

An aerial photograph of Can Tho city, Vietnam, showing a dense urban area along a wide river. The sky is filled with large, dramatic clouds, suggesting an overcast or stormy day. The river is in the foreground, with several boats visible. The city buildings are a mix of colors, and a prominent white high-rise is visible in the distance.

PEOPLE'S COMMITTEE OF CAN THO CITY
STEERING COMMITTEE 158

**CAN THO CLIMATE CHANGE ACTIVITIES STRATEGY
IN THE PERIOD 2015-2030**

For a stronger and more resilient city of Can Tho

*(Enclosed with Decision No:1334/QĐ-UBND dated May 8th, 2015 of the
People's Committee of Can Tho City)*

Can Tho City, 2015

Số: 1334/QĐ-UBND

Cần Thơ, ngày 08 tháng 5 năm 2015

QUYẾT ĐỊNH
Về việc phê duyệt Kế hoạch hành động
ứng phó biến đổi khí hậu thành phố Cần Thơ giai đoạn 2015-2030.

ỦY BAN NHÂN DÂN THÀNH PHỐ CẦN THƠ

Căn cứ Luật Tổ chức Hội đồng nhân dân và Ủy ban nhân dân ngày 26 tháng 11 năm 2003;

Căn cứ Quyết định số 158/2008/QĐ-TTg ngày 02 tháng 12 năm 2008 của Thủ tướng Chính phủ về việc phê duyệt chương trình mục tiêu quốc gia ứng phó biến đổi khí hậu;

Căn cứ Quyết định số 2139/QĐ-TTg ngày 05 tháng 12 năm 2011 của Thủ tướng Chính phủ phê duyệt chiến lược quốc gia về biến đổi khí hậu;

Căn cứ Công văn số 990/BTNMT-KTTVBĐKH ngày 24 tháng 3 năm 2014 của Bộ Tài nguyên và Môi trường về việc hướng dẫn cập nhật Kế hoạch hành động ứng phó với biến đổi khí hậu;

Xét đề nghị của Giám đốc Sở Tài nguyên và Môi trường tại Tờ trình số 949/TTr- STNMT ngày 24 tháng 4 năm 2015,

QUYẾT ĐỊNH:

Điều 1. Ban hành kèm theo Quyết định này Kế hoạch hành động ứng phó biến đổi khí hậu thành phố Cần Thơ giai đoạn 2015-2030.

Điều 2. Giao Giám đốc Sở Tài nguyên và Môi trường chủ trì, cùng Thủ trưởng sở, ban, ngành thành phố, Chủ tịch Ủy ban nhân quận, huyện tổ chức triển khai thực hiện Kế hoạch hành động ứng phó biến đổi khí hậu thành phố Cần Thơ giai đoạn 2015-2030; định kỳ tổng hợp, báo cáo Ủy ban nhân dân thành phố kết quả thực hiện theo quy định.

Điều 3. Quyết định này có hiệu lực kể từ ngày ký.

Điều 4. Chánh Văn phòng Ủy ban nhân dân thành phố, Giám đốc Sở Tài nguyên và Môi trường, Thủ trưởng các cơ quan, ban, ngành thành phố, Chủ tịch Ủy ban nhân dân các quận, huyện, chịu trách nhiệm thi hành Quyết định này. /.

Nơi nhận:

- Như Điều 4;
- Bộ TN&MT;
- TT. Thành ủy;
- TT.HĐND thành phố;
- UBND thành phố (1);
- VP.UBND thành phố (3B);
- Lưu: VT.VK

TM. UBND THÀNH PHỐ
KT. CHỦ TỊCH
PHÓ CHỦ TỊCH



Đào Anh Dũng

CAN THO CLIMATE CHANGE ACIVITIES STRATEGY IN THE PERIOD 2015-2030

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**PEOPLE'S COMMITTEE OF CAN THO CITY
STEERING COMMITTEE 158**



Can Tho City, 2015

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ABBREVIATIONS

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ADB	Asian Development Bank
CC	Climate change
CCAI	Climate Change and Adaptation Initiative
CCCO	Climate Change Coordination Office
CG	Central Government
CFM	Center for Meteorology
CRR	Cuu Long Rice Research Institute
CRW	Centre for Rural Water Supply and Environmental Sanitation
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CTU	Can Tho University
DoARD	Department of Agriculture and Rural Development
DoC	Department of Construction
DoCST	Department of Culture, Sports and Tourism
DoC	Department of Transportation
DoET	Department of Education & Training
DoIC	Department of information and communication
DoIT	Department of Industry and Trade
DoNRE	Department of Natural Resources and Environment
DPI	Department of Planning and Investment
DoST	Department of Science and Technology
GIZ	German Agency for Technical Cooperation
HMO	Hydrometeorological
HWL	Highest Water Level
IMHEN	Institute of Meteorology, Hydrology and Environment
IPCC	Intergovernmental Panel on Climate Change
JICA	Japan International Cooperation Agency
LWL	Lowest Water Level
MD	Mekong Delta
MoC	Ministry of Construction
MoNRE	Ministry of Natural Resources and Environment
MRC	Mekong River Commission
PC	People's Committee
RCA	Red Cross Association
RD	Rural development
SE	Social economy
SLD	Shared Learning Dialogue
SLR	Sea Level Rise
UWC	Urban Works Company
UUPM	Urban Upgrading Project Management
WSSC	Water Supply & Sewerage Company.
WACC	Center of Water management and Climate change
WU	Women's Union
WB	World Bank
WMO	World Meteorological Organization

EXPLANATION OF TERMINOLOGY

1. **Weather:** the atmospheric conditions in a small area and at a certain short period of time, manifested via a combination of many factors such as temperature, pressure, humidity, wind-speed, rain...
2. **Climate:** the sum of all the trends and changes of the weather conditions in large and certain areas in the world, in longer, often yearly, periods of time.
3. **Climate Change:** the vagaries of the climate compared with normal trends, and maintaining for a long time, (often about 30 years, WMO, or longer). CC is caused directly by the increases in the average air temperature. Yet, the underlying causes are human activities that emit green-house gases, along with the deforestation that destroys all the needed trees to absorb those gases. Thus, those gases accumulate over time in the air, holding the heat from the sun, and warming the atmosphere.
4. **Seas level rise:** is the rise in the water levels of all oceans throughout the world, due to the increase of temperature, and not the regular tides or storm tides... Sea level rise at a certain location may be higher or lower than that of the global average because of the differences in temperature of different oceans, and of many other factors.
5. **Climate Change Uncertainty:** in CC, the rate of the increases in temperature and rises in sea water level can be calculated rather accurately, but other extreme phenomena (thunderstorms, storms, rains causing floods and landslides...) cannot be predicted.
6. **Greenhouse gases:** are the CO₂ gas from the burning of coal, petrol, oil, and other gases...; the CH₄ gas from the decomposition of meat, fish, and plants... in closed environments; the N₂O gas from the using of urea/nitrogen fertilizer; the CFC gas may from refrigerators and freezers. These gases accumulate in the air, absorbing and retaining solar heat and making the Earth abnormally warm.
7. **Climate Change Scenario:** the prediction of future weather situations made by simulation algorithms, based on the social-economic developments, calculating the volume of green-house gases to be emitted, forecasting the rate of increase in average atmospheric temperature, and drawing the conclusion of the extent of Climate Change and SLR. Climate Change scenarios are long-term and based on the future social-economic developments to predict. While weather forecasts and hydrological forecasts are short-term and based on the trends and changes already occurred to make predictions.
8. **Vulnerability:** the extent of damage to individuals, communities, or areas (or the ability to adapt) caused by the same kind and intensity of Climate Change.
9. **Climate Change resilience:** the adjustments of natural system or human towards the changed situations or environments, in order to decrease the vulnerability caused by the current or potential fluctuations and changes of the climate, and utilize any advantages that Climate Change might bring.
10. **Climate Change adaptation:** the human activities and projects in order to adapt to the negative impacts of Climate Change.
11. **Climate Change mitigation:** all the activities to mitigate the level or intensity of green-house gases emissions in order to decrease the concentration of green-house gases in the air.

PREFACE

Can Tho is a river city with a dense network of rivers, with their water supplied from Hau River (Bassac), a tributary of Mekong River. Located in the central basin of Mekong Delta, Can Tho city counts water not only as a valuable resource, but also as a potential threat to its development.

Recently, the changes in water regime of Hau River in Can Tho city have become more and more serious, due to the impact of SLR and unsustainable development activities of the nations from upstream Mekong River. In particular, CC, mainly caused by the increase in average air temperature, results in an increase in the intensity and frequency of the phenomena such as thunderstorms or tornadoes. However, the responsibilities for deep and prolonged floods or droughts together with bank erosions and salinity intrusions must not only be claimed by CC, but also by mankind.

From 2010 to 2015, the Can Tho's PC has issued the first phase of the action plan to adapt to CC. The main objective is to study and realize in practice what CC in Can Tho city is; and, based on the result of this study, combined with the socio-economic status and the wishes of the local community, to make the "Action plan to respond to CC during the period of 2015-2030". With the motto "For a stronger and more resilient city of Can Tho", this plan is a joint effort of the local communities, government at all levels, different departments of the city, as well as many home and foreign consultants, institutes, schools, agencies, and organizations. The ultimate goal of this plan is to protect Can Tho city from future threats and guarantee the establishment of a green and environmentally-friendly economy in the region.

The plan is divided into the following main parts: The Challenges of CC in Can Tho – Points of View, Approaches and Responses, and a Green Economy; Objectives, Key Tasks, and Solutions. Generally, the plan focuses on dealing with priority issues such as: guaranteeing life and health, ensuring livelihoods and improving people's lives against future threats. This action plan is a long-term, no-regret and regional-scale one; seeking to adapt well to CC, as well as consolidating the achievements in reducing poverty and socio-economic development that have already been obtained.

We are all sure that CC is affecting, and will continue to affect our lives, but nobody knows exactly what kinds of climatic-hydrological risks are waiting for us ahead, how strong they are, or when they will come... Yet, if this strategy is carried out properly, it is likely that Can Tho city will be able to mitigate the damage caused by sudden extreme-phenomenon.

The action plan to respond to climate change during the period of 2015-2030 is the result of the work of many stakeholders, through which, the CTPC have, once more, chosen to take the initiative to respond scientifically-practically-comprehensively, instead of being passive to the threats. And thus, depending on the changes of the situations, the plan can be modified in order to fit with future practice.

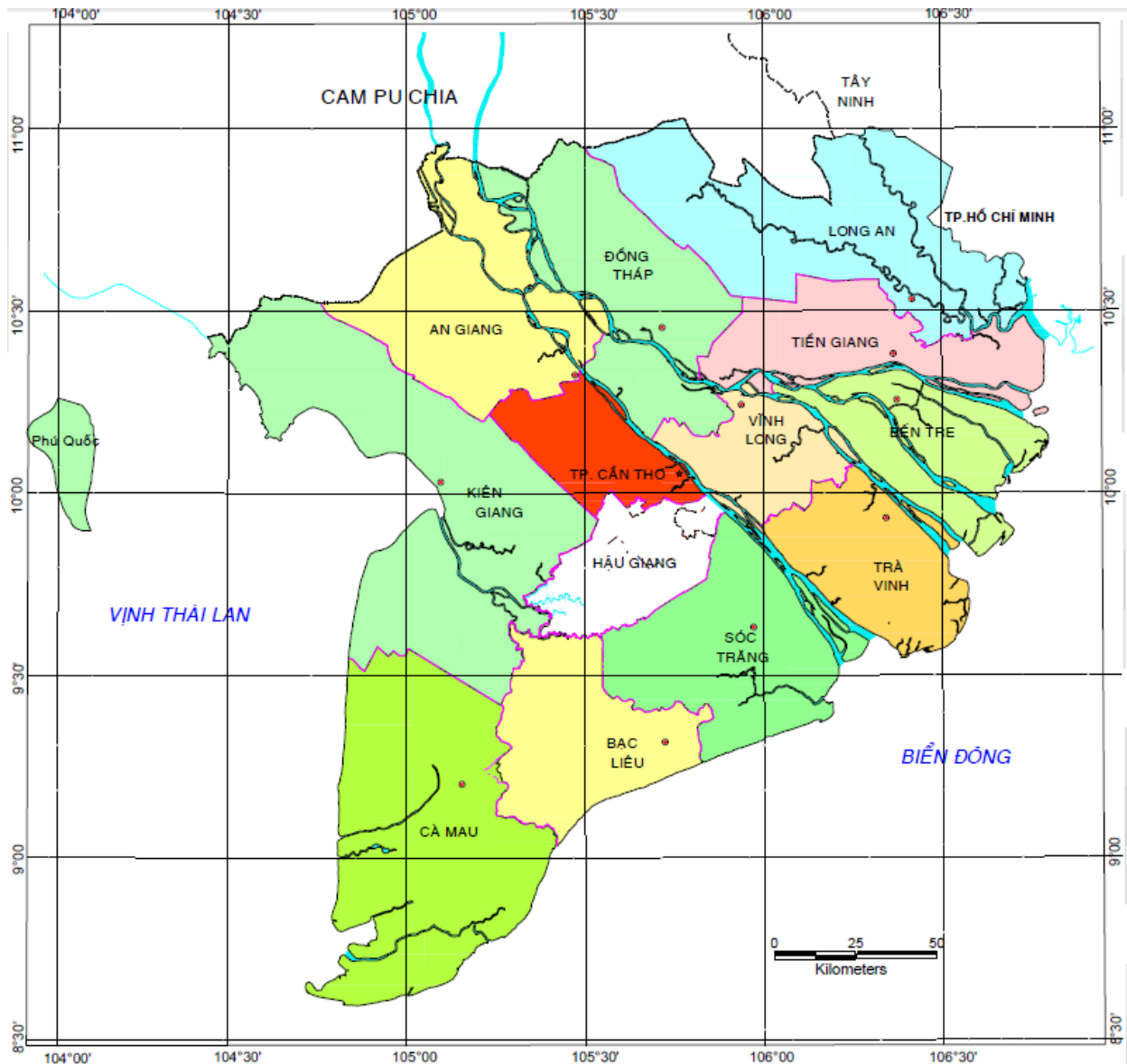
Editorial Board

Adaptation activities are to help increase the capability to adapt or react, in order to respond to, overcome, and recover when facing difficulties, natural disasters, thanks to the necessary preparations.

The main activity to help prevent and reduce the causes of CC is to cut down green-house gases emissions.

CCCO collected

MAP OF LOCATION OF CAN THO CITY



Source: Scheme to develop comprehensive transportation within the area of Can Tho city, in order to respond to CCand SLR – Department of Transportation, 2014

Figure 1 Location map of Can Tho city in the Mekong Delta

The objective of development planning:

- Develop a national-class, civilized, modern city of Can Tho, making it the motivating urban center of the whole Mekong Delta, as well as the urban gateway of Lower Mekong Basin; contribute to promoting the socio-economic development of Mekong Delta, granting it the influence on the area of South-East Asia.

- Develop the city space in the direction of a comprehensive, balanced, and sustainable development, ensuring national security and defense; develop harmoniously with the natural scenery, promoting the character of a river city – featuring eco-friendly city of Mekong Delta.

Source: Decision No. 1515 / QĐ-TTg, dated August 28th, 2014 of the Prime Minister about the approving the scheme on adjustments to the general planning of Can Tho city until 2030, and the vision until 2050.

The vision of socio-economic development of the city until 2030:

- Build and develop Can Tho city into a central city – a nucleus, civilized, modern, green, clean city with the characters of a river and hick town, represents the cultural identity of the whole Mekong Delta.

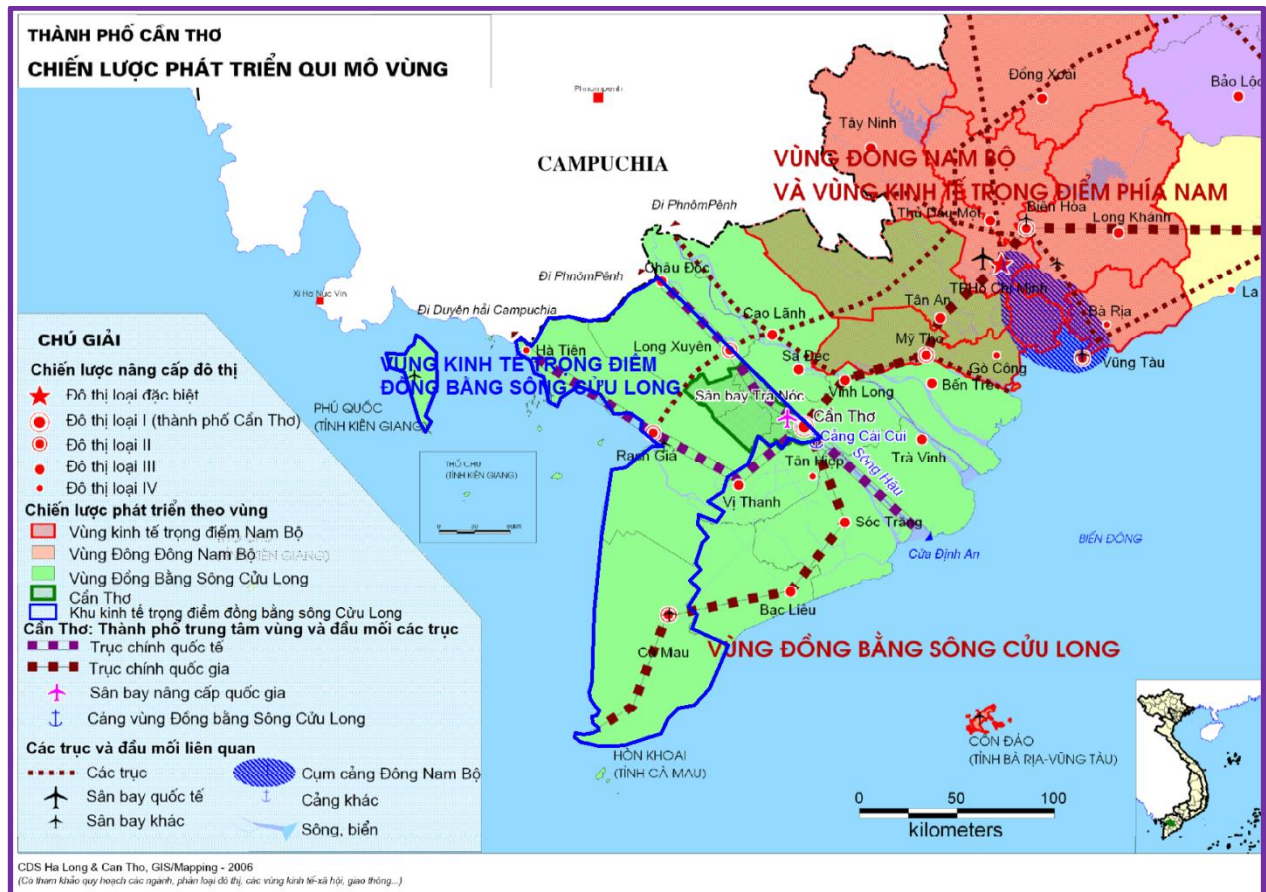
- City economy: basically a high-tech, knowledge economy, the sectors of service and industry account for over 98%, and agriculture nearly 2% of it; being an important service center for education, science and technology, with medical services of top quality in Mekong Delta, and reputable in the area of ASEAN.

- Regarding urban development and infrastructure: until 2030, the population of the city is about 1.9 to 2.0 million people, with the urban population of about 1.6 million. The urban infrastructure is synchronized and modernized; smooth traffic with various large-scale types of transportation; the infrastructure of information and communication, networks of power and water supply, drainage system and environmental protection constructions... meet the development requirements of the citizens.

- Regarding society: being a safe, peaceful city with friendly and harmonious communities, ensure that the social order and safety, national security and defense are maintained.

Source: Decision no. 1533/QĐ-TTg of the Prime Minister, dated August 30th, 2013 about approving the general planning for the socio-economic development of Can Tho city until 2020, vision until 2030.

DEVELOPMENT STRATEGY FOR MEKONG DELTA

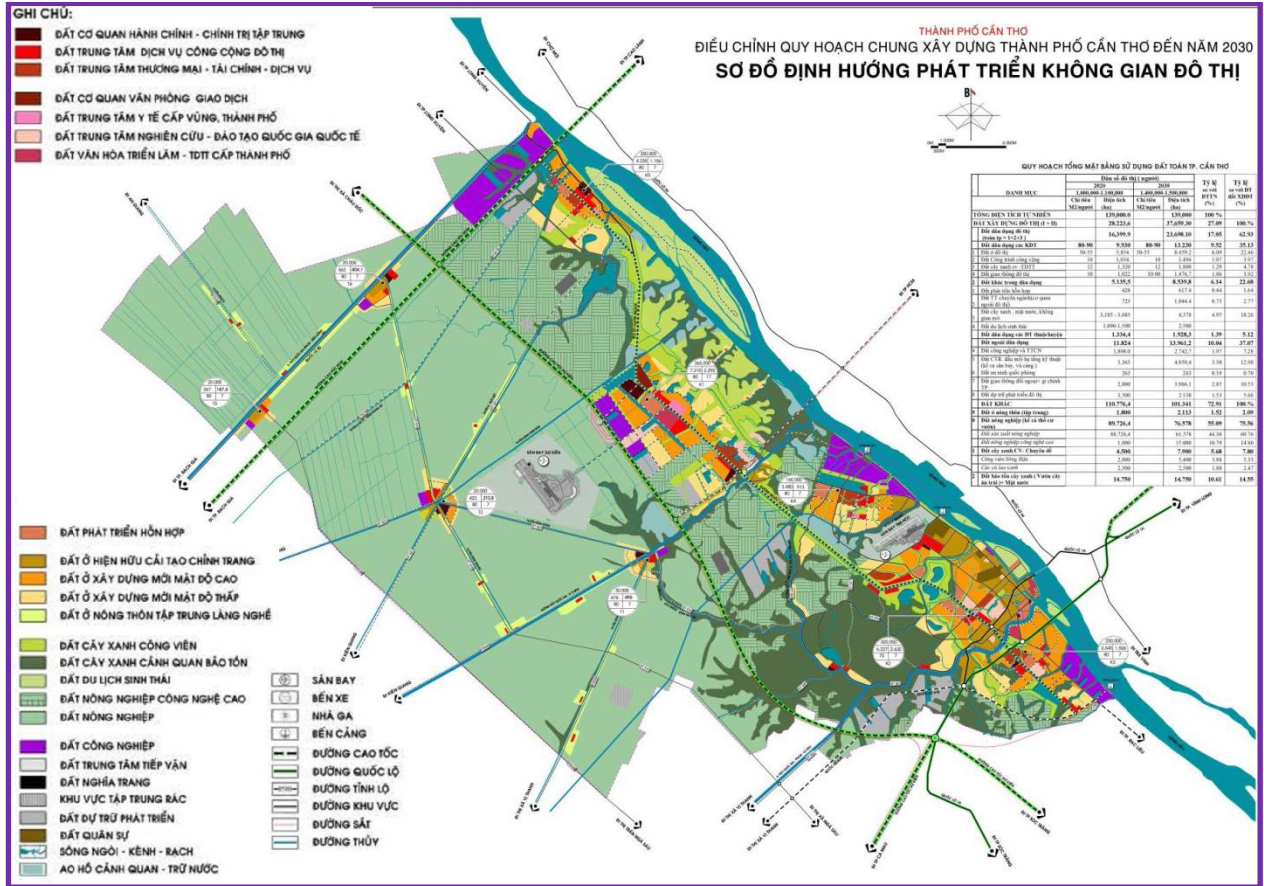


Source:CCCO, 2014¹

Figure 2 CanTho city in development strategy of Mekong Delta

¹Complied according to the Project Ha Long-Can Tho to develop infrastructure, 2006 and Decision no. 492/QĐ-TTg dated April 16th, 2009 about the Major economic area of Mekong Delta.

CAN THO CITY ORIENTATION OF SPATIAL DEVELOPMENT UNTIL 2030



Source: Department of Construction²

Figure 3 Can Tho city orientation of spatial development until 2030

²According to the Decision no. 1515/QĐ-TTg dated August 28th, 2013 of the Prime Minister

THE LEGAL BASES FOR PLANNING

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Resolution no. 24 – NQ/TW, dated June 03rd, 2013 of the 9th Central Executive about Responding proactively to CC, strengthening natural resources management and environment protection;

Resolution no. 08/NQ-CP, dated January 23rd, 2014 about the action program to implement the Resolution no. 24/NQ-TW;

Resolution no. 07 – NQ/TU, dated February 06th, 2012 about Natural resource management, environment protection, and CC adaptation in Can Tho city;

Program no. 39-CTr/TU of Can Tho City Commission, dated July 25th, 2013;

Official Dispatch No. 990/BTNMT, dated March 24th, 2014 about the guidance to update the action plan to respond to CC;

Program no. 57/KH-UBND, dated July 17th, 2012 of CTPC about improving the capacity to respond to CC for the officials of the city through the making the Action plan to respond to CC during the period of 2015 – 2030;

And other related documents from the central and local government.

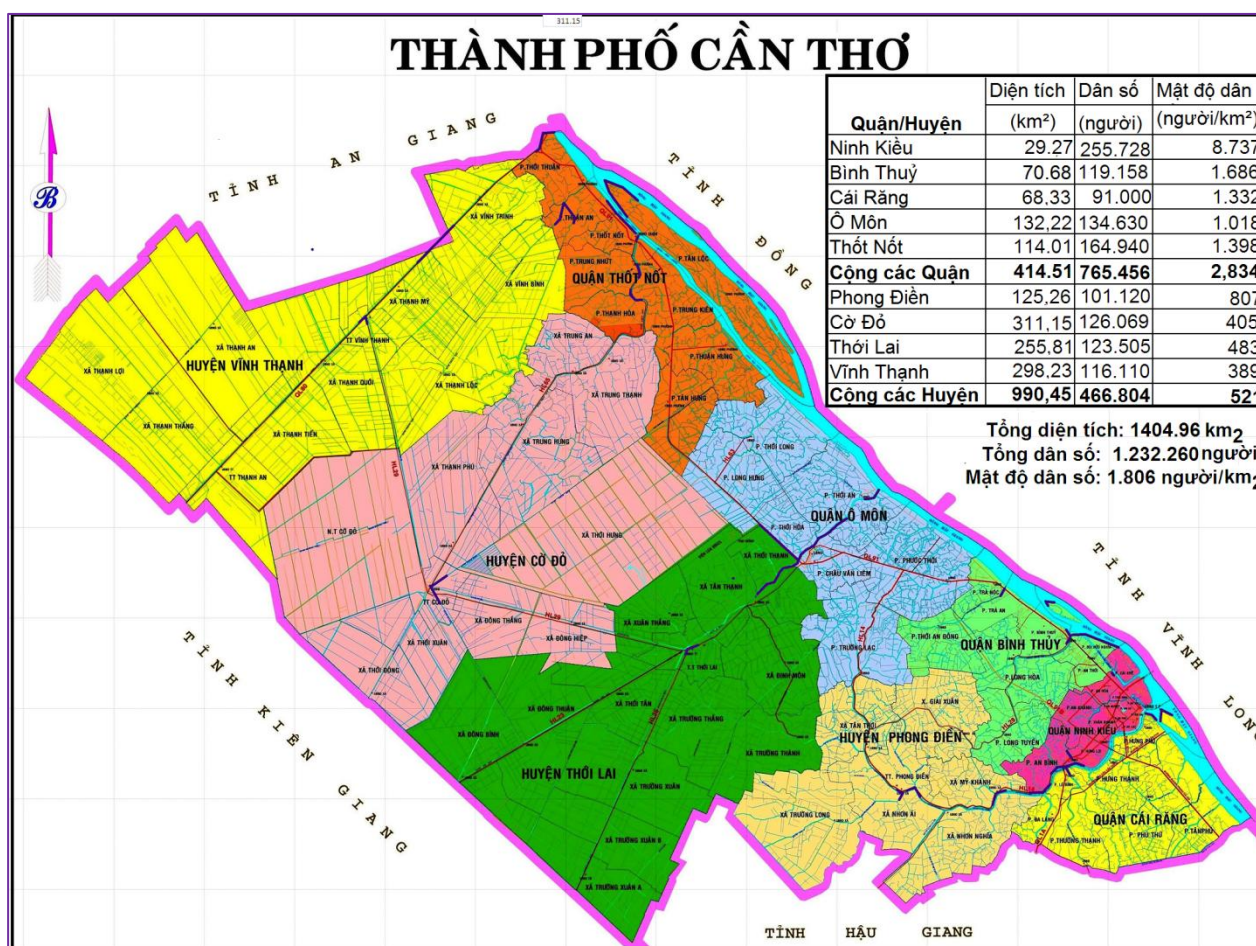
I. CURRENT STATUS AND CHALLENGES OF CANTHO

I. 1. About Can Tho city

I.1.1. Administrative

Established in 2004, Can Tho City is a city directly under the Central Government. As a first-class city of Viet Nam, located in the major economic area, Can Tho city is identified as the center of economy, culture, education, health-care, as well as the transportation hub of Mekong Delta.

There are nine administrative units belonging to Can Tho, including 5 urban districts: Ninh Kieu, Binh Thuy, O Mon, Thot Not, Cai Rang, and 4 suburban districts: Vinh Thanh, Co Do, Thoi Lai, Phong Dien. The total number of units at ward level is 85, consisting of 44 wards, 5 towns and 36 communes.



Source: CCCO, 2014³

Figure 4 Administrative map of the city of Can Tho.

³Compiled according to the map of DoNRECan Tho, and Statistical Yearbook of 2013

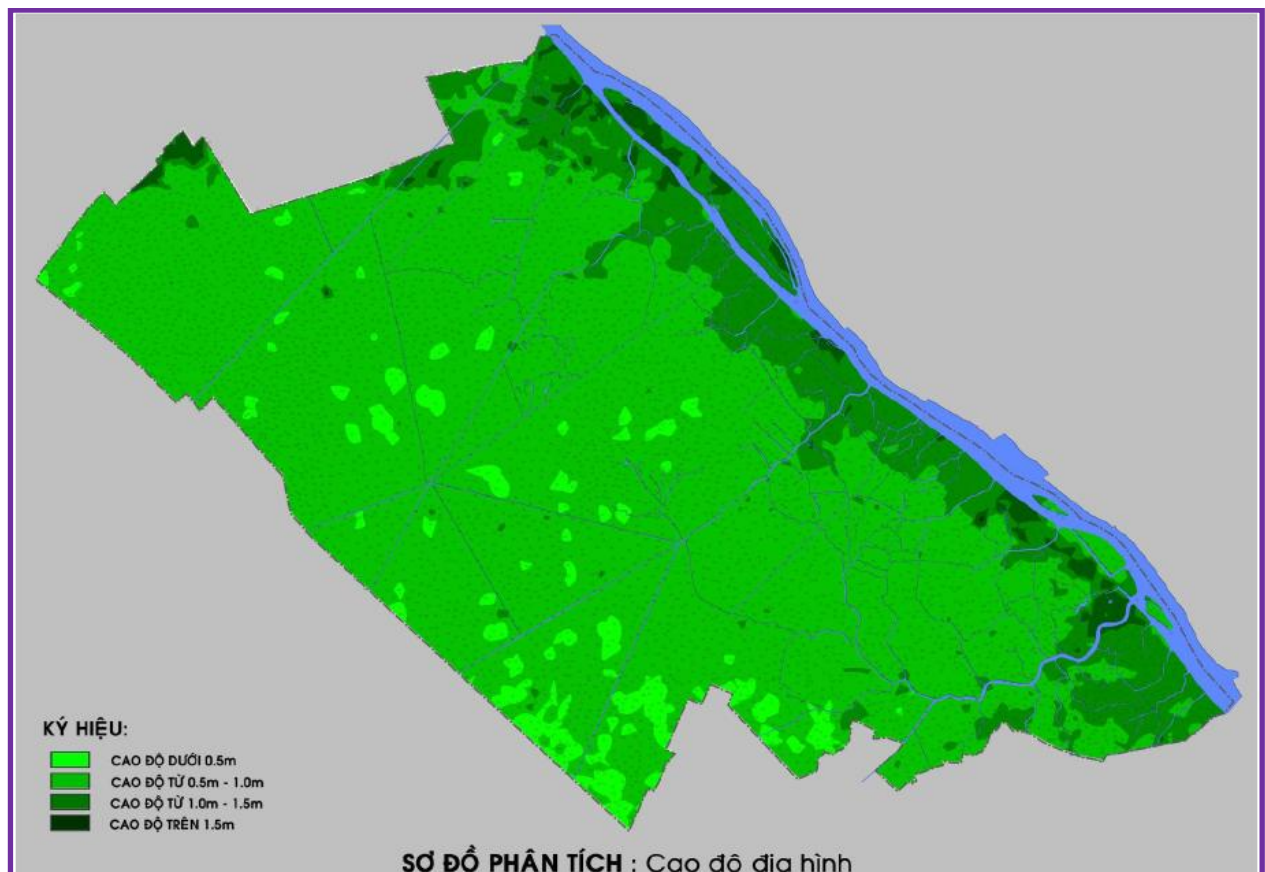
1.1.2. Area and population

The area of Can Tho city is 1,404.96km², and the population is more than 1.232million people. According to the Statistical yearbook of 2013, the number of poor households (under the new criteria) takes up about 8.2% of the city total.

1.1.3. Geography

Located at the heart of Mekong Delta and 75km away from the East Sea, Can Tho city has no natural jungle. The distances to other cities in the region are as follows: Long Xuyen 60km, Rach Gia 116km, Ca Mau 179km, and Ho Chi Minh City 169km.

The city has a low and flat topography, with an average elevation of about 0.5 – 1m above sea level. The strip of land along Hau River, Highway no. 1, and Highway no. 91 has higher elevation, from 1 to 1.5m, and is the main area for urban development. From Hau River, the topography follows a lowering trend in the direction from the northeast to the southwest.



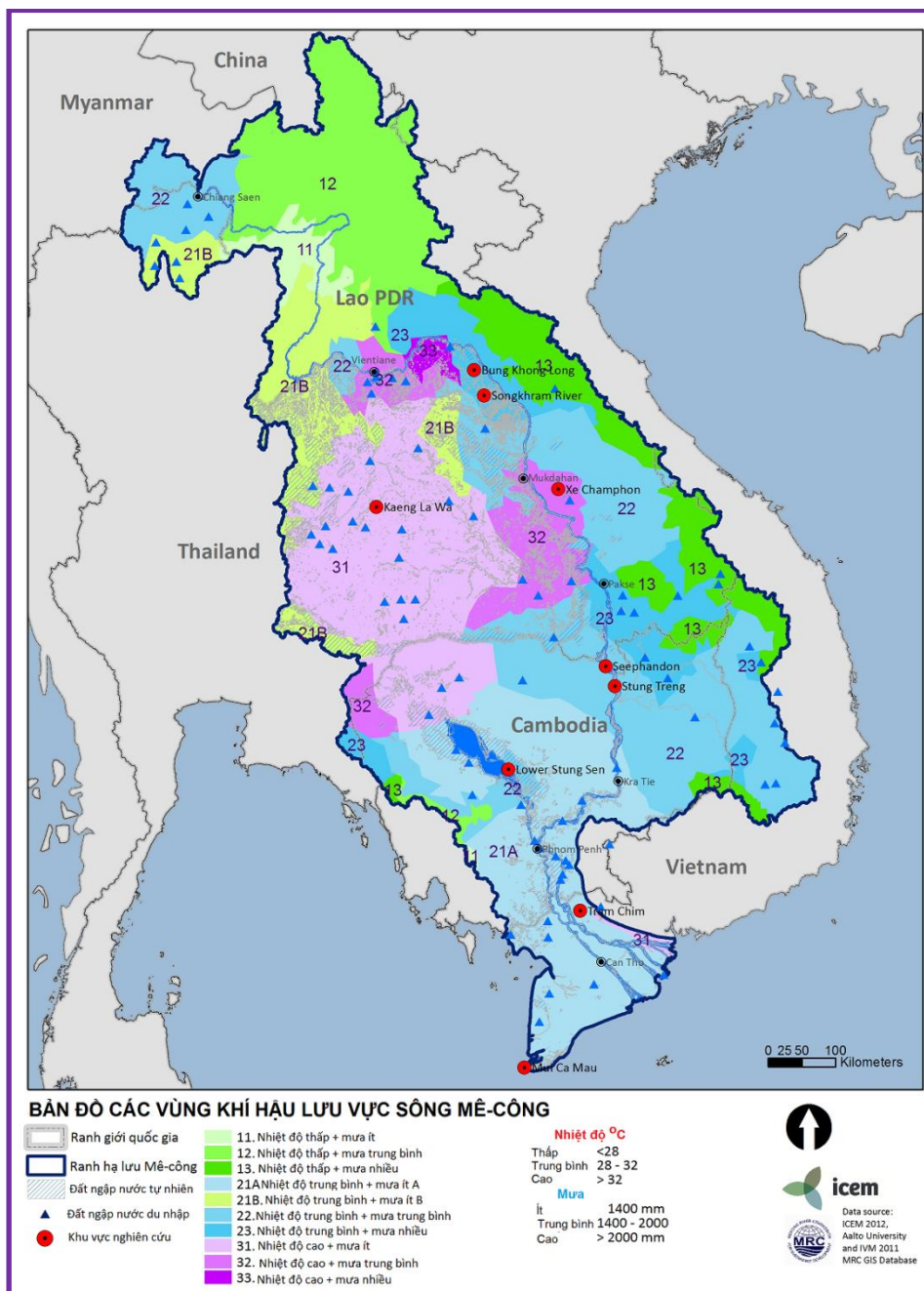
Source: Adjustments to the General Planning of Can Tho city, Southern Sub-Institute for Urban and Rural Planning, 2011

Figure 5 Topography map of CanTho City

1.1.4. Hydrometeorology

Can Tho city is located in the tropical, subequatorial zone, with a trait of being hot and humid, and having two distinct seasons: the rainy season from May

to November, and the dry season from December to April. The annual average temperature is from 26.8 - 28°C. The temperature difference between day and night during the dry season can be up to 8–10°C. Air humidity is relatively stable from 79.0 to 83.4%. The average rainfall is about 1.700mm/year, concentrated in September and October, at the same time with Mekong River floods, making a season of floating water, bringing aquatic resources and land rehabilitation.

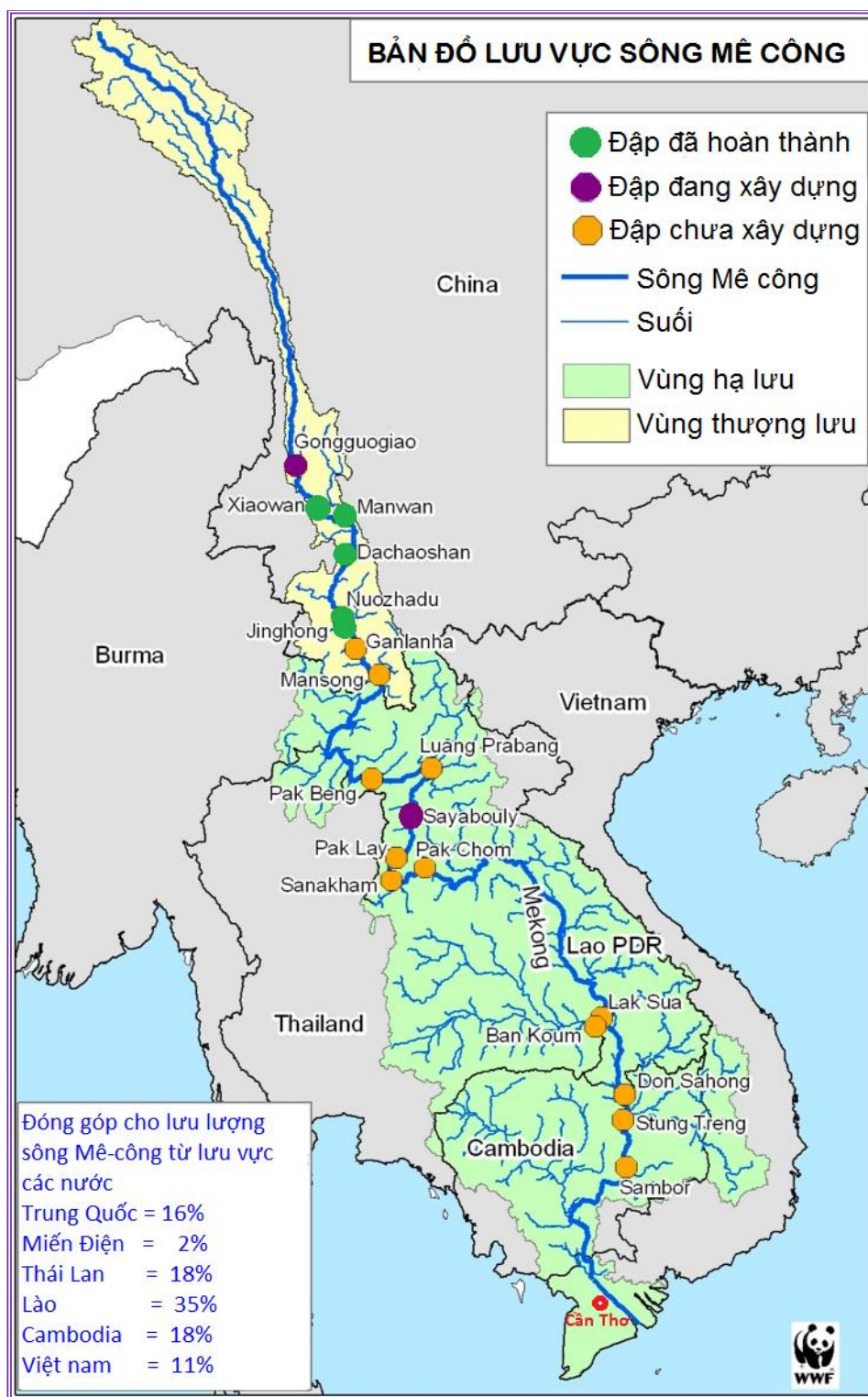


Source: Climate zones of Mekong basin, MRC-ICEM, 2012

Figure 6 Map climate-Mekong Basin and the Mekong Delta

The water flowing regime of the rivers and canals, as well as the “floating water” regime in Can Tho city is affected by the flow of Mekong River, the tides from the East Sea, local rains and the infrastructure system in the basin, in which

the combination of the flowing regime from upstream Mekong together with the tidal regime from the East Sea makes the strongest influence.



Source: collected by CCCO, according to the WWF of Laos, 2009.

Figure 7 Mekong basin and Mekong delta of VietNam

Generally, there are 2 flooded areas in Can Tho city, with 2 different causes: from O Mon district to the north part of the city, floods come from the river flow of Mekong River; while from O Mon to the south part, floods result from the

tides. The areas affected seriously by the tides include the areas near Hau River of the following districts: Thot Not, Binh Thuy, Ninh Kieu và Cai Rang.

Normally, the area of the land which is 100cm-deepflooded is about 9,700 – 35,600 ha. The area of the land which is averagely-flooded, 50-100cm-deep, is about 87,800 – 88,400 ha. The deeply flooded areas include Vinh Thanh, Thot Notand part of Co Do and O Mon.



Source: Mekong Delta Research and Development Center, 2003

Figure 8 Brief of the main causes of flooding of the city of Can Tho

Located on the west coast of Hau River (Bassac), in the international delta of Mekong, just before the river flows to the sea, Can Tho is a lowland area with a dense network of several big and small canals, of which the total length is about 3,405 km, making a total water surface area of about 6,800 ha.

1.1.5. Environment

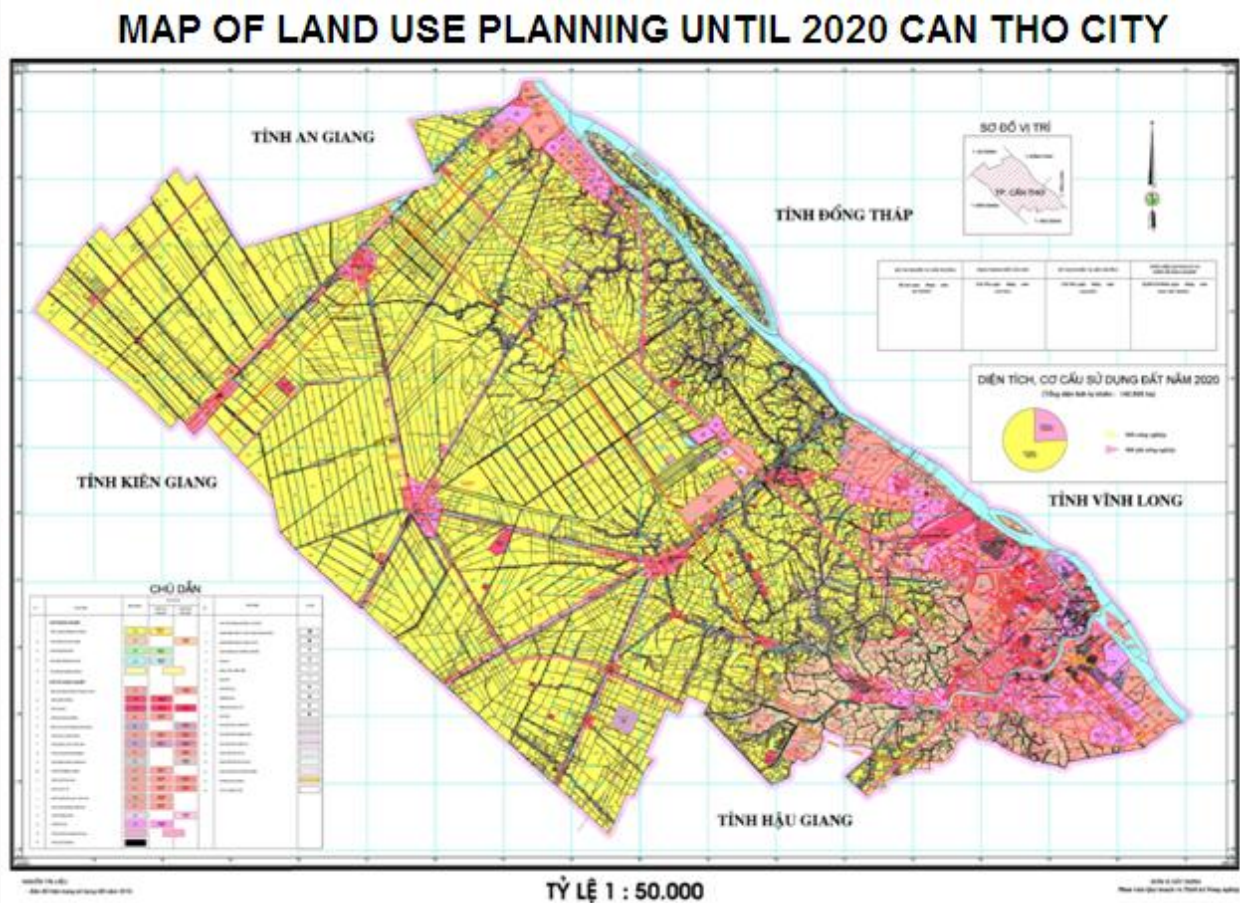
According to the Center for Monitoring Natural Resources and Environment of the DoNRE, the air and soil environments of the city are unpolluted, and almost all of the indicators are within the limited thresholds.

However, Can Tho city is facing serious water pollution, including the branch canals as well as the main stream of Hau River. The causes of water

pollution can be: domestic wastewater from the community, wastewater from aquaculture activities and industrial wastewater.

1.1.6. Economy⁴

From 2004 to 2013, the average growth rate of Can Tho city is 14.5%/year, and particularly 11.67% in 2013; the total added value reached 62,000 billion VND, nearly 3.5 times higher than that of 2004. The average income per capita increased from 10.3 million VND in 2004 to 62 million in 2013. Budget revenues reached nearly 11,000 billion VND.



Source: website of Can Tho DoNRE⁵

Figure 9 Land use planning map of Can Tho to 2020

The proposed target for annual growth rate from 2016 – 2020 is about 15%; Until 2020, sector III takes up 47.9%, sector II 48.8%, and sector I 3.3% of the economic structure. GDP per capita reach \$6,480 by 2020, and \$14,200 by 2030. The rate of GDP mobilized into state budget reach 12 - 13% during this period⁶.

⁴Press Release “10 Years’ Achievements in Socio-Economic Development of Can Tho city”

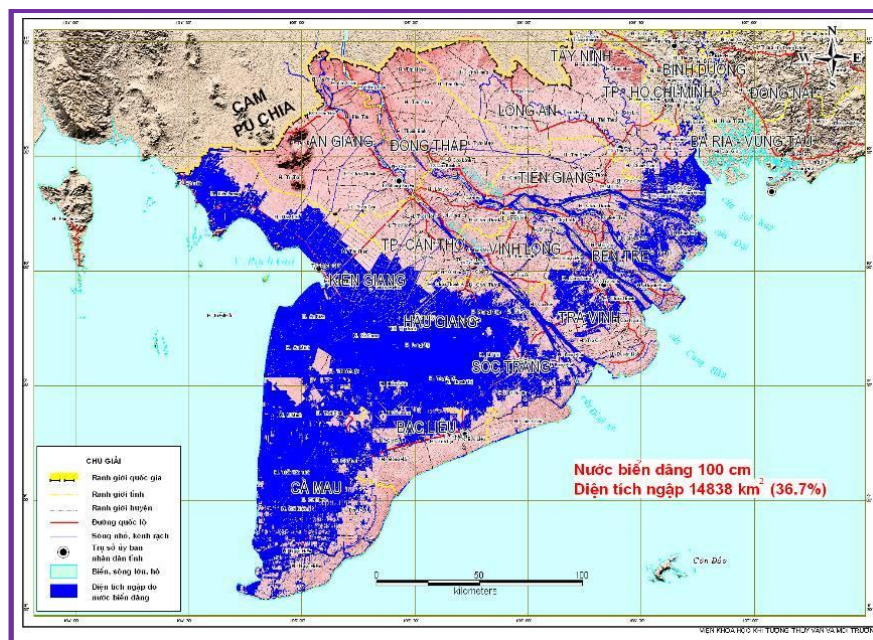
⁵<http://stnmt.cantho.gov.vn/map/qh2013/qhsddct2013.htm>

⁶ Decision no. 1533/QĐ-TTg, dated August 30th, 2013 of the Prime Minister, about approving the general planning for the socio-economic development of Can Tho city until 2020, vision until 2030.

I. 2. Challenges

I.2.1. Model of hydrometeorological forecast

According to the scenario B2-AR4 by IPCC⁷, the MoNRE has issued the detailed hydrometeorological forecasts of Mekong Delta as follow: Compared to the period of 1980-1999, the average air temperature in 2100, increases 2.0 – 2.6°C; average annual rainfall increases 4.1 – 8%; SLR is of 59– 82cm, and has stated that if SLR is of 1m, nearly 40% of the Mekong Delta is flooded.



Source: CC and SLR Scenarios, IMHEN, 2012

Figure 10 Flooding map of the Mekong Delta, if sea level rise of 1 m

However, compared to the trend of the practical data, the true situation can be much worse. The possible reason is that this model only uses univariates to make prediction. For example, it only simulates floods caused by SLR, while in practice, floods are also caused by many other factors such as local rains, water flows from upstream, land subsidence... Therefore, the above forecast needs to be supplemented with more practical data in the recent time.

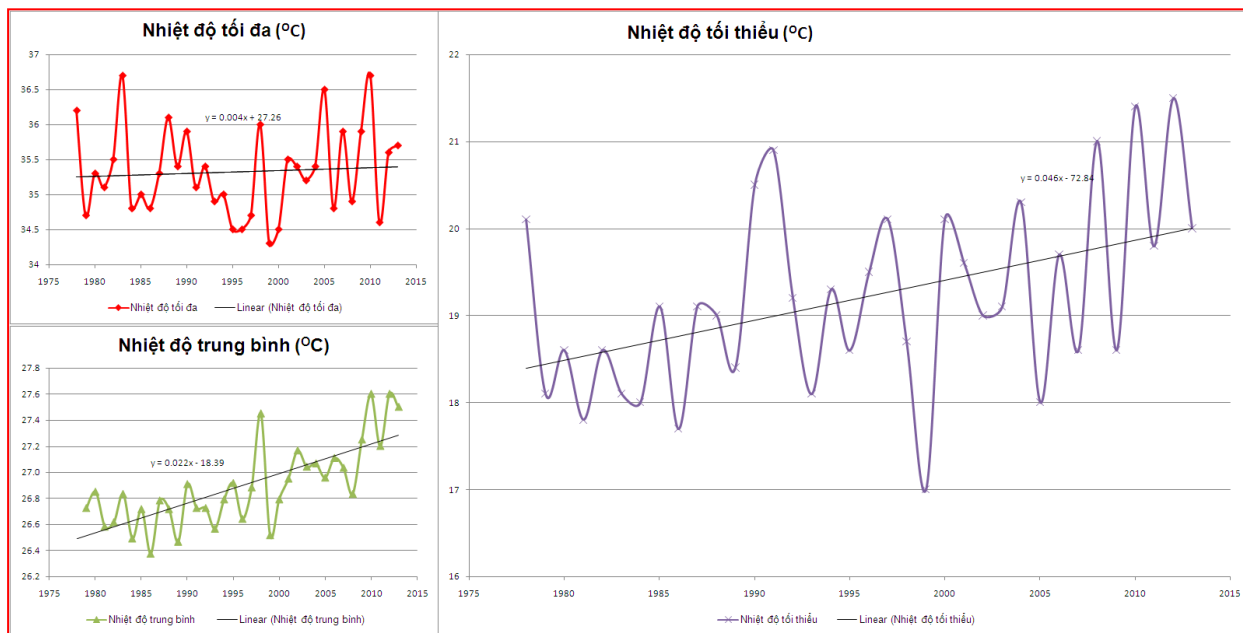
I.2.2. The Hydrometeorological status according to practical data

Each factor mentioned below is presented in years, during the period 1978 – 2012⁸. These results are the practical measurements of the weather status, and have been concluded by the Directors and experts from Centers for Hydrometeorology of all 13 cities and provinces in Mekong Delta in the workshop “The Hydrometeorological Trends in Mekong Delta” held by CCCO of Can Tho city in late 2013.

⁷ Average scenario, the fourth assessment report 4 of IPCC

⁸ The data are collected during 34 years, long enough to define the climatic trends according to WMO

Air temperature in Can Tho



Source: Southern Hydrometeorology Station

Figure 11 Chart of yearly air temperature changing

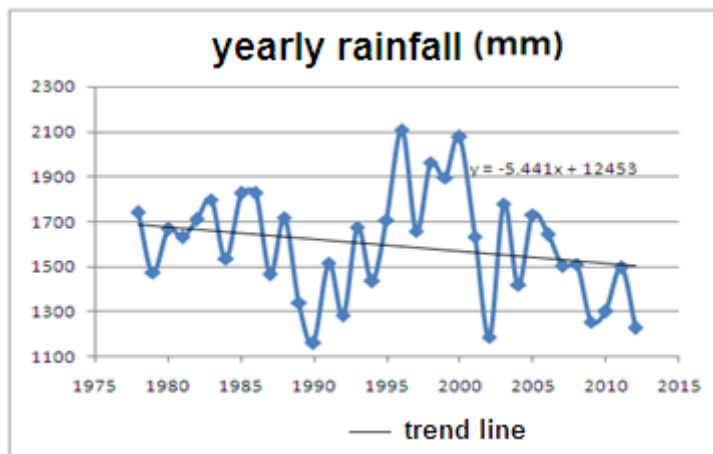
While the highest daytime temperature remained, the highest temperature at night increased significantly at 1.5°C , resulting in an increase in the average air temperature of about 0.7°C . Moreover, statistics also showed a decrease in the number of annual days with temperature higher than 35°C .

Both practical and simulated statistics show a remarkable increase in the average air temperature. Public health and crop yields will be affected negatively if the temperature exceeds the limit threshold. As air temperature increases, the temperature of water, soil, and everything related to the air also increases. Increased temperature, especially at night, causes sleeplessness and difficulties in health restoration, putting more heat pressure upon human bodies, especially the elderly and children. This leads to more illnesses, especially tropical, infectious diseases caused by the development of bacteria, insects and hosts of diseases, and the decline in nutrition and sanitation.

The increased temperature also affects other fields such as energy, transport, industry, construction, tourism, commerce... with the extra costs for cooling, ventilation, storage, operations of equipment and vehicles, and material endurance.

Rainfall

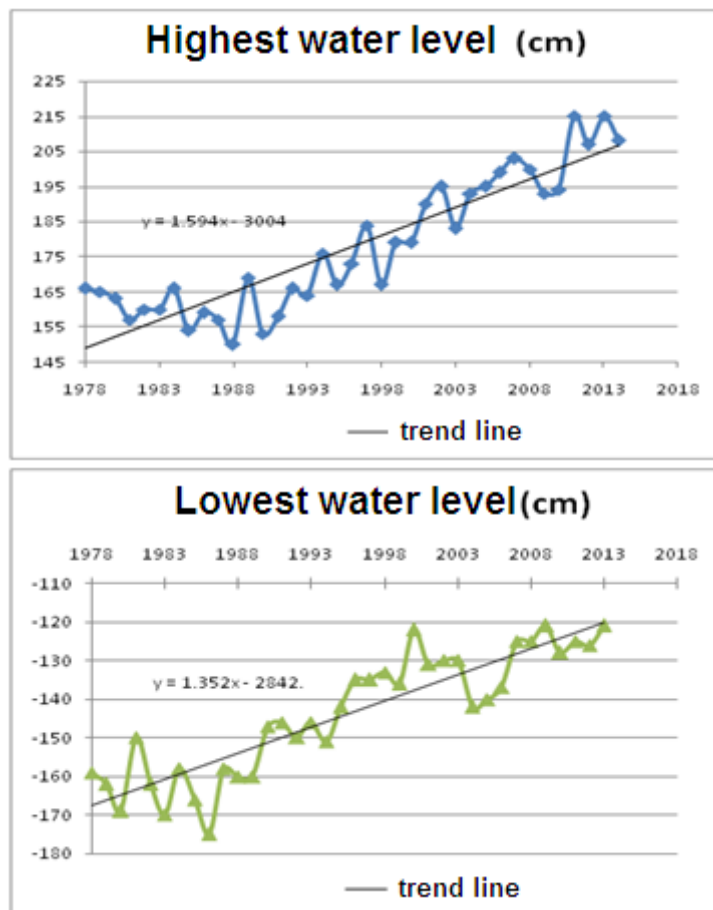
Annual rainfall tends to decrease, from about 1,700mm to 1,500mm / year.



Source: Hydrometeorology station

Figure 12 Chart of yearly rainfall changing

The water level, stream flow and flooding



Source: Hydrometeorology station

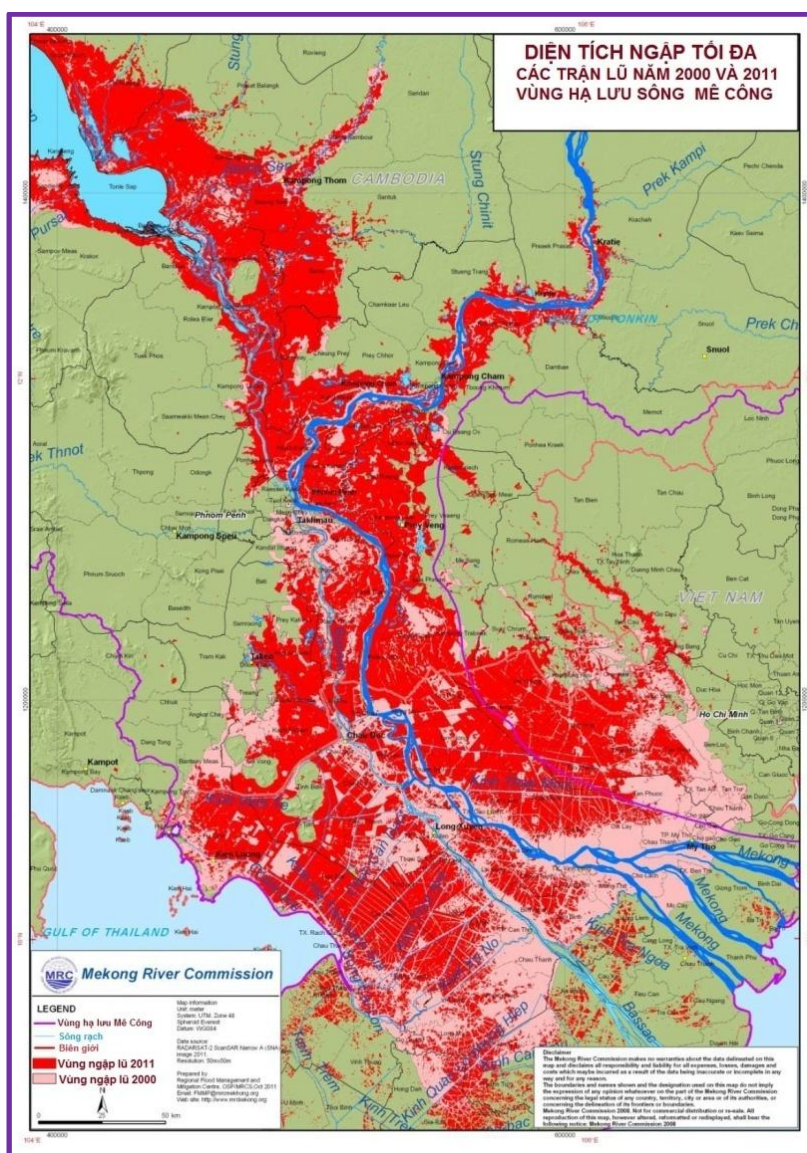
Figure 13 a+b Chart of yearly water level changing in Hau river, CanTho station.

HWL and LWL are 2 indicators for flood and drought hazards. Both the data of HWL (in floating water season) and LWL (in dry season) measured at the

hydrometeorology stations show an increase of 50cm. Particularly, the flood crest of 2011 was 215cm, the second highest in the flooding history of Can Tho, and in 2013, there were absolutely no floods from the upstream, yet the water level at the station in Can Tho still reached 215cm.⁹

Though the floods in 2000 and 2011 were big floods from Mekong River, with the total water volume of 241 and 242 billion m³/year respectively, statistics during this period still shows a downward trend of the total water volume of Hau River in Can Tho, from 210 to 190 billion m³/year.

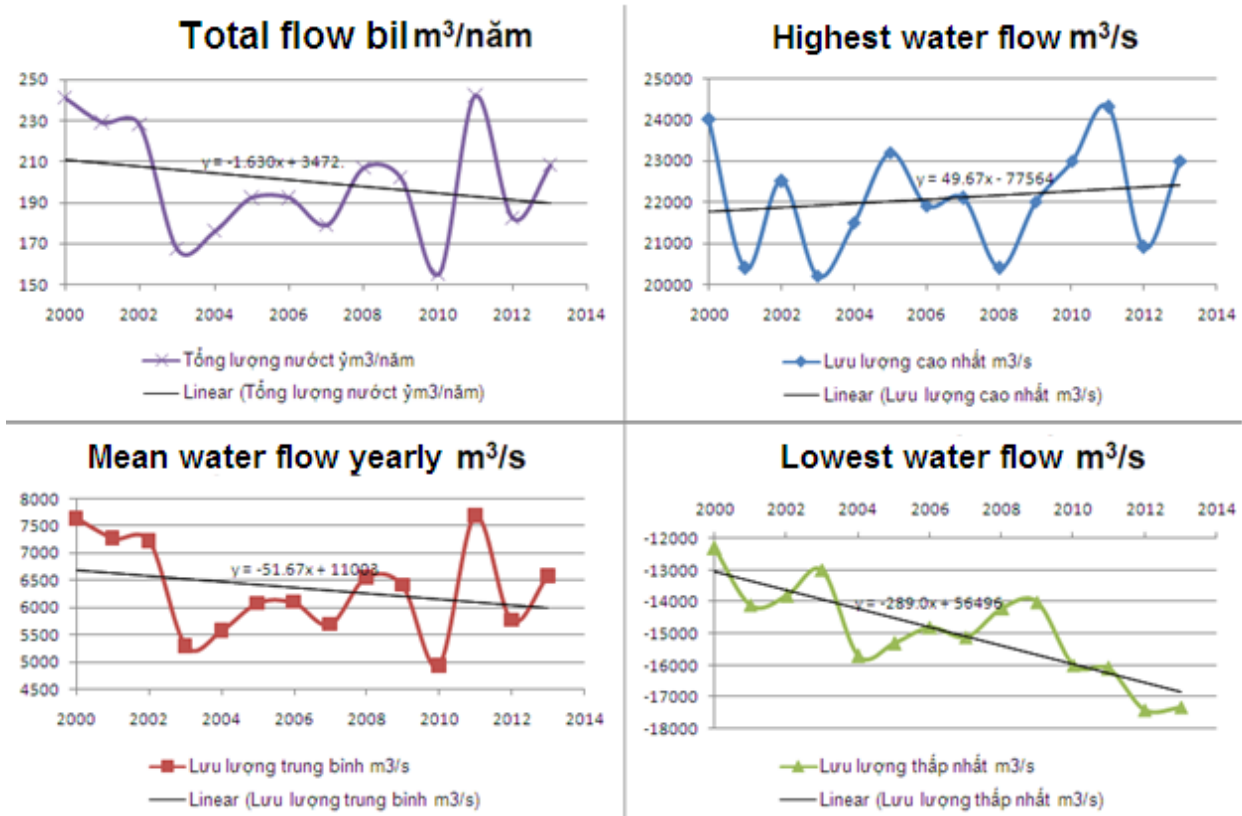
At the same time, the highest flow, as well as the flow from upstream, barely increased. In contrast, the lowest flow, or the flow from the ocean tides increased continuously, from about -13,500 to -15,500 m³/s. The average water flow decreased from 7,000 to 5,500 m³/s in 10 years.



Source: Report on flooding situation in 2011, MRC, 2011

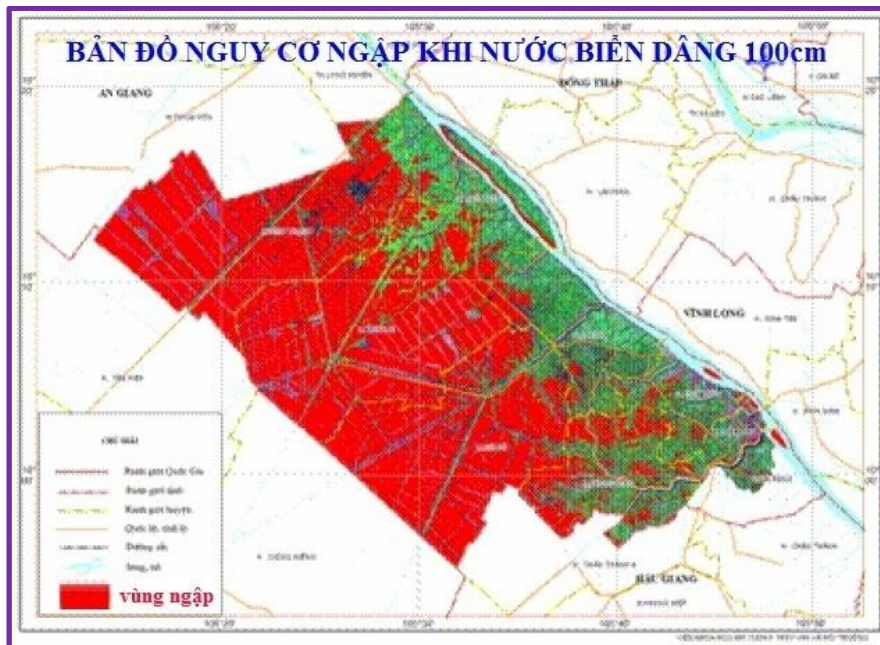
⁹Southern Hydrometeorology Station

Figure 14 Map of deepest water level flooded in 2000 and 2011



Source: Mekong River Center of Hydrometeorology

Figure 15 Chart of Hau river flow changing in Can Tho

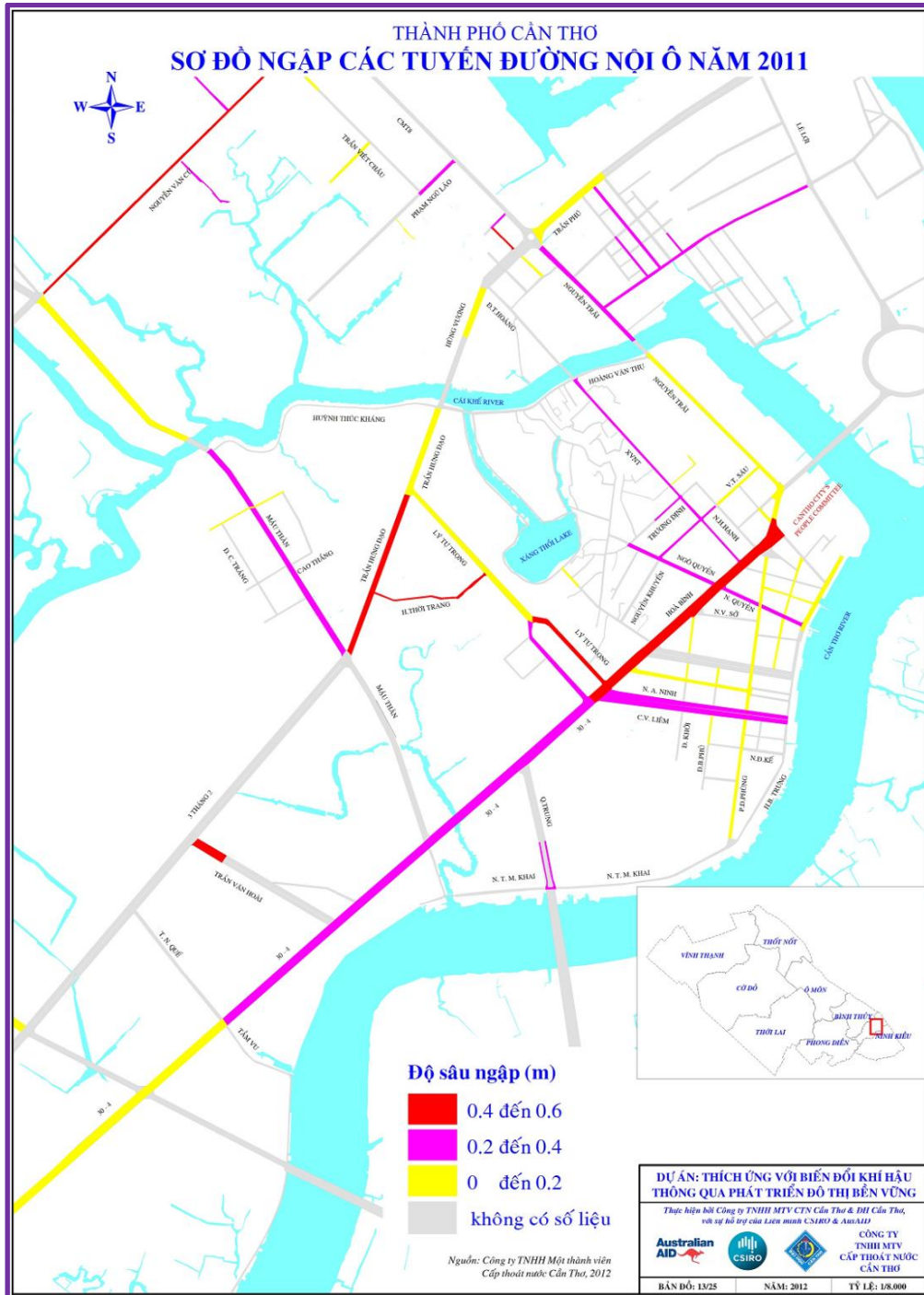


Source: CC and SLR Scenarios in Can Tho city, IMHEN, 2011

Figure 16 Map risk of flooding in the city of Can Tho.

Practical records in the recent years show that the HWL in the areas of Chau Doc, Tan Chau (headwaters of Hau River) did not increase, yet the HWL at the Can

Tho Station increased constantly (50cm in 30 years). Certain places in Ninh Kieu district were still flooded, even after their foundations had been raised. In 2011, in Ninh Kieu district alone, there were 22 places flooded by rain, 56 places by tide (crest of tide at 2.15m) and 43 places by heavy rains combined with high tides (rain of 80mm-tide at 1.87m).



Source: Project to adapt toCCvia sustainable urban development, CSIRO-CTU

Figure 17 CanTho city inundated roads in major flood year in 2011

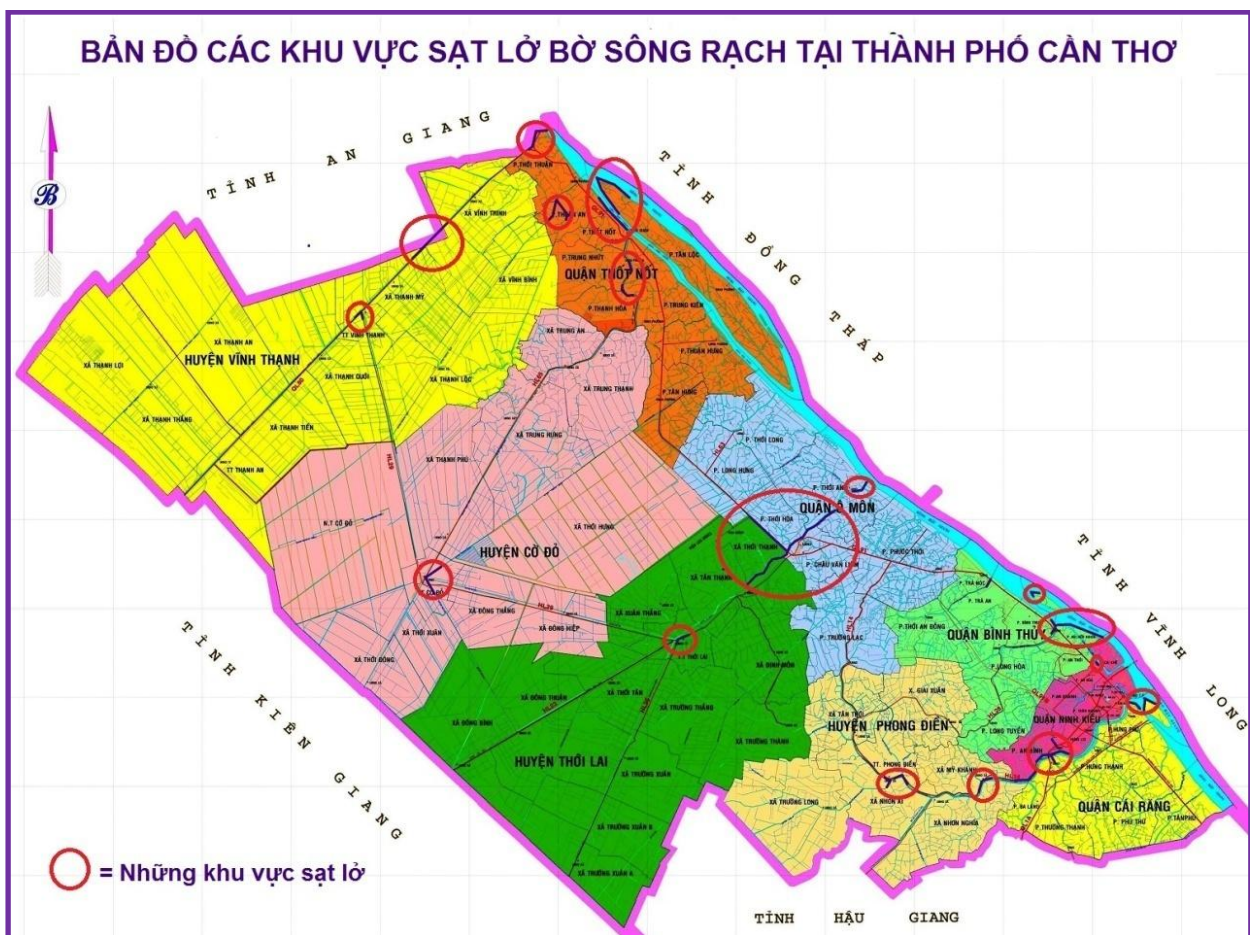
In rural areas, the normal floating-water level is 0.5 - 1m above the ground. During times of floods, water level can be higher, depending on the crests of the floods. The rural areas affected by the tides from the East Sea are flooded 6 times

during the period from August to November. In the years of high floods, they can be flooded up to 8 times in the same period, with a depth from 0.1-0.6m.

The forecast models of the Southern Institute of Water Resources Research and CTU shows that during the period from September to November, the water level in Can Tho might increase 50cm if sea level increase for 30cm, and up to 1.2m if sea level increase for 100cm. Deeper and longer floods cause negative impacts towards the agriculture and aquaculture production, leading to a decline in agriculture producing activities as well as the export turnover.

Combining the practical data with the simulated ones from the forecast model, it is shown that the water level on Hau River in Can Tho by 2030 might rise up to 2.3m. Thus, for the meantime, the foundation elevation of flood-preventing constructions should be at least 2.5m. However, the plans for future constructions should allow their foundations to be raised up to 2.7m and 3.0m.

Bank Erosion



Source: Water Resources Department

Figure 18 Can Tho City riverbank serious erosion areas

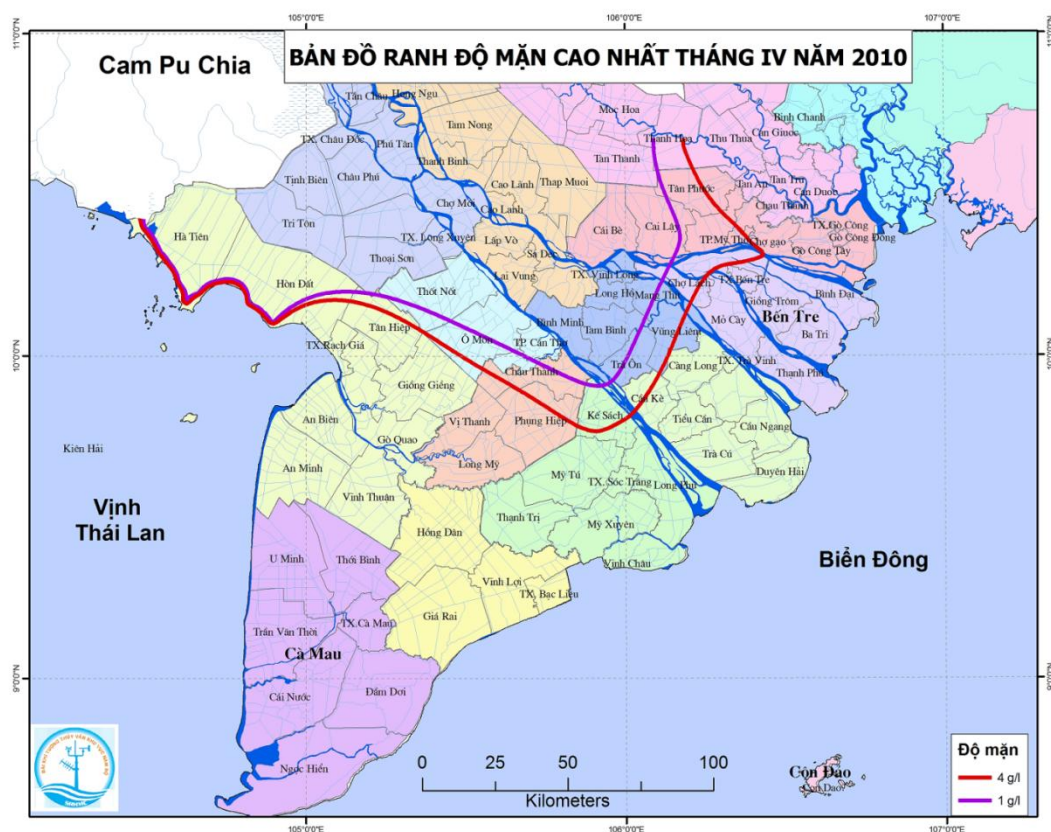
Due to the recent changes in the hydrological regime, many erosions occurred in Can Tho, affecting the quality of road and waterway transportation and housing, causing losses of people’s properties and lives. The banks experienced

erosions are those of Hau River, Cai Rang River, Tra Noc Canal, O Mon Canal, Thot Not Canal... Up to now, there have been nearly 200 households suffering from the impacts of bank erosions. Most recently, on March 6th, 2010, the foot of Tra Nien bridge, which was under construction, in Phong Dien district was eroded into Cai Rang River together with 3 houses, causing two deaths. The total cost of damage caused by bank erosions rose up to tens of billions VND.

Currently, there are 38 points of bank erosion scattering throughout the districts of the city.

Drought and salinity intrusion during dry season

According to recorded data up to now, the lowest flow of Hau River in Can Tho during the dry season seldom reached 800m³/s, while the water required for rice crops could be up to 850m³/s. The decrease in water flow during dry season caused draught in higher areas (Vinh Thanh, Thot Not) and salinity intrusion in lower areas (Vinh Thanh, Cai Rang). Facing no counter-force, tides from the sea intruded deeply into mainland, interfering in the production of agriculture and aquaculture, the supplying of fresh water and the activities in the sectors of industry and services.



Source: Southern Hydrometeorology Station

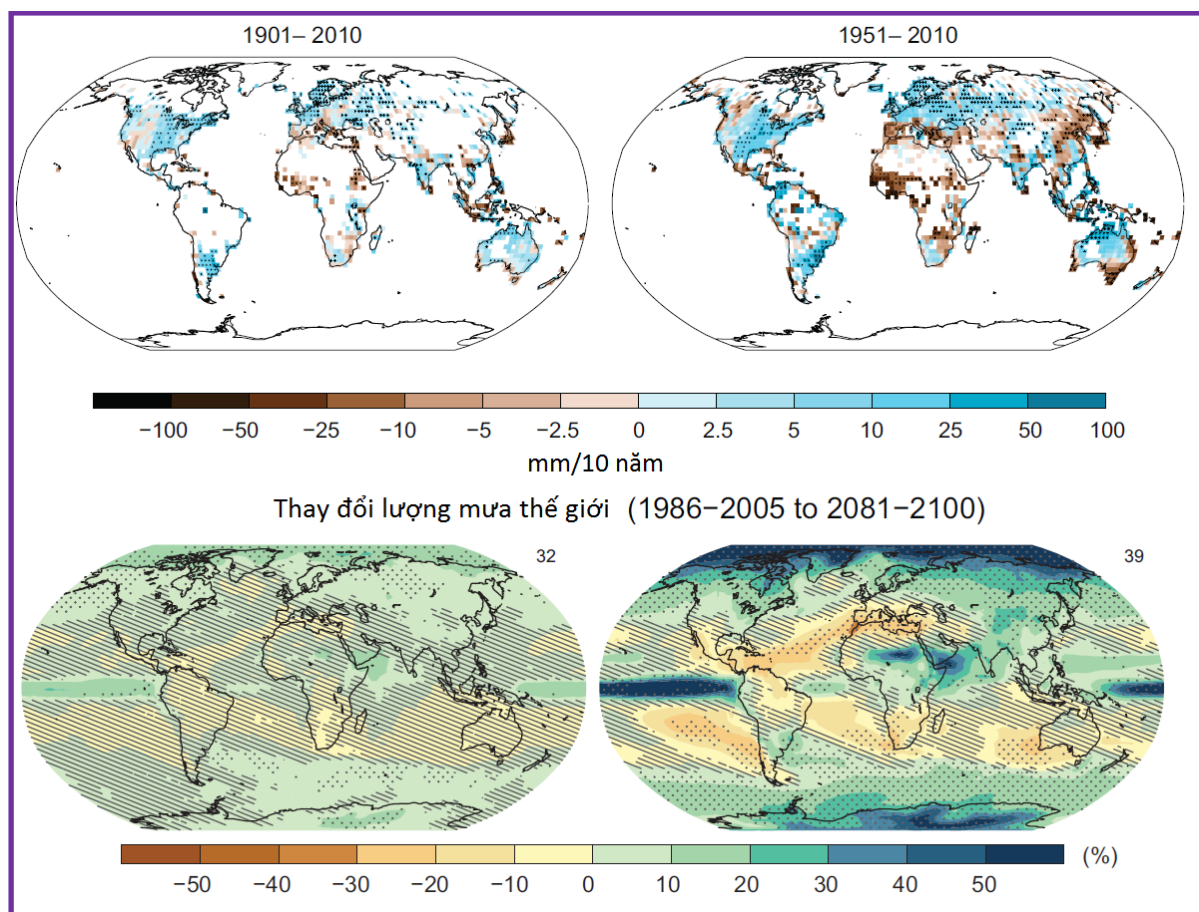
Figure 19 Map saltwater intrusion in the Mekong Delta in 2010

Tornado and Storm

On July 30th, 2014, in Co Đò Town, Co Do district, Can Tho city, a strong tornado damaged 147 houses, 56 of which collapsed completely, the estimated total cost of damage went up to hundreds of billions VND. According to the agencies specializing in meteorology, the ratio between the number of storms and tropical depressions in Mekong Delta over the total number of that in all over Viet Nam has increased in the recent years, from 0.75% in 100 years ago to 2.85% in the last 50 years. That storms in the region have increased both in frequency and intensity is a constant threat both in the short-term and the long-term towards all fields, areas and communities. According to the national target program against CC, Mekong Delta, including Can Tho city, is very vulnerable to storms and tornadoes due to its flat topography. In future, storms and tornadoes may cause more and more damage to the power system, plants, houses and other land constructions.

1.2.3. Other challenges

Unable to proactively control the water resource



Source AR5-IPCC

Figure 20 Precipitation model in the world to 2100

Local rainfall is decreasing. According to the latest report (AR5) of IPCC, in the Mekong Subregion, rainfall of the period of 2081-2100 is predicted to remain unchanged, and is likely to be lower than the period of 1981-2005. Meanwhile, the countries from upstream Mekong River are constructing many dams for their hydroelectric power stations, their demand for water required for development also increases, making it impossible for Mekong Delta, including Can Tho city, unable to control the volume and regimes of the natural water resource.

Land deformation and subsidence

According to the Norwegian Geotechnical Institute (NGI) in the seminar “Results of the Research Project, Phase 1 – Land Subsidence in Ca Mau Peninsula” which took place in Can Tho on June 17th. Due to the extraction of the underground water, the land surface of Ca Mau province is subsiding. In Can Tho, this phenomenon is also an issue that requires attention and researches.

Currently, there have been no specialized researches to reveal the truth of whether or not the land surface in Can Tho and Mekong Delta is subsiding. Yet, from the phenomena of: (1) In Chau Doc, the impact of the tides during the flooding season is increasing (2) the water levels in Can Tho (both lowest and highest) is rising; (3) the volume of water from the East Sea flowing into Can Tho is increasing, while the rate of SLR is only 3mm/year. Findings about the causes of the above phenomena all converge on the subsidence of land.

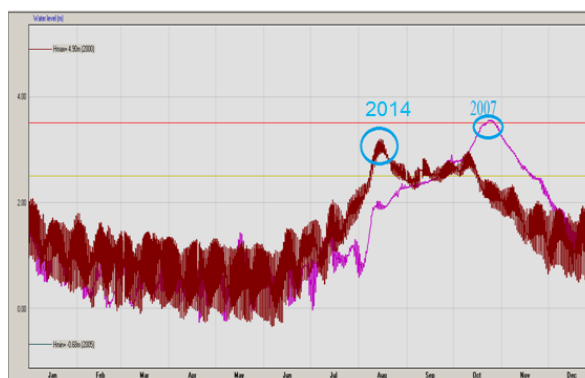


Figure 21 Comparing the tidal oscillation in 2007 and in 2014 in Chau Doc

1.2.4. Social and economic weaknesses

The local economy is not strong enough:

The local economy depends mainly on agriculture, aquaculture, and exportation of raw, low value products and materials. Social accumulation is not high, and the infrastructure, especially the constructions against natural disasters, is still weak.

Knowledge and awareness of the community are low

People's awareness about CC and the capacity to respond to CC has been improved, but is still far from reality. There is still confusion between the threats from the unsustainable development activities and those from climate. The idea that the activities to respond to CC are purely social work, and are unable to generate profits is still popular among the business sector.

lack of qualified human resources

The departments in Can Tho city are working hard but are still unable to meet the demands of the missions in their own fields. Most officials are not specialized and full-time in working with CC responding activities. This can be an additional burden for the related departments.

The system of state agencies on climate change management¹⁰ in Can Tho city needs to be consolidated. Accordingly, there needs to be a specialized agency to take care of the CC responding activities. For CC is a rather new issue, it is necessary for the departments and agencies to update their work constantly and persistently.

Laws and policies are out-of-date

The current laws and policies have existed before the occurrence of CC. Therefore, they are unable to support effectively in terms of people's awareness, or to meet the practical demands for CC responding activities. For the time being, city government has not come up with suitable financial policies or policies in other aspects in order to support the CC responding activities and mobilize the private business sector, as well as the whole society, to take part in implementing these activities.

No local budget for CC responding activities

The income per capital in Can Tho is still low compared with other cities directly under the central government. The poverty rate remained at 10.46%. The income difference between rich and poor households, urban and countryside areas is rather big. The Economy is mainly based on agriculture and processing industries. Most of the revenue of local government is submitted to the central, while investments from the state and private sector are still limited. Thus, the budget for CC responding activities is dependent on financial support from the central government and international donors. There is no constant budget for Can Tho city. Financial difficulties have had negative influence on the implementation of the specialized plans and projects.

¹⁰ Resolution no. 08/NQ-CP, 2014

Lack of comprehensive coordination among different levels, fields and stakeholders

The cooperation among the different departments and units of the districts of Can Tho city in CC is not close enough. This can be seen from the lack of cooperation among local government units with city departments in the management and deployment of the irrigation works for aquaculture or the works against flooding, contributing directly to the increase of flooding in urban areas.

1.2.5. Possibilities to exploit benefits from CC

Though CC brings many threats for the society, there are still some benefits coming along that need to be studied to exploit effectively, such as the positive phenomena of:

-Agricultural productivity tends to increase, due to sufficient sunlight, abundant CO₂ in the atmosphere and still sufficient water – the optimal conditions for the photosynthesis of plant. But for how long will this last? When will plants reached their maximum productivity and start to suffer from the bad effect of CC? These things will happen for sure in the future, if the world fails to figure out an effective solution.

-In order to respond to CC effectively, the communities have to change their living habits, social lifestyles into greener, more eco-friendly ones. This can help raise their awareness and responsibilities in protecting the livelihoods of their local communities and applying advanced technologies into using the natural and power resources more effectively.

-The completion of the interventional projects will attract financial and advanced-technological investments from the world, promoting green economy for Can Tho city.

II. ORIENTATION TO CC RESPONDING AND DEVELOPMENT

II. 1. Viewpoints

- Proactively respond to CC and protect natural resources is the mission of the political system; responsibility and duty of government agencies at all levels, unions, enterprises and communities, of which the people's committees at all levels must play the key roles.¹¹

- CC Adaptation activities must follow the principle of serving the lives, health and property of the people and their community, and on that basis, serving the development suitable to the conditions of each local area.

- CC Adaptation activities of the city must be based on the actual needs, and must be inter-regional, inter-sectorial, with concentrated investments for obvious purposes, and shared responsibilities of all local governments within the region.

II. 2. Approaches

- Based on the actual data provided by the agencies specializing in statistics, the Office used the software of Excel to calculate, analyze, and assess the data related to economy, society, hydrometeorology...with reference to the documents on climatic models from MoNRE and the latest report of IPCC¹².

- Referring to the official documents, decisions related to the orientation planning for the socio-economic development of Mekong Delta and Can Tho city.

- Combining the planning model of bottom-up and top-down, together with the support from scientists and consultants, including the following steps:

1/ Propagate, organize training courses to raise people's awareness about the practical CC in their local areas, improving their capacities to respond locally. The people mentioned here are specified as the ones who concern and knowledgeable about, and have settled for years in the areas.

2/ Collect information about disasters, the climate, local people's opinions and wishes in responding to the calamities often occur among the local community. This information will be reviewed and proposed by the government at ward and district levels.

3/ Edit the information, opinions and wishes about responding to CC proposed by the districts to make a draft action plan against CC, then send it to experts to ask for professional consultancy, as well as organize SLD workshops to listen to the comments, assessments and additional suggestions from the scientists and departments on the draft. This kind of consultation must be done several times. The scientists mentioned here are specified as

¹¹ Program no. 39-CTr/TU of Can Tho City Commission, dated July 25th, 2013

¹² Fifth Assessment Report of IPCC (AR5), 2013

the ones who are profoundly expert in the fields related to the work of responding to the natural disasters and CC, protecting ecological environments and socio-economic development of the local area.

4/ Modify, supplement with additional ideas, and finalize the action plan and send it to the departments authorized in planning management for revisions, and then submit it to the People's Committee for approval and financial arrangements to implement the plan.

5/ After being approved, the plan will be promulgated so that all agencies, local governments, organizations, and communities will implement it together. The plan will be reviewed frequently for any necessary adjustments, so that it will always meet the demands of CC adaptation in Can Tho city.

II. 3. Orientation for adaptation

-CC adaptation includes all the construction-based and non-construction-based activities for the main objective of mitigating the impacts, based on the application of cost-benefit calculations, and concerning about the environment and the no-regret principle.

-Sustainable CC adaptation based on the development of a green economy, taking the responding activities as the basic motivation for economic development, raising people's living standards and livelihoods and, in return, taking the improvement in people's income, accumulation, socio-economic development as an enhancement for the city communities' capacity to respond to CC.

-The priority order of adaptation activities and projects follows the Decision no. 1485/QĐ-BKHĐT, dated October 17th, 2013 of the Minister of Planning and Investment about the issue of the guidance framework for priority CC adaptation options in planning the socio-economic development, with the 4 steps:

+Step 1: Identify the priority targets for adaptation

+Step 2: Classify, select the projects that suit the priority targets in Step 1,

+Step 3: Grade the selected projects on their extents of meeting the targets,

+Step 4: Rank the priority projects on their extents of meeting the targets

And integrate the priority projects to the annual plan for socio-economic development of the local area.

III. OBJECTIVES, KEY TASKS, AND SOLUTIONS

III. 1. CC threats in Can Tho

Based on the results of the assessment about the impacts of CC made by the working groups (with the participation of communities) in 9 districts in the Can Tho city, some CC impacts can be identified as follow:

Table 1 Summary of CC threats to Can Tho

District	Factors of Impact				
	High Temperature	Flooding	Erosion	Tornadoes	Salinity Intrusion
Cai Rang	**	***	*	*	**
Phong Dien	*	***	***	**	-
Ninh Kieu	***	**	*	**	*
Binh Thuy	**	**	***	*	-
O Mon	*	***	*	*	-
Thoi Lai	*	***	*	***	-
Co Do	*	***	*	**	-
Thot Not	**	***	**	**	-
Vinh Thanh	*	***	*	***	**
Can Tho city	**	***	***	**	*

Source: Report on natural disasters in the districts 2012

Note: *: mild; **: moderate; ***: severe; -: no impact

Table 2 Harm of CC threats

Fields of life	Factors of Impact				
	High Temperature	Flooding	Erosion	Tornadoes	Salinity Intrusion
Health	***	**	***	***	*
Property	*	**	***	***	**
Livelihood	***	**	***	**	**
Aquaculture	***	***	*	***	***
Agriculture	**	***	***	*	**
Industry	**	**	*	*	*
Tourism Services	**	+/-	*	*	*

Source: Report on natural disasters in the districts 2012

Note: *: mild; **: moderate; ***: severe

+/-: beneficial or harmful depending on the different circumstances

In short, to adapt to CC in Can Tho is to ensure the capacity and infrastructure for the communities to cope with high temperature, flooding, bank erosion, tornadoes, and salinity intrusion.

III. 2. Objectives for CC responding

According to the Action plan to respond to CC Can Tho City Commission¹³ the objectives for CC responding plan in Can Tho city until 2020 are as follow,

- Improve the capacity for disasters forecasting and warning, CC monitoring;
- Make and implement effectively the plan to respond to CC in the period of 2015-2030 in the direction to 2050¹⁴;
- Establish the responding network for Mekong Delta;
- Develop the awareness and responsibility of every member of the society about proactively preparing for natural disasters and responding to CC in order to mitigate the damage;
- Build constructions to limit the negative impacts of the tides, floods, salinity intrusion, guaranteeing people's lives and livelihoods;
- Propose to consolidate, improve the legal policies, current financial regulations, facilitate capacity building and effective operation for CC responding activities;
- Focus on developing and upgrading local and community medical facilities.
- Improve the quality and diversity of the professions, focusing on the development of highly skilled workforce, meeting the demands of human resources for economic integration and CC adaptation;
- Gradually orient the market of industrial – agricultural production and services suitable to the conditions of Mekong Delta.

III. 3. The key tasks and solutions

According to the official documents: Resolution no. 07- NQ/TU of Can Tho City Commission dated December 06th, 2012; Program no. 39-CTr/TU of Can Tho City Commission, dated July 25th, 2013; Resolution no. 08/NQ-CP, dated January 23rd, 2014 about the action program to implement the resolution no. 24/NQ-TW,

III.3.1. Propagate and educate to raise awareness

- Build new and renovate the network for monitoring the hydrometeorology, environment, and land-distortion (subsidence); build and consolidate the database for socio-economic development in general and for CC responding in particular. This database includes actual and accurate data from the local areas, throughout the country, as well as international regions about natural disasters, hydrometeorology status..., making them the basis for the propagation to raise awareness, as well as the making of responding plans.

Particularly, for the international hydrometeorological data set, the set of all the regions around Mekong River is essential, especially the stations from Stung-

¹³ Program no. 39-CTr/TU of Can Tho Commission, dated July 25th, 2013

¹⁴ Resolution no. 07- NQ/TU of Can Tho Commission, dated December 06th, 2012

Treng, Cambodia to the border of Viet Nam, for the hydrological regime of this area affects directly to Mekong Delta.

- Compile the standard sets of documentation for the propagation about CC for: communities, local officials, city officials, leaders of different fields, teachers, lecturers and students of all levels..

- Issue regular special columns and programs about the CC activities, damage and the responding results on the media. Making the propagation to raise awareness about CC responding and protecting environment a compulsory module in the training courses for officials and specialists at all levels.

- Prepare and promulgate the “Green Standards”, among the departments and local governmental units at all levels. These standards are about eco-friendly ways of life, work, manufacturing and business, service, with no or least emission of green-house gases, following the development trend of a green economy.

- Annually classify and rank the local areas and government agencies of Can Tho city for their environment protection and CC responding accordingly to the “Green Standards”. Commend and reward the individuals, local communities, departments that have good achievements or initiatives, and consider penalizing the ones who do not obey the “Green Standards”.

- Cooperate with the Institutes and Universities, Research Institute for Climate Change (DRAGON Institute) of Can Tho University to train, drill the civil servants, officials, of the offices, departments, sectors of the districts of Can Tho city, especially the ones who are in charge of activities to respond to CC.

III.3.2. Support diversified response with scientific researches

- Prepare to establish and operate the “Scientific Advisory Board for responding to CC and mitigating the damage from disasters in Can Tho”. The Board consists of: scientists about the nature, hydrometeorology, manufacturing and local eco-system; and national and international scientists from many other fields of expertise. The Board is responsible for giving advice and counselling the 158 Steering Committee and CTPC, helping them in identifying the priority responding activities to invest, as well as the initiatives to be researched and experimented on...

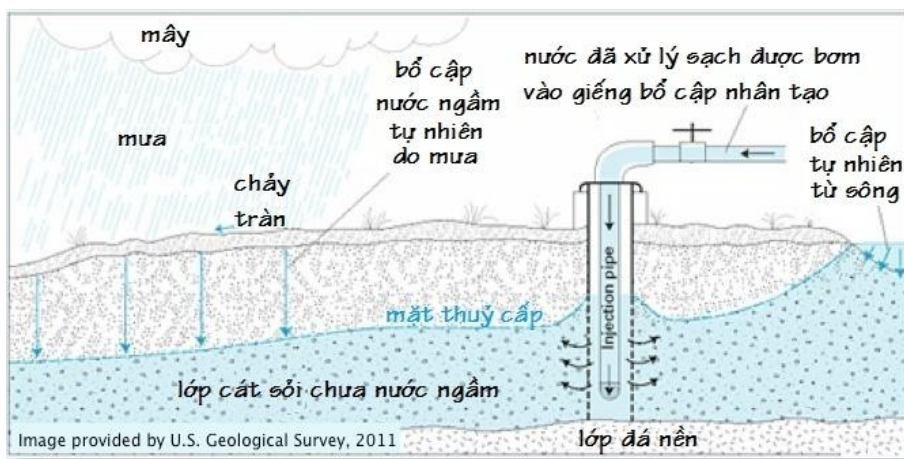
- Research and apply the remote sensing technologies into examining land distortion; make plans for groundwater recharging in order to overcome land subsidence; as well as research the impacts of the hydrometeorology regimes of the areas from upstream Mekong River that lead to the seasonal and unusual flooding in Can Tho and Mekong Delta and propose solutions for these phenomena.

- Support the enterprises in processing for exportation to research and improve their food processing and producing lines to produce instantly-usable end-products, in order to increase the export value and the income for employees.

-Study and apply the solutions for bank erosion, together with creating sustainable livelihoods for people, including: set up the technological chain for producing PVC plastic panels for protection of the river and canal banks in Can Tho and Mekong Delta; compile and promulgate the conditions and standards for designing the embankments made of PVC plastic panels...

-Applying the policies of the state¹⁵, proactively study, improve and promulgate the “Policy for self-balancing agro-livestock-aquatic production”, via the diversity of crops, partly shifting from rice growing to vegetable growing and aquatic and livestock feed. Increase the investments for fertilizer factories to manufacture the fertilizers suitable for the rice-field and plants in Mekong Delta.

-Research for the completion and invest for the application of producing lines of clean agricultural products, processed products, power, and materials for constructions-transportation...towards a green economy: saving raw materials, power, and water.



Source: The United States Geological Survey, 2011

Figure 22 Diagram principles and groundwater recharge



Source: Thanh Phat Company, 2012

Figure 23 PVC embankment works of Dam Sen Park, HCMC

¹⁵ Decision no. 889/QĐ-TTg, dated June 10th, 2013 about approving the proposal to restructure agriculture.

III.3.3. Improve capacity for State administration in CC.

- Promote the cooperation with the Southwest Steering Committee and neighboring areas in the implementation of the construction-based and non-construction-based projects to respond to CC via establishing and operating the Policy Dialogue Forum, building the “Strategy on CC for Mekong Delta”.

- Consider the possibility to establish Can Tho Commission on CC to give advice, helping People’s Committee with inter-sectorial CC responding activities and realizing the international cooperation about CC for local areas following the model of National Committee on Climate Change¹⁶.

- Improve the capacity in administration for the DoNRE and its units to carry out the work of State administration related to CC, including: preparing the specialized workforce who can work with foreign languages; technological machinery for monitoring, forecasting, testing... making suitable plans and preparing the necessary budget. Promote the role and function of counselling and serving Can Tho Commission on CC in managing the specialized activities and cooperating with other agencies in Mekong Delta, and in the whole country, to implement the responding activities or projects, using the budget of the local or central government in Can Tho.

- Improve the capacity of the CCCO, in order to mobilize international funding, and using it effectively to resolve the local urgent, actual needs; and to assist Can Tho Commission on CC in cooperative activities of construction and coordinating the implementation of the projects related to CC that receive international funding. The criteria of the Office to recruit more personnel: postgraduates in environment and water resources, sociology or diploma... with proficiency in English.

- Improve the capacity of the Specialist Group on CC response directly under Can Tho Commission on CC. The Specialist Group is responsible for collecting information from the local areas, and within the sector, in order to counsel the Commission, the Office of Water, Mineral Resources and Hydrometeorology (planning to establish the Office for Hydrometeorology and Climate Change in the future), and the CCCO in the making and implementation of the responding plans, programs, projects suitable to the current conditions of the local areas and operating requirements of the Departments. Members of the group include the staff in charge of planning and professions of the agencies and units and the People’s Committees at district level. They are also responsible for creating and applying standard processes to mobilize and consolidate the participation of communities, organizations, and businesses... in CC responding.

- Introduce the additional task of advising, cooperating in CC response activities in Can Tho to the departments, sectors, and local communities.

III.3.4. Improve, renovate the policies, laws

- The Commission on CC instructs the CCCO to make the plan and find the fund for implementation, and to propose that the Southwest Steering Committee try to establish, operate “Mekong Delta Policy Dialogue Forum on CC response”. The objective of this forum is to unify the responding activities in the region, concentrating the strengths and forte of the local communities to reduce poverty, improve community life, improve the economic capacity of the region, in order to improve the capacity to recover and respond effectively on CC, seeking to build a green economy together.

- Promulgate the Set of Regulations to define the policies of the city in promoting the use of technology and equipment that help save power-water-other resources. Support the manufacturing of the components, products, machines that apply the technology of the renewable energy such as: solar power, wind power, biomass power. Favor the construction and operation of the factories that use advanced technology to produce new materials used in the sectors of construction, transportation, irrigation...

- Mobilize to successfully compile and apply the “Cooperation mechanisms to respond to CC”, which are inter-sectorial, inter-regional, and consist of ways to handle violations, resolve contradictions, conflicts of interests, among the local areas in the city and in Mekong Delta.

- Compile and promulgate the criteria (or index) to measure the degrees of necessity and success of the responding activities; the objectives to assess and select the professions and the areas in need of investments as well as identify the appropriate approaches of investment for each type of activities.

- Promulgate the instructions for integrating the factor of CC responding into projects already approved, or the annual or 5-year-periodic plannings, and the activities, projects for future socio-economic development of the city and its unit, based on the actual hydrometeorological database of the local areas.

III.3.5. Improve, renovate financial mechanisms

As CC is becoming more frequent and complicated, in many different forms such as: increased temperature, floods, tornadoes, bank erosion, salinity intrusion, lightning..., the demand for researches, constructions, and transportation and irrigation facilities is becoming more diverse and persistent. Thus, the city needs to create, manage and use effectively the funds for the above tasks.

According to preliminary calculations¹⁶, by 2030, in order for the city to achieve the basic degree or capacity of responding, a total amount of 25,575 billion

¹⁶ Preliminary calculations from the Delta Program no. 2 of the Netherlands, 2010 and the budget estimates from the local projects.

VND¹⁷ of funding is required, particularly, from now to 2020 an amount of 5,697.5 billion VND; from 2020 to 2030 19,877.5 billion. These are just general calculations, and can vary, depending on the practical situations of the city.

In order to mobilize an amount of 25,575 billion, average revenue of the city budget must reach 852,500 VND/person/year, throughout 15 consecutive years. This amount of money might come from many different sources: local tax revenue, financial support from central government; loans; investments from private sector; international donors; or the funds voluntarily contributed by individuals, groups. In order to gather money from the communities, the core issue is to renovate the economic structure, promoting economic growth.

Renovating the economic structure

Assuming to take the model of the Netherlands against flooding as standard, in order to have enough economic potential for the demand of investments to respond to SLR and CC, Can Tho city must proactively and dynamically restructure GDP as follows: Sector I: <5%, Sector II: 25%, and Sector III >70%.

The total production value of agriculture should be maintained or increase compared to now, yet it should only make up about 5% of GDP; the value of Sector II must continue to be reinforced, the proportion of Sector III must be promoted strongly. Particularly, in the next years, there must be policies and activities to successfully encourage the increase in the value of Sector III.

The fields in Sector III that Can Tho city can focus on: transport services, inland freight, exportation leadership for the friendly countries of Thailand, Cambodia and other countries; Construction services, especially for CC responding works in the region and neighboring countries; Services of designing, producing, and installing clean energy systems on many scales; Eco-tourism services, CC responding tourism and sport services, especially beauty salons...

Creating the budget for CC

+ Sources from: economic career; science career and development investment¹⁸. This budget is used for determining the projects and organizations to study the feasibility priority projects in order to mobilize the support, participation or sponsorship from international financial organizations and NGOs.

+ State budget for CC career: suggest the People's Councils, the Congress to supplement this budget into the list of State budgets.

¹⁷ LIST OF TASKS AND PROJECTS, page i

¹⁸ Joint Circular No. 07/2010/TTLT-BTNMT-BTC- BKHĐT, dated March 15th, 2010 about Guidelines for the management and use of the funding from state budget to implement the National Target Program on CC period 2009-2015

+Establish a new Fund for CC response development, or introduce the task for CC responding to the current Investment fund of the city accordingly to the regulation of the state¹⁹.

+Study and apply the regulations of the Ministry of Finance²⁰, channeling the profits from city lottery activities into establishing local CC responding funds.

+ Mobilize the funding from international governmental and non-governmental organizations in the world, as well as the donors in homeland.

Encouraging the private sector to invest in CC responding activities.

- Guarantee the revenue of businesses during investment socialization, maintaining the responding works of: flooding prevention, civil constructions, community health-care, processing manufacturing, together with the livelihoods, especially for the poor laborers.²¹

-Promote the policy to decrease corporate income tax to 10% in 15 years²².

- Promulgate the policies to encourage, promote CC responding insurance activities of the insurance companies in the local areas.

III.3.6. Integrate to international CC response

-Invest to make the list of priority projects, and compile feasible plan to mobilize the funding from World Bank, ADB, Japan International Cooperation Agency, Rockefeller Foundation, Ford Foundation, German Agency for Technical Cooperation and other European relief organizations, as well as their assistance to implement the studies, feasible and focused projects related to CC.

-Prepare sufficient documentation for Can Tho city to join the organizations of Delta Alliance in the world (from the Netherlands and American);

-Study and propose projects and take part in the CCAI activities of MRC.

-Mobilize the neighboring provinces, under the guidance of the Southwest Steering Committee and MoNRE, to complete the set of “Rules to use, exploit, protect the resources of Mekong River”, which is legally effective, eco-friendly including the principles, criteria for the exploitation and uses of the resources of Mekong River, to submit to the Government as a basis to negotiate with the other 6 countries within the basin of Mekong River.

¹⁹No. 138/2007/NĐ-CP, dated August 28th, 2007 about the establishment and operation of the Local Investment and Development Fund

²⁰No. 01/2014/TT-BTC, dated January 02nd, 2014 of the Ministry of Finance about Guidelines on the regime of financial management for lottery businesses

²¹Decree no. 124/2008/NĐ-CP dated December, 11th, 2008 of the Government about the detailed regulations and guidelines for the implementation of some articles in the Law on Corporate Income Tax

²²Decree no. 122/2011/NĐ-CP dated December 27th, 2011 about the amendments and supplements for the Decree no. 124/2008/NĐ-CP of the Government.

III. 4. Adaptation tasks for the mean time

The following programs include the inter-sectorial, inter-regional tasks that need to be carried out simultaneously to achieve the best synergic effects.

III.4.1. Proactive Adaptation

- Monitor the hydrometeorological and environmental status, especially the extreme factors to give early warnings. Consolidate and reconstruct a network for monitoring the hydrometeorological and environmental status, land-subsidence, and salinity intrusion. Apply information technology to the management and processing of data to give timely warnings, helping to propose suitable strategies. Train and raise the capacity of officials in managing the systems of warning stations, data and information.
- Make and help state agencies, businesses, and communities to maneuver regularly the plans to mitigate the damage from disasters.
- Plan the elevation of the foundations accordingly to areas: rice fields, orchards, farms, industrial zones, urban areas, traffic roads... and accordingly to the sub-zones of the river basin and environment. Define and promulgate the standards for proper construction to deal with future threats in each particular area of climate-environment.

III.4.2. Green livelihood, housing and manufacturing

For vulnerable people or people with difficulties to self-improve their capacity of social adaptation, this Program consists of interconnected tasks:

- Consult for the needs of the communities, and the demand for social goods to build the facilities for manufacturing and trading that satisfy a green economy²³;
- Provide vocational training for unemployed laborers with no stable incomes, and offer them jobs in the green facilities mentioned above;
- Consult about the wishes of people with no private houses in order to design, build and sell instalment houses to people who have jobs but have no stable dwellings; focus on improving the designs of super-low-cost houses²⁴ suitable for the conditions of poor workers.

III.4.3. Mitigation of CC damage

- Improve the Planning against flooding²⁵, counting in the threats of land-subsidence and urban flooding prevention.

²³ Focusing on 3 issues: i) Limit to the lowest possible the uses of coal, petrol, oil, gas... ii) Save as much electricity, water and raw materials as possible; iii) Augment more areas of greeneries, and temporary rain water storing....

²⁴ Super-low-cost houses, architect Vo Trong Nghia, 2014

²⁵ Decision no. 1721, dated July 20th, 2012 about Approval of irrigation works against flooding in Can Tho

- Combine the projects to make plans, build constructions for flooding prevention with the improvements and upgrades, or even renovations for the current road and waterway traffic system; follow the principle of “no-regret” in building constructions. This combination is to help increase the capacity of road and waterway traffic, prevent erosion and prepare for tornadoes and storms, using the comprehensive experiences on the prevention of flooding and SLR from the Netherlands²⁶.
- Combine the construction of residential areas overcoming floods with manufacturing areas, creating the livelihoods for the vulnerable people. Research, design and invest in building houses against storms, tornadoes, and floods²⁷, and provide them to the areas with high risks of disasters.
- Invest in producing materials, products, especially plastic products used in the building of houses, erosion preventing constructions, of many scales depending on the actual needs.

III.4.4. Improvement of CC responding capacity

Improve awareness and capacity of communities

- Promote the propagation of the standardized documentation on CC via the mass media, especially, to women, children and the elderly...
- Integrate the knowledge about preparing for, preventing, and mitigating disasters as well as responding to CC into the schools at all levels in Can Tho city.
- Study the feasibility of, and implement the “Project for undergraduate and postgraduate education in the major of CC adaptation”. Combine training with scientific researches, and applying them to address the local practical requirements on CC adaptation. The trainees must be of variety: regular students, officials, leaders and staff of enterprises, especially the private sector.
- Organize activities and training courses for the enterprises to invest to the responding works, producing of green materials, practicing of saving resources and raw materials in manufacturing.
- Hold annual formal events to acknowledge and reward individuals, groups that have achievements and initiatives in responding to CC.

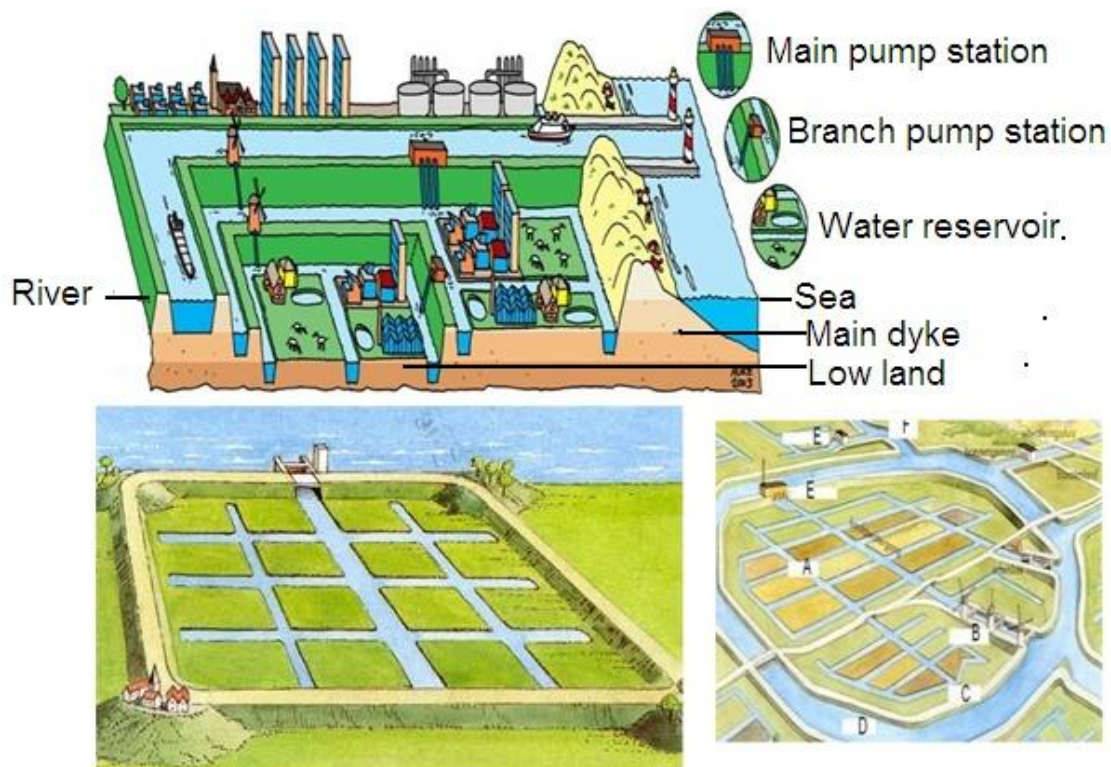
Protect public health and environment

- Study the prevention and remedies for the diseases related to CC, especially the mosquito-borne and gastrointestinal diseases.

²⁶http://thuycong.ac.vn/index.aspx?aac=CLICK&aid=ARTICLE_DETAIL&ari=670&lang=1&menu=thong-tin-trao-doi&mid=1019&parentmid=0&pid=1&title=vai-net-ve-thuy-loi-ha-lan

²⁷<http://blog.i-s-e-t.org/?p=544> ; <http://danangupi.vn/Default.aspx?PageId=1441>

- Make plans and maneuver medical emergencies such as SARS, Ebola...
- Research and implement the project to increase the capacity of the local medical facilities system, including propagating and mobilizing the communities to take part in the prevention, examination and treatment of common local diseases.
- Enhance the inspection and control of food safety on the streets and in households.
- Make plans for the improvement and renovation of the water supply system to suit with local conditions.
- Make plan for the treatment of waste-water in populated areas, urban areas and markets; make plan for the treatment and recycle of solid waste.



Source: Hydraulic Construction Institute

Figure 24 Diagram simulated irrigation systems Netherlands

IV. IMPLEMENTATION

1. Based on the implementation of the Resolution no. 07- NQ/TU of Can Tho City Commission dated December 06th, 2012; Program no. 39-CTr/TU of Can Tho City Commission about this Action plan to respond to CC in the period of 2015-2030, and based on the functions, missions assigned, the departments, agencies, people's committees of the districts in Can Tho city proactively make the action plans for the agencies and communities.
2. Leaders of the DoNRE assist the CTPC to unify the implementation of the action plans, summarizing the demands for human and financial resources, implementing the plans, reporting annually on the results of implementation to the People's Committee at year-end meetings.
3. Leaders of the other departments and of People's Committees at district level in Can Tho focus on steering, promote inspections, implementation of this Action plan, reporting annually on the results of implementation to the DoNRE so that they can make the summarized report city People's Committee.
4. The Department of Planning and Investment, Department of Finance, DoNRE, and CCCO, according to their functions, are responsible for the mobilizations and arrangements of homeland and foreign funding to guarantee the favorable conditions for the implementation of this Action plan against CC in the period of 2015-2030.
5. During the implementation, if any need for amendment and supplement of the details of the plan arises, the departments, sectors, communities must cooperate proactively with the DoNRE, CCCO to make report to CTPC and ask for their instructions./.

ON BEHALF OF CITY PEOPLE'S COMMITTEE

VICE CHAIRMAN

Mr. DAO ANH DUNG

APPENDIX I LIST OF TASKS AND PROJECTS

Action plan against CC in the period 2015-2030

No.	Name of Tasks / Projects	Target – Content	Est. Time	Hosting /Cooperating Unit	Est. Budget(Bil. VND)
I	Period 2015 – 2020				6,392.5
I.1	Program for Proactive Adaptation				
1	Propagate to raise citizens' awareness about adapting, responding to CC, natural disasters (Phase 1)	Raise awareness of the people in the area about CC. Expectation is to raise knowledge for 100,000 people.	2015-2020	CCCO/DoNRE, DoIC, DoET	70
2	Improve the capacity of hydrometeorological monitoring to have early warnings about disasters.	Increase the capacity to provide information about disasters, predicting the trends and giving out warnings.	2015-2016	DoNRE / CFM	150
3	Assessing the impact of CC on water resources in the districts of the city	Define the extent of impact of CC towards the area and its water resources	2015-2017	DoNRE /DoARD	5
4	Make plans for ground elevation and surface-water sewerage (GE&SWS) in Can Tho city until 2020, vision to 2030	- specify the development of GE&SWS according to the General Plan of Can Tho city until 2030, vision to 2050. - Propose plans, itineraries and determine the resources for the planning of GE&SWS.	2015-2020	DoC/ DoNRE	100
5	Project to develop a comprehensive system of transportation to respond to CC & SLR. Build and upgrade the capacity to respond to CC for road and waterway transportation works in Can Tho city (Phase 1)	Study, propose solutions for smart traffic, multi-method transportation, synchronous, interconnected works of transportation...regarding the factors of CC	2015-2020	DoT /DoC, and DoNRE	100
6	Project to build the flood preventing	Upgrade and build new the system of works for flood	2020-	DARD / DoC	425

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	system in central Can Tho city	prevention, sewerage, and protection of the riverbanks residential areas, infrastructures in central Can Tho.	2030		
7	Project to upgrade the infield irrigation system in Can Tho	<ul style="list-style-type: none"> - Invest in building infield irrigation system, finalizing the infrastructure for agricultural production, building modern rural areas and responding to CC; - Build the self-flowing irrigation system combined with electric water pumping station suitable with natural and producing conditions. 	2020-2025	DARD /DPI, DoC	270
I.2 Program for Green Livelihood, Accommodation and Production					
1	Project “Apply and transfer technologies in CC adaptation” (Phase 1)	Respond to CC; ensure stable production; solid housing; decrease greenhouse gases emission; protect the environment; People are aware of protecting the environment, using clean fuel, using fuel effectively	2015-2020	DoScT/ DARD, DoNRE, CCCO	150
2	Project “Support the relocation of industrial manufacturing facilities interspersing among residential areas into industrial zones, complexes” (period 2012–2015, oriented to 2020)	<ul style="list-style-type: none"> - Promote effective industrial development. - Ensure stable lives for people, sustainable environment in planning for the industrialization of the city 	2015	DoIT/ DoC	100
3	Action plan about cleaner industrial production in the areas of Can Tho city (period 2011 – 2015)	Develop the industries towards green development	2015	DoIT / DoNRE	7.5
4	Plan to implement the Program for Green Energy of Can Tho city	Increase the use of green power in the living, manufacturing, trading activities...	2015	DoIT /DoNRE	3
5	Project to implement national target program about using energy sparingly and effectively in Can Tho. (period 2012 – 2015)	Increase the capacity and efficiency in using power for living, manufacturing, trading activities...	2015	DoIT /DoNRE	3

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6	Invest in producing, trial application of new materials, technologies into housing, traffic, recreation facilities.	Enhancing the value of production and services in the general GDP structure. Create stable jobs and livelihoods for poor people	2015-2020	DoIT / DoST&DoNRE	3000
7	Project to research and train human resources, and experiment the development of an economy with tourism & sports services, combined with stabilizing people's livelihoods suitable to local conditions.	Contributing to diversifying and restructuring the economy towards increasing the proportion of services to 70% in the economic structure. Improve living standards and social income, especially for the poor	2015-2020	DoCST/ DoT; DoC; DoIT.	1000
I.3 Program for CC Damage Mitigation					
1	Build places to keep children safe in areas under high risk of flooding	Prevent drowning among kindergarten kids; Complete 06 places to keep children safe in flooding areas in 2 districts: Vinh Thanh & Co Do – 2 rooms for each place	2015-2020	DoET /DoC	12
2	Enlarge the green areas in the districts of Can Tho city	Reduce heat; minimize bank and soil erosion; create a green environment	2015-2020	DoC /UWC	18
3	Plant trees in schools in Can Tho city	Respond to the changes of weather, temperature. Raise the awareness to protect the environment for school staff, teachers and students	2015-2020	DoET /UWC, DARD	4
4	Build pools to store water, helping with floods, as well as forming marsh parks to help preserve biodiversity.	Store water for use during the dry season, help with urgent flooding situations, and protect local endemic species... Develop eco-tourism, create more livelihoods	2-15-2020	DoNRE / DARD&DoCST	500
I.4 Program for Raising the Capacity to Respond to CC					
1	Project to study and propose solutions to reduce greenhouse gases emission from transportation activities in Can Tho city	Select, propose, and organize the operations of new-tech, eco-friendly means of transport and traffic systems. Reduce greenhouse gases emission	2015-2020	DoT / DoNRE, CCCO, DoST	5
2	Program to prevent drowning and build Composite swimming pools for children in the districts of Can Tho.	Mitigate the impacts of disasters upon the weak, vulnerable citizens of Can Tho. Averagely 1 - 2 Composite swimming pools for each district	2015-2020	DoET /RCA, WU	50

CAN THO CLIMATE CHANGE ACTIVITIES STRATEGY IN THE PERIOD 2015-2030

3	Education programs to provide knowledge about CC, diseases prevention and disasters mitigation for students of all levels	Integrate knowledge (theory and practice) into the curriculum of all levels	2015-2020	DoET / CCCO	30
4	Build systems of multipurpose schools: education - shelter - emergency (Phase 1)	Improve the public capacity to respond during the rainy and flooding seasons, and in times of disasters	2015-2020	DoET /DoC	360
5	Project to improve the supplies of clean water people in rural areas of Can Tho to respond to CC (Phase 1)	Supply sufficient clean water for people in rural areas. Strengthen the confidence of ethnic minorities. Protect the resources of underground water. About 30.000 people will benefit directly from the project	2020-2030	DARD/CRW, WSSC.	30
II	PERIOD 2020 – 2030 (with assessments from period 2015-2020 to consider necessary adjustments)				19.182,5
II.1	Program for Proactive Adaptation				
1	Propagate to raise public awareness in Can Tho to adapt, respond to CC, disasters (Phase 2)	Review and learn experiences from Phase 1. Improve local public awareness about CC. Expectation is to raise awareness for 200.000 individuals.	2015-2020	CCCO/ DoNRE, DoIC, DoET	140
2	Project for urban development and upgradation in Can Tho and Mekong Delta to adapt to CC.	Increase the capacity for Can Tho city in establishing, implementing, and operating the urban infrastructure services effectively, adapting to CC, developing sustainably.	2020-2030	UUPM / DoC, DARD	6600
3	Collect, process the packaging of crop protection products in agricultural production	Increase the awareness to protect environment in agricultural production.	2020-2025	DARD / CCCO	5
4	Project of embankments to prevent erosion for Cai Son Canal (along both sides)	Protect river banks, ensuring people's lives, helping the development and embellishment of a nice and clean urban civilization, promoting rural tourism. Create a good environment to attract tourists sustainably.	2020-2025	DARD / DoC	218
5	Project of embankments to prevent erosion for the area of My Khanh market	- Short-term: protect river banks; ensure accommodation and livelihoods for citizens along the riversides; safeguarding	2020-2025	DARD / DoC	206

CAN THO CLIMATE CHANGE ACTIVITIES STRATEGY IN THE PERIOD 2015-2030

		Provincial road 923 & Trang Tien bridge. - Long-term: secure riverbanks in Can Tho around the My Khanh market Phong Dien district;guarantee socio-economic development of the area of the project, contribute to ensuring the economic development in the province.			
6	Project of embankments to prevent erosion forRach Cam market, Long Hoa ward, Binh Thuy district, Can Tho city	Secure riverside roads;protect property and lives for people from disasters;the infrastructure of the area.Contribute to sustainable exploitation and development of general resources to develop the economy and protect the eco-system.	2020-2025	DARD / DoC	104
7	Raise the ground elevation, prevent flooding for Centers for Continuing Education, junior high schools, high schoolsin Can Tho	Guarantee the quality of education during flooding seasons. All flooded schools in the city will be upgrade.	2020-2025	DoET /DoC	1.000
8	Project to develop comprehensive traffic and transport,responding to CC and SLR. Build & upgrade the capacityto respond to CC for road & waterway traffic works in Can Tho (Phase 2)	Review & learn experiences from phase 1,enhance the capacity of the traffic and transportation constructions in Can Tho to withstand the impacts from CC. Build the key constructions that contribute greatly to CC responding.	2020-2030	DoT / DoC	200
II.2	Program forGreen Livelihood, Accommodation and Production				
1	Apply & transfer the technologies to adapt to CC(Phase 2)	- Review & learnexperiences from phase 1 - Continue to consolidate the activities of studying, applying, transferring the technologies to respond to CC;stable production;greenhouse gases reduction;environment protection; uses of clean sources of fuel.	2020-2030	DoST /DARD, DoNRE, CCCO	300
2	Build residential complexes against flooding	Relocate the households in the areas under high risk of erosion. Provide accommodation in residential areas against floodscombined with securing the livelihoods.	2020-2025	DoC /DARD	1000
3	Implement the model of rice cultivation	Support farmers to reduce production costs, as well as	2020-	DARD / CTU, CRR1	3.5

CAN THO CLIMATE CHANGE ACTIVITIES STRATEGY IN THE PERIOD 2015-2030

	that decrease greenhouse gases emission and crop protection products residues in Can Tho city	reduce greenhouse gases emission and crop protection products. Collect, utilize & tackle the straw. Organize training courses for new-tech solutions, emission reduction. Apply science & technology into cultivation.	2025		
II.3	Program for CC Damage Mitigation				
1	Project to make plan, build multipurpose works to prevent floods combined with improving and upgrading the road & waterway traffic systems of Can Tho city	Follow the principle of “no-regret” in the construction of works, building works that can prevent floods as well as interconnected traffic system.	2020-2030	DARD / DoC, DoT	10000
II.4	Program for Raising the Capacity to Respond to CC				
1	Project to increase the supplies of clean water for people in rural areas of the city to respond to CC – Phase 2	Review & learn experiences from phase 1. Supply sufficient clean water for people in rural areas and ethnic minorities’ households. Strengthen the confidence in the State’s policies of people in area of the project. Build the infrastructure to develop the economy in the area. Contribute to protecting underground water.	2020-2030	DARD / WSSC, CRW	40
2	Project to study and propose solutions to reduce greenhouse gases emission from transportation activities in Can Tho city	Reduce greenhouse gases emission in the future. Select, propose eco-friendly means of transport. Implement new technologies which are applicable in Can Tho, ensuring sustainable development & reduction of greenhouse gases emission.	2020-2030	DoT / DoST, CCCO	5
3	Establish the system of multipurpose schools: education - shelter - emergency (Phase 2)	Review & learn experiences from phase 1. Increase the public capacity to respond in rainy and flooding seasons, and in times of disasters	2020-2025	DoET / DoC	360
TOTAL					25,575
III	PERIOD 2030 – 2050: Review & assess period 2020-2030 to consolidate, supplement and adjust tasks suitable for the new period.				

APPENDIX II LIST OF OFFICIAL DISPATCHES FROM CENTRAL GOVERNMENT ON CC

No.	Code	Name of dispatch	Date of Issue	Content
1	35/2005/ CTTTg	Directive for the implementation of Kyoto Protocol under the United Nations Framework Convention on Climate Change	17/10/2005	The Prime Minister has assigned the MoNRE –the leading agency of Vietnam Government to participate and implement the Kyoto Protocol, having the responsibility to coordinate with the concerned agencies, planning and implementing the Kyoto Protocol in Vietnam;
2	47/2007/ QĐTTg	Decision to approve the Plan to implement Kyoto Protocol under the United Nations Framework Convention on Climate Change period 2007 – 2010	06/04/2007	The Prime Minister has assigned the MoNRE and concerned local departments and agencies to do the following main tasks: - Create and finalize the legal framework, system of legal documents related to the Convention on CC, Kyoto Protocol and Clean Development Mechanism (CDM); - Propagate, raise awareness, train human resources, finalize the organization and enhance the facilities to implement the Convention on CC, Kyoto Protocol and CDM; - Promote basic investigations, scientific research in order to implement the Convention on CC, Kyoto Protocol and CDM; - Improve efficiency, promote international cooperation for the Convention on CC, Kyoto Protocol and CDM; - Establish, organize activities to implement the Convention on CC, Kyoto Protocol and CDM in all fields to protect the climate, develop the society and economy.
3	158/2008/ QĐ-TTg	Decision to approve the national target program against CC	02/12/2008	The decision states clearly the viewpoints, guidance principles, scope of implementation and goals of the national target program against CC; bring out 9 necessary tasks and solutions; Estimate the budgets and allocate the funds to implement the program; organize the implementation: establish the National Steering Committee, Board of Directors and Program Office; responsibilities of the Ministries, agencies, localities and concerned functional agencies; the supervision and assessment of the implementation results of the Program is done at national, professional, and local levels.
4	04/2004/ QĐ- BTNMT	Decision to approve the Action plan to preserve and develop sustainably the wetlands	05/04/2004	Approve the Action plan for the preservation and sustainable development of the wetlands in the period 2004- 2010 with general and specific targets until 2010; with 7 action program in the period 2004- 2010; bring out the list of priority projects to implement in order to carry out the acts of the plan.
	172/2007/ QĐ-TTg	Decision to approve the National strategies to prevent, respond and mitigate disasters until 2020.	16/11/2007	Approve the National strategies to prevent, respond and mitigate disasters until 2020 with viewpoints and guidance principles, general and specific targets of the strategies; tasks and general solutions to prevent, respond and mitigate disasters for the whole nation and for each region. The Decision also points out the action plans with construction-based and non-construction-

CAN THO CLIMATE CHANGE ACTIVITIES STRATEGY IN THE PERIOD 2015-2030

5				based methods;the criteria to assess the process of the implementation the strategies;the tasks and implementation for concerned agencies and departments.
6	01/2004/N QLT- TLĐ- BTNMT	InterprovincialResolution aboutcoordinated actions to protect the environment, facilitating sustainable development	15/11/2004	Define the objectives and requirements of the Resolution; point out the content of coordinated actions among concerned agencies and departments; assign the responsibilities clearly of each agency and departmentin environment protection and sustainable development; bring out plans for implementation at each central and local level.
7	10/2006/T TBTNMT	Circular to guide the construction of projecst on clean development mechanism under Kyoto Protocol	12/12/2006	The Circularstates generallyabout the clean development mechanism (CDM) and the project on clean development mechanism; define the subjects, fieldsallowed to construct and implement CDM projects; the requirements for CDM projects; instruct the steps to prepare, construct, confirm andapprove CDM projects.
8	79/2006/ QĐ-TTg	Decision to approve theNational target program about using energy sparingly and effectively	14/04/2006	The Decision states clearly general and specific targetsof the program; points out 11 projects to improvestate management about using energysparingly and effectively, organize the system to manage energy for the program.The key solutions to implement the National target program aboutusing energy sparingly and effectively, including solutions for finance, investment in science & technology, and education, international cooperation.Organize the implementation of the National target program about using energy sparingly and effectivelyvia the establishment of the steering committeeof the state andassign the tasks clearly of each concerned agency and department
9	2730/ QĐ-BNN- KHCN	Decision to promulgatethe Action framework to adapt to CCfor the field of Agriculture and rural developmentperiod 2008-2020	05/09/2008	Promulgate the Action framework to adapt to CC for the field of Agriculture and rural developmentperiod 2008-2020, defining the maintargets and tasks;the main solutions and implementation for concerned agencies and departments; list of activities to implement the action frameworkto adapt to CCfor the field of agriculture and rural development
10	1819/ QĐ- BTNMT	Decision onthe "Promulgationof the Action program ofthe DoNRE... as Vietnambeing a member of the World Trade Organizationperiod 2007- 2010".	16/11/2007	The Decision has defined the key tasks, emphasizing the" Implementation ofthe activities related to CC adaptation ": Improve the awareness and capacity of the Vietnamese enterprises in reducing the risks when investing in the fields which are highly vulnerable to the impacts of CC,and promote investment opportunities in the field of emission tradingvia the clean development mechanism (CDM); Integrate the issue of CC its impacts into policy making, development planningand environment protecting, facilitating the economic integration and sustainable development;Construct a National Strategic Framework on CC adaptation.