang Nai Temple</td>
<td>Major communal parks for the area with high density commercial uses along the main street</td>
</tr>
<tr>
<td>Existing Uses</td>
<td>Strategic Points</td>
<td>Opportunities</td>
</tr>
<tr>
<td>---------------</td>
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<td>---------------</td>
</tr>
<tr>
<td>Informal Settlements and industrial port area</td>
<td>- Bangkok Bridge</td>
<td>Bridge park for communal and cultural activities, transit hub for BRT to water transportation.</td>
</tr>
<tr>
<td>Informal Settlements and industrial warehouses</td>
<td>- Adjacent Don Khlong Temple</td>
<td>Major cultural district and development magnet, Bangkok amphitheatre, museums, activity and festival area, piers</td>
</tr>
<tr>
<td>Informal Settlements and governmental institution waterfront</td>
<td>- Important street edge</td>
<td>Governmental waterfront that open for public uses, riverfront walkway</td>
</tr>
<tr>
<td>Informal Settlements and unused spaces</td>
<td>- Adjacent to Chan Nok Temple</td>
<td>Religious activity space with market and commercial programs.</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Pier</td>
<td>Religious activity space, cultural event, bazaar, pier, sport field, high-density commercial and residential area</td>
</tr>
<tr>
<td>Existing Rama IX Bridge Park</td>
<td>- Bridge</td>
<td>Public park, playground, sport field, bazaar</td>
</tr>
<tr>
<td>Existing unused green spaces and informal settlements</td>
<td>- Canal intersection</td>
<td>Religious activity space for festival and cultural use, communal park with ecological walkway</td>
</tr>
<tr>
<td>Unused land and informal settlements</td>
<td>- Bridge</td>
<td>Public park with high density public programs along the edge, religious and cultural space on the east part</td>
</tr>
<tr>
<td>Unused land</td>
<td>- Adjacent to Khamin Temple</td>
<td>Religious activities area, communal park, sport field, amenities for village</td>
</tr>
<tr>
<td>Unused land</td>
<td>- Adjacent to Khlong Pum Temple</td>
<td>Religious activities area and high-density commercial uses such as shops and markets</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Adjacent to two temples: Bang Kachao Nok Temple and Bang Kachao Klang Temple</td>
<td>Religious activities area and gate way park to Bangkachao peninsula. Amenities for community.</td>
</tr>
<tr>
<td>Industrial ports and warehouses</td>
<td>- Intersection of main roads</td>
<td>Intermodal transit from BRT, and new subway, to ferry terminal. This space provides high-density commercial uses and public space</td>
</tr>
<tr>
<td>Industrial ports, warehouses, fuel storage tanks, and informal settlements</td>
<td>- Large sites that awaited for redevelopment</td>
<td>Intermodal transit from BRT and new subway, to ferry terminal, public parks, sport facilities, main cultural district, museums, major riverfront space, flood detention lower park, major iconic riverfront space, high-density mixed use space, religious activity area, riverfront walkway</td>
</tr>
<tr>
<td>green space</td>
<td>- Major pier that connects Bangkachao with Klong Toey</td>
<td>Cultural and religious space, temple, gateway of Bangkachao, ecotourism and ecology walkways.</td>
</tr>
<tr>
<td>Villages and rural areas with green space</td>
<td>- Major pier that connects Bangkachao with Klong Toey</td>
<td>Cultural space, gateway of Bangkachao, ecotourism and ecology walkways, communal park with amenity support</td>
</tr>
<tr>
<td>Industrial ports, warehouses, fuel tanks, and informal settlements, Bangkok Port Authorities' lands</td>
<td>- Large sites that awaited for redevelopment</td>
<td>Port authorities has already released the landuse map for the redevelopment of this area, it will include mainly the high-density commercial and residential use, and governmental institution with green space along the riverfront and the edge.</td>
</tr>
<tr>
<td>Villages and rural areas with green space</td>
<td>- Existing pier</td>
<td>Ecotourism and ecology walkways, communal park with amenity support</td>
</tr>
<tr>
<td>Green space with agriculture lands</td>
<td>- Green space</td>
<td>Communal park with flood detention plan</td>
</tr>
<tr>
<td>Warehouses</td>
<td>- Major pier that connects Bangkachao with the east side of Bangkok</td>
<td>Cultural and religious space, gateway to Bangkachao greenway.</td>
</tr>
<tr>
<td>Existing pond and Bang Nam Pueng area</td>
<td>- Large pond with green area</td>
<td>Public park, swimming pool, flood detention pond, sport facilities, resorts, restaurants, fishing pond</td>
</tr>
</tbody>
</table>
Figure 5.20: Klong Toey Port site.\textsuperscript{147}

\textsuperscript{147} Source: Author. Base map from Google Earth.
Site 1: Klong Toey Port Site

The area where the Klong Toey Port is located presents a unique redevelopment opportunity as deep-sea port activities are increasingly transferred to new and better-equipped ports on the Eastern Seaboard. Reduced port activity is likely to result in prime waterfront land being freed for redevelopment. In order to keep jobs in the area, new development should be introduced into the Port area. The Port Authority’s new zoning plan marks the high-density commercial and residential zone along the waterfront. The creation of green open area is limited only on the boundary of the site and riverfront. The boundary of the Port Authority area (site 45) is represented by the black dashed line.

Site 45 is dedicated entirely to new high-density development and high-rise buildings, hence the proposed green space in site 42 will address environmental issues and create open recreational spaces. This project proposes the construction of a canal to replace the old service rail tracks along Chua Ploeng road. This canal will be connected to the east-west canal that run through the inner city, and is designed to facilitate water flow from the north down to the river more effectively.

Figure 5.21: The open recreational space at Klong Toey Port site.\textsuperscript{148}

\textsuperscript{148} Source: Author. Base map from Google Earth and BMA Planning Department.
The ‘lower landscape’ of this new canal will provide a main pedestrian walkway that will connect Rama IV road to the riverfront. Moreover, on the lower left corner of the site there is an existing dead-end service water channel. This project extends this channel to connect with the new canal discussed above, thus isolating half of the riverfront as an island. This island park is on the same level with lower landscape level. It is a large flood allowance plain, consisting of wetland, public park, and water treatment landscape.

The redevelopment plan on the east of the canal can be explained in two parts: the linear entrance along the canal and the new waterfront. In the first part, the design carefully integrates the new development into the existing setting. This renovation project includes a new flood detention plain under the highway, a museum in old train station building, and an art gallery in existing warehouse. Existing Informal settlements in the site will not be totally removed or replaced with new low-income housing like other developments, but new shop houses constructed along the main walkway will provide jobs for the community. In the same area, a park and a sport field will replace the old warehouses, thus contributing to the gradual improvement of the community. At the intersection of the highway and new canal, there is an intermodal transit node of the subway and pier. These stations, including the activity space and shops, are designed on the lower level as a sunken park (see section in figure 5.24).

The new development on the waterfront comprises of a new cultural district, a national stadium, and a Thai cultural zone, mixed with low-rise, high-density shops and commercial areas along the main street. These components are explained in detail in the following plans and sections. (see figure 5.23-5.27)

Figure 5.22: The barrier Klong Toey Port and the green Bangkachao.\(^{149}\)
Figure 5.23 – 5.27 (Next page): Urban design project on Klong Toey port site.\(^{150}\)

\(^{149}\) Source: Author. Base map from Google Earth and BMA Planning Department.

\(^{150}\) Source: Author.
Lower landscape approaching to riverfront and the sunken court as main entrance from Rama IV road.

New section of 'Lower landscape'.

Park under highway is proposed to be flood detention plain in the lower level (same level with the lower landscape) and is connected with main walkway by three new entrances.

The Mae Nam train station is converted into train museum and open up its park space for public uses.

Intermodal transit node and the relationship between canal, subway, port, shops, and lower landscape. The sunken court is the main activity level which is surrounded by mixed-use facilities and transportation hubs.

Floating market is adjacent to the new pier.
Intermodal Transit Node
Highway Park
Sunken court as main entrance
Water Treatment Facility (converted from old warehouses)
Pier
Subway station
Museum (converted from existing train station)
Existing informal settlements
New Park
Sport field
Tourist Info and police station
Existing commercial and residential district
Existing Green Space
Residential bldg
Market
New green zoning from Port redevelopment plan
Flood allowance park and wetland

New religious and cultural activity space for Chong Lom Temple

New pier

Living machine floating garden, water treatment concept along the canal and flood plain

Flood allowance park and wetland water treatment island is the former warehouse and fuel tank storage site

Bangkachao is preserved as the green area and opened up by the new ferry network.

High-density mixed-use area including cultural programs are on one side of the canal, balancing by the green island across the canal.

Art galleries and shops, converted from the existing warehouse

Shops

Public park (existing)

Waterfront deck

New Chedi (Temple)

New pier

Art galleries and shops, converted from the existing warehouse

New pier

New Chedi (Temple)
Thai cultural zone: two temples, religious activity area, Thai cultural concert hall, with religious and communal waterfront spaces and pier.

Main Bangkok cultural districts with mixed-use commercial area.
Site 2: Historical Core Site

As part of its plan to preserve the city’s historical heritage, the BMA has divided the Ratanakosin Island into zones of conservation areas. The redevelopment plans in these areas have to be carefully integrated with the surroundings and the historic buildings. The design process starts by activating the waterfront access by the canal’s ‘lower landscape’ concept. This canal redevelopment will provide the continuous pedestrian walkway, thus creating at both ends of the canal as new riverfront parks. The north park (site 12) is the location of a new museum park where the old building is converted into an art gallery, linking the art space with the adjacent National Museum. The existing flower market is located at the south end of the canal. A riverfront walkway along the market is designed to connect the lower landscape with the bridge park. This walkway will also help protect the river from the market’s direct waste disposal and change a public exposure of the market along the riverfront.

Furthermore, the Royal Navy Sport Club’s sport fields should be open to the public, while parking lots in the same area should be converted into a waterfront park with walkways along the river. The existing buildings on the south of the block should be renovated into shops, restaurants, and recreational area. Also, the spaces between temples and piers should be converted into communal area for cultural uses. Other components of the site are explained in following diagrams and detail plans.

Figure 5.28 (Left page): Historical Heritage Map.151
Figure 5.29 (Next page): Redevelopment of open recreational spaces in historical core.152
Figure 5.30 (Next page): Diagrams of the new open recreational spaces.153
Figure 5.31 (Next page): Bangkok riverfront skyline.154

151 Source: Author. Base map from Google Earth and BMA Planning Department.
152 Source: Author. Base map from Google Earth and BMA Planning Department.
153 Source: Author. Base map from Google Earth and BMA Planning Department.
154 Source: Take me to Asia, http://online.takemetoasia.com/ImageData/Citys/bangkok3.jpg
Santichaiprakarn park with old fort (existing park)

Temple cultural park: connects with canal walkway and existing pier

Museum riverfront park: converts from existing building to gallery and riverfront park

Train station park: intermodal transit node with train station and pier

Exist pier waterfront: converts road and parking into pedestrian walkway and plaza for market activities.

Temple cultural park: connects the temple and existing pier together

Main Grand Palace riverfront park with communal park (converted from parking lots), sport field (converted from the Royal Navy Sport Club), and supporting commercial area (converted from existing building in the block)

Royal Navi Association park: opens up for public uses and creates the connection with temple’s riverfront walkway

Temple riverfront space: links three temples together with continuous waterfront walkway, highlighting at the fort park at the canal intersection

Market riverfront walkway: connects the lower landscape from canal to bridge park.
Conclusion and Suggestion

River and canals are invaluable natural assets that have often been neglected, since the time of industrialization and motorization. Bangkok is one of the modern cities that has focused its developments on the establishment and consolidation of man-made infrastructure, leaving the waterfronts as large areas of underused land, industrial ports, warehouses, and informal settlements.

As communities are increasingly aware of environmental issues and quality of life in the city, it is time to rehabilitate the river and connect it back to Bangkok. Reincorporating rivers back into urban life is not an issue unique to Bangkok. While many port cities, such as Bilbao and New York City, have successfully re-integrated their rivers and waterfronts back into the everyday life of the community, considerable effort is still required if the Chao Phraya River in Bangkok is to play a much more important role in Thai society than just being a secondary means of transportation. With critical environmental degradation of the air and water quality, together with the lack of sufficient green open spaces, Bangkok is now in dire need of a major redevelopment, specifically on its river and riverfront. This thesis has proposed the creation of an open space network along the Chao Phraya River by opening up the potential areas and connecting them with new system of water transportation. This network will offer green spaces, initiate the uses of riverfront, create the communal and cultural activities with temple and palace, and alleviate the flooding and water contamination problems.

However, no plan is truly a plan if it cannot be carried out. The proposal to redesign the waterfront, offer the network of open spaces, or even adapt the water transportation alone is difficult to start if it needs to meet complicated requirements and policies of each councils and authorities, such as the National Town Planning Board, Minister of the Interior, Royal Government of Thailand, BMA, and Marine Department.

A crucial step in implementing the development plan is to create a dedicated authority. The suggestion is to create a Bangkok Metropolitan Regional Development Authority with the powers to carry out large-scale development and redevelopment schemes over the whole region. This organization will take control over both sides of the Chao Phraya River including Bangkachao peninsula. Most importantly, a revolving capital fund should be set up to enable the designated authority to initiate development schemes.

This thesis involves a comprehensive range of proposals at different scales. At the regional scale, it offers the readjustment of the water transportation system by creating a completed network of ferry terminals, which reinforce with the extended express boat routes. The water network will not only connect the streets on both riversides, but also link the open recreational network that consists of the activity space and high-density multi-use transit node. Moreover, this new water network will also be connected to the existing inland public transportation, highlighting the major transit nodes as communal destinations.
At the urban scale, a series of open recreational spaces is created through the redevelopment of unused or underused areas along the river. These urban scale developments vary from site to site by their characteristics and surroundings. In site scale, the thesis redesigns the canal section which offers not only the continuous pedestrian access to the river but also the flood detention and water cleansing system. This canal section, in turn, reflects back to the regional level, where it creates the pedestrian walkway network following the existing canals from the inner city to the riverfront. Two high priority zones, the Klong Toey Port site and historic core site, have been studied for the possibility of detailed implementation. Many urban design issues have been incorporated at the small scale, such as the management of infrastructure landscape in the city, the redevelopment strategy for informal settlements, the section of intermodal transit nodes between subway stations and ferry piers, and the balance between the cultural spaces and historic buildings.

Indeed, with each of these various scale of proposals, many details need to be thoroughly resolved, and attentive consideration will refine the projects. Each of the 49 open recreational spaces can be undertaken as a single project and be implemented separately. Although this thesis suggests to begin with the canal revision in order to improve public’s access to the river, any redevelopment, even of the smallest projects, can be a starting point leading to the activation – or the re-activation – of the whole riverfront.
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