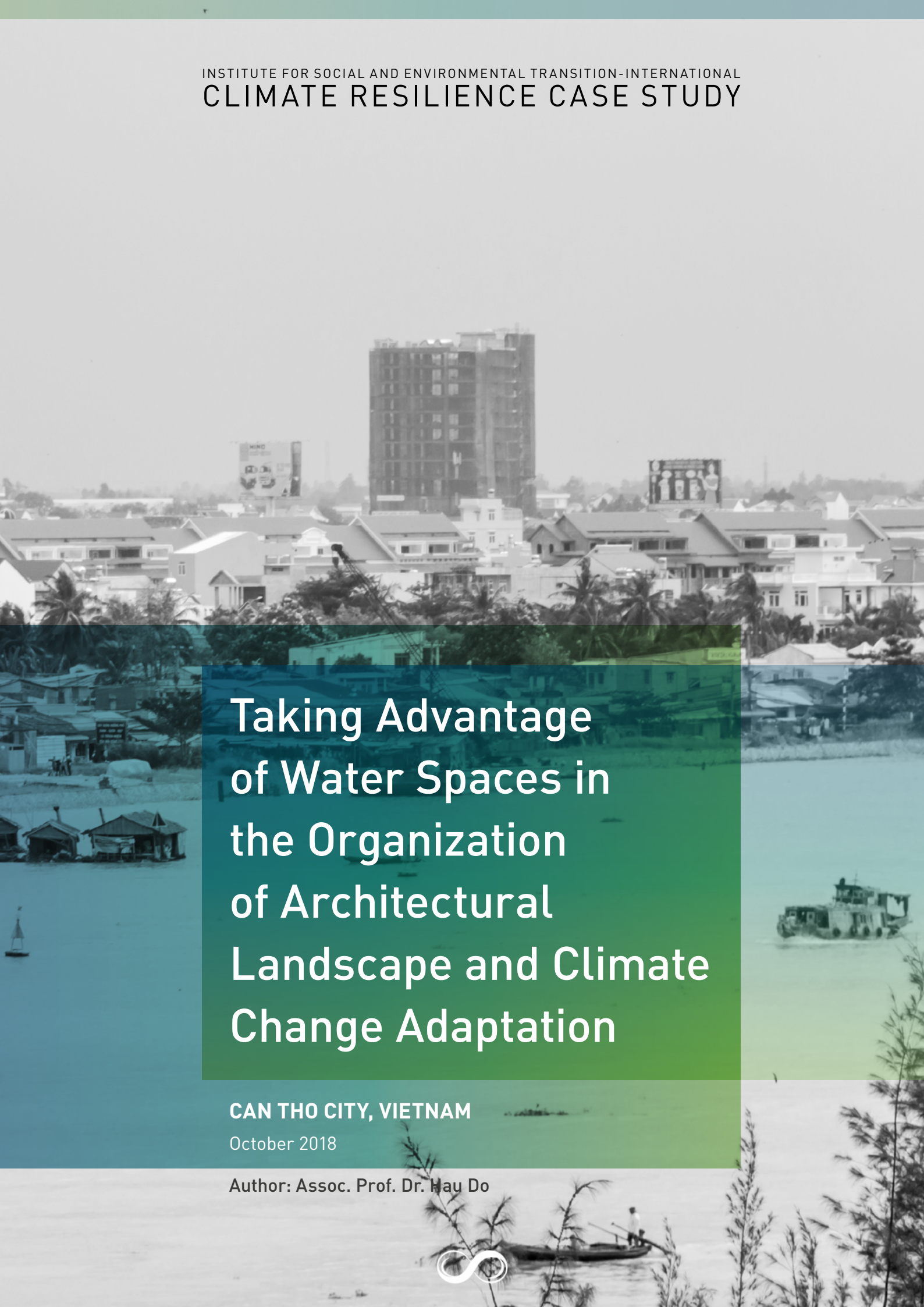


INSTITUTE FOR SOCIAL AND ENVIRONMENTAL TRANSITION-INTERNATIONAL
CLIMATE RESILIENCE CASE STUDY



Taking Advantage of Water Spaces in the Organization of Architectural Landscape and Climate Change Adaptation

CAN THO CITY, VIETNAM

October 2018

Author: Assoc. Prof. Dr. Hau Do



VIETNAM

Thailand

Can Tho

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This is part of a series of case studies developed for the professional training for architects and urban planners in Vietnam to enable them to integrate climate change adaptation into their professional work. The training was developed and delivered by a team by ISET and Viet Nam Urban Development Planning Association, with funding by the Rockefeller Foundation under the Vietnam National Engagement and Extension of Resilience Practice Project.

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BACKGROUND

Vietnam is one of the countries most vulnerable to climate change and sea level rise. Of the 84 developing coastal countries assessed under a sea level rise study by the World Bank (Dasgupta et. al. 2009), Vietnam is among those expected to experience the most severe impacts of global warming induced sea level rise on its population, GDP, urban expansion, and wetlands. The report pointed out the risk of severe disasters in many areas in Vietnam, among which the Cuu Long (Mekong) River delta, the country's rice basket, is one of the worst affected.

Can Tho City has a strategic position in the Cuu Long River delta. It is the driver for development in other provinces in the river delta. Many national agencies are based in the city, in all areas from economics, military, culture, communication to education and training. Can Tho City lies in an area with a network of crisscrossed rivers and channels, in between green stretches of fruit orchards, making up a natural-ecological-social urban landscape typical to the entire region. This natural landscape provides

the overarching guide to the planning and design of the city, and a great advantage if effectively explored and employed. It is potentially the most powerful driver for the development of the city's economy, society, culture, transport system, and especially its urban landscape.

Along with the development process in Vietnam, Can Tho has been rapidly urbanized during the past few years, promoting the needs for social, economic and cultural development, and very importantly for the reorganization of the urban architectural and spatial landscape. These needs have become more and more critical in the city's efforts to keep pace with its development potentials. New urban areas are planned and constructed in the context of recent adjustments of the city's master plan, and gradually transforming Can Tho's urban architectural and spatial landscape. The adjustments to Can Tho city's urban master plan until 2030, with vision to 2050 was approved by the Prime Minister on August 28, 2013.

Part 1

INTRODUCTION

1. DEVELOPMENT HISTORY AND CURRENT CONDITION OF CAN THO CITY

1.1. History of the establishment and development of Can Tho city

According to history documentation, in 1739, the land of Can Tho was first developed and named Tran Giang. On February 23, 1876, after acquiring the entire six provinces in the south, the French colony issued a decree to form a new county named Can Tho from Phong Phu district (of Tran Giang) and part of An Xuyen and Tan Thanh districts of An Giang province.

However, this area has a long established history prior to that. According to geological research data, the Cuu Long River delta used to be a shallow seabed, with islands of Ha Tien and Bay Nui. When the sea gradually retreated, stretches of land started to emerge along the Tien and Hau rivers, and a flora was quick to develop on this terrain.

About 2000 years ago, in the Cuu Long River delta, under the impacts of south-westerly monsoons and the southeast ocean current, vast land areas started to emerge, forming the triangle-shaped delta by the Tien River, with branches flowing through My Tho and Ben Tre, and the Hau river, which flows through the area of Can Tho into the ocean through estuaries in Soc Trang. The delta landscape was formed and gradually transformed.

From the eighth to the sixteenth century, the Cuu Long River delta was quite pristine, although some areas

had been reclaimed by several migrant groups. In the seventeenth century, Mac Cuu, a man from Zhoulei, Guangdong, China, and a rebel against the Qing Dynasty, took his entourage to Ha Tien to follow the Nguyen Dynasty. He recruited drifters to support the reclamation of wastelands in this area. In the year of Mau Ty (1708) Lord Nguyen Phuc Chu assigned him as the Commander of Ha Tien town, with a base at Phuong Thanh. From then on, more and more people started to settle in this area.

In 1732, the Nguyen Lord divided the southern region into three sub-regions and one town: Tran Bien Sub-region (Bien Hoa region), Phien Tran Sub-region (Gia Dinh region), Long Ho Sub-region (Vinh Long region), and Ha Tien Town. When Mac Cuu died, following his father's career, Mac Thien Tu continued to push the frontier development.

In 1739, he finished the reclamation and established four more areas, including Long Xuyen (Ca Mau), Kien Giang (Rach Gia), Tran Giang (Can Tho), and Tran Di (north Bac Lieu), and annexed them to Ha Tien town. Seeing the advantage of the location, Martial Prince Nguyen Phuc Khoat allowed Mac Thien Tu to construct Tran Giang into a strong capital town in the Hau Giang area. "Gia Dinh thanh thong chi" Book stated that: "The capital town of Tran Giang lies by the west side of Hau River, from upstream at east of Nam Vang town flowing down to Chau Doc, Can Dang, to the south at Cuong Oai and Lap Vo towns and Tran Giang, through Tran Di and finally

Ba Thac estuary...” (Can Tho History and Geography Book, page 25).

Tran Giang capital town was not only a military base for national defence, but also a rear area of Ha Tien – Rach Gia during wars, which was evidenced in history. During many battles here, the Nguyen Dynasty army had to rely on Tran Giang, such as the one on October 3 of Tan Mao (1771) against Siamese intruders. This shows that by the 1700s, Tran Giang had already become an important military base with stable development amidst a turbulent historical period.

In the year of Quy Hoi (1803), Gia Long King established Vinh Dinh District, under Dinh Vien precinct, Vinh Thanh Town. In the year of Nham Thin (1832), Minh Mang King separated Vinh Dinh District (former Can Tho) from Dinh Vien precinct of Vinh Long province and annexed it to Tan Thanh precinct of An Giang province. In the year of Ky Hoi (1839), Minh Mang King renamed Vinh Dinh District Phong Phu District and assigned Tan An village as the capital of the district.

From then on, Phong Phu District continued to develop, well-known as a prosperous and stable area, in contrast to other areas in the western region at the time. Regarding trade, the district had three very busy markets: Suu market near Can Tho river dock, Tan An market near Binh Thuy river dock, and Thai A market near O Mon river. On the map by A. Pouyanne (Voies d'eau de la Cochinchine), Can Tho was depicted as a 2.5 m elevated expanse of land, highly suited for residential settlement. In a book called “Can Tho then and now”, the author Huynh Minh cited an excerpt in a book from the Gia Long and Minh Mang period, describing Phong Phu district as follows: “Can Tho river is 3 km to the east of Phong Phu district, west of Hau River. It is 4 truong (6.8 m) wide, and 2.5 truong (4.3 m) deep. On the west bank of this river is the former capital of Tran Giang. It originates from south of Dai Giang, joins with the Bon river to Da Suu and Da Rang rivers, 13 dam (7.5 km) from Ba Lang T-junction. The northern branch runs east for 12 dam (7 km) to Binh Thuy River, and another branch runs from the north to the east for 45 dam (26 km) to Kien Giang port, called Be Gate.” Part of the

community here were soldiers and their families, and the other part migrants from the north. A folksong goes:

“Dragons gathered in Hue, horses in Dong Nai

Why does the green water keep running?

Does it feel for these drifters from lands far away...”

- Folk songs of Hau Giang – published in 1986 -

Most people of Tan An, Thoi Binh and Binh Thuy villages of the then Phong Phu District lived hidden near small channels such as Can Tho, Tham Tuong, Binh Thuy. Rivers here were very meandering, with plenty of slowly flowing branches, which were crucial to the development of agriculture and prosperity of people living by their banks. Here rivers provided the key transport routes, thus villages and markets were all closely connected to river and channel docks. T-junctions and intersections became key trading hubs, and most markets were close to them. Therefore, at the beginning of the 19th century, the author of “Gia Dinh thanh thong chi” mentioned trade centres in the region: “The western centre is capital of Tran Giang by the Can Tho river... Truong Tau Ba Thac centre downstream of Hau River is where Tay Duong come for trading. There are Vietnamese, Chinese, and Cambodian sharing the roads. Streets and markets go on and on” (Can Tho History and Geography, page 30).

With the above characteristics, researchers regarded Tran Giang (Can Tho) as a river-based cultural area with influence on the entire west region of the Hau River. At the end of the 19th century and beginning of 20th century, the French colony took over three eastern provinces and by June 1867, three western provinces—Vinh Long, An Giang and Ha Tien.

On January 01, 1868, Bonard, the Governor of the south region issued a decision to join Phong Phu District with Bay Sao District (Soc Trang) to form a new district with administrative centre in Sa Dec.



On April 30, 1872, the governor ordered to join Phong Phu with Bac Trang (Lac Hoa, Vinh Long) into a county, with administrative centre in Tra On, and a year later in Cai Rang (Can Tho).

On February 23, 1876, the Sai Gon authority issued a new decree to take Phong Phu district, part of An Xuyen and Tan Thanh district to establish Can Tho county with capital in Can Tho at Tan An village.

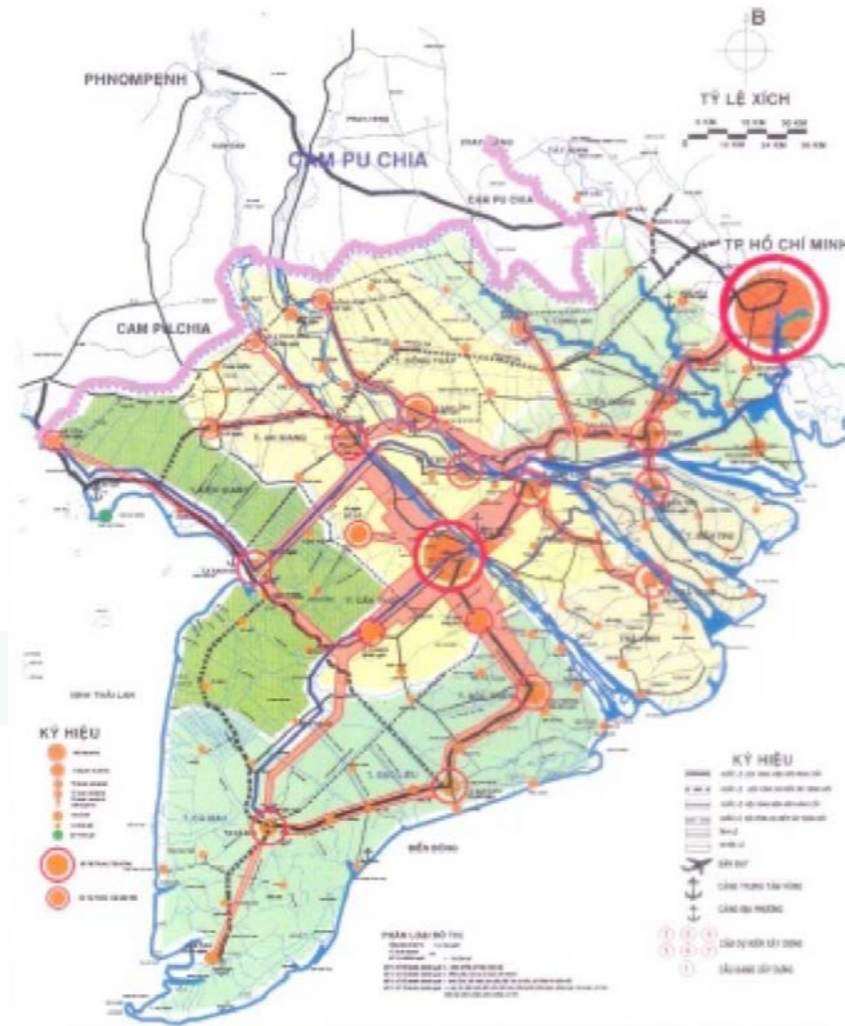
From 1876, when the French established the Can Tho county, to 1954, the boundary of Can Tho province basically remained unchanged, and included districts of Chau Thanh, O Mon, Phung Hiep, Tra On and Cau Ke. However, during the war against the French from 1948-1949, the government partly adjusted the boundaries of provinces. Can Tho took under its administration the

area of Thot Not (Long Xuyen), Long My, Go Quao, Giong Rieng, and Rach Gia town (Rach Gia). Can Tho also returned the two districts of Cau Ke and Tra On to Vinh Long and Tra Vinh. After the Geneva Agreement was signed, the administrative boundary and the name of Can Tho province under the former regime in the south of Vietnam were changed many times.

In 1956, the Ngo Dinh Diem renamed Can Tho province Phong Dinh province. In 1961, they took part of Long My, Vi Thanh to establish Chuong Thien province and rearranged districts and communes in the two provinces. During this period, the northern government still kept the name of Can Tho province.

In November 1954, Long My, Giong Rieng, Go Quao and Rach Gia town were annexed to Rach Gia province, Ke

FIGURE 2
OVERALL MAP OF URBAN DEVELOPMENT IN THE MEKONG DELTA



Sach district to Soc Trang province, and Thot Not district to Long Xuyen province. The province took back Long My district in 1957, Ke Sach district in 1958, and Thot Not district in 1963.

In 1966, Vi Thanh commune was established under Can Tho province. In 1969, Can Tho town was taken from Can Tho province to sit under the Southwest region. In 1971, Can Tho town was added back to Can Tho province.

In 1972, Can Tho town was upgraded to Can Tho City, under the Southwest region.

After reunification, the Government issued Decree no. 03/ND-76 dated March 24, 1976 to join Can Tho province, Soc Trang province and Can Tho city to establish a new province named Hau Giang, with the capital in Can Tho

City. In December 1991, session 10 of the eighth National Assembly meeting of the Socialist Republic of Vietnam issued a resolution to divide Hau Giang province into two provinces of Can Tho and Soc Trang. In November 2003, session 4 of the ninth National Assembly meeting issued Resolution no. 22/2003/QH dated November 2003 and Decree no. 05 by the Government dated January 02, 2004 to take Can Tho province to establish the centrally administered Can Tho City, and establish Hau Giang province.

The current Can Tho City includes 8 administrative units, in which there are four urban districts (Ninh Kieu, Binh Thuy, O Mon and Cai Rang), and four rural districts (Phong Dien, Co Do, Thot Not and Vinh Thanh), with 4 towns, 30 wards and 33 communes.

NATURAL CHARACTERISTICS

CLIMATE

- Annual average temperature: 26.7°C
- Annual average humidity: 82% (ranging from 76-86%)
- Primary wind direction from December to April (dry season): Northeast
- Primary wind direction from May to October (rainy season): Southwest
- Daily average hours of sun: 7.1 hours
- Yearly average hours of sun: 2,249.2 hours (2004)

HYDROLOGY

- Length of area adjacent to the Hau River: 15.4 km
- Waterway system: There are 158 rivers, channels and canals at various sizes flowing through the city, creating waterway network connected to branches of two major rivers – the Hau and the Can Tho rivers. Other large canals are Binh Thuy, Tra Noc, O Mon, Thot Not, and many other channels in rural districts. The section of the Hau River in Can Tho city is about 1,600 m wide, lying in the transitional area to the tidal zone. Can Tho river is about 280-350 m wide.
- The river and channel system is affected by semi-diurnal tidal regime.
- Flood season in the Cuu Long River system often occurs from July to November every year. Hau River flow rate can reach up to 35,000-40,000 m³/s during the flood season and is about 1,970 m³/s in the dry season.
- Flood depth of 5% floods is about 2.15 m; and of 1% floods 2.21 m.

1.2. Current conditions of Can Tho City

a. Geographical location

Can Tho City lies by the west bank of the Hau (Bassac) River. It is the geographical centre of the Mekong (Cuu Long) River delta.

The city's boundary is defined as follows:

- Bordering with An Giang and Dong Thap provinces to the north
- Bordering with Hau Giang province to the south
- Bordering with Vinh Long and Dong Thap provinces to the east via the Hau River
- Bordering with Kien Giang province to the west

Can Tho City has an area of 138,959.99 ha, and includes 8 districts: Ninh Kieu district – 2,922.04 ha; Binh Thuy district – 6,877.69 ha; Cai Rang district – 6,253.43 ha; O Mon district 12,557.26 ha; Phong Dien district – 11,948.24 ha; Co Do district – 40,256.41 ha; and Vinh Thanh district – 41,034.84 ha.

b. Current socio-economic conditions

- The average GDP growth rate of Can Tho city is 13.5%/year during the 2001-2005 period, and 15.1%/year during the 2006-2010 period. The industry sector often has a high growth rate, averaging at 17.3%/year during the 2001-2005 period and 18.1% during the 2006-2010 period. Meanwhile, during the 2006-2010 period, the growth rate of agriculture and aquaculture sectors dropped significantly compared to previous years, as opposed to increasing growth rate of the service sector.
- GDP growth rate in 2012 was 11.5%, in which agriculture, forestry and aquaculture: 4.57%; industry and construction: 9.2%; and service: 14.43%.
- Per capita income based on actual price increased from 384 USD in 2000 to 784 USD in 2005 and 1,950 USD in 2010. Per capital income in 2012 was 53.7 million VND, or 2,514 USD, which was 174 USD higher than in 2011 (2,340 USD).
- Economic structure: In the GDP structure, the proportion of agriculture, forestry and aquaculture is

TABLE 1

POPULATION DISTRIBUTION IN CAN THO CITY (2010)

No.	Item	2000	2005	2010	GROWTH RATE [%]	
					2001-2005	2006-2010
Total GDP, comparative price 1994		4,544.4	8,546.4	17,289.7	13.5	15.1
1	Sector 1	1,149.3	1,646.7	1,769.8	7.5	1.5
2	Sector 2	1,308.5	2,905.7	6,665.3	17.3	18.1
3	Sector 3	2,085.7	3,994.0	8,854.6	13.9	17.3

Source: Synthesis report of adjusted master plan for socio-economic development of Can Tho City until 2020 and with vision to 2030 © Statistics Office

TABLE 2

POPULATION DISTRIBUTION IN CAN THO CITY (2010)

NO.	DISTRICT	NO. OF WARDS / COMMUNES	AREA (HA)	POPULATION (PEOPLE)	POPULATION DENSITY (PEOPLE/KM ²)
Urban districts			41,849.98	739,478	1,767
01	Ninh Kieu	13 wards	2,926.46	246,743	8,431
02	O Mon	7 wards	13,221.56	131,465	994
03	Binh Thuy	8 wards	7,068.23	113,289	1,603
04	Cai Rang	7 wards	6,832.54	87,423	1,280
05	Thot Not	9 wards	11,801.19	160,558	1,361

10.66%, industry and construction 39.22%, and service 50.13%. The proportion of sector I decreased by 0.91%, of sector II decreased by 2.59%, and of sector III increased by 3.51%.

- Total production value (comparative price 1994) of the agriculture and aquaculture sector increased by 6.02%, industry and construction sector by 10.16%, and service sector by 15.22%.
- Export turnover of goods and services for foreign currency income is approximately at 1,291 million USD. Import turnover is approximately 285 million USD.
- State budget income and expenses in 2012:
Total state budget income (according to targets set in ordinance) was 5,800 billion VND, in which nationally earned income was 5,200 billion VND, and income from export and import was 600 billion VND.
Total local spending was 7,150 billion VND, 12.2% higher than assigned by the national level, and at 94.3% of the estimated amount by the municipal budget allocation, 21.5% higher than in 2011.
- Total investment in the city was 34,498 billion VND, 8.5% higher than in 2011.
- Percentage of households using qualified water: 89.8%
- Rate of solid waste collection: 85%.

c. Population and labour

• Population

- In 2010, the population of Can Tho was about 1.2 million people. Average population density was 852 people/km² (twice the average population density of the Cuu Long River delta region).
- The city's average population growth rate was 1.11%/year in the five years from 2000-2005, but reduced to 0.87%/year in the period from 2006-2010 (due to population and immigration policies).

• Current population distribution

The population of Can Tho City is distributed among five urban districts and four rural districts.

Urban districts: In general, the population distribution in the urban district is not even, the average population density of the urban districts is about 1,767 people/km². Ninh Kieu is the district with highest density at 8,431 people/km². Other districts have much lower density: O Mon at 994 people/km², Cai Rang at 1,280 people/km², Binh Thuy at 1,603 people/km², and Thot Not at 1,361 people/km².

2. THE ROLE OF RIVERS AND CHANNELS IN THE CULTURAL AND SOCIAL LIFE IN CAN THO

Can Tho was once called "Tay Do" (or western capital) as the city lies at the heart of the entire western area of the south region of Vietnam. The Cuu Long river delta and Can Tho in particular has a long tradition of living in a river-based environment. The typical images of Cai Rang floating market, Phong Dien floating market, riverine stilt-houses, and boathouses represent a life attached to rivers in the Cuu Long river delta. Most households have a little boat of some sort and are always ready to travel along rivers and channels. Not only a means for travel, boats are considered a second house of most people here.

The river system in Can Tho also facilitates traditional commercial activities, as it provides important route for transporting goods, food and aquatic products, making up a network of urban floating markets connected to Ho Chi Minh cities and provinces in the Cuu Long river delta. The Hau and Can Tho rivers play a key role in transporting industrial materials and products to factories such as those in the Tra Noc industrial zone, and Hung Phu and Binh Thuy industrial zones in the future. Restaurant

and refreshment businesses grow along the river system, including the Hau River, Can Tho River, Khai Luong canal, and Cai Khe canal, particularly those at Ninh Kieu Quay, Bai Cat and Cai Khe island areas.

Can Tho City is also a focal point for land transportation and waterway transportation for the entire region, with six road systems managed by the Ministry of Transport. All industrial zones and clusters in the city are closely attached to waterways. Hau River is the key waterway route with the busiest traffic, connected to Phnom Penh and the East Sea. The system of rivers, channels and canals has a special role in transport, good delivery and passenger travel, as well as in the organization of the city's spatial structure. It is the core element that forms the river-based urban structure of the city.

From the ecological perspective, the city has large number of rivers, channels and canals with very high density. The total length of this network is more than 1.5 km, with total water surface of over 1 km², or about 5.19% of the city area, according to preliminary survey.

The river system also has a role in shaping and developing functional zones in the city. The core urban centre of



Photo: Tho Nguyen © ISET-Vietnam, 2018

the city is Ninh Kieu district, where both the Hau River and Can Tho River run through, and where major infrastructures sit and almost all urban activities take place. Nowadays, water spaces in the Hau and Can Tho rivers are considered the front image of urban Can Tho. According to the orientation for development of Can Tho until 2020, the city will continue to develop along the Hau River according to the linear urban model, taking advantage of water spaces, at the same time organize infrastructures to face the water.

The most typical feature of water spaces to local lives in the Cuu Long river delta is that of floating markets. This is a very unique feature of the Cuu Long river delta and Can Tho City. Floating markets here are markets organized on a river. Through a crisscross system of rivers and channels, everyday from before dawn, hundreds of boats from Ca Mau, Soc Trang, Rach Gia, Vinh Long gather together, bringing vegetables and fruits to sell in the floating markets. At midday, the boats scatter out to head back to their home province and prepare for the next day's gathering. In Can Tho, the two most important floating markets are Cai Rang and Phong Dien.

Like other areas in the Cuu Long river delta, Can Tho is a young city, only developed a few hundreds years ago, on large land areas with low-density population, vast water surfaces and interweaving river systems. People gather along rivers and channels because it is more convenient for

their daily lives. They raised the land to build houses, with locally available and low cost materials such as mangrove and myrtle timber and nipa palm leaves, which also take less time and effort to work on. All family members, relatives, and neighbours can contribute to building and roofing houses.

Besides settlements on land, there are also houses built floating on river branches, or on stilts made of mangrove or myrtle posts. Nowadays, these posts are made of new construction materials of reinforced concrete. Floating houses are still built along rivers and channels, encroaching on the space of water, and river water is used for daily activities such as washing and cooking. It is people's belief that the best locations for houses are those with "deep running water", or where the water is not trapped and still, but flows clear, and rises and falls according to the tidal cycle. Houses at best should face a road at their front and have a river running at their back. Rivers facilitate boat traveling, so building a house next to a river creates a space for interacting with river activities, offers the benefit of fresh air, and the family can collect water directly from the river.

3. INFLUENCE OF RIVERS ON THE ECOLOGICAL ENVIRONMENT

Rivers have a huge role in improving the environment, especially urban environments. Water surfaces help to

reduce air pollution, by cleaning the air of pollutants and toxicants. Water surfaces are critical to the improvement of atmospheric clarity in a city, as well as light and ultraviolet radiation. According to documents of the Soviet Urban Construction Research Institute, atmospheric clarity will be 5-8% higher, and ultraviolet radiation 30% lower in areas with water surfaces and green spaces than areas without these elements. The micro-climatic effect of water surfaces has critical environmental implications because it affects the meteorological condition of the environment and human health.

Water surfaces also affect wind regimes, as they increase air freshness, reduce environmental temperature, increase relative humidity, and change the reflectivity of temperature regimes.

The most relevant characteristic of water related to microclimates is that its thermal capacity is twice that of soil, which means that it becomes hot and cold less than (dry) soil, which significantly affects air temperature. The ability of water to retain heat and cold for a longer time helps to relieve the fluctuation of air temperature, and thus improves the microclimate of areas close to water surfaces.

A key indicator of climate change related to water surfaces is the drop in air temperature in the summer by 2.4°C and increase in relative humidity by 5-12%. The impact of water surfaces on reducing radiation temperature in riverine cities is 12-14%, and lakeside cities 2-4.5%.

Blue and green spaces will facilitate vertical air circulation. The difference between heat regimes of areas with water surfaces and built up areas leads to effects related to air pressure. The thinner air in built up areas is pushed away by cool air from water surface, which increases air movement.

4. THE VALUE OF RIVERS IN ARCHITECTURAL AND LANDSCAPE ORGANIZATION IN CAN THO CITY

The urban image of cities in the southwest region is very distinct from that in northern and central cities. This distinction can be seen clearly in the quite homogenous urban image, with very little architectural differences in

southwestern cities. The typical urban space in these cities is always attached to water surfaces and rivers, thus is very open, exemplified by the Hai Gieng centre of My Tho, Ninh Kieu Quay of Can Tho, and Road 1-5 in front of the Co Chien river in Vinh Long. Urban rivers are possibly the most effective and well-developed urban form. However, a large number of rivers are being hidden away as cities turn their back towards the rivers. This popularizes the image of rivers with ramshackle fishing and trade villages, which has a rural and disorganized look, and lacks the inherent southern characteristic of order, openness and vigour.

For medium and small-sized southwestern cities, which are rich in ecological potential and landscape variety, detailed urban plans and designs are tools that need careful considerations when applying. Southwestern cities and Can Tho with their many rivers and channels facilitate the shaping of urban structure, architectural and landscape organization and construction from a river-centred perspective.

Can Tho is a city adjacent to and stretching along the sides of major rivers such as Hau River and Can Tho River, which direct to the city centre, and branches that thread their way inside the city. If these rivers and branches are redesigned and dredged in large scale, and if the waterway network is organized in a systematic way to support tourism and economic development, these will surely create a breakthrough and a unique feature for Can Tho City, while improving the urban scenery. However, the participation of rivers in Can Tho's urban spatial organization is very limited. The majority of houses and streets turn their back towards the rivers. There are several highlights such as Can Tho ancient market, Ninh Kieu hotel, Ninh Kieu Park and flower gardens, but these are not large in scale and not long enough in size to create a visual instruction, and do not facilitate the harmonization between urban architecture and nature.

A short river section from the T-junction between Hau River and Can Tho River to the Can Tho ancient market had been cleared to create a landscape of river-green park-urban street, improving the city scenery with distinctive local features.

Part 2

URBANIZATION, CLIMATE CHANGE AND RIVERS IN CAN THO

1. IDENTIFYING ISSUES IN THE CROSS-SECTORAL MULTI-STAKEHOLDER CONTEXT

According to the master planning process led by the Urban Planning Institute, most of planning work is assigned to an external consultant and there are strategic approaches to doing this. However, the lack of engagement with multiple stakeholders created challenges to implementation. At the same time, there lacks coordination between city departments and agencies and the district level in the planning process, and organization of dialogues for investors and businesses (to reach a shared vision).

The city needs to build a shared vision of what is essential to its development (creating green spaces in the long term, an integrated urban structure and multi-centred system, centres and strategic locations for development), so that all stakeholders, including investors, understand the city government's priority and vision in the development process. Especially, it is important to engage with the Ministry of Natural Resources and Environment (MONRE), Ministry of Agriculture and Rural Development (MARD), Ministry of Construction (MOC), as well as local communities in identifying issues and build visions that integrate the impacts of urbanization and climate change.

2. CLIMATE CHANGE PROJECTS IN CAN THO CITY

Can Tho is located in the Cuu Long river delta, an area considered highly exposed to the impacts of climate change. Similarly to Da Nang and Quy Nhon, Can Tho had established a Climate Change Coordination Office (CCCO) under the provincial People's Committee. The CCCO cooperated with many organizations and agencies both in Vietnam (Ministry of Science and Technology [MOST], MONRE, NISTPASS, Can Tho University) and international (World Bank, ISET, CSIRO, ADRA) to implement climate change projects in Can Tho City. However, the establishment of the CCCO in 2011 is quite recent, therefore most projects that it managed, implemented or participated in largely involved building capacity, strengthening institution, and sharing experience on reducing climate change risks, and flooding in urban and peri-urban areas of the city.

In 2012, MOST in collaboration with MOC conducted a research to explore the planning of a water city to respond to climate change. In this research, the authors studied the impacts of climate change on the city, and tested the integration of measures to mitigate and adapt to climate change into the urban master plan of Can Tho.



Photo: Thanh Ngo © ISET-Vietnam, 2017

3. INTRODUCTION TO THE WATER-CENTRED CITY APPROACH

Vietnamese cities were traditionally built around water. The urban-rural co-development process has always been based upon rice growing deltas, in elevated areas of the delta, or those adjacent to water surfaces to allow access to the water for daily activities, production and transport. Typical examples include Co Loa City in the Red river delta, Hoa Lu City by the Hoang Long river at the southern edge of the Red river delta; Hanoi City also in this delta, by the banks of the Red River; Pho Hien by the Red River; Hue City in the Huong river delta; and Sai Gon (Ho Chi Minh City) which was built 300 years ago by the Sai Gon River.

Nowadays, most Vietnamese cities are located around rivers:

- The fluvial deltas (including two triangle-shaped deltas in the north and the south) are areas with the largest number of urban centres, and also with highest

population in Vietnam (especially Hanoi, Ho Chi Minh City and Can Tho).

- In the central coastal area, cities take various forms, but all revolve around waterscapes—these are cities on fluvial deltas of small rivers, coastal sand dunes, tidal grounds, mountain-foot plains, and seafront areas.
- Cities that were not developed on deltas or coastal plains but on highlands areas are always located close to a water source, or by the bank of a major river which provides a transport route.

Urban planning in Vietnam in general and in Can Tho City in particular utilizes tools to support the integration of environment protection, such as strategic environmental assessment and research on how to adapt to and reduce the risks of natural disaster and flooding. However, these tools and approaches are not vigorous enough. Most urban plans only see the benefits of water surfaces in improving the landscape and providing temporary room for water, thus focus mostly on micro-climatic and landscape factors, and do not fully appreciate the critical role of water spaces.

Besides a comprehensive analysis of natural factors such as topography, climate, hydrology, soil, biology, human settlement and activities, it is also important to consider in-depth the most critical factors, such as the role of river networks in the formation of river-centred cities.

In the assessment of Can Tho urban plan in 2006, which provided the basis for revising the city's urban master plan until 2030, the OSA-WIT-LATITUDE and SIUP-VIUP research team presented the river-centred cities approach to Can Tho and suggested that the city adjust its urban master plan to enable constructing an integrated water-based system.

4. THE URBAN PLANNING PROCESS BASED ON RIVER-CENTRED APPROACH

The process of designing an urban plan according to a river-centred approach and for climate change adaptation is similar to that of urban master planning with focus on natural habitats and landscapes. On the perspective of respecting and taking advantage of the natural environment, it is important to develop visions and objectives, and select a spatial development strategy to ensure parallel economic development and environmental sustainability, which means focusing on creating harmonious natural-human landscapes, highlighting natural features in creating the city's identity, and building resilience to climate change.

Water-centred urban planning for climate change adaptation should be done under an integrated planning framework; approach urban design issues from a interdisciplinary, multi-dimensional, multi-phase and interactive manner; resolve flooding issues of each sector (urban, water supply, drainage) and each population group (the poor, genders, locations, sensitive groups); and create new urbanization patterns and novel urban forms for climate change adaptation, environment protection, natural resource preservation and life quality improvement.

In planning a water-centred city, the emphasis should be on natural factors such as topography, landforms, climate, hydrology, oceanology, and water surfaces. There should be considerations of the impacts of these natural factors on

people's life, land use, and community organization. The planning should also include flood mapping, and mapping of production zones, and elevation mapping for landscape classification.

With the participation of MOC, Can Tho Planning Institute, Vietnam Urban and Rural Planning Institute (under MOC), and international consultancies, the Adjustments to the urban master plan of Can Tho city until 2030 with vision to 2050 was approved by the Prime Minister on August 28, 2013.

Part 3

A COMPREHENSIVE PLAN FOR CAN THO CITY

Objective: Taking advantage of rivers in organizing the architecture and landscape and adapting to climate change in Can Tho city

1. ORIENTATIONS IN ORGANIZING THE ARCHITECTURE AND LANDSCAPE OF CAN THO CITY TO TAKE ADVANTAGE OF RIVERS

According to the Adjustments to the urban master plan of Can Tho City approved by the Prime Minister, the architecture and landscape organization of Can Tho is to be developed in a comprehensive, balanced and sustainable manner, in harmony with the natural landscape, and highlighting the identity of a river city and a typical ecological city of the Cuu Long river delta. The existing natural landscape helps to moderate the impacts of urbanization. With the purpose of directing development, landscape is considered a structural element of the urbanization process. The natural landscape at visible and strategically selected locations should be maintained and improved in size and environmental quality.

Throughout its history, Can Tho City (like other cities in the Cuu Long river delta), has primarily been a river city. Despite the modernization process and the newly planned and constructed infrastructure, Can Tho is still identified by its special relationship with the Hau River and its branches all the way to the sea, along with countless irrigation channels and river islands. Building Can Tho as a river city is acknowledging the primary principle of a city's waterscape. The deposition and erosion process of the Hau River and its branches created a terrain with three levels (low, medium and high). This is a typical example of

spatial organization in Can Tho City. From the 18th to the 20th century, the appearance of canals created important highlights to riverside landscapes. The current challenge is how to orientate the urbanization process to align development to this existing context.

As suggested under the urban master plan of Can Tho City, the city aims to become a regional hub by the southern side of the Hau River. This is an excellent opportunity for Can Tho to restructure its existing relationship with the rivers, to turn around towards the river. However, to increase the sustainability of this plan, it is important that suggested urban development areas do not crowd themselves into large-scale urban spaces by the river in a disorganized manner. Instead of becoming a city stretching alongside the Hau River, Can Tho should be developed into a chain of urban hubs, each with their own identity. Therefore, it is important to promote the creation of green and blue spaces, turning Can Tho into a high-quality urban area with compact urban spaces in between blue and green spaces (production or ecological areas) of proper sizes.

This requires a level of balance in organizing consecutive series of constructed and unconstructed areas, with upgrade of waterway routes and their surrounding landscape in rural and urban areas. These are guiding principles to identify which features must be preserved as valuable spatial structures and should not be urbanized. Therefore, urban districts should be compact, with clearly identified spaces, each making up a part of Can Tho City.

FIGURE 5
SPATIAL STRUCTURE OF CAN THO CITY'S URBAN LANDSCAPE

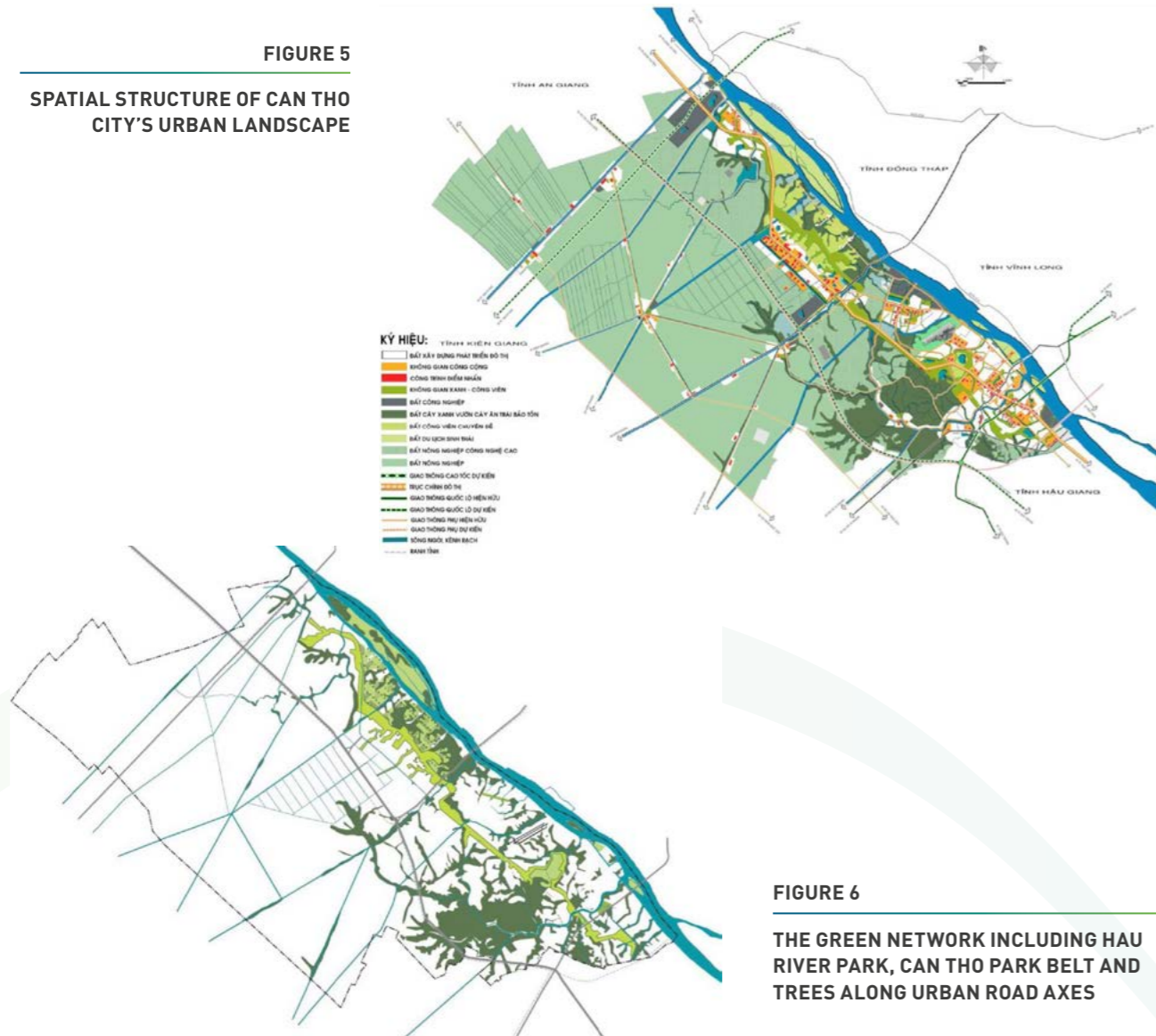


FIGURE 6
THE GREEN NETWORK INCLUDING HAU RIVER PARK, CAN THO PARK BELT AND TREES ALONG URBAN ROAD AXES

Landscape structure

The diversity of the city's landscape will be highlighted. The development is towards a city with plenty of green and blue spaces, compact high-quality urbanized spaces with inclusion of water surfaces and green trees at proper scales.

- Plant the proper types of trees, with proper arrangements—such as in the formats of belts, clusters or points—to fit with the urban area's functions.
- Set up axes of green trees along major roads in the planned road network, and green corridors surrounding the ecological areas by the Hau River and its islands to create open spaces for the city to receive cooling winds.

The approved (adjustments to) Can Tho City urban master plan emphasizes the landscape diversity of the city. The development is towards a city with plenty of green and blue spaces, compact high-quality urbanized spaces with inclusion of water surfaces and green trees at proper scales.

To address climate change issues (such as flooding), the proposal suggested adjusting the structure of the drainage system. The drainage network is designed to handle large volume of water during floods, at the same time provide surface water storage, drainage and irrigation. It can also manage the quality of water (wastewater and its use in proper conditions), and support using water for recreational and landscaping purposes. The network comprises of a channel system, which includes storm-water channels

FIGURE 7
INTEGRATED WATER SYSTEM

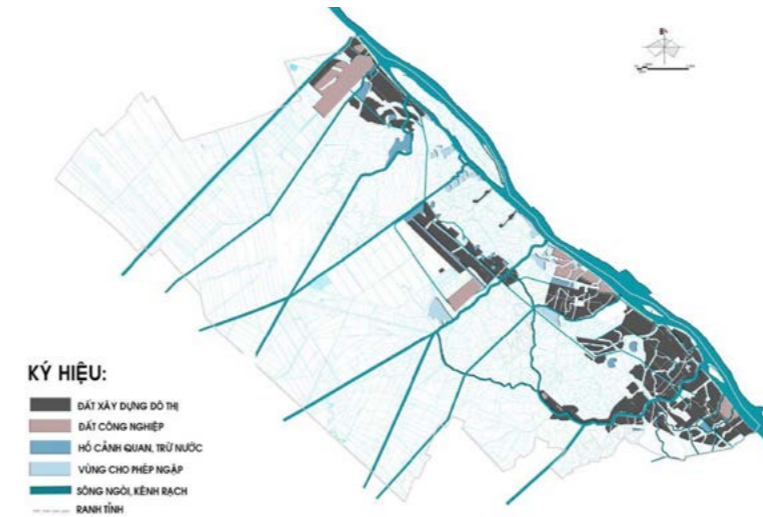


FIGURE 8
DEVELOPMENT ZONING MAP

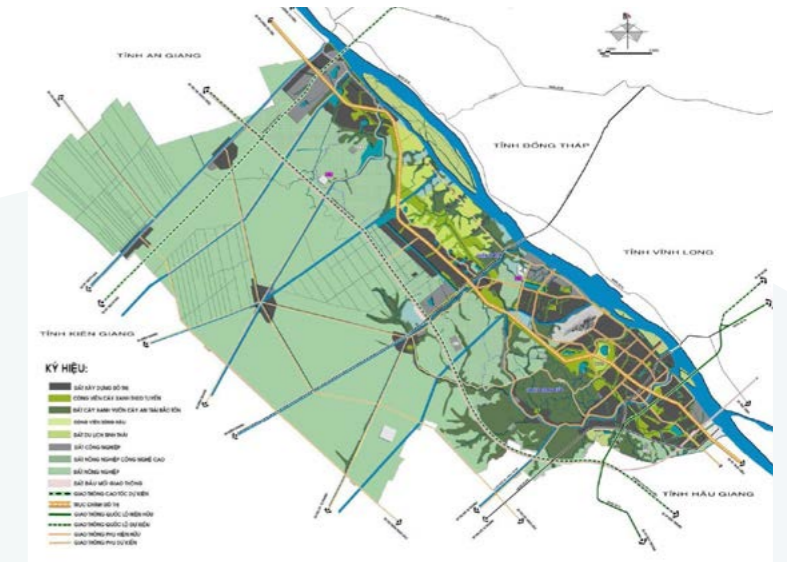
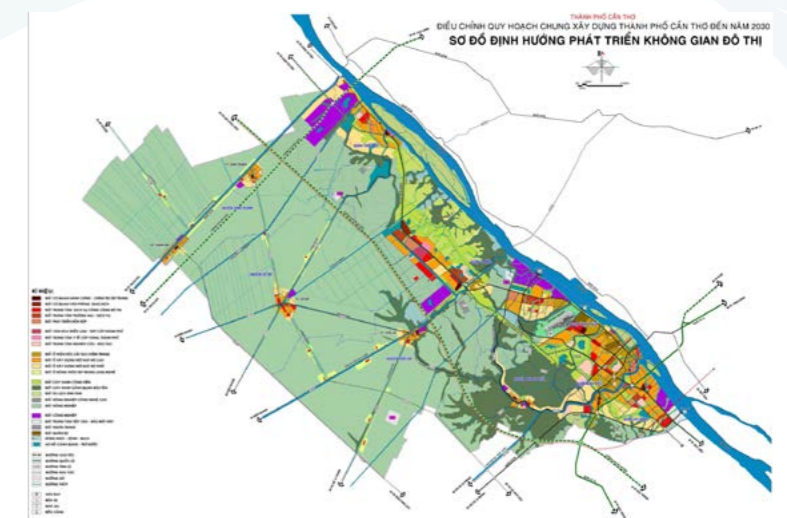


FIGURE 9
ORIENTATION FOR SPATIAL DEVELOPMENT OF CAN THO CITY



and strips of ecological low-lying lands (closely connected to the internal road system), the flexible zones, which include riverine spaces (with seasonally fluctuating water

levels), the multi-scale wastewater filtering system, and the chain of surface water retention bodies (lakes and ponds connected to canals, natural lakes and rivers).

Part 4

FROM PLANS TO IMPLEMENTATION



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3. PUBLIC RECEPTION OF THE URBAN MASTER PLAN

On December 09, 2013, the People's Council of Can Tho City organized its ninth session meeting. In the meeting, the electors expressed frustration with a range of issues, especially related to land use, construction, and urban management and planning. Many reported that in the city, many approved plans and projects had not been implemented, or had very slow progress, causing difficulties to daily lives and a lot of frustrations among the local people. Examples of these projects include Can Tho University of Medicine and Pharmacy Resettlement Area, the park along the two sides of Can Tho River (in Ninh Kieu district), Tay Do University, Thien Duong Cemetery, projects by the Can Tho Sugar Company and Idico 10 Company (in Cai Rang district).

In Binh Thuy district, there are projects by Xuan Lan Company, University Village project, Tra Noc Residential Area and Market, industrial and handicraft zone, and slaughterhouses. In O Mon district, there is the Trade Centre project in Chau Van Liem ward.

Electors from Thoi Lai and Vinh Thanh rural districts expressed frustration with the multiple-year pending project of the Truong Xuan Trade Center and Vinh Thanh Industrial Cluster projects. They demanded to know whether these projects would be implemented and when,

so they could be less reactive in planning for production activities and house construction.

Moreover, electors from Ninh Kieu district requested the city for information about the total area and scale of the project to build the city People's Committee's Guesthouse on Cai Khe Island, the contractor responsible for construction on this site, the type of infrastructure it is, and whether its construction is consistent to the city's urban development plan.

Electors from Cai Rang district requested the city to check on the construction progress of Can Tho river embankment, because this project had been ongoing for a very long time, affecting the lives of many people in this area...¹

Concerns of local people in Can Tho regarding the city's urban plan is a hot issue in the context that Can Tho has many 'pending' projects due to lack of funding for implementation, and disputes with compensation and land clearing. According to an official from Can Tho Department of Construction, the key issue is not about plan approval or sharing information with the public, but in that plan approval only provides a direction, not accompanied with allocation of funds for implementation.

¹ Dan Tri Online Newspaper: <http://dantri.com.vn/chinh-tri/can-tho-cu-tri-buc-xuc-vi-quy-hoach-du-an-treo-813363.htm> accessed at 10.00 am of 10/01/2014.

1. CONSIDERATION OF EXISTING ISSUES

The adjustments to the urban master plan of Can Tho City until 2030 reviewed construction projects and plans that had been or were being implemented. Specifically:

There are a total of 35 plans that were developed and had been or were being implemented. These plans cover a total area of 7,920.06 ha. Among them, there are 7 plans at the scale of 1:2000 with a total area of 2,337.84 ha, and 20 plans at the scale of 1:500 with a total area of 960.17 ha. Eight plans had their general direction finalized and design task approved, with total area of 4,622.5 ha.

According to the Department of Planning and Investment (DPI), among the 44 urban residential area development projects and 44 resettlement area projects, which have a total planned budget of 13,500 billion VND, there are so far 39 projects that had started land levelling, or 43% of all projects in the area, with about 3,850 billion VND disbursed. In addition, 37 projects for constructing socio-economic facilities, such as for service, trade and tourism activities, are in the phase of project establishment.

The maps show the detailed plans and projects that had finished construction. The earliest work was about developing the areas on the southern bank of Can Tho River in Cai Rang district.

FIGURE 10
UPDATED MAP OF PLANNING PROJECTS

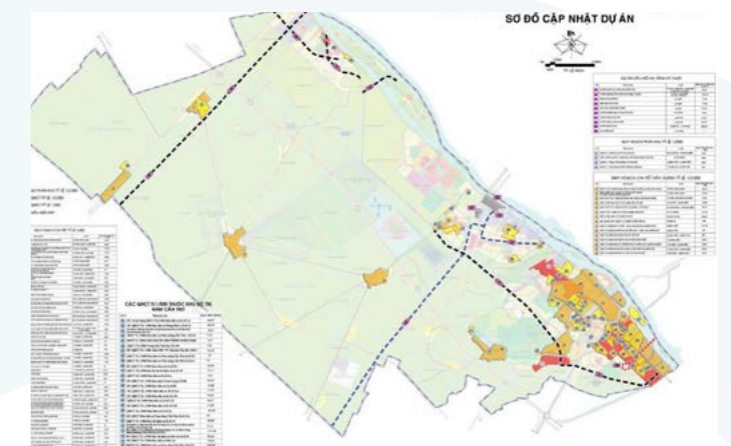


FIGURE 11
UPDATED MAP OF PROJECTS IN CONSTRUCTION PERIOD

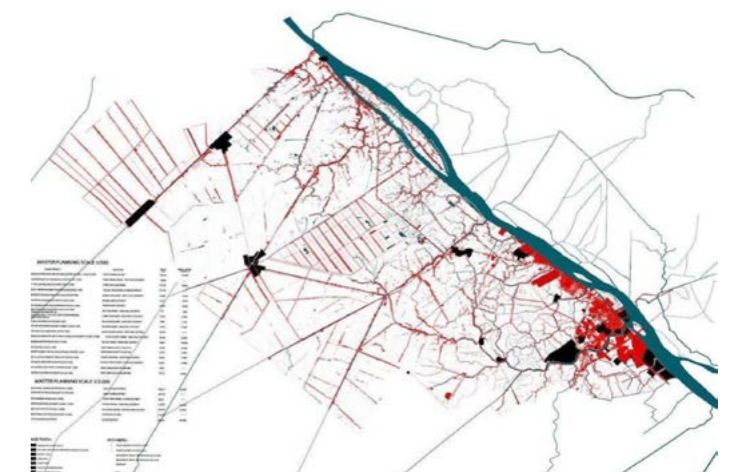


FIGURE 12
SPATIAL MAP OF AGRICULTURE AREAS

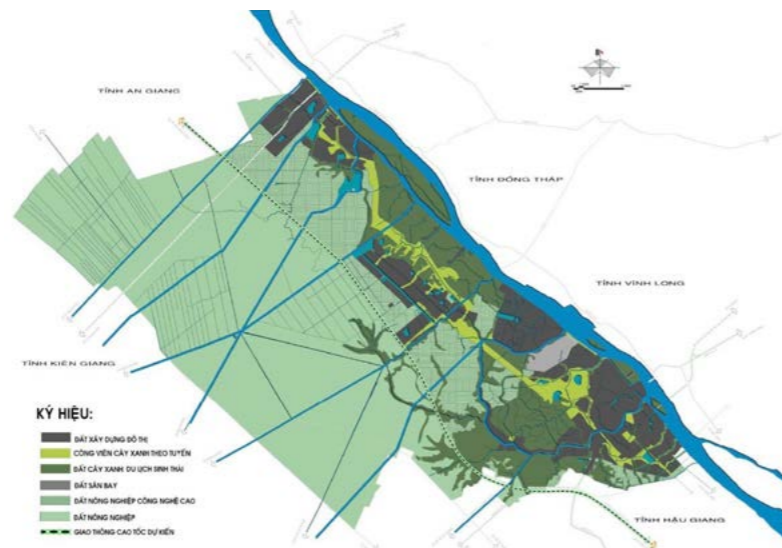


FIGURE 13
THE GREEN NETWORK OF HAU RIVER PARK – CAN THO RIVER PARK BELT

2. CREATING SPACE FOR AGRICULTURE, PARKS AND FLOODWAY AND PROTECTING THEM FROM ENCROACHMENT

Agriculture land, green zones and parks are areas of special attention in Can Tho City's development according to the water-centred city and green city principles.

The development orientation of rural areas in Can Tho is based on the new rural area programme model. There are two forms for rural residential areas: 1) rural residential areas concentrated at the centre of communes and closely linked to high-tech agriculture production areas, providing

clean agriculture produces to centre areas; and 2) smaller scale rural residential areas, closely linked to ecological tourism, tourism services, and preservation of traditional craft villages.

Total area of green tree preservation land (orchards) and theme parks in the city is about 25,395 ha. Agriculture areas along the Hau River that are at medium elevation (not high enough for urbanization) and have potentials in their river landscape will be a supplement to the green tree network, creating vastly open spaces in between urban hubs along the Hau river (Hung Phu, Ninh Kieu, Tra Noc, Thot Not...).

FIGURE 14
FRAMEWORK DESIGN OF URBAN AREAS AND CONTROL AREAS



3. ISSUES AFFECTING PROJECT DESIGN

To form an integrated water city in Can Tho according to the original objectives, the issue of urban designed should be a focus, specifically related to major spatial axes and the landscape of parks, trees and lakes.

Besides, controlling the landscape of theme parks, open spaces, green tree preservation areas (orchards), and maintaining biodiversity, channels, canals, lakes, and urban squares are areas of focus. Core areas and axes are controlled by regulations of construction density, land use ratio, and height.

However, the context of centrally managed economy means that planning in Vietnam in general and in Can Tho in particular is based on centrally determined criteria under the socio-economic development plans, regarding population of each district, and infrastructure target per person, such as schools, green space and land use.

Population targets are often not met, and infrastructure targets are merely numerical calculations made in planning documents and rarely realised in reality. These targets are not effectively compulsory, which complicates planning across levels. They would be more useful if provided as reference to support decision making only, as is the case in most cities in the world. In that way, urban planning will be less about numbers and figures and more about the reality of urban life, and the construction of infrastructures will be based upon continuous adjustments according to actual needs and each city's financial ability.

4. FINANCIAL ISSUES

Although taking advantage of rivers in landscape organization and responding to climate change in Can Tho City are considered priorities and key factors in the Adjustments to the urban master plan of Can Tho City until 2030 with vision to 2050, approved by the Prime

REFERENCE



Photo: Tho Nguyen © ISET-Vietnam, 2018

Minister, related financial implications were not considered clearly and in details. In the report of the urban master plan, the resources for implementation were mentioned very generally, with wording such as:

- Investment from national source;
- Financial support and investment of domestic and international organizations;
- Promoting to the maximum level the local resources, encouraging investments from multiple economic sectors, promoting socialized sources in the health, education, culture and sports sectors...
- Taking proper advantage of existing infrastructure system, promoting the use of public land and assets, local natural resources and other sources to generate funds for infrastructure development;
- Developing mechanisms and policies suitable to the city's characteristics, and creating attractive investment environment to incentivize economic sectors to participate in the construction and development of the city according to the urban plan.

In the Prime Minister's approval decision, the financial issue was only mentioned briefly as follows: "Assign the People's Committee of Can Tho City to develop mechanisms and policies to mobilize financial resources and land of Can Tho City."

Thus, the plan had identified priority projects, strategic projects, and especially projects with integration of river landscape and climate change adaptation, however specific financial issues were not adequately addressed.

Dan Tri Online Newspaper (2014). *Cần Thơ, cử tri bức xúc vì quy hoạch dự án treo*. <http://dantri.com.vn/chinh-tri/can-tho-cu-tri-buc-xuc-vi-quy-hoach-du-an-treo-813363.htm> accessed at 10.00 am of 10/01/2014.

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Government of Vietnam (2013). Decision no. 1515/QĐ-TTg on Adjustments to Can Tho city's urban master plan until 2030, with vision to 2050 was approved by the Prime Minister on August 28, 2013, approved by the Prime Minister on August 28, 2013.



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