Climate change adaptation planning under uncertainty in Ho Chi Minh City, Vietnam: a case study on institutional vulnerability, adaptive capacity and climate change governance

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CLIMATE CHANGE ADAPTATION PLANNING UNDER UNCERTAINTY IN HO CHI MINH CITY, VIETNAM

A case study on institutional vulnerability, adaptive capacity and climate change governance

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Declaration

I declare that all the material contained in this thesis is my own work. No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this university or any other institutions.

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Abstract

Climate change is expected to have wide-ranging impacts on urban areas and creates additional challenges for sustainable development. Urban areas are inextricably linked with climate change, as they are major contributors to it, while also being particularly vulnerable to its impacts. Climate change presents a new challenge to urban areas, not only because of the expected rises in temperature and sea-level, but also the current context of failure to fully address the institutional barriers preventing action to prepare for climate change, or feedbacks between urban systems and agents. Despite the importance of climate change, there are few cities in developing countries that are attempting to address these issues systematically as part of their governance and planning processes. While there is a growing literature on the risks and vulnerabilities related to climate change, as yet there is limited research on the development of institutional responses, the dissemination of relevant knowledge and evaluation of tools for practical planning responses by decision makers at the city level.

This thesis questions the dominant assumptions about the capacity of institutions and potential of adaptive planning. It argues that achieving a balance between climate change impacts and local government decision-making capacity is a vital for successful adaptation to the impacts of climate change. Urban spatial planning and wider environmental planning not only play a major role in reducing/mitigating risks but also have a key role in adapting to uncertainty in over future risk. The research focuses on a single province - the biggest city in Vietnam - Ho Chi Minh City - as the principal case study to explore this argument, by examining the linkages between urban planning systems, the structures of governance, and climate change adaptation planning. In conclusion it proposes a specific framework to offer insights into some of the more practical considerations, and the approach emphasises the importance of vertical and horizontal coordination in governance and urban planning.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER ONE

CHAPTER TWO

CHAPTER FOUR

CHAPTER FIVE

CHAPTER SIX

CHAPTER EIGHT

LIST OF TABLES

CHAPTER TWO

CHAPTER FOUR

CHAPTER FIVE

CHAPTER SIX

List of Abbreviations

ADB	Asian Development Bank
ARC	Architectural Research Centre
CPI	Centre of Planning Information
DPA	Department of Architecture and Planning
DOC	Department of Construction
DOT	Department of Transportation
DST	Department of Science and Technology
DoNRE	Department of Natural Resources and Environment
HCMC	Ho Chi Minh City
HCMC PC	Ho Chi Minh City People's Committee
HIDS	Ho Chi Minh City Institute for Development Studies
IPCC	Intergovernmental Panel on Climate Change
IWC	Institute of Water Management and Climate Change
MoC	Ministry of Construction
MARD	Ministry of Agriculture, and Rural Development
NSADM	National Strategy and Action Plan for Disaster Mitigation and Management
NTP	National Target Program
SCFC	HCMC Steering Centre of Flooding Control Program
SEA	Strategic Environmental Assessment
UPI	Urban Planning Institute
UNFCCC	UN Framework Convention on Climate Change

CHAPTER ONE

INTRODUCTION

1.1 Background to the Research

The inevitability of changes occurring to the climate at both global and local scales is now well-established. Climate change is an increasingly important global development issue and it is expected to have stronger wide-ranging effects on urban areas (Stern, 2006). Potential impacts include accelerated sea level rise, dramatic changes in weather patterns, increase in sea surface temperatures, intensification of tropical cyclones, tsunami, ocean acidification and storm surges, altered precipitation and runoff (Nicholls et al., 2007). Climate change is associated with substantial risks and already has significant consequences on ecosystems, physical and social systems (Root et al., 2003; Adger, 2003; Fussel, 2007; IPCC, 2007a). It poses specific risks to all urban areas leading to potential destruction of infrastructure, loss of lives, and loss of assets, societal disruption, and economic damage. The IPCC noted that the consequences of global climate change are becoming more and more observable and traceable in many regions worldwide. Climate change consequences vary across continents and regions. Predictions include regional differences in the increase of the number, frequency and intensity of climate extremes, along with gradual changes such as temperature increases and alterations and variability in seasonal and rainfall patterns (IPCC, 2007a).

Living with vulnerability in the context of increasing weather extremes and with inadequate adaptation measures is a threat, especially, in the daily lives of urban poor. Developing countries are expected to suffer the most from the negative impacts of climate change, since they are more reliant on economics that are affiliated with climate-related sectors, such as agriculture, and will be more affected by changes of environmental, coastal, and water resources. Moreover, developing countries are generally considered to be more vulnerable due to 'weak institutions', 'lack of institutional capacity', or 'lack of capacity of government' (Hamdy et al., 1998; Burton, 1996). Over the past two decades, cities have attracted an increasing amount of attention in discussions

of climate change. Yet, with international climate negotiations faltering, cities have become sites of hope; places where climate change mitigation and adaptation strategies can be mobilised. Increasingly, the urban scale is being authorised as a potentially powerful locus for action on climate change (Bulkeley & Betsil, 2003; Bulkeley et al., 2003; Burch, 2009). Furthermore, cities, particularly in developing countries where urban areas are rapidly expanding and high proportion of poor people are vulnerable to climate-related disruptions (UN, 2011), are facing particular pressures associated with climate change. In these countries, the increased climate hazards combined with rapid urbanisation are likely to increase strain on the capacity of local governments as they attempt to respond to the vulnerabilities of the urban population. These constraints related to institutional barriers including limited understanding of scientific information about climate hazards and their impacts on cities and how broader socio-economic processes influence urban vulnerabilities and underpin urban climate change adaptation; constraints on integrating information about hazard exposure and vulnerability into local planning processes and future development as well as a lack of capacity on financial resources, weakness in decision-making structures and other institutional features. While impacts and responses differ from city to city, there are 'generic issues' (Leck and Simon, 2013) that include the policy trade-offs across local and regional boundaries and between scales of government.

Asian cities, including some of the largest metropolitan areas in the world where a large share of national populations, political influence, and economic resources are concentrated, are facing numerous challenges, such as lack of the knowledge or resources needed to undertake modelling for projection of future local climate conditions (ADB, 2010), lack of a systems for incorporating evidence into decision making (lack of adaptive management), challenges of incorporating uncertainty into planning process, and addressing highly uncertain future climate impacts on rapid growing coastal cities leading to potential failures in future investment and development (ACCCRN, 2010).

Recent studies indicated that Asia's coastal cities are increasingly vulnerable to flooding disasters resulting from the combined effects of climate change, as reflected by sea level rise and intensified storms and storm surges, and land subsidence, as well as ongoing urban growth in low-lying coastal zones (IPCC, 2007a). Moreover, the scientific literature has documented that climate change, sea level rise and the sinking of the deltas on which most Asian mega urban regions have arisen, are all occurring at much faster rates than earlier projected and therefore pose even greater risks than previously indicated (Fuchs, 2010). All studies identify Southeast Asia as the flood-prone region with the greatest need for urgent policy measures. In flood-prone cities such as Ho Chi Minh City, Kolkata, Dhaka, Bangkok and Manila, potential sea level rise and increased frequency and intensity of extreme weather events poses enormous adaptation challenges.

According to recent studies from the World Bank on the impacts of climate change, in term of the impacts of multiple sea-level rise (SLR) scenarios, ranging from 1m to 5 m for 84 coastal developing countries investigated by the World Bank in 2007 and by Rockefeller Foundation (Dasgupta et al., 2007) Vietnam is predicted to be one of the top-five countries worldwide to be most affected by rising sea level. The statistics from Vietnam Government show that the highest vulnerability is located in the megacities and densely populated coastal cities - Ho Chi Minh City (HCMC PC et al., 2007). Historically, as a city situated in a low-lying area, Ho Chi Minh City has been exposed to floods. Ho Chi Minh City is a megacity with uncontrolled urbanization and dynamic economic. In recent years, flood has become a serious problem with a multitude of follow-on impacts. It received heavy rains brought by tropical storms and cyclones. Further urbanization and future changes in climate are likely to increase flood risks. Currently, with the weakness in governance and limitations of the present urban planning system and the activities of planning agencies in reducing flood risk and coping with climate change put all levels of HCMC governments under high pressure.

The interest in this field of study is very much related to past field experience of the author. I began my professional career as an architect in HCMC in 1999, after finishing my B.Arch. After gaining my M.Arch in Urban Planning from HCMC University of Architecture (HUA) in 2004, I was employed by Danang City Government (Vietnam) as a specialist in the fields of Architecture and Urban Planning and Management. In total I have seven years' experience working for Danang City Government, and five years' experience working in project management and urban design in HCMC. In 2011, I was chosen to join 'Project 165' – one of the biggest central government projects in Vietnam. The project is designed to strengthen the country's human resources capacity, by sending talented government officials to foreign countries to study. My interest in this subject is derived from my experiences working for local governments in Vietnam, and also because Vietnam is likely to be among the countries most adversely affected by climate change. Despite this, the country's local governments have so far tended to be passive in adapting to and coping with the issue.

1.2 Problem statement

Climate change as a phenomenon and as an idea represents an extraordinary challenge to us all as societies and individuals. Urban areas have many linkages with climate change as major contributors to climate change, while also being particularly vulnerable to its impacts. It is clear that the way cities develop is part of climate problem, but it can be part of solution. Existing research on urban climate impact reduction and adaptation tends to focus on addressing specific technical responses to particular climatic hazards rather than seeking to identify indirect or cumulative impacts such as institutional barriers to acting to prepare for climate change, or feedbacks between urban systems and agents (Klein et al., 2007). Moreover, the predilection to ignore institutional issues is not surprising giving that most researchers have always assumed institutional appropriateness when discussing actions to deal with

climate change. As climate impacts arise not from the single climate hazard, but from a combination of factors ineffective emergency preparedness plans at all levels of government as well as the lack of frameworks for multiple agencies and jurisdictions to respond to the combined hazards make the rapidly-growing cities in Asia all the more vulnerable to changing climate.

Increasingly, despite the importance of climate change, there are few cities in developing countries attempting to address this issue systematically as part of their decision-making process. The planning system is considered to be a key public policy area to anticipate and prevent negative impacts of climate change, as well as taking advantage of any positive opportunities it might offer to urban development. Mainstreaming climate change into planning processes and systems allows early action, which should be more cost-effective than responding to changes as they happen or retrospectively. How climate issues can being incorporated into planning strategies somehow remains confused in the developing country context. While there is a growing literature on the risks and vulnerabilities related to climate change, as yet there is limited research on developing the tools for practical planning responses as well as disseminating urban climate knowledge and its relevance to urban planning, to urban decision makers at the city level.

Moreover, urban planners are facing issues arising from the specific 'problem structure' of climate adaptation. Adaptation is characterised by complexity and uncertainty. In terms of adaptation planning, the two levels of uncertainty are the scientific and the social. Scientific uncertainty results from imperfect climate models as well as uncertainty in the models of climate change impacts. Because of the multiple feedbacks in the Earth system - all models are always imperfect to some extent and a model can never fully describe the system that it attempts to specify (Smith, 2002; Stainforth et al., 2007). Uncertainty in science leads to the social uncertainty. The decision-makers have to cope with unknown future developments without having a clear baseline or target

values to reply on. From the decision making point of view, uncertainty is known as the 'gap between available knowledge and the knowledge policy-makers would need in order to make the best policy choice' (Walker et al., 2010).

Given advances in scientific understanding on the consequences of climate change, the consideration of adaptation is of the highest priority (Adger, 2001). Urban planning is called upon to play a primary role in adapting cities to climate change impacts, and in mitigating GHGs emissions. The role of urban planning is seen to be particularly critical in dealing with climate change, since most municipal governments making urban planning decisions also have a great deal of influence over emission sources and the range of adaptation activities that take place. Future uncertainly in flood risk has implications for managing risk and role of planning. It is evident that planning is not just about formulating ideas, policies and programmes, but also about implementing these through collective action. In principle planning should have a major role in reducing risk, in practice it lacks the capacity. Therefore new adaptive planning approaches are needed, the more so the longer planning fails to manage ongoing urban expansion and mitigate the risk. Moreover, adaptive planning can have an important role in overcoming the larger governance issues, especially lack of coordination. Yet, most of studies have focused on examining climate change impacts on global systems or the adverse impacts which these changes will present, with only a few studies advertising the role which institutions play in shaping or constraining the choices open to actors. Because climate change actions does not take place in an institutional vacuum but have always relied on national and local level institutions to ensure their success. Institutions can play an important role in shaping or constraining climate change adaptation actions. Thus, it is important to understand how institutions can be made to become more supportive of appreciate responses.

Concerned with actions to deal with climate change in HCMC, the study particularly focuses on analysing how theoretical assumptions about the capacity to respond to climate change in a particular society can be shaped or constrained by the local context. Specifically, the study will explore the constraints that the institutional context imposes on individual and organisational behaviour in urban planning and how this relates to taking actions to cope with the impacts of climate change. Therefore, an understanding of how institutional arrangement shape and constraint actions at different levels of governance in the country will be critical to measure to the competence of urban planning responses to climate change in HCMC.

1.3 Aim, Objectives and Research questions

The impacts of climate change will vary from place to place and the combination of institutions and legal, political tools available to public decision-makers vary with national context and in practice from region to region. These impacts will be localized and will vary based on a community's physical, social, and economic characteristics. Communities are best positioned to assess and address the implications of climate change at the local level. Therefore, the local government should take an active role in preparing for climate change.

Addressing questions about the capacity of institutions and potential of adaptive planning therefore demands a case study approach. The research examines how the challenges of climate change are responded and how climate change considerations can effectively be integrated in urban planning processes in the case of HCMC, and the thesis will draw out lessons for theory and practice. This in-depth case study offers the potential for understanding such complex relationships.

1.3.1 Aim of the Research

The overall aim of research is to improve the understanding of climate change concerns within urban planning decisions and processes, and how planners and decision-makers respond to the uncertainties associated with climate change impacts in order to achieve urban climate resilience in HCMC.

1.3.2 Objectives of the Research

The specific research objectives are:

a. To provide the overview of urbanisation problem of HCMC and the effects of climate change on urban development
b. To develop an improved understanding of current climate change vulnerability and the main challenges which climate change presents to HCMC's future development.
c. To examine any current climate change adaptation planning and flood management from both institutional and governance perspective.
d. To investigate urban planning processes and institutional conditions that shape planning decision for tackling climate change in HCMC as well as institutional context that surrounds climate change policy in a given municipality.
e. To identify the key barriers to an integrated approach to climate change response planning and to make climate change as an integral part of urban planning decisions and processes in HCMC.

1.3.3 Research question and sub-questions

The research is then guided by the following overall research question:

What institutional conditions provide the appropriate context for integrating climate change issues in urban planning processes to achieve greater resilience for the urban system and adaptation to climate change in the case of Ho Chi Minh City?

A number of sub-questions will be addressed:

a. How is Ho Chi Minh City's development likely to be affected by a combination of the impacts of urbanization and climate variability?

b. What are the key climate change concerns for the development of HCMC?

c. Does the current state of planning institutions in HCMC provide the right context for mainstreaming climate change issues?

d. What are the existing urban planning agencies and wider institutional arrangements to respond to urban flood risk and climate change issue in HCMC?

e. What are the key challenges to make climate change concerns an integral part of urban planning processes in HCMC and how can the gaps be addressed?

1.4 Ho Chi Minh City: Rationale for the selection of the case study

HCMC offers a potentially rich subject for a case study. HCMC is the Vietnam's biggest city and strongly influences its national development. HCMC accounts for 23% of National gross domestic product (GDP) and 20% of foreign direct investment (ADB-Asian Development Bank, 2010). Its GDP growth has outpaced the national level growth: between 10% and 12% in 2001-2011. The region in the south of Vietnam is the most important target area of foreign direct investment and processes double-digit growth rates far in excess of the country's average (Ronald and Ulrike, 2009). Therefore the city and the surrounding provinces are the most important driving forces for the economic growth and the modernization of Vietnam.

HCMC is located in the southern part of Vietnam, on the Saigon River and north of the Mekong River Delta. This is the largest urban area in Vietnam, with population of more than 7.4 million in 2010. The population has been rapidly increasing at an annual rate more than 3.5% per year. The population projections by HCMC's Real Estate Association (HoREA) forecast around 12 million inhabitants in 2025 based on a scenario with an annual growth rate of 3.4% (Loan, 2008). However, these data do not include unregistered migrants and temporary workers. The actual population will exceed far from the 6 million inhabitants and even the estimations for 2025 have to adjust upwards taking the migrants in HCMC into account.

The land use and the population density differ considerably. The city consists of urban and rural districts, including 13 inner urban districts, 6 newly established urban districts, and 5 suburban districts. It is relatively dense at 10,550 inhabitants per square kilometre (27,300 per square mile). The highest density areas are the inner city in districts 3, 4, 5, 10, 11 with more than 45,000 inhabitants per square kilometre (100,000 per square mile). The density in suburban and rural areas of the city is much lower than inner city. The rural districts are dominated by agricultural land, as well as swamp, marsh, and mangroves. The total city area is 2,095 square kilometres (104 km^2 urban inner city, 600 km^2 outer urban area, and the remaining area largely rural) (ADB, 2010).

HCMC is built in an area of significant wetlands, 60 km from the coast, with much of its population located to the west of Saigon River. The estuary of Dong Nai River, Saigon River and Nha Be River forms a wide-spread network of rivers and canals with almost 8,000 km length, covering 16% of HCMC's area (Hoa and Tung, 2007). The central business district sprawls over several square miles. A number of tall commercial buildings are concentrated in the historical inner district areas (District 1, 3, 5). The city has very high density housing and much of which is low rise with less than four stories. About 20-

30 per cent of HCMC's population is estimated to be migrants or temporary residents and many of whom live in cramped transitional boarding houses or squatter settlements, particularly on the urban fringe. As the city expands, slum settlements have emerged throughout the city. In the urban areas, slums and squatter settlements tend to be concentrated in the most vulnerable locations along canals, waterways, and flood plains in district 8, 6, 4, Binh Thanh, Go Vap (Waibe, 2006). In suburban and rural districts, slums have developed around new industrial zones, public land and construction sites. Urbanization is one of the key contributors to increasing rates of urban poverty in HCMC.

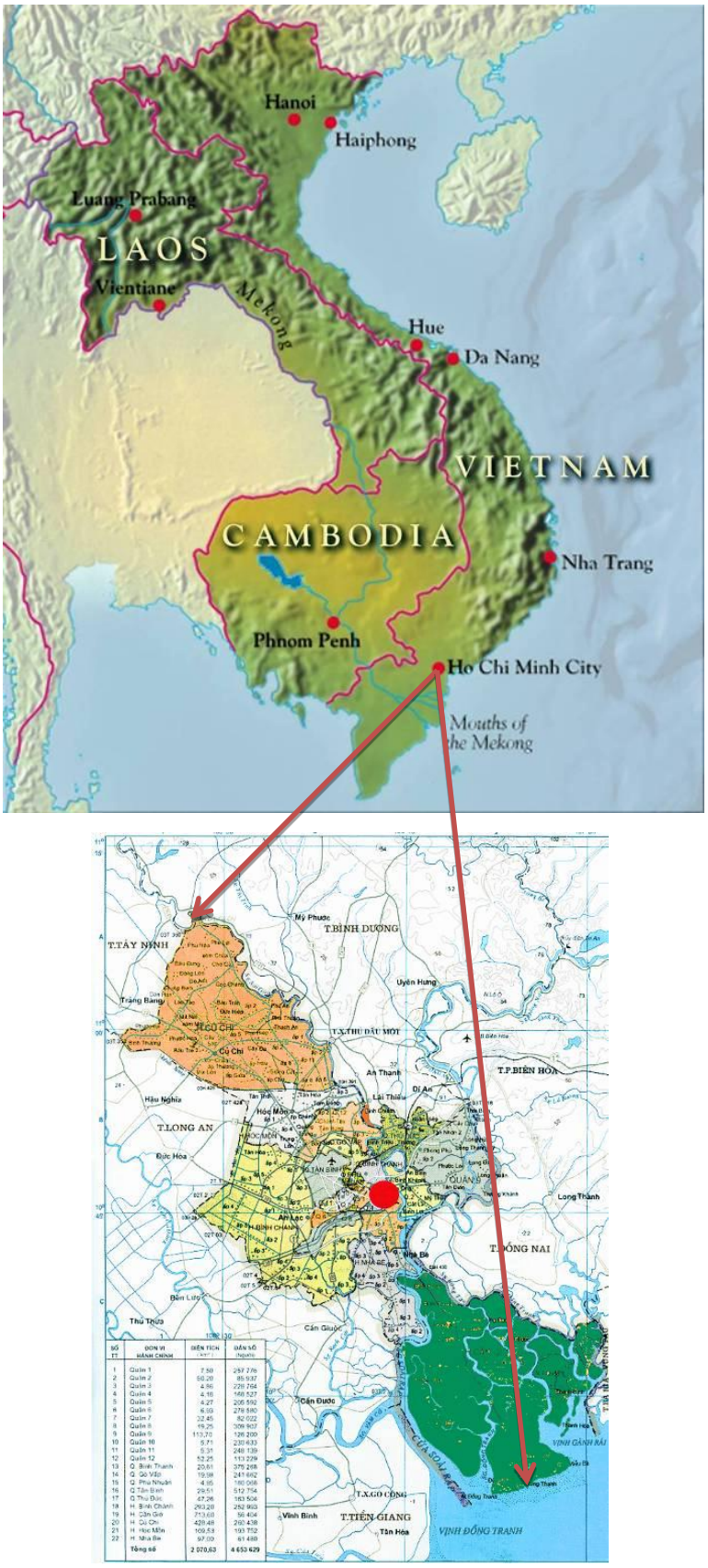


Figure 1.1: Ho Chi Minh City Case study area

HCMC has recently experienced rapid urban expansion and has become a major cultural and socio-economic growth hub. HCMC's rapid urbanisation has led to social, economic and environmental problems with urban flood and water pollution becoming increasingly serious. Urban flooding has become a wide-spread phenomenon and major concern in HCMC in recent years that has accompanied the city's rapid growth and development. HCMC's urban settlements are regularly flooded due to a combination of tides, heavy monsoon rainfalls and storm surge floods. Especially since the mid-1990s, the extent of flooded areas, flood durations and flood frequencies have steadily increased and have caused destruction of infrastructure, loss of lives, loss of assets, societal disruption, and economic damage (Ho, 2007; Chinh, 2008; ADB, 2010).

HCMC is vulnerable because of its distinct topographical location just above sea level. More than 45% of land cover in HCMC is 0m-1 m in elevation, 15-20% is 1m-2 m, and very little land sits above 4 m (Ho, 2008; ICEM-International Centre for Environmental Management, 2009). Rapid growth of population, urbanization and industrialisation are other causes of vulnerability in HCMC. The dynamic economy draws migrants from all over the country, and the vast majority of the growing population are settling in low-lying and thus unfavourable areas. As a result, millions of people could be at risk from flooding in the future.

A number of international development agency-supported studies relating to flood management and the impacts of climate changes in HCMC have already been carried out or are ongoing and this research will draw on these include: The Megacity Research Project - Integrative urban and environmental planning framework adaptation to climate change (Germany, 2009-2013); Ho Chi Minh City: moving towards the sea with climate change adaptation program (Netherlands, 2010-2015) and Ho Chi Minh City: Adaptation to

Climate Change Study (ICEM: International Centre for Environmental Management; ADB: Asian Development Bank, 2008-2009).

1.5 Outline of the thesis

The thesis follows a linear-analytic structure which is conceptualised by Yin (2003:152). According to Yin, this standard approach is the comfortable for most researchers, investigators and readers and probably is the most advantageous for a thesis. Thus, the sequences of chapters will be structured as follows:

- Chapter One is the **introduction**, which outlines the general research issues and how the study came into being. It provides a background to study, statement of the problem, aim and objectives, research question and sub-questions, the rationale for selection of the case study and the structure of thesis.
- Chapter Two, **Urban development and climate change: A review of theoretical issues**. This chapter has two parts: **Climate change overview (Part A)** and **Responding to climate change (Part B)**. Though a literature review, **part A** examines the existing discourses and paradigms that underline the current understanding of climate change and its impacts present to cities. **Part B** examines climate change response options: mitigation – adaptation and the urgent call for adaptation efforts. The part of chapter continues exploring the concept of adaptation, climate change adaptation under uncertainty and framing adaptation to climate change. Some concepts that are directly related to adaptation are discussed.
- Chapter Three, **Urban planning and climate change – A challenge for integration**. This chapter deals with the main part of theoretical development in the research. The chapter continues with the discussion commenced in Chapter two by looking more closely at the relevant debate in the literature on urban planning playing the dynamic role in building adaption to climate

change on urban areas. The chapter addresses the role planning institutions can play in influencing climate change threats and responses as well as the specific challenges which climate change present to the planning process. The chapter explores the concept of multi-level involving vertical and horizontal co-operation and the institutional capacity required act on adaptation. It proposes a flexible conceptual framework for the research.

- Chapter Four, **Research design and methodology**. This chapter outlines the methodological approach employed for the empirical work. The chapter deals with the research design of the study and a description of the methods used for the collection, analysis and interpretation of data.

- Chapter Five, **Urban development and climate change in HCMC: challenges and prospects**. This chapter presents the first stage of findings from the field work which addresses the environmental context of HCMC, outlines the perceived environmental challenges and sets these alongside the recent history of urban development and the dynamics of urbanisation and their linkages with climate change.

- Chapter Six, **Adaptive capacity, governance and institutional vulnerability**. Drawing on the documentation and interviews gathered in the field work, the chapter explores the understanding of relationships between appropriate practical and policy responses and the capacities of the institutions of government related to climate change management. The institutional structure (multi-level system and cross-scale networks at national and local level) for climate change management is analysed by focusing on examining the roles, capabilities, and authority of local government: leadership, municipal competencies and responsibilities, resources, vertical and horizontal coordination and urban political economies and seeks to clarify the involvement of actors in the governance process.

- Chapter Seven, **Discussion of the challenges and the way forward**. This chapter is developed based on the discussion on the major issues arising from chapter 5 and 6. The chapter draws on the interviews and documentary reviews from the field work and focuses in particular on significant ideas and

opinions of interviewees about the key challenges making climate change an integral part of urban planning decisions in HCMC and how to resolve the perceived gap between necessary actions and existing capacities. The chapter relates important findings to theory by demonstrating the importance of institutions in urban planning boundaries for dealing with climate change and urban flood risk in HCMC.

- Chapter Eight, **Potential changes and the potential for changes.** This chapter provides the recommendations on the practicality of integrating climate change concerns in the current urban planning decisions and processes, as well as improving the climate change urban governance for the case of HCMC.

- Chapter Nine, **Conclusions and recommendations.** This chapter provides the conclusions about the implications of the research findings and identifies the knowledge gaps for exploration in future research.

CHAPTER TWO

URBAN DEVELOPMENT AND CLIMATE CHANGE – A REVIEW OF THEORETICAL ISSUES

PART A: CLIMATE CHANGE OVERVIEW

Climate change is an important scientific issue which has become the subject matter of a vast body of different types of research conducted at global and local levels. It is now widely acknowledged that climate change presents a new type of challenge for development. The aim of the chapter is to identify the key issues that will set the theoretical context for the research. The first part of chapter examines the existing discourses and paradigms that underline the current understanding of climate change and its impacts. The second part then reviews the responses that have been made to this challenge, with a particular focus on the concept of 'adaptation'.

2.1 Understanding climate change

Climate change has been widely recognized as one of the most pressing, global problems facing humanity. According to the leading scientific research authority on global climate change-the Intergovernmental Panel on Climate Change (IPCC[1], 2007a), climate change refers to "*A change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity*".

[1] The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 as a reaction to growing concern about climate change since the 1970s and 1980s. The IPCC, which is mandated to assess the scientific, technical and socio-economic evidence relevant to understanding the issue, produced its first assessment report in August 1990. This provided the initial scientific evidence of climate change and provided the basis for negotiations on - an international response to the problem. Within climate change research, the reports of the IPCC have become an authoritative source that sets agendas and acts as a legitimizing device for research. It is therefore worth examining primary research on climate change and its interpretation within the reports of the IPCC (Adger 2006). Created in 1988 by the World Meteorological Organisation (WMO) and the United Nations Environmental Programme (UNEP), IPCC's purpose is to evaluate the state of climate science as a basis for informed policy action, primarily on the basis of peer-reviewed and published scientific literature.

The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as "*change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods*" (UN, 1992).

The concept of global climate change, then, refers to broader, measurable changes in patterns of weather and climate, while also suggesting that these have been significantly altered by human activities, above and beyond natural fluctuations over time. In more precise terms, climate scientists theorise changes as occurring as a result of both internal variability within the climate system and external factors, which may be either 'natural' or 'anthropogenic' (IPCC, 2001b). Internal variability can be caused by changes to the Earth's tilt and its orbit around the sun, as well as interactions between the atmosphere and ocean. Two natural external factors are changes in the energy output of the sun and volcanic eruptions. However, these natural factors do not explain the warming observed in the last 40 to 50 years (Hulme et al., 2002). It is believed that a significant part of this warming results from a rise in greenhouse gas (GHG) emissions such as carbon dioxide from fossil fuel burning and deforestation, natural gas leakage, methane from agriculture, and ozone in the lower atmosphere from the products of vehicle exhausts.

This increase in emissions has led to a rise in the concentration of GHGs in the atmosphere and subsequently a rise in radiative forcing. The increase in anthropogenic greenhouse gases in the atmosphere and the changes of temperature have been scientifically observed. A study from IPCC (2007b) contends that the warming of the global climate is now beyond dispute and that several long-term change in the world's climate are currently being witnessed in many parts of the world. The changes increase the frequency of extreme climate events.

There is strong evidence that most of the warming observed over the last fifty years is attributable to human activities (IPCC, 2001b). Data from 'Special Report on Emission Scenarios' (SRES) scenarios for greenhouse gas emissions (IPCC, 2001b; 2007a) indicate that since the beginning of the twentieth century global temperature has risen by about 0.6°C and projected temperature increases for the end of the 21st century range from 1.1 to 6.4°C, rising more rapidly during this period than at any time in the last 1,000 years. The changes in the global average surface temperature have a wide variety of effects at global, regional and local levels, including: average and extremes changes in temperature, sea levels, weather patterns, wind patterns, precipitation and river runoff, drought, food production, ecosystem health, biodiversity, phenology, and human health (IPCC, 2007b). For the same set of scenarios assumed by the IPCC, the global mean sea level rise was projected to rise from 0.09 to 0.88 meters between 1990 and 2100.

'These projections indicate that the warming would vary by region, and be accompanied by increases and decreases in precipitation. In addition, there would be changes in the variability of climate, and changes in the frequency and intensity of some extreme climate phenomena' (IPCC 2001a, p. 3).

Observed changes in regional climate have affected many physical and biological systems including shrinkage of glaciers, changes in sea level (IPCC, 2001b) and the decline of some plant and animal populations (IPCC, 2001b; Root *et al.*, 2003; Parmesan and Yohe, 2003). Among the most difficult challenges presented by climate change is the expected increase in the frequency and intensity of extreme weather events, including floods and droughts, more violent storms, more intense heat waves, and escalating conflict over food and water resources (OECD, 2010).

The IPCC in its Fourth Assessment Report identifies climate change impacts as a major global concern and warns that climate change will have severe

implications for countries and cities if urgent actions are not taken now to address it.

2.2 Urban context

It is widely believed that urban areas have many linkages with climate change. Urban areas are home to more than half of the world's population and this proportion is predicted to reach to 60% by 2030 (figure 2.1, p.22). In terms of broader environmental sustainability, cities are major contributors to climate change and also highly vulnerable to its impacts (Wilbanks. et al., 2007; OECD, 2010). Cities consume 60%-80% of energy production worldwide and account for a roughly equivalent to share of global carbon dioxide emissions and significant amounts of other greenhouse gas emissions.

Rapid urbanisation has significant implication for climate change, air quality, water availability and quality, land use and waste management. There is the challenge of dealing with ongoing urbanisation in conjunction with the climate-related challenges that cities face. Climate change in cities will potentially increase the frequency and intensity of extreme events and related hazards both to the urban population and property (Barnet et al., 2005; Douglas et al., 2008; OECD, 2010). The expected impacts of climate change pose a massive challenge to cities. A recent study about climate change and cities indicated that the major concern about the relation between rapid urbanisation and climate change is the potential for increasing flooding to disrupt urban development along coasts and rivers (Rosenzweig et al., 2011). Therefore, cities, especially in developing countries, are facing the challenge about how to plan for new infrastructure, taking climate change both adaptation and mitigation into account.

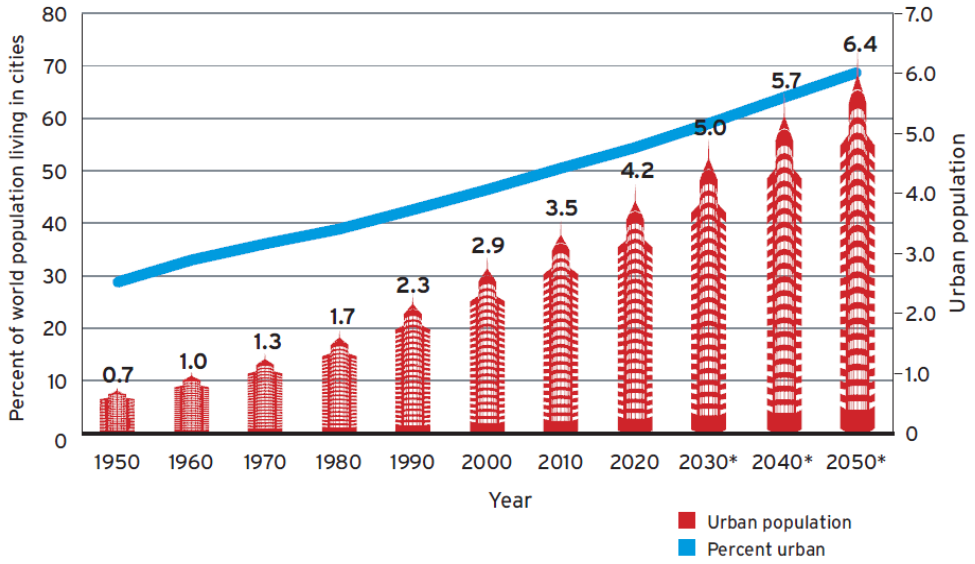


Figure 2.1: People living in Cities (percentage of world population and total)

Source: UN, Development of Economic & Socio Affairs, Population Division

Urban centres are heavily vulnerable to the impacts climate change and disaster risks. Cities are at risk because they concentrate several of the production assets, high value properties, and populations densities that are most exposed and vulnerability to climate-related hazards. For example, '*Much of the health risk and vulnerability to climate change is concentrated in (informal) settlements. Many cities include dangerous sites, such as steep slopes, low lands adjacent to unprotected riverbanks and ocean shorelines, and have structures that do not meet building code*' (IPCC, 2014). Climate change brings added stress to urban areas through increased frequency of heat waves, more frequent and intense droughts and inland floods compromising water supplies, as well as sea level rise and storm surges affecting inhabitants and essential infrastructure, property and ecosystems (UCCRN, 2011). A large proportion of the world's urban centres is located in the low-lying coastal areas which are particularly vulnerable to storm surge and water-related calamities, with the potential to negatively impact infrastructure and worsen access to basic urban services and quality of life in cities (Hanson et al., 2010). Many poor coastal cities lack the requisite protective infrastructure and resources to safeguard

themselves against the impact of climate change (Parnell et al., 2007; Martine, 2009).

It is clear that how cities develop is part of the climate problem, but it can also be part of the solution. '*The fate of the Earth's climate and the vulnerability of human society to climate change are intrinsically linked to the way the cities develop over the coming decades and century*' (British Council, 2004). However, cities also have a key role to play in the global agenda for addressing the challenge of climate change. Because cities have regulatory power and influence, they can potentially find effective ways to address climate change through creative programmes and initiatives; it is widely argued that actions taken in and by cities may facilitate significant progress in dealing with climate change. A study from OECD (n.d) concluded that '*Cities are centres of innovation and can advance clean energy systems, sustainable transportation, waste management and spatial development strategies to reduce greenhouse gases. With access to up to date climate science, impacts and vulnerability assessment, local authorities can also work with local stakeholders to design and implement effective adaptation strategies*'.

The report calls for the dynamic role of city governments and inhabitants in delivering adaptation measures as well as implementing effective adaptation strategies.

Climate change impacts on cities

In the context of climate change, many of the decisions relating to future urban development require information on climate change risks to cities. However, most of the developments taking place today rarely take into consideration the impacts of potential changes to the climate (Houghton, 2004). Climate change impacts vary from city to city, as well as place to place within a city and among individuals owing to their differing degrees of exposure to risk and levels of vulnerability. There is an increasing recognition of the impacts of climate

change in cities as it will potentially increase the frequency and intensity of extreme events (Barnet et al., 2005; Douglas et al., 2008; OECD, 2010). The expected impacts of climate change pose a massive challenge to cities. In particular, the population of settlements in low-lying coastal areas, flood plains and hills lopes are most exposure to climate change (Adger et al., 2003). Furthermore, institutional and social factors are important determinants of the level of climate change impacts (Agrawal et al., 2008). The way institutions shape climate change impacts can be explained in terms of how individuals are differentially affected by the same climatic event.

The literature review bellow identifies the most important climate change threats and impacts for cities, including sea level rise (and storm surge), urban flooding, drought and storm, water availability and resources, high temperature and heat-waves, health risks due to climate change, and ecological systems and environment (Huq et al., 2007; OECD, 2007). These impacts of climate change will be examined in detail in the following section.

2.2.1 Sea-level rise

Sea level variability and change are manifestations of climate variability and change. Global warming will potentially cause a one meter rise in sea levels in the course of present century and has been seen as a major threat to low-lying coastal areas where there is growing urban development around the globe in the 21st century (Dasgupta et al., 2009; Harrison & Carson, 2013). More generally, human-induced climate change is expected to cause a profound series of ocean related changes including rising sea level, and sea-surface temperature, altered storm patterns and wave sizes, salt intrusion into aquifers and surface waters, and run-off characteristics (Horton, 2011).

The expected sea level rises will have uneven effects on different regions and localities within them. These effects fundamentally depend on geographically

and geologically regional or local sea level conditions impacting the shore lines of the areas. The literature indicates the impacts of sea level rise will include increased coastal erosion, higher storm surge flooding, more extensive coastal inundation, changes in surface water quality, increase loss of property and coastal habitats, increased flood-risk and potential loss of life, with impacts on agriculture and transportation systems. Furthermore, the impacts of sea level rise will be more severe in coastal cities of the developing world, where tens of millions of people are expected to be displaced by the end of this century as they lack the capacity to adapt to this challenge. This will be in addition to the extensive economic and ecological damage that will occur (Nicholls, et al., 2008; Dasgupta et al., 2009).

2.2.2 Urban flooding, drought and storm

Scientific climate change observations and modelling projections indicate an increase in precipitation extremes in the warming climate. Rainfall extremes will increases in most all areas on the earth and directly affects the risk of floods, rain, storms and droughts. Urban floods mostly caused by greater rainfall intensity and changes in the built environment have caused major disasters in the urban centres (Nicholls et al., 2008). Climate change also results in more frequent heavy storms and tropical cyclones. In some cities, flooding will be exacerbated by poor urban infrastructure and the obstructions caused by development to drainage and increased runoff due to increasing built…surfaces. On the contrary, with climate change, some other regions will receive less rainfall leading to more droughts. Droughts will lead to a reduction in water supply, with lost productivity, and possibly famine resulting (Tompkins, 2002). And droughts may be integrated through the interaction between the natural condition related to the change of climate and human actions such as changes in land use and land cover, and the increasing demand for water. Such scenarios suggest that the frequency and severity of climate change-induced flooding, droughts and storms may threaten to

overwhelm the capacity of most city governments to deal with the scale of the problem.

2.2.3 Water availability and resources

Climate change is anticipated to exacerbate problems of water availability and resource management (UN, 2011), especially in arid areas in the world, where the scarcity of water resources, increasing population and the experience of droughts can lead to famine, loss of livestock, crop failure, migrations and loss of life. Available water resources are expected to decline as a result of excessive withdrawal of both surface- and ground-water due to population increase, as well as decreased water run-off due to reduced precipitation and increased evaporation attributed to global warming. These issues are likely to put billions of people at risk of water deprivation, especially in countries already challenged by problems of water stress: '*Currently, 1.6 billion people live in countries and regions with absolute water scarcity and the number is expected to rise to 2.8 billion people by 2025*' (World Bank, 2013). Hence, the impacts of climate change on water availability and resources depends not only on direct climatic drivers (such as changes in the volume, timing, and quality of stream flow) but also on non-climate drivers such as urbanisation and population increase.

2.2.4 High temperature and heat-waves

There is a general consensus in the literature indicates that cities will experience increased temperatures and more heat-waves as a results of climate change (Gill et al., 2007; UN-Habitat, 2009). This will be exacerbated by the urban heat island effect. The heat island is an example of unintentional climate modification when urbanization changes the characteristics of the Earth's surface and atmosphere. Cities are expecting to experience more heat-waves, with temperatures in the central 'heat islands' often several degrees higher than in surrounding countryside. Heat waves are likely to increase in severity

and duration in the future, contributing to heat mortality in both developed and developing countries. These issues will lead to increase in the frequency and severity of heat-stress events in cities and can affect the health, labour productivity and leisure activities of the urban population. There are also other economic effects such as the additional cost of climate-control within building, and environmental effects such as the formation of smog in cities and the degradation of green spaces with further increased greenhouse gases if additional demand for cooling is met with electricity generated from fossil fuel. Moreover, high energy demands in the face of climate change are likely to increase pressure on urban management.

2.2.5 Health risks due to climate change

Climate change and weather play a significant role in the health of people. There is a close link between local climate and the occurrence or severity of some diseases and other threats to human health. According to Rosenzweig (2011), climate change can be conceptualised as an amplifier of existing human health problems, attenuating or aggravating multiple stresses and, in some cases, potentially pushing a highly stressed human health system across a threshold of sustainability (figure 2.2, p.28). Climate change may increase the number of heat-related illnesses and deaths. Climate change accelerates the spread of disease primarily because warmer global temperature enlarge the geographic range in which disease-carrying animals, insects and microorganisms as well as the germs and viruses they carry can survive. Most of the increased burden of deaths and disease are likely to be from malnutrition, diarrheal diseases, malaria, heat waves, and floods. Heat stress is predicted to rise especially in cities of the mid and high latitudes, where it is believed likely to have adverse effects on such vulnerable groups as the aged and the urban poor. Vector-borne diseases in particular, include infections transmitted by the bite of infected arthropod species such as mosquitoes, ticks, sand-flies, and blackflies. For many areas, malaria-carrying mosquitoes may

become the most serious threats as nearly half of the world's population is now thought to be at risk of this disease.

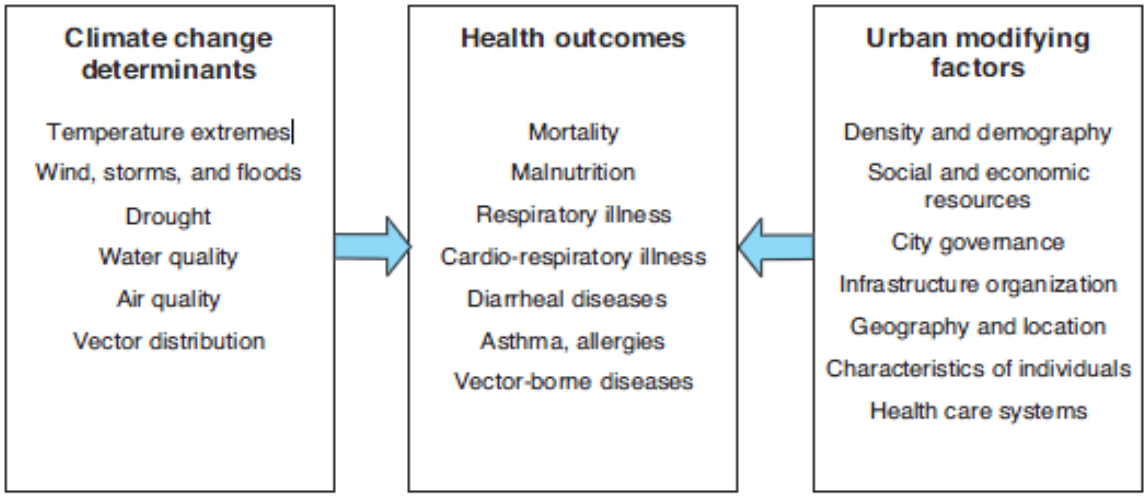


Figure 2.2: Climate change determinants and urban modifying factors on health outcomes in cities (Adopted from Rosenzweig et al., 2011)

The impacts of climate change on health will depend on many factors, including the effectiveness of a community's public health and safety systems to address or prepare for the risk and the behaviour, age, gender, and economic status of individuals affected. The impacts will also vary by region, the sensitivity of populations, the extent and the length of exposure to climate change impacts, and society's ability to adapt to change. Thus, climate change adaptation strategies should include a strong focus on the urban health hazards. Protecting urban population requires the involvement of all groups (government, private, communities), levels of government (international, national, regional, and local) and diverse disciplines (planning, engineering, meteorology, health).

2.2.6 Ecological systems and environment

Climate change is an important environmental influence on ecosystems. The impacts of climate change on city ecosystems will result largely from the combined effects of temperature and rainfall (Hulme, 2005). Climate change and the impacts of climate change affect ecosystems in a variety of ways. For example: warming may force species to migrate or as sea level rises, salt water intrusion into a fresh water system may force some key species to relocate or die; water stress resulting from acute precipitation problems may also have direct impact on species and on the spread of vegetation. Moreover, climate change not only affects ecosystem and species directly, it also interacts with other human stressors such as development.

2.3 Vulnerability to climate change

Vulnerability is the most important factor that will influence climate change impacts on cities (Rosenzweig et al., 2011; Hardoy and Lankao, 2011). The concept of vulnerability which helped to clarify the understanding of disaster risk, has come into widespread use in the scientific community in analytical approaches to explain the risks associated with climate change. Understanding vulnerability to climate-related risks has become one of the important focal points shaping associated research. The concept of vulnerability has been used in a variety of ways, with different meanings, and different implications (Prowse, 2003). The diversity in the conceptualisation of vulnerability is due to the fact that the term has been used in different policy contexts, referring to different systems exposed to different hazards as well as the complexity of interrelated impacts and knock on effects associated with the different types of hazard.

2.3.1 Concept of vulnerability

Vulnerability[2] is conceptualized in many different ways by scholars from different research communities such as those dealing with food security, poverty, public health, natural hazard, disaster risk and management, general environmental stress, and climate change. This concept originally comes from the social sciences in addressing natural hazards and disaster risk in the 1970s, when vulnerability mostly related to buildings and structures at risk and how hazards damaged these buildings and structures. Vulnerability is now comprehensively defined to include not only physical dimensions of a hazard event, but also the social aspects of risk. Recent publications focusing on the conceptualization of vulnerability in climate change research include Adger (1999), Kelly and Adger (2000), Olmos (2001), Downing et al. (2001), Moss et al. (2001), Brooks (2003), Cardona et al. (2003), Downing and Patwardhan (2004), O'Brien et al. (2004), Downing and Patwardhan (2004), Birkmann (2006), Thywissen (2006), H. M Füssel (2007), and Ionescu et al. (2009).

The IPCC Third Assessment Report (TAR) defines vulnerability as "*the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity*" (IPCC, 2001a, p. 995; Adger, 2006). Vulnerability "*depends not only on a system's sensitivity, but also on its ability to adapt to new climatic conditions*" (Watson et al., 1996). The International Strategy for Disaster Reduction (UN/ISDR, 2003) highlights the dynamic nature of vulnerability, where it is "*a set of conditions and processes resulting from physical, social, economic, and environmental factor, which increase the susceptibility of a community to the impact of hazards*". United National Development Programme (UNDP) defines vulnerability as "*a human condition or process resulting from physical, social, economic and environmental factors, which determine the likelihood and scale of damage from the impact of a given hazard*" (UNDP, 2004:

11). From a natural hazards perspective, Blaikie et al., (1994) define vulnerability as "*the characteristics of a person or group in terms of their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard*".

Within the climate change literature, vulnerability is usually presented as a two dimensional concept comprising both the risk of harm to an individual or system (hazard and stress) and the extent to which the internal properties (the different means and capacities to reduce the impacts) allow that individual or system to resist, cope with or become liable to the ensuring impacts (Moser et al., 2010; Lankao and Qin, 2011).

So as to obviate the difficulty of formulating a single definition of vulnerability as the term is used within the broader discourse, Birkmann (2005) presented an over view of the key '*spheres of the concept of vulnerability*' (figure 2.3, p.32). From Birkmann's perspective, vulnerability is understood as the internal side of risk in almost definitions. This concept widens in scope with the introduction of different elements under the term vulnerability such as human, physical and environmental. The elements of vulnerability are those conditions that increase and determine the likelihood of injury, death, loss and disruption of livelihood of human being. Birkmann (2007) demonstrated that "*the concept of vulnerability has been continuously widened and broadened towards a more comprehensive approach encompassing susceptibility, exposure, coping capacity and adaptive capacity, as well as different thematic areas, such as physical, social, economic, environmental and institutional vulnerability*".

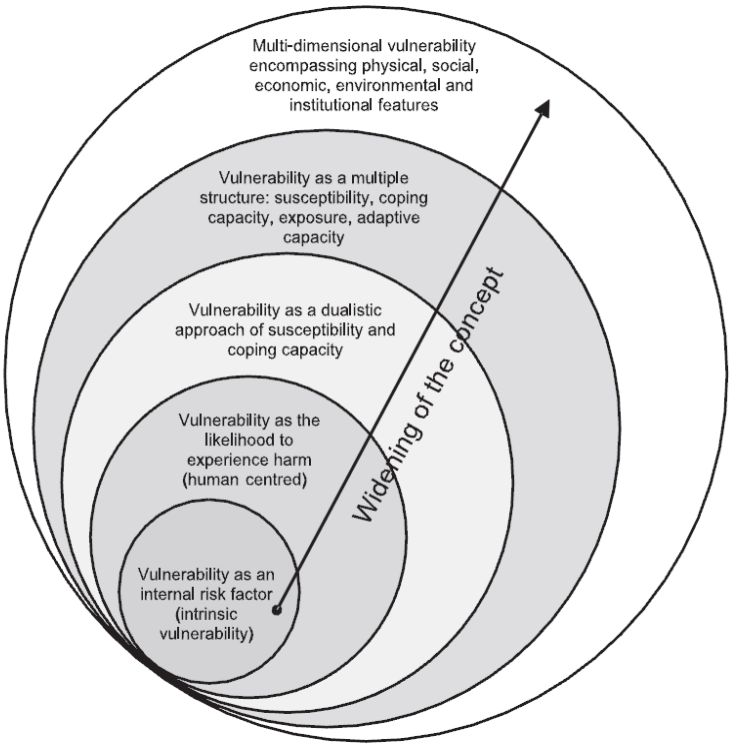


Figure 2.3: Key spheres of the concept of vulnerability
Source: Birkmann (2005)

The definition of the IPCC (2007b) specifically highlights that the vulnerability of a system is understood as a function of three components: (i) exposure to climate change effects; (ii) sensitivity and (iii) adaptive capacity, which are influenced by range of bio-physical and socio-economic factors. Therefore, vulnerability **V= *ƒ* (exposure, sensitivity and adaptive capacity)**. In which, **exposure** is defined by IPCC as "*the nature and degree to which a system is exposed to significant climatic variations*"; **sensitivity** as "*the degree to which a system is affected, either adversely or beneficially by climate related stimuli*" and **adaptive capacity** as "*the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behaviour and in resources and technologies*" (IPCC, 2007b). From this formula, it can be generally understood that the more a system is exposed to a hazard and the more sensitive a system is to such a hazard, the more vulnerable it is. Additionally, the more adaptive a system is, the less vulnerable it is to a hazard.

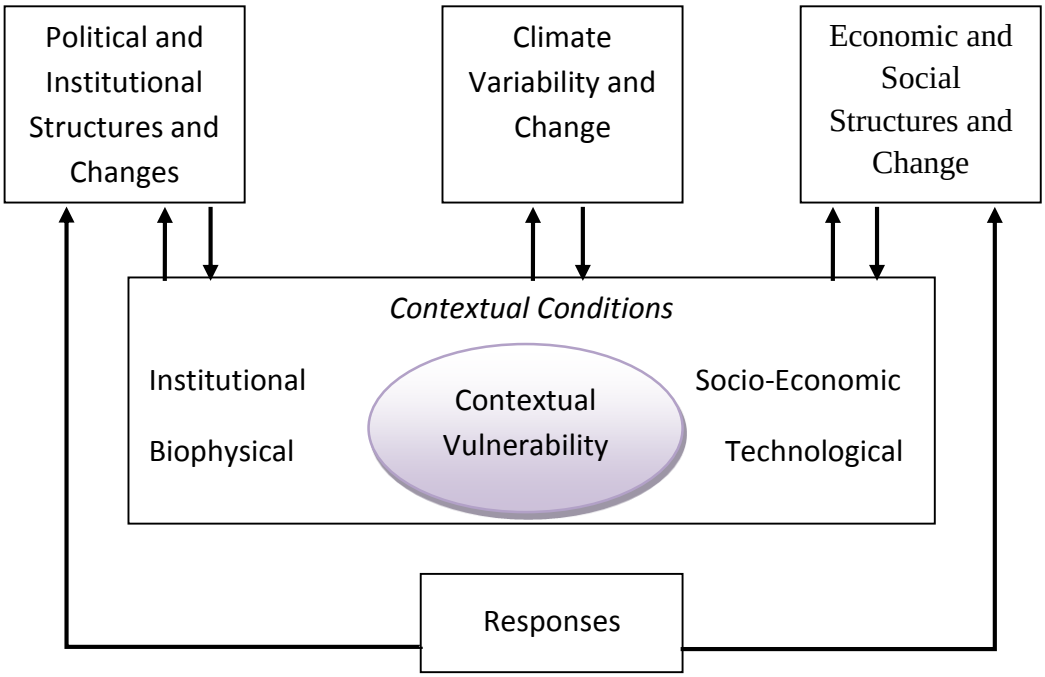


Figure 2.4: Contextual vulnerability (O'Brien et al., 2007: 75)

The concept of 'contextual vulnerability' was used as the starting point for exploring options for adaptation specific to the local context in climate change vulnerability studies (O'Brien et al., 2007) by focusing on the multidimensional interactions between climate and society. From this perspective, O'Brien highlights contextual vulnerability as a function of the particular institutional, biophysical, socio-economic, and technological conditions within a given context (figure 2.4). The contextual vulnerability approach is substantially about devising measures that reduce vulnerability to climate change through ongoing socio-economic and political processes of change. Moreover, this approach typically focus more on the current socio-economic determinants or drivers of vulnerability, i.e. social, economic and institutional conditions. From this approach, the systems are considered to be highly complex in nature, with social, political, economic and institutional structures that constantly changing, and which interact with climate change and climatic variability. Thus, vulnerability - a place-based phenomenon - should be analyzed in a particular geographic location.

Vulnerability refers to both 'internal' and 'external' dimensions (Chambers, 1989). Internal vulnerability relates to defenselessness and insecurity, as well as the capacity to anticipate, cope with, resist, and recover from the impacts of a hazard, while the external dimension involves exposure to risks and shocks. In this research, the external and internal dimensions of vulnerability will be understood as follows (i) institutional and socio-economic conditions as internal dimension within which vulnerability is mediated and policies and interventions for reducing vulnerability are implemented, and (ii) bio-physical and location-specific determinants that constitute the external dimension of vulnerability.

In terms of climate change, Brooks (2003) and Fussel (2007) identify two main areas of concern to which the term is applied:

- Biophysical vulnerability (the amount of damages, actual or potential, produced).
- Social vulnerability (the way in which elements of physical environment, and economic, and social system are related to the community by performing a mediating function of impact of risk event).

These two types of vulnerability are briefly discussed below.

2.3.2 Biophysical vulnerability

Biophysical vulnerability is typically defined as the exposure of human systems to natural extreme events and, as a consequence, to hazards (Burton et al., 1993; Macchi et al., 2008; Carina & Keskitalo, 2008). As defined by Brooks (2003), biophysical vulnerability is '*a function of the frequency and severity (or probability of occurrence) of a given type of hazard… Disasters occur when there is an interaction between a natural hazard and a population*'. Brooks highlights that a hazard may cause no damage if it occurs in an unpopulated area or in a region where human systems are able to cope with it.

A study from O'Brien (2004) highlights that understanding of vulnerability in bio-physical research traditions to vulnerability, then, locates vulnerability as an 'end point' of analysis which is directly related to certain damages occurring from 'natural' events such as drought or flood. In this perspective, Quin and Lankao (2011) argue that studies that focus on biophysical vulnerability gives more attention to the interactions between hazard (weather-related) exposure, the sensitivity of systems and the impact that will occur. However, Fussel (2007) argues that the emphasis on physical hazards makes the approach difficult to apply in social systems, where vulnerability is largely associated with human behaviour and therefore need to investigate the social dimensions of vulnerability.

2.3.3 Social vulnerability

In contrast to biophysical vulnerability, the term of social vulnerability is used in modern risk and disaster studies to emphasis the human dimension to hazard. According to Adger and Kelly (2000), social vulnerability is as '*the ability or inability of individuals and social groupings to respond to, in the sense of cope with, recover from or adapt to, any external stress placed on their livelihoods and well-being*'. In this perspective, they use the word 'social' to underscore the human dimension and argue that any meaningful examination of vulnerability must consider how the social, economic and institutional conditions of society put people at risk of a range of climate change hazards. On this view, vulnerability arises not only from the physical characteristics of a climatic event but to a great extent from the inherent properties of society, as determined by the factors which are incorporated within a human system, such as 'poverty, inequality, marginalisation, social networks, literacy, gender patterns, access to health care and housing' (Adger and Kelly, 1999; Brooks, 2003). The nature of social vulnerability will depend on the nature of the hazard to which the human system in question is exposed: although social vulnerability is not a function of hazard severity or probability of occurrence,

certain properties of a system will make it more vulnerable to certain types of hazard than to others (Brooks, 2003).

In its broader sense, social vulnerability is one dimension of vulnerability to multiple stressors and shocks, including natural hazards. According to Warner (2007), impacts from multiple stressors are due to characteristics inherent in cultural values, social interactions and institutions. Furthermore, social vulnerability reflects the 'political economy approach' which focuses largely on people, with its central question being "*who is most vulnerable, and why*?" (Fussel, 2007). In this perspective, the people are unequally exposed to climate change because of the uneven distribution of risks. Therefore, understanding the socio-economic and political context of the systems within which the impacts occur may well determine the degree of vulnerability that exists (Kelly and Edger, 2000). Vulnerability studies which focuses on the inherent condition of systems will help to explain how differences in assets and the capacity to respond, merge with the policy and governance framework to shape the way vulnerability is distributed.

In the urban context, the three main factors that create vulnerability in urban centres are identified as (i) the processes that lead to urbanisation and urban change, (ii) the inadequate capacities of governments, (iii) and the location and expansion of settlements in areas that are hazard-prone (Satterthwaite, 2009). Moreover, the lack of a clear understanding of the size of the potential impact and the failure of government (national and local) to consider climate change risk and vulnerability in urban planning and development are another causes of vulnerability of systems to extreme weather events (Hardoy and Pandiella, 2009). The urban poor are considered to be most at risk from extreme events because in addition to living in unsafe areas, their houses are usually built of poor quality materials with much of the construction work not following any safety standards (Moser et al., 2010). Other factors that underlie the vulnerability of individuals and places are unplanned development,

inadequate to access to land by the poor and the lack of access to decision-making process.

2.3.4 Vulnerability assessment

Before any successful adaptation strategy can be developed, assessing the vulnerability of systems is the first step to respond to climate change challenges in cities. Vulnerability assessment identifies areas of unsustainability, specific capacities and potential responses of vulnerable people in the context of exposure in particular locations (UNEP, 2009). It is at the forefront of attempts at finding out which specific people or areas are most at risk from climate change and the reasons for their susceptibility (Kelly and Adger, 2000). The start point for vulnerability assessments lies in the question 'Vulnerable to what?'. Answering this question involves the identification of the most important cause of vulnerability, investigating where and how different drivers and pressures interact and lead to vulnerability, and the available capacities to cope with threats (UNEP, 2009). According to Kaiser (2007), it is important to provide guidance on the specific actions to be taken in order to address the associated impacts.

Assessments of climate change impacts and vulnerability vary widely and there are numerous approaches exist for assessing the vulnerability of cities. These ranges from the use of indexes derived from specifically selected indicators which rely primarily on the use of locally generated data to assess vulnerabilities, to the use of statistically-modelled scenarios that present information about future changes in climate. It is also dependent on the subject matter, time frame, geographic coverage and the purposes of assessments.

PART B: RESPONDING TO CLIMATE CHANGE

2.4 Response to climate change

To address climate change and its associated impacts, two approaches, namely mitigation and adaptation, have been identified that deal with the cause and effect of climate change. The first response is therefore to reduce the rate of climate change by reducing emissions of greenhouse gases to the atmosphere; climate change mitigation (IPCC, 2001b; Klein et al., 2007). Adaptation, on the other hand, refers to responses aimed at attenuating the negative impacts of climate change or exploiting its potential beneficial effects. In general, mitigation is about avoiding the unmanageable, whilst adaptation is about managing the unavoidable (Wilson and Piper, 2010).

Research amongst climate scientists recognise that for countries to slow down the rate of change of the global climate system, and hence, reduce the adverse impacts of climate change, there is need to reduce the emission of GHG. On the contrary, adaptation is used to imply changes in both the behaviour and characteristics of a system to enable it deal with external stresses. Adaptation actions, therefore, are necessitated by concerns that given the unprecedented rate of change in the global climate, the impacts of climate change would be severe if current vulnerabilities were not reduced. Adaptation thus allows systems to cope with risks by reducing its current or future vulnerability to an adverse impact.

Currently, mitigation and adaptation constitute two major bodies of policy dialogue and practices addressed at climate change issues. According to Klein et al (2007), the interactions between climate change mitigation and adaptation can be summarised as follows: (i) Effective climate policy aimed at reducing the risks of climate change to natural and human systems requires a portfolio of diverse adaptation and mitigation actions; (ii) Different governance levels

are involved in decisions on adaptation and mitigation, and that interrelationships exist within and across each of these level; and (iii) Creating synergies between adaptation and mitigation can increase the cost-effectiveness of actions and make them more attractive to stakeholders, including potential funding agencies. Furthermore, there is no choice between mitigation and adaptation in a world faced by climate change. These two strategies must work together. So mitigation and adaptation policies and approaches need to be assessed at a range of spatial levels for their fit with problems, and a combination of these is needed to confront the threats and risks of climate change (Wilson and Piper, 2010). While climate change policies originally focused primarily on mitigation owing largely to the initial limited understanding of adaptation issues, and of the link between vulnerability and disasters, this has now changed considerably, with both the approaches being used to promote the tenets of sustainable development (Klein et al., 2003).

Science shows that mitigation will not be efficient or timely enough to avoid all potential impacts of climate change. Moreover, it is clear that while the effects of mitigation may take several decades to manifest, adaptation activities take effect almost immediately. Therefore, there is a call for adaptation efforts to be carried out to prepare and protect societies, economies and the environment. Many scholars have emphasized the importance of planning adaptation activities either in response to or in anticipate of climate stimuli (Burton et al., 2005; Adger et al., 2005; UNFCCC, 2008). Thus, adaptation will be inevitable and is becoming more important and more urgent (Sperling, 2003; Christoplos et al., 2009).

2.5 Climate change adaptation responses under uncertainty

2.5.1 Concept of adaptation

Researchers give the adaptation debate a heritage which originates in the literature on evolutionary biology and Darwin's concept of natural selection, adaptation strategies form a 'credible' response to climate change (Yohe and Neumann 1997; Parry et al. 1998; Smith et al. 1999; Smith et al. 2000; Yohe, 2000; Barnett, 2001; Oliver-Smith, 2004; Adger et al. 2005; Gallopin 2006; Nelson et al. 2007). The wide ranging debate means that we need to specify the particular ways in which we understand adaptation relevant to this thesis. This concept has been used in the interdisciplinary field of global environment change, changing more in the direction of a concept used by researchers and others to guide policy making with the aim of securing sustainable and equitable development in the light of changing climate.

There are many definitions of adaptation in the literature on climate change. Some definitions focus on the process of adaptation, others consider the end product of such a process (Smithers & Smit 1997; Pielke 1998; Smit *et al.* 2000). Adaptation to climate change is defined by the IPCC (2007b) as the "*adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities*" (Parry et al., 2007); or "*the adjustment of a system to moderate the impacts of climate change, to take advantages of climate change new opportunities or to cope with the consequences*" (Adger, 2003:190); or "*actions by individuals or systems to avoid, withstand, or take advantage of current and projected climate changes and impacts… in order to decrease a system's vulnerability, or increase its resilience to impacts*" (Pew Centre on Global Climate Change, 2009). It is useful therefore to see adaptation as involving adjustments to enhance the viability of social and economic activities and to reduce their vulnerability to climate, including its current variability and extreme events as well as longer-term climate change (Smith et al. 2000).

The literature suggests that adaptation is an important concept in the issue of climate change in two ways: (i) relating to the assessment of impacts and vulnerabilities, and (ii) development and evaluation of response options. Therefore, adaptation is subject to numerous understandings and uses among different disciplines. According to Adger et al (2005), adaptation consists of diverse activities undertaken by individuals and groups for personal or collective interest and by governments in the interest of the public. He emphasizes that adaptation is required specifically to decrease the vulnerability of systems by enhancing their capacity to cope with that occur (Adger et al., 2005:79). Thus, adaptation involves a continuous process of building adaptive capacity of individuals, communities, and groups to cope with a range of climatic events and to translate these capacities into actions. However, adaptation will vary according to the systems in which they occur, who undertakes them, the climatic stimuli that prompts them, and their timing, functions, forms, and effects. As an illustration, Oliver-Smith (2004) recalls discourses on society's domination over nature. Adaptation here would include adjustments by humans of their surrounding environment, rather than changing their behaviour. From the perspective of climate change researchers, such adaptation would require knowledge about magnitude and designs of the changes, something which is currently not fully understood (IPCC, 2001a).

The two of the most common categories of adaptation are described by Fussel (2007) as autonomous adaptation and planned adaptation. Autonomous adaptation is described by Fussel as that which is widely undertaken by individuals in response to a stimulus. By contrast, planned adaptation takes place either in anticipation of a climatic event or after the event has occurred. Adaptation approaches have been distinguished according to individuals' choice options in which the choice typology has been extended to include the role of community structures, institutional arrangements and public policies (UNEP, 1998). In addition, adaptation can be short or long term,

localized or widespread, and they can serve various functions and take numerous forms.

2.5.2 Climate change adaptation under uncertainty

Uncertainty is an unavoidable aspect of scientific endeavours (IPCC, 2007b; Lewandowsky et al., 2014). Uncertainty is present in all phases of climate change research and applications, from the physical science to the impacts through to the effort to make decisions regarding mitigation and adaptation across temporal and spatial scales. Uncertainty in climate change comes from the basic question of whether the earth is warming, whether human activity is causing this to happen, and when, where and how soon the impacts of climate change will take place. Therefore, climate change is an additional source of uncertainty for decision-makers. Uncertainty during decision-making in adaptation measures relates both to the predictions on which decisions are made and to the 'best' adaptation approach. From this view, uncertainty can be described as "*the gap between available knowledge and the knowledge policy-makers would need in order to make the best policy choice*" (Walker et al., 2010) or "*a person is uncertain if s/he lacks confidence about the specific outcomes of an event. Reasons for this lack of confidence might include a adjustment of the information as complete, blurred, inaccurate, unreliable, inconclusive or potentially false*" (Klauer and Brown, 2004). IPCC (2007b) defined uncertainty as "*An expression of the degree to which a value (e.g., the future state of the climate system) is unknown. Uncertainty can result from lack of information or from disagreement about what is known or even knowable (i.e., among experts). It may have many types of sources, from quantifiable errors in the data to ambiguously defined concepts or terminology, or uncertain projections of human behaviour. Uncertainty can therefore be represented by quantitative measures (e.g., range of values calculated by various models) and/or by qualitative statements (e.g., reflecting the judgment of a team of experts)*".

Generally speaking, climate change uncertainties are associated with: (i) projections of future climate change, especially for longer time horizons; (ii) evaluations of impacts of this change on species and ecosystems; and (iii) the effectiveness of strategies designed to abate and mitigate these impacts. The large uncertainties and complexities present a challenge for decision-makers when they design the adaptation measures. Uncertainty, therefore, in this view relates to the satisfaction and awareness of the decision-makers. Two major sources of uncertainty are the likelihood of an outcome (i.e., properties of the system being studied) and the confidence in the information used. The level of certainty associated with climate change and their impacts is often a key determinant for the perceived usability of that information for formulating adaptation responses. As a result, uncertainty regarding future climate conditions is large that it makes many traditional approaches to designing infrastructure and other long-lived investments inadequate (Hallegatte, 2009). Therefore, decision-makers who have to make urgent decisions based on highly uncertain information can adopt various adaptation strategies to cope with this situation. For example, in order to avoid the burden of decision making under uncertainty, policy makers can develop approaches by shifting responsibility to do so to other agencies, such as national government, by simply expecting design criteria to be set at that level and following these criteria. Other solution suggested by Van der Sluijs (2005) include various attempts to transform, accept, or assimilate uncertainty.

How to move forward in the face of uncertainty and how adaptation can cope with uncertainty are the questions arising in climate change adaptation planning. According to Dessai (2009), climate prediction is limited by fundamental and partly irreducible uncertainties and value judgements, society can make effective decisions by aiming for decisions that produce satisfactory, rather than optimal, results. There are a number of techniques to help reduce uncertainties such as the suggestion from Glick et al (2011) using simulation analyses that account for uncertainties, sensitivity analyses that

explore how robust certain models or adaptation strategies are to various assumptions, and scenario analyses that examine a range of possible outcomes of either impact projections or results of implementing adaptation objectives. Other researchers focus on employing an *adaptive management* approach in which adaptation management objectives are evaluated through monitoring and evaluation (Lawler et al., 2010; Cross et al., 2012). The adaptive management approach should be used because knowledge on such an uncertain issue should be continually updated and challenged. Furthermore, adaptive management utilizes policy based experimentation, developing alternative hypotheses, identifying gaps in knowledge, as well as assessing what knowledge would most effectively address, explore and communicate uncertainty, and scientific dissent and the limits of scientific knowledge should be acknowledged. Other approaches to dealing with uncertainty which have been developed include *exploratory modelling* (Bankes, 1993) and *robust decision-making* (RDM) (Groves et al., 2008; Lempert and Groves, 2010). Especially, RDM has been used to support a wide range of climate-related decision by using robustness criteria, multiple futures, and adaptivity to hedge against uncertainty.

2.6 Framing adaptation to climate change

Adaptation to climate change continues to rise on the agendas of researchers, practitioners, and decision-makers, driven by growing evidence that climate change is real, already observable, and threatening to undermine development (WRI, 2007). In the previous section, the intentional focus of concept 'adaptation' was on an exploration of how adaptation theory is defined and currently being applied in climate change science. There is a broad range of different adaptation typologies, presented in a number of concepts and frameworks. In the following sections, therefore, some concepts that are directly related to adaptation will be discussed.

2.6.1 Adaptive capacity

Adaptation depends greatly on the adaptive capacity or adaptability of an affected system, region, or community to cope with the impacts and risks of climate change. Adaptive capacity and maladaptation are two important concepts which are directly related to adaptation and often used when discussing or assessing adaptation processes. Adaptive capacity is closely related to other commonly used concepts: adaptability, coping ability, stability, flexibility, management capacity, robustness, and resilience (Smit et al., 1999; Fraser et al., 2003; Brooks, 2003; Adger et al., 2004; Fussel and Klein, 2006).

According to the IPCC, adaptive capacity is defined as the "*ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences*" (IPCC WG II, 2001:72); or "*A combination of all the strengths and resources available within a community, society or organization that can reduce the level of risk, or the effects of a disaster. Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management*" (UN/ISDR., 2004). Adaptive capacity was conceptualised by Folk et al. (2002) as "*ability to cope with novel situations without losing future options*". In this perspective, Adger et al. (2007, p.719) considers adaptive capacity as '*the capacity to adapt is the dynamic and influenced by economic and natural resources, informal networks, entitlements, institutions and governance, human resources, and technology*'. With this view, Adger introduces the feature of adaptive capacity into the sphere of general development objectives.

Adaptive capacity is most commonly assumed to depend on a number of resources which constitute the asset base that lays the foundation for initiating adaptation. Moreover, adaptive capacity is considered to be one of the

characteristics (or determinants) of a system that would influence the occurrence and nature of adaptation (Smith et al., 2000). The forces that influences the ability of a system to adapt to climate change impacts are the determinants of adaptive capacity (Walker et al., 2002; Adger, 2003). Others characteristics of adaptive capacity are sensitivity, vulnerability, coping range, susceptibility, critical levels, stability, robustness, flexibility, and resilience (Smit et al., 2000).

Adaptive capacity likes other climate change concepts can be very wide ranging. There are many factors (table 2.1, p.47) that drive adaptive capacity and lead to inconsistency across and with regions, including economic wealth, technology, information and skills, infrastructure, institutional support, and governance (Brooks et al., 2005; Berkhout et al., 2006; Pew Center on Global Climate Change, 2009). Base on the main factors for adaptive capacity and the examples of how they be connected to the region's ability to adapt will help to identify the main features of communities or regions that seem to determine their adaptive capacity and to understand the conditions that influence the adaptability of societies to climate stimuli in the fields of hazards, resource management, and sustainable development. Therefore, enhancing adaptive capacity may reduce vulnerability and promote resilience.

Table 2.1: The main factors for Adaptive Capacity

Source: IPCC, 2001; Pew Center on Global Climate Change, 2009.

Factors	**Examples**
Economic Resources	Wealth of individuals and localities
Technology	Localized climate and impact modelling to predict climate change and variability; efficient irrigation systems to reduce water demand.

Information/Awareness	Species, sector, and geographic-based climate research; population education and awareness programs.
Skills/Human Resources	Training and skill development in sectors and populations; knowledge sharing tools and support.
Natural Resources	Abundant levels of varied and resilient natural resources that can recover from climate change impacts; healthy and inter-connected ecosystems that support migration patterns, species development and sustainability
Infrastructure	Systems that provide sufficient protection and enable efficient response (e.g., wireless communication, health systems, air-conditioned shelter)
Institutional support/Governance	Governmental and non-governmental policies and resources to support climate change adaptation measures locally and nationally.

Developing countries are considered to be the countries having the lowest adaptive capacity because of their limited access to technology, finance, information, scientific knowledge; in addition to inadequate infrastructure, large inequalities and high poverty levels, lack of well-functioning institutions, as well as the least degree of development of social institutions. These conditions generally give developing countries a low capacity to adapt to climate change. In this sense, adaptive capacity is known as being inversely correlated with vulnerability. Therefore, the adaptive capacity of a system determines its vulnerability, and in effect serves as the link between vulnerability and adaptation. On this sense, a system with high adaptive capacity could be adapting to changes and possess low vulnerability to the impacts from climate change. In a broader sense, the adaptive capacity of a human system represents the potential of the system to reduce its social vulnerability and thus to minimise the risk associated with a given hazard. Therefore, the higher adaptive capacity experiences a society has, the more successful adaptation it will achieve.

Recently, research on building adaptive capacity has increasingly focused on practical applications. Figure 2.5 (page 49) exemplifies this tendency: it shows the cycle of building adaptive capacity in order to deliver adaptation actions based on its potential impacts by the UK Climate Impacts Programme (2009). The framework is divided into two main categories: building adaptive capacity (focusing on creating the information, supporting social structures and governance) and delivering adaptation actions (focusing on actions which help to reduce vulnerability to climate risks or to exploit opportunities) reflect the range of adaptation measures and strategies from which a good adaptation response can be developed. This framework highlights that addressing adaptive capacity issues based on an effective adaptation plan must be carried out first in order to successfully deliver adaptation actions. Thus, this principle of seeking support and then taking action is included throughout the development of the decision support tools.

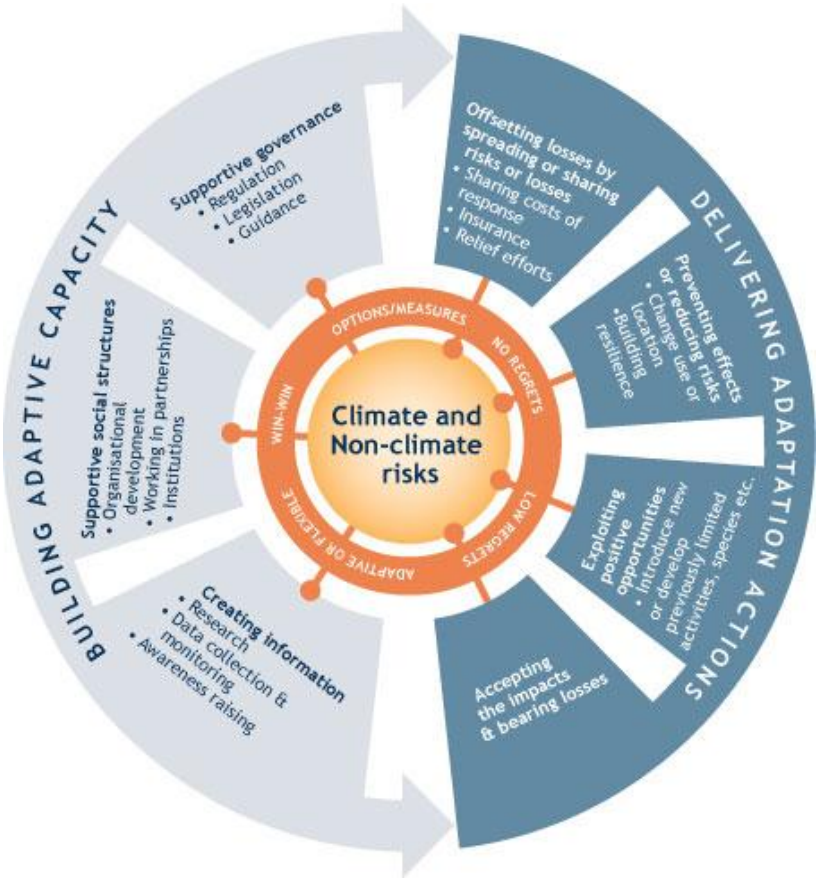


Figure 2.5: Framework for identifying adaptation options (UK Climate Impacts Programme, 2009)

Currently, research on adaptive capacity has brought social issues into the discussion. According to Adger the role of institutions and social capita is substantial in the facilitation of effective adaptation (Adger, 2003; Adger et al., 2007; Osbahr et al., 2010). Examining the social elements of what they define as successful adaptation, Osbahr noted that one of these elements is related to the concept of adaptive capacity and the mechanisms for social learning. Social learning constitutes an important contributor to knowledge transfers between individuals, and most importantly between key individuals and the wider community.

Due to its characteristics, adaptive capacity is not only unequal across developing and developed countries, but also within and across societies. Most of the literature on climate change adaptation planning recognises the importance and usefulness of analysing adaptive capacity on differentiated scales from national to local. It will provide the decision-makers and policy-makers with information on both the constraints and opportunities that social systems are facing in their efforts to cope with and adapt to changing conditions.

2.6.2 Maladaptation

Attempting to define and find measures of successful adaptation imply that adaptation can be unsuccessful (Adger et al. 2005; Doria et al. 2009). In adaptation action, decisions may fail to meet their objectives and they may even increase vulnerability or undermine the resilience of other systems, groups or individuals if the strategy imposes externalities at other spatial or temporal scales. This problem of increasing risks from adaptation is termed 'maladaptation'.

IPCC (2001:80) defined maladaptation as "*any change in natural or human systems that inadvertently increase vulnerability to climatic stimuli; an adaptation*

that does not succeed in reducing vulnerability but increase it instead". The concept maladaptation was applied in the context of climate change by Smit (1993) and Burton (1997). Burton describes how policies and practices can be maladaptive if they increase vulnerability. An example of maladaptation was given by Smit (1993): the abandonment of marginal farms after years of repeated droughts could be considered failure at the level of the individual farm, but as an adaptation for the entire agriculture sector, because the better-quality farms remain active, and therefore the overall quality and chance of survival during droughts rises.

Certainly, maladaptation may not only increase vulnerability, but can generate new risks. Therefore, we can learn from the threats rising from maladaptation about the impacts of specific measures aimed at increasing the ability of one group to adapt or cope with certain changing conditions must be considered in a large picture. The concept of maladaptation also has links to discussions on the role of stakeholders in development projects and programmes and to this extend contributes to the already precarious relationship between environment and the poor.

Failing to integrate adaptation into development planning and policies can result in maladaptation, where initiatives enhance rather than reduce vulnerability to the impacts of climate change.

2.6.3 Mainstreaming climate change adaptation into development planning

Mainstreaming climate change adaptation into development planning and policies has increasingly emerged as a policy strategy that recognises the link between development and climate change adaptation. It has been promoted as an effective way to respond to climate change. Mainstreaming adaptation promotes the shift in the responsibility for implementing strategies from

individuals and agencies dealing with climate change issues to all sectors of government and civil society. The expected benefits from mainstreaming include avoided policy conflicts, reduced risks and vulnerability as well as ensuring current and future strategies are well adapted to climate change.

UNDP-UNEP Poverty-Environment Initiative (2011) defines 'mainstreaming climate change adaptation' as "*the iterative process of integrating considerations of climate change adaptation into policy-making, budgeting, implementation and monitoring processes at national, sector, and subnational levels. It is a multi - year, multi-stakeholder effort grounded in the contribution of climate change adaptation to human well-being, pro-poor economic growth, and achievement of the MDGs*".

Mainstreaming climate change adaptation is a multi-level process. Mainstreaming implies that awareness of climate change impacts and associated measures to address these impacts, are integrated into the existing and future policies and plans of developing countries, as well as multilateral institutions, donor agencies and NGOs. The UNDP-UNEP Poverty-Environment Initiative (2011) highlights the three important levels of intervention on mainstream climate change adaptation, including:

- The first level consists of making development efforts consciously aim at reducing vulnerability while avoiding maladaptation. This can be seen as strengthening the base for adaptation by addressing adaptation deficit and increasing the overall resilience of the country and population.

- The second level is about ensuring that climate change is considered in the decision-making of relevant government agencies so that policy measures catering to climate change are developed. This means not only climate-proofing policies but also addressing emerging needs for adaptation within the different sectors or geographical areas.

- The third level calls for specific adaptation policy measures targeting issues that the first two levels have not yet tackled.

2.6.4 Urban resilience

The notion of resilience is gaining increasing prominence across a diverse set of literatures on cities and climate change. There is a growing set of studies that explore how resilience is connected to other key concepts that appear within climate change literature including vulnerability, adaptation, sustainability, and transition. Recent studies about 'climate resilience' and 'urban resilience' emphasize the idea that in order to be resilient, cities and urban systems need to be able to quickly bounce back from climate related shocks and stresses (Pelling, 2003; Boyd et al., 2008; Sperling et al., 2008). Therefore, in order to promote the urban resilience to climate change, it requires cities become resilient to a wider range of overlapping and interacting shocks and stresses. Taking into account the relation between resilience and city, Alberti et al. (2003) understand urban resilience as the degree to which cities tolerate alteration before reorganizing around the new set of structures and processes. Urban resilience is related to the degree to which city can maintain human functions as well as ecosystem functions.

In broad terms, urban resilience describes the ability of a city or urban system to cope with a wide array of shocks and stresses related to climate change. Urban resilience can be summarized into four categories: urban ecological resilience; urban hazards and disaster risk reduction; resilience of urban and regional economies; and promotion of resilience through urban governance and institutions (Leichenko, 2011). The characteristics of urban resilience have been categorised as follows:

(i) **Robustness** (the strength of a system and its elements to withstand disruption without suffering degradation or loss of function): how 'strong' a city is? How many threats a city is able to carry?

(ii) **Redundancy**: the extent to which a system or its elements have substitutes to ensure functioning in the event of a disruption;

(iii) **Resourcefulness**: the capacity within a system to identify problems, establish priorities and mobilize and apply resources in face of disruption and,

(iv) **Rapidity** (the capacity to meet priorities and achieve goals in a timely manner to contain losses and thwart future disruption): another characteristic of urban resilience relates to 'the speed to return'. How fast a city will restore or shift into a new stable paradigm? (Pimm, 1984; Linnenluecke and Griffiths, 2010).

Urban resilience aims to enhance cities' ability to absorb the amount of disturbance and react appropriately. According to Folke et al. (2003), there are four elements which can be used to build resilience and adaptive capacity in order to enhance urban resilience: (i) learning to live with disturbances and uncertainty; (ii) nurturing diversity for reorganization and renewal; (iii) combining different types of knowledge for learning; and (iv) creating opportunities for self-organization.

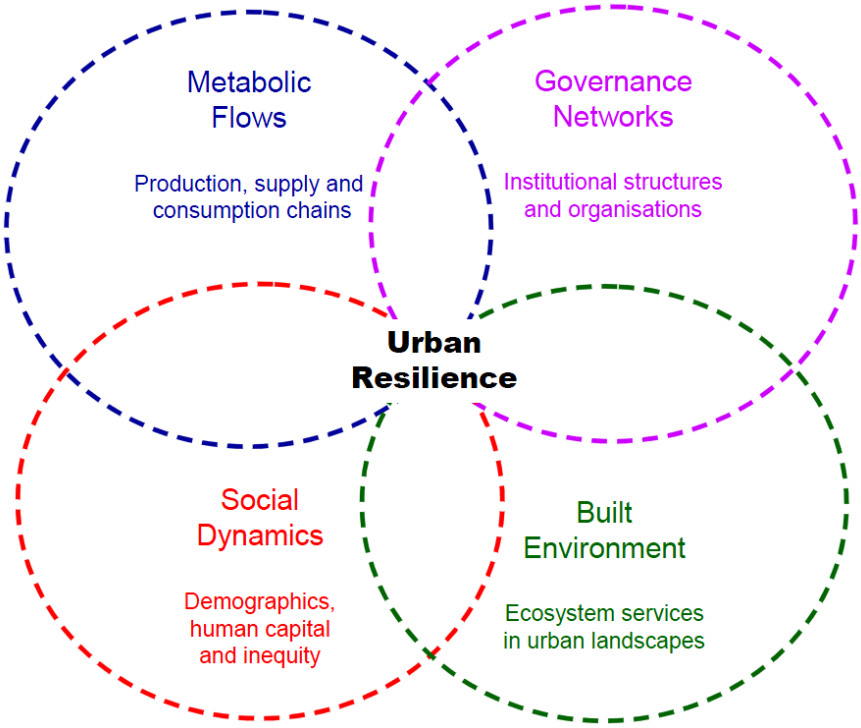


Figure 2.6: Four interconnected research themes for prioritising urban resilience research. *Source: Resilience Alliance (2005)*

Focusing on issues of resilience and considering cities as complex adaptive systems, the Resilience Alliance (2005) suggested four main themes that were of particular significance for the resilience of urban systems and landscapes (figure 2.6). In which, the multi-level understanding of the resilience of urban systems are analysed through (1) metabolic flows-focus on sustaining urban functions, human well-being and quality of life; (2) governance networks-focus on the ability of society to learn, adapt and reorganise to meet urban challenges; (3) social dynamic of people as citizens, members communities, user of services, consumers of products; and their relationship with (4) the built environment, which defines the physical patterns of urban form and their spatial relations and interconnections.

2.6.5 Adaptive management

The concept of 'adaptive management' was used to strengthen the relationship between climate policy and climate science (Holling, 1978; Walters, 1986). Adaptive management involves the selection of a strategy that can be modified to achieve better performance as one learns more about the issues at hand and how the future is unfolding.

In term of uncertainty in climate change, adaptive management seeks to improve scientific knowledge, and to develop management regimes that consider a range of possible future outcomes and even take advantage of unanticipated events. It also promotes the flexible decision making that can be adjusted in the face of uncertainty as new outcomes from management actions and other events develop. The decision makers seek strategies that can be modified once new insights are gained from experience and research and then make choices based on their best assessment. In this approach, learning, experimenting and evaluation are the key features which are actively planned for in decision-making. Dewar and Wachs (2006) highlight six iterative steps in adaptive management: assessment, design, implementation, monitoring,

evaluation, and adjustment. The United Nation Development Programme defines five-step process as an adaptation policy framework (Burton et al., 2004), including:

- Scoping and designing the adaptation project which ensures that the project is well-integrated into the national policy planning and development process.
- Assessing current vulnerability which responds to issues determine society's vulnerability including exposure, sensitivity, and capacity to adapt.
- Assessing future climate risks which helps to develop future scenarios of what trends may occur.
- Formulating an adaptation strategy by identifying and selecting a set of policy options and measures to create a strategy.
- Continuing the adaptation process by implementing, monitoring, evaluating, improving, and sustaining the initiatives.

What this sort of analysis of adaptation points to directly is the skills, resources, and other institutional capacities of actors in various institutional settings. This becomes all the more clear when the discussion turns to 'barriers'.

2.6.6 Barriers to adaptation

Barrier to adaptation have been defined as "*obstacles that tend to delay, divert, or temporarily block the adaptation process, but which can be overcome with concerted effort, creative management, change of thinking, prioritization, and any related shifts in resources, land uses, or institutions*" (Ekstrom, Moser, Torn, 2011). In term of climate change, the UK Climate Impacts Programme (2009) indicates barriers/constraints to ability for a system to adapt, including the following:

- Limited understanding of climate risks and vulnerabilities guidance.
- Lack of supportive policies, standards, regulations, and design guidance, encouraging status quo and/or presenting impediments to progress.

- Existing legal or regulatory restrictions.
- Lack of availability or restricted access to appropriate technologies.
- Costs of identified adaptation options when budgets are limited.
- Lack of availability of resources such as in-house expertise.
- Social/cultural/financial rigidity and conflicts.
- Short-term nature of planning horizons - necessity of realising return on investment.

There are also barriers associated with perceptions of uncertainty:

- Confidence for the long term - mismatch between business planning horizons and timeframe of projections of climate change.
- Not seen as a big problem yet, so the temptation is to wait for the impact then react.
- Belief that the uncertainty is too great to warrant taking adaptation action now.
- Lack of useful precedents or evidence of adaptation actions – what are others doing?
- Lack of acceptance/understanding of risks associated with implementation - what if the decision is wrong?

Overcoming these barriers is more challenging, therefore, in order to achieve a successful adaptation, it requires to build a strong adaptive capacity through improving the understanding of climate change, evaluating associated risks and vulnerabilities, and updating legal and institutional frameworks.

2.7 Summary

This chapter discussed and analysed the relationship between climate change and urban development. Part A traced the literature underpinning the current understanding of climate change in the urban context and its impacts present to cities. Strong evidences from literature review shows that climate change, which describes a highly complex set of challenges, is grim reality that poses

a major threat to humanity and sustainable development. And it is widely believed that urban areas have many linkages with climate change as major contributors to climate change, while also being particularly vulnerable to its impacts. The most important climate change impacts for cities includes sea level rise, urban flooding, drought and storm, water demand and water availability, human health problems, energy use, infrastructure damage from extremes, tourism and cultural heritage, urban biodiversity and air pollution. These impacts lead to potential destruction of infrastructure, loss of lives, loss of assets, societal disruption, and economic damage (IPCC, 2007). Climate change already threatens development processes in developing countries, where severe climatic events are already being experienced. Especially, developing countries are facing the challenges of dealing with ongoing urbanisation in conjunction with the climate change. The increased climate hazards combined with rapid urbanisation are likely to increase strain on the capacity of all levels governments of countries in developing world. The importance of cities in fighting against climate change is derived from the fact that cities have certain characteristics that make them unique.

Part B of chapter dealt with the response to climate change by exploring the central concept of adaptation and climate change adaptation under uncertainty: how adaptation theory is defined and currently being applied in climate change science. As clarified in this chapter, adaptation will be inevitable and is becoming more important and more urgent. Because it is an important policy response option along with mitigation as it can significantly reduce adverse impacts of climate change. Central to this part of chapter is to attempt to put together the two notions of adaptation and adaptive capacity. Adaptation depends greatly on the adaptive capacity in which the adaptive capacity of communities is determined by socio-economic characteristics. It means that adaptive capacity is central to deal with the given challenges of climate variability and extremes. Hence, enhancing the adaptive capacity represents a practical means of coping with changes and uncertainties in

climate, including variability and extremes. Some concepts that are directly related to adaptation such as maladaptation, barriers to adaptation, adaptive management, urban resilience and mainstreaming adaptation were also discussed in order to develop a theoretical framework that informs the research process.

After exploring climate change issues in the urban context and the responses to climate change from literature review, the following chapter continues to dig into the literature about the role of urban planning in tackling with climate change, and the challenges of integration of climate change into urban planning and management.

CHAPTER THREE

URBAN PLANNING AND CLIMATE CHANGE –

A CHALLENGE FOR INTEGRATION

3.1 Introduction

This chapter deals with the main part of theoretical development of this research. The chapter continues with the discussion commenced in Chapter two by looking more closely at the debate in the literature on urban planning related to climate change and to the governance of climate change adaptation in urban areas.

3.2 Urban planning in developing countries

Urban planning is defined by Taylor (1998) as a 'technical and political process dealing with the control of the use of land and the design of the urban environment, including transportation networks, to guide and ensure the orderly development of settlements and communities'. Planning theory generally distinguishes between two different types of theory: The first focuses more on the object itself which aims to 'improve our understanding of the planning problems' (Taylor, 1998:153). It is concerned with the elements of planning practices. It focuses on the discussion of spatial planning, land-use planning, building regulation and conservation. The second is better described as 'procedural planning theory'. In this case, planning practices have some steps to follow in order to apply particular urban development policy and the procedure sometimes needs to address the views and opinions of different stakeholders. Recent literature shows that historically urban planning has moved from more physical development into urban policy delivery (Taylor, 1998).

According to UN-Habitat (2009), the dominant approach to planning in the 20th century had three key characteristics: (1) It was seen as an exercise in the physical planning and design of human settlements while it responded to social, economic or political matters; (2) it involved the production of master plans or layout plans, showing a detailed view of the built form of a city once

it attained its ideal and-state; and (3) It was viewed as a normative task that should be driven by a particular set of values which described the ideal living environment and, in the view of planners, reflected the 'public good' (UN-Habitat, 2009).

The planning of most of the world's cities was originally based on the European planning tradition, with its strong emphasis on land use planning and urban design. In much of Asia and Africa, this was in many ways presented as a panacea for some of the growing problems of the developing world, without much regard to the specificities of context. The outcome, as commonly received, is that urban planning is weak and ineffective (UN-Habitat, 2009; World Bank, 2009). Inadequacies in urban planning mean that cities in the developing world are unable to deal with negative externalities of rapid urbanisation and industrialisation. Urban planning in developing countries faces enormous. One of the challenges is the unregulated growth and expansion of cities due to rapid urbanisation. Moreover, the unprecedented growth in the urban population has often overwhelmed the capacity of cities to provide the services and infrastructure needed to support am adequate living environment and urban livelihoods. Rapid urbanisation has led to increased pressure for land, as shanties and squatters come to predominate, thus intensifying sprawl, congestion, and overcrowding.

Freire identifies the main challenges to the future of urban planning and urban management in Third World cities, including: (i) the need to keep urban planning and management flexible and ready to adapt to new developments in the economic or social front; (ii) getting the best possible technical analysis; (iii) pushing the agenda of excellence; (iv) thinking big and long-term; (v) looking at the big picture-overall competitiveness, labour market, environmental quality, and standing as regards capital and human capital; (vi) engaging the private sector; (vii) understanding and discussion with community leaders of how much limited-resource local government can offer;

(viii) establishing contracts vertically with the central government and horizontally with other municipalities (Freire, 2006:12).

With regard to the planning challenges faced by cities, Farvacque., et al (1992: 63) highlights further challenges including the existence of obsolete and unappreciated planning regulations and codes; the dominance of the master plan with its undue delays; and the centralisation of planning powers in central government which distances local authorities from the planning process. Other challenges include institutional fragmentation involving the isolation of planning functions from such other functions as infrastructure and service delivery (which are each separately managed), and a lack of co-ordination between urban planners and financial planners. In this perspective, Friedmann (2005), argues that the financial inadequacies on the part of local bodies, who are responsible for the provision and maintenance of urban services and infrastructure is a key problem faced by planning.

Urban planning issues in the East and Southeast Asian cities are similar to cities in other developing countries. As these countries were mainly once colonies, the planning process was establish by colonial planners and most diffusion of Western urban planning models to the region occurred before the World War II (UN-Habitats, 2009; Huynh, 2015). In these cities, the master plan approach is used to guide the process of planned development of an urban area. Even initially, the master plans in this period were considered too ambitious and impractical, but they became outdated shortly after their introduction due to rapid urbanisation (Kim and Choe, 1997; Silver, 2008; Nguyen, 2008). In this perspective, Huynh (2015) argues that urban planning focusing too much on immediately emerging challenges and not strategic long term actions is the main problem facing the Asian cities. Traditional approaches to planning have focused on the physical dimension, i.e., building and maintaining infrastructure and services, but this focus on 'hardware' is inadequate when it comes to managing the mega urban growth faced by many

cities (UN-Habitat, 2011). Huynh concludes that urban planning in Asian cities has tended to constrain the development of cities instead of facilitating their growth.

In the face of rapid urbanization and the prospect of climate change, countries in the Southeast Asia have begun to address climate change issues within different ministries. Some countries have formulated national climate change policy with measures for adaptation and mitigation. Some also consider that mainstreaming climate change into development planning is crucial. However, most of developing countries in the region are facing the similar problems related to urban planning. Local authorities lack the mandate and human capacity to handle urban planning and its enforcement mechanisms (Yuen and Kong, 2009). In this region, Bangkok and HCMC-two economic centre of Thailand and Vietnam-share the same problems related to urban flooding, sea-level rise, and coastal erosion (Webster and McElwee, 2009). Flood problems in these cities are mainly due to the geographical location (located on low-lying flood plains areas), land subsidence, and land use change (caused by rapid urbanisation/population growth and ineffective urban land use).

3.3 Urban planning, climate change and the role of municipal governments

3.3.1 Climate change and the role of municipal governments

As examined in the chapter 2, evidence of climate change has been observed across the globe and it is seen as a major long term challenge facing urban development. There is a rapidly increasing attention to adaptation to the unavoidable impacts of climate change by mainstreaming climate change into urban development planning. Recent studies highlight the leading role of cities in coping with climate change (Wilson, 2007; Measham et al., 2011; Baker

et al., 2012; Isaksen and Stokke, 2014). The impacts of climate change are experienced locally, and this geographic variability in climate change impacts emphasises the need for 'place-based' approaches to climate vulnerability analysis and adaptation (Kelly and Adger, 1999; Cutter et al., 2000; Turner et al., 2003). Consequently, municipal governments are arguably well-positioned to promote climate change adaptation by encouraging local people to participate in local policies and decision making process. It is believed that local municipal authorities can facilitate participatory processes by fostering strong relationships with other urban actors who have the desired technical capacities to address many of the challenges faced in urban areas (Friedmann, 2005). This new relationship in planning necessitates the involvement of new sets of actors including the private sector, the citizenry and the local community. In this context, Agrawal (2008) argues that local institutions have three critical roles in climate change adaptation planning, including (i) structuring responses to local impacts; (ii) mediating between individual and collective responses to vulnerability; and (iii) governing the delivery of resources to facilitate adaptation.

With the significant role in addressing climate change adaptation, urban planning has been identified as a critical mechanism through which climate change adaptation can be facilitated. Planning institutions are critical drivers of adaptation to climate change. The next subsection, therefore, will explore the positive and potentially important role of urban planning in adapting to climate change.

3.3.2 Adapting to climate change on cities: the role of urban planning

Urban planning is considered a societal tool to create order among activities in the urban space, to reduce conflicts among them, and seeking the wellbeing of their inhabitants (Blair, 1973). Much of the existing literature on climate

change and environmental management emphasizes urban planning as a key public policy area to anticipate and prevent adverse impacts of climate change on cities, particularly reducing social and urban vulnerability, creating adaptation, promote sustainable development and to take advantage of any opportunities it might bring (Füssel, 2007; Preston. et al., 2011). From a climate change adaptation perspective, Stern (2007) suggests that 'the planning system will be a key tool for encouraging both private and public investments towards locations that are less vulnerable to climate risks today and in the future'.

Urban planning can be viewed in diverse ways, involving perceptions which focus on urban planning policy issues along with others which consider it in terms of planning practice. In this context, urban planning could, for example, provide an integrated framework to reduce the risk from climate change, developing risk profiles and adaptation strategies at macro and micro scales, correlating risk, vulnerability, adaptive capacity and resilience to adaptive responses (Blakely, 2007; Stern, 2007; IPCC, 2007; UN-Habitat, 2007). Moreover, UN-habitat (2009) argues that by effectively managing the way development takes place in cities, urban planning can reduce climate change because well-planned cities make more efficient use of energy and the urban landscape. Urban planning is thus a very important approach for mitigating emissions and adapting cities to climate change by facilitating actions to address the unsustainable use of energy in buildings, industries, and transport, through discouraging sprawl, reducing travel distances in cities, and ensuring that building construction and upgrading meets acceptable standards (Bulkeley, 2006).

Urban planning can also reduce social and physical vulnerability in cities through the range of adaptation actions it undertakes focusing on hazards and protecting the development of new settlements in unstable locations. The IPCC (2007) argues that in order to address adaptation, land-use policies and regulations that integrate climate change considerations into settlement and

infrastructure planning are necessary. Climatic concerns (climate variations and change) need to be made an integral part of planning process (Wilson, 2006). It is evident that planning is not just about formulating ideas, policies and programmes, but also about implementing these through collective action. In principle planning should have a major role in reducing risk, and though in practice it can enhance institutional responses it often lacks the capacity.

In terms of climate change, spatial planning is regarded as a key instrument for governance adaptation to climate change and climate change and climate change impacts in spatial context (Wilson, 2006; Bulkeley, 2006; Stern, 2007). Spatial planning is conceived as being holistic, concerned with the interface between governance and public policy implementation and looks forward to the relatively distant future (Healey, 2005; Wilson, 2006; Wilson and Piper, 2010). From this perspective, the EU's White Paper on adapting to climate change points to the leading role of planning '*A more strategic and long-term approach to spatial planning will be necessary, both on land and on marine areas, including in transport, regional development, industry, tourism and energy policies*' (CEC, 2009).

Climate change adaptation planning literatures indicates the significant challenges in integrating climate change adaptation into local development planning such as lack of information, institutional compartmentalization and fragmentation and resources constraints. In this context, Measham et al., (2011) highlight that the planning agenda is usually full in most authorities and it is hard to find institutional space for climate change adaptation.

Developing countries in Southeast Asia are facing the problem of weak capacity of local or municipal government. Local authorities lack the mandate and human capacity to handle urban planning and its enforcement mechanisms (Yuen and Kong, 2009). In these countries, planning is generally

short-term, physically oriented and unable to respond effectively to change. Plan implementation is other issue. There is an urgent need to strengthen the institutional capabilities that are prerequisite to effective plan implementation

Nevertheless, there is significant scope for integrating climate change into urban planning. However, it requires a careful balancing of the economic, social and environmental dimensions of sustainable development (Campbell, 2007). Urban planning has a dynamic role in building adaptation to climate change through the collaboration with the scientific community, administrative techniques and a policy framework for involving other local stakeholders, including private and social sectors. Furthermore, spatial planning coordinates the different relevant socio-economic approaches through a holistic approach to shaping spatial development with a long-term perspective (Biesbroek. et al., 2009).

To further explore the relationship between urban planning, climate change and the role of municipal government, the following section will examine planning governance in the context of urban development.

3.3.3 The governance of planning in urban development

Urban areas have always had some form of the governance of place, demanded by the challenge of the intensity and density of the interactions of urban life (Healey, 2007). The qualities of places of an urban area and the spatial organisation of phenomena are important for quality of life, for distributive justice, environmental well-being and economic vitality. The relationship between evolving forms of governance and particular approaches to planning as well as the importance of governance in the planning of cities has been the subject of increased attentions over the years, including many interpretations of its actual meaning (Gonzalex and Healey, 2005; Heider, 2005). The concept of governance of planning was described by Heider (2005)

as the inclusion of a wide range of actors in the 'shaping and making policies' at the municipal level. It is now widely used to imply that decision making processes for the city have been broadened out, with a restructuring of the relationships between government bodies and other stakeholders. The concept has gained prominence in the field of planning, mainly due to the desire to integrate many responses to the numerous social problems that emerged after the dismantling of the welfare state. The term 'governance' refers to a broader range of processes which contributes to the aggregation of interests and demands and to the coordination of social activities (Rhodes, 2000). Governance represents a major departure from traditional form of government, which emphasized the dominant role of the state. As a new system of management, it involves an active role not only for the public sector, but also for the private and voluntary sectors.

Urban governance presupposes that marginalized groups and communities will be empowered to actively take up this new role. This certainly entails conscious efforts on the part of governments to enhance the ability and self-confidence of marginalized groups to make the transition from being passive to more active participants in development processes.

There is a growing attention paid to shaping the governance capacity of planning in order to address climate change adaptation. In this context, Bulkeley highlights the importance of focusing on the administrative structure of city's governance by establishing appropriate planning framework and building the competencies and resources of municipal authorities in order to achieve urban resilience. In the view of responding climate change, he emphasizes the arising challenges of municipal capacity for governance climate change respects the role of urban planning: addressing patterns of urban development, including sprawl and illegal and informal housing settlements, and developing low carbon infrastructures (Bulkeley. et al., 2011).

3.3.4 Urban planning in the multi-level governance of climate change

The previous sections provided the context for the planning response to climate change and pointed out the vital role of urban planning in adapting climate change on cities and the necessity of mainstreaming climate change into planning processes as well as the important of governance of planning in urban development. This section clarifies where urban planning fits into the picture in the multi-level governance of climate change.

As noted previously, climate change poses many significant technical challenges for spatial planning and it is not just a technical issues but an issue for planning governance. It also raises questions about how to plan adaptation responses with uncertain knowledge of potential impacts or how to include alternative forms of energy supply within local developments (Bulkeley, 2009). From this perspective, Bulkeley argues that through the spatial planning system, multiple modes of governing climate change are taking shape, creating a fragmented governance landscape, which provides both opportunities and barriers for progress in addressing this critical issue. In this sense, modes of governing are orchestrated by particular conceptions of the policy problem, institutionalised relationships, and clusters of policy interventions and techniques. Recently, many cities have been grappling with climate change using master, strategic, and action plans aimed at mitigating GHGs emission and adapting to the anticipated, albeit uncertainty, impacts of climate change (Jabareen, 2015).

The literature shows clearly that in this century that land-use planning, territorial management, spatial ordering and town/city planning became an established part of government systems in most countries. Sanyal (2005) argued that different national cultures and governance practices provided variable fertile ground for planning systems. Planning has focused on the issue

of institutional change as a central element in the debates in planning since the early 1990s. The essence of planning is institutional design (Innes, 1995). However, according to Wilson and Piper (2010) climate change is a challenging issue for spatial planning in part because it raises particular problems of understanding 'the public interest'. Planning systems in almost countries have developed as an intervention in the free operation of land markets and development rights, with conceptions of the public interest lying both in the national interest and in local or community interests.

Despite the monumental significance of the action plans, analysts have to assess their nature and impact at the national or local levels and their possible effect on environment and society. In many countries, national governments have retained their powers of central or national level decision making through legislating for the right set policy for the use of land and space, and for powers to determine applications for consent for certain types of development (Wilson and Piper, 2010). Thus, planning systems that focused on integrated approach to developing and regulating the qualities of places have been pushed and pulled by the way these forces have interacted in the governance landscapes of individual countries. Planning is an essential delivery mechanism for national climate change policy as translating national policy goals (emissions reduction or renewable energy generation) into regional and local realities.

In addition, climate change is reconfiguring the governance of spatial planning and the relationship of national, regional and local levels. In terms of different modes of governance for local authorities' climate change actions, the climate change agenda is bringing about a shift in the regulatory powers of local spatial planning, but it is also prompting greater integration with other interventions and across different scales (Wilson and Pipe, 2010). Spatial planning is increasingly considered as a means through which to deliver mechanism for predetermined adaptation goals, as well as engaging

proactively with a range of different partners, particularly private sector and community-based organisations, in order to achieve climate change objectives.

3.4 Governance of climate change adaptation in urban area.

3.4.1 Climate change and the complexities of urban governance

Governance has become a widely used term in the analysis of decision-making in society. As argued above under the impacts of climate change, cities must be proactive in reducing risks and local government have emerged as important players in climate change adaptation planning. Commentators emphasize that climate change policies require cooperation between different parties, and extend across several policy and sectoral planning areas (Winsvold *et al*., 2009). In this aspect, planning is seen as part of a more broadly conceived idea of urban governance. The concern of how cities might be able to respond to the governance challenges of mitigation and adaptation is rapidly increasing among academic and policy communities and a growing number of scholars focus on exploring how the climate change issue is governed at the urban level (Robinson and Gore, 2005; Betsill and Bulkery, 2007; Bulkeley *et al*., 2009; Davoudi *et al*., 2009).

Governance processes take place across multiple sectors of administration locally and globally, stretching the sphere of governance both horizontally and vertically. Therefore, governance process can be termed as a system of continuous negotiation between nested governments at the several different territorial tiers (Hooghe and Marks, 2003) and climate change governance can be described as a broad range of options of coordination concerning climate change adaptation. In order to address climate change successfully and sustainably, it is vital to foster collaborative relationships between national, regional and local government institutions (Leck and Simon, 2013). As climate change adaptation is a relatively new policy issue, governance mechanisms

and policy instruments for coping with changing climate are still in the process of developing.

Thus, there is growing awareness that urban governance can have a major influence on climate change, based on how they structure it as a problem and how they conduct their planning in a collaborative manner, enabled by strong leadership and support from local government networks (Betsil and Bulkeley, 2007; Tanner et al., 2008; Bulkeley et al., 2009; OECD, 2010; Keskitalo, 2010; Aylett, 2014; Bauer and Steurer, 2014).

The concept of governance used in these debates draws on distinctions developed by political scientists to express the nature of the relationships of authority that exist rulers and the ruled – what is the often referred to as regime characteristics. In 1989, the World Bank attributed the weak economic performance in Africa to the failure of public institutions. They highlighted that "*the underlying litany of Africa's development problems is a crisis of governance*" and defined governance as "*The exercise of political power to manage a nations affairs*" (World Bank, 1989). As such governance came to denote a broad concept encompassing the organizational structures and the activities of all levels of governance, be they central, regional or local as well as the judicial executive organs of government. It also came to incorporate institutions and organizations of civil society in their capacity as participants in shaping and influencing public policy that affects their lives. The core elements of governance are (i) public sector management; (ii) accountability; (iii) legal framework for development; and (iv) transparency and information.

3.4.2 Multi-faceted conception of governance

This conception of governance can be used to understand the complex inter-relationships between stakeholders and societal coordination processes regarding to climate change (Benz, 2004; Dietz, 2007). Because of increasing

human pressure on and demand for complex social- ecological system services, thus it is important to understand fundamental design principles and the institutional architecture required for effective adaptive and multi-level governance of social-ecological systems (Ostrom, 2010; Bierman *et al*., 2012). Therefore, it is of critical importance to understand pathways of change that lead to such governance (Young, 2010; Folke *et al*., 2005). In contemporary approached 'Governance' is not restricted to government, but relates to the process of steering and managing a new trajectory that is systematically viable in a climate-changing situation. Mayntz (2006:15) defines governance as "*all co-existing forms of collective regulation of societal circumstances: from institutionalized civil society self-regulation through various forms of cooperation between public and private stakeholders to sovereign action by government-stakeholders*". In this context, governance is seen as a generic term for coordination of social actions and not as a distinction from hierarchical regulation or control. The broad definition also has analytical and normative dimensions. From the perspective of Folke (2005), governance is the structures and process by which people in societies make decisions and share power and in its normative usages governance therefore means creating the conditions for ordered rule and collective action or institutions of social coordination. UNDP (1997) defines 'good governance' as "*participatory, consensus oriented, accountable, transparent, responsive, effective and efficient, equitable and inclusive*".

According to Benz (2004), governance is a perspective on a complex reality and it is used to facilitate the survey of multi-layered political and social contexts, as they can be observed in the field of mitigation and adaptation to climate change (Dietz, 2007). From perspective of Pierre and Peters (2000), the governance concept has been used both in the sense of 'structure' and 'process' for steering and managing parts of societies. Governance as 'process' refers to managing networks, markets, hierarchies or communities (Rhodes, 1996). In this perspective, governance involves agency, not the intentional acts of single individuals but the process that results from the involvement of many states

or societal agents (Kjaer, 2004, p.12). Governance as 'structure' refers to the pattern of institutional design and the mechanism in which social order is generated and reproduced. In this sense, governance is defined as "*the pattern that emerge form governing activities of social, political and administrative actors*" (Kooiman, 1993).

The term governance also refers in many cases to the instruments of an arrangement, in which can be defined as the options available for the realisation of societal aims. The creation, determination and implementation of instruments in governance arrangements in the regulation of societal circumstances are involved by not only government but also civil society or private actors. Thus, governance is connected with a wide range of regulatory and non-regulatory instruments that are being proposed and initiated by non-state actors.

Adaptive governance

These multi-faceted dimensions of governance therefore helpfully give a context for understanding how governance strategies for complex social-ecological conditions may or may not emerge and the range of challenges in building adaptive capacity. In relation to climate change the idea of 'Adaptive governance' is an approach that promises to reduce uncertainty by improving the knowledge base for decision making. In term of climate change uncertainty, adaptive governance seems to be a promising approach for improving climate adaptation governance (Munaretto et al., 2014). The governance strategies studies in the literature on governance of climate change adaptation are emerging with slightly different names such as adaptive governance (Folke et al., 2005); resilience management (Walker et al., 2002); adaptive management (Arvai et al., 2006); adaptive co-management (Olsson et al., 2004; Armitage et al., 2008); adaptive collaborative management (Kalibo and Medley, 2007) and earth system governance (Biermann, 2007). These

various themes have emerged from literature to promote governance capacity by fostering fluid governance frameworks and supporting networks, innovative methods of knowledge sharing and the development of community capacity. Drawing on these various stands of relevant literature, this thesis uses the term adaptive governance to cover all these debates.

The concept of adaptive governance is derived from institutional theory that focuses on the evolution of formal and informal institutions for the management and use of shared assets. Adaptive governance of social-ecological system is an overarching issue that integrates both their ecological and institutional layers (Shkaruba and Kireyeu, 2013). As described by Ostrom (1999) and Dietz (2003), adaptive governance integrates principles from adaptive management with empirical and experimental evidence that communities can self-organize to overcome the tragedy of the commons. This perspective emphasizes the importance of understanding the local contexts and the recognition of behavioral complexity. Nelson et al (2008) have observed that that adaptive governance explores ways in which government and community-based institutional arrangements complement each other to improve natural resource management, integrating scientific and local knowledge. Similar views have been voiced by Dietz et al (2003) who assumed that adaptive governance requires reliable information, dealing with conflicts including compliance, providing infrastructure and designing institutions that are prepared to deal with change.

There is a growing recognition that besides adapting the physical ecological system, also the social and governance system themselves need adaptation. According to Birkmann et al. (2010), the concept of adaptive governance indicates that there is a need for a paradigm shift to move from the dominant focus in urban adaptation on the adjustment of physical structures towards the improvement of planning systems, tools and governance process (e.g. norms, institutional settings etc that are highlighted in the literature on

governance). The work of Ostrom (1996) and McGinnis (1999) emphasises that adaptive governance relies on polycentric institutional arrangements that are nested, quasi-autonomous decision-making units operating at multiple scales. A key characteristic of adaptive governance is iterative learning, which enables actors to cope with change and governance, enabling institutions that guide public and private interactions (Folke et al., 2005; Olsson et al., 2007; Armitage. et al, 2007). The implementation of adaptive governance in the context of climate change adaptation may be enhanced by having realistic expectations, fitting adaptive governance to the specific situations, and emphasizing conditions for success such as well-defined, small scale resource systems, stakeholders assess to tools and management, presence of leaders supporting the process, explicit support of public agencies or presence of resources and capacity building (Plummer and Baird, 2013).

A study by Folke et al. (2005) indicates that in adaptive governance system, all actors and institutions are connected at multiple organisational levels in which some actors provide leadership, vision, meaning, trust and help to transform organisations into learning environments. From this perspective, Folke also highlights four interacting characteristics of adaptive governance of social-ecological systems, including: (i) building knowledge of ecosystem dynamics; (ii) feeding ecological knowledge into adaptive management practices; (iii) supporting flexible institutions and multi-level governance systems; and (iv) dealing with uncertainties, surprises and external perturbations.

In summary, natural disasters, extreme weather events as well as climate change are forcing a rethink about the way governments manage their environmental resource management system. Urban planning and its governance need to engage with the wide structural environmental managerial framework. These issues pose high requirements for governance by requiring the coordination of demands across national, regional and local levels, as well as coordination between sectors. It also requires governance

practices that are anticipatory, oriented towards the long term, and are open to learning, more inclusive deliberation, innovation and adaptation. In this context, adaptive governance is emerging as a promising approach for improving climate adaptation governance.

Having reviewed the urban governance and the concept of adaptive governance in the context of climate change, the next subsection will now discuss a particular aspect of governance, the debate about multi-level governance and how this impacts on the capacity to act on climate change adaptation.

3.4.3 Multi-level governance and the capacity to act on adaptation

The increased climate hazards combined with uncontrolled rapid urbanization are likely to increase strain on the capacity of all levels of governments as they attempt to respond to the vulnerabilities of the urban population. Adaptation to climate change is widely recognized as a 'multi-level' governance challenge because expected impacts and respective measures cut across governmental levels, sectors and societal domains (Bauer and Steurer, 2014). This means that the challenge of climate change can only be handled on different scales through coordination of demands and needs across international, national, regional and local scales, as well as coordination between sectors. As cities and national governments cannot act alone to effectively tackle climate change, there is a need for understanding the linkages across multiple levels of government and with the private sector and non-governmental stakeholders. Multi-level governance provides a conceptual framework for understanding how central governments and other public and private actors interface to design and implement policies from international to national and local levels of action (Hooghe and Marks, 2003).

Multi-level governance is defined as decision-making that is steered not only by public but also by private and other interests, and as a process that takes place across multiple geographic scale levels and sectors (Hooghe and Marks, 2003; Boland, 1999). Betsil and Bulkeley (2006:149) describe multi-level governance systems as 'systems that are linked horizontally (across geographic space) as well as vertically (across levels of organisations'). In terms of climate change, multi-level governance also provides a flexible conceptual framework to understand the relationships between cities, regions and national governments across mitigation and adaptation policy issue as well as across a widening range of non-state and non-governmental actors (Marks, 1993; Betsil and Bulkeley, 2004; Bulkeley and Schroeder, 2008; Corfee-Morlot et al., 2009; OECD, 2010).

Multi-level governance is understood to be an alternative and opponent to the traditional hierarchical top-down system of international – national – local government relations. Multi-level governance signifies both that trans-national levels of government and local authorities play a more important role in global politics. It also signifies a horizontal shift where responsibilities are moved from governmental towards non-governmental actors. However, in the multilevel governance chain, local actors can play the role as a 'structure' for the implementation of national or international climate objectives, as well as that of policy 'actor' taking independent policy initiatives.

Any multi-level governance framework will encompass at least two different dimensions of action and influence and both warrant attention: (i) the vertical dimension across scales or levels of governance; (ii) the horizontal dimension of governance (Hooghe and Marks, 2003; Bulkeley and Betsil, 2005; OECD, 2006). The vertical dimension of multi-level governance is concerned with relation between two or more levels of government (national, regional and local), be they formal or informal, institutional, financial or informational. In this context, according to OECD (2010), on the vertical axis, the national

governments cannot effectively implement national climate strategies without working closely with regional and local governments as agents of change. On the contrary, to take action, cities cannot be effective and do not operate in isolation from other parts of government. Vertical coordination can occur in three ways: (i) bottom-up when local initiatives influence national action; (ii) top-down when national frameworks influence local actors; or (iii) reciprocally.

Horizontal interactions can bridge the divides between different policy areas or sectors, between state and non-state actors, or between regions or local authorities (Betsil and Bulkeley, 2006; Glasbergen, 2011). Recent studies from OCED highlight the evidence of multi-level patterns of governance and transnational networks on climate and other global environmental issues where actors work across organizational boundaries to influences outcomes (OCED, 2010). In this context, Bulkeley and Moser (2007) argue that within the multi-level regulatory framework, learning, information transmission and co-operation also occurs horizontally with linkages increasingly being forged between cities, regions and national government. At the local level, horizontal coordination concerns different forms of co-ordination among local jurisdictions that belong to the same urban metropolitan area or the same rural area or between urban and rural areas. Moreover, urban regions are characterized by significant institutional fragmentation while many strategic decisions need to be made, and services provided, at this level. Therefore, the horizontal dimension of multi-level governance is associated with the need for improving coordination across line ministries at the central level for dealing with cross-cutting policies, which is particularly the case on environmental issues. For example, in dealing with a multi-level dimension, OCED countries have set up cooperation and coordination mechanisms and permanent institutional bodies to streamline the relationship between levels of government. But, the consequences of multi-level governance are debated. Challenges stem from the fact that more than one level of government plays

an important role in designing, implementing and enforcing regulations (Rodrigo et al., 2009). Nevertheless, the multi-level governance looks very relevant to systems with a history of strong vertical connection, and that the normative aspects of the multi-level governance debate suggest all systems need to be aware of vertical and horizontal potentials.

As mentioned previously, climate change is problem which poses significant challenges for governance. The way in which climate change impacts and adaptation are treated by actors on different levels is to a large extent dependent on differential adaptive capacities such as financial resources, access to information, decision-making structures and other institutional features (Smit and Wandel, 2006). Given requirement for different responses in different localities, adaptation may be considered an event more compelling example of the need for such decentralization as well as coordination.

In addition, multi-level governance is a valuable concept providing a framework to identify vertical governance between different levels of government, as well as horizontal governance across multiple sectors at the same level of government, including engagement with non-governmental actors, and governance across and between cities or territories.

3.5 Institution and governance

The following section explores the concept and substance of institutional capacity in the context of future climate related action. The institutional approach adds to the previous discussion and with a focus on capacity assessment helps to examine the role of institution plays under conditions and processes that can promote features of adaptive capacity. Understanding of how institutions identify, what institutional capacity actually is, and what institutional capacity would be required for various forms of future actions to

recognize and respond to major stressors is essential to better understand adaptive responses to climate change.

3.5.1 Overview: Theorizing institutions

There are some basic principles from the vast literature on institutions that need to be kept in mind. There is a growing awareness that institutions can have a major influence on climate change, based on how they structure it as a problem and how they devise responses to deal with its impacts. A variety of definitions of institutions exist. For example, they have been theorized as "*systems of rules, decision-making procedures, and programs that give rise to social practices, assign roles to the participants in these practices, and guide interactions among the occupants of the relevant roles*" (IDGEC, 1999); as "*multitude of means for holding society together, for giving it a sense of purpose, and for enabling it to adapt*" (O'Riordan and Jordan, 1999); as "enduring regularities of human action in situations structured by rules, norms, and share strategies" (Crawford and Ostrom, 1995); and as social scientific objects "*humanly devised constraints that shape human interaction*" (North, 1990). Institutions are therefore characterized as social entities which reduce uncertainty by providing structure to everyday life and social engagement. Moreover, institutions are created by people and, in turn, institutions organise and structure human behavior towards collective ends (Ostrom, 2005; Bussey et al., 2012). Therefore, institutions affect choices made in the process of governing, and institutions can promote or hinder individual actions to adapt to changing conditions. The ability of individuals to negotiate institutions can open opportunities for institutional modification. This is important because it can alter flows of information and resources consequently changing adaptive actions. Therefore, understanding how institutions might change requires an analysis of the power that flows through relationships and of the influence of structural forces on institutional fixity.

The most cited definition of institutions belongs to North (1991), who defines institutions as the rules of the game in a society or, in other words, institutions are humanly devised constraints that shape human interaction. Institutions from North's definition consist of both formal (i.e. rules, laws, constitutions) and informal (i.e. norms of behavior, conventions, self-imposed codes of conduct) sets of rules, compliance procedures and moral and ethical behavioral norms designed to constrain individuals in the interest of maximizing the wealth or utility of the principals.

In term of climate change, institutions are considered to be the multitude of means for holding society together, for giving it a sense of purpose, and for enabling it to adapt. It also helps to define climate change both as a problem and a context, through such socialized devices as scientific knowledge, culturally defined interpretation and politically tolerable adaptation policies.

3.5.2 Institutional capacity

Especially important to the discussion of planning and governance in this Chapter is the concept of institutional capacity that has evolved over the years, and acquired many different meanings and definitions, "*the concept of institutional capacity is a moving target since the field has evolved over the years from an initial focus on building and strengthening individual organizations and providing technical and management training to support integrated planning and decision-making processes between institutions*" (Segnestam et., 2002). Its meaning has expanded beyond individual organizations, their mandates, structures and processes. Today, institutional capacity often implies a broader focus of empowerment, social capital, and enabling environment, as well as the culture, values and power relations that influences us (Segnestam et al., 2002). A study by the IPCC (2007) argues that the existence of weak of institutions in developing countries has implications for the capacity to adapt to or mitigate climate change.

The concept of institutional capacity actually sheds some light on this broader notion of capacity. In general terms, capacity can be defined as "*the ability to perform functions, solve problems and set and achieve objectives*" (Fukuda-Parr & al., 2002). Skocpol (1985) defines capacity is "*the ability of states to implement official goals, especially over the opposition of powerful social groups, or in the face of difficult economic circumstances*". Capacity is systemic, so, in some sense, all dimensions of institutional capacity deserve attention (OECD, 2003). Lindley (1975) defined institutional capacity as the ability to "*enhance the capability of local governments to perform intelligently and efficiently under their own direction*"; or "*the ability of this broadly defined system of institutions, organizations, communities, relationships, rules, and values, within their different contexts, to achieve organizational and societal goals*" (Wickham et al., 2009). From the perspective of Keohane (1998), he argues that institutions are not only discrete organizations (e.g. government agencies), but also more generally, sets of rules, processes or practices that prescribe behavioral roles for actors, constrain activity, and shape expectation. The World Bank (2004) illustrates the ability necessary for an institution to decide on what goal(s) to pursue and to act on whose behalf, to perform tasks towards the end(s), and to constantly improve performance.

The institutional capacity debate has clear links to related discussion of 'governance'. The term 'governance' is broader in meaning than 'institutional capacity', which as seen earlier refers to institutional and decision-making structures (Leftwich, 1993). Both are context dependent, relate to institutional environments through which citizens and government interact, and are influenced by value systems and power relations. The conceptual scope of governance extends beyond that of institutional capacity to include and emphasize principles of accountability of stakeholders, equitable participation, transparency and predictable legal and regulatory frameworks (ADB, 2006).

Therefore, institutional capacity is a broad concept that constitutes factors such as technical ability, leadership, legitimacy of organizations, political support, supporting enabling environment (legal frameworks and coordination arrangement). As a result, strengthening institutional capacity requires improving vertical and horizontal coordination and integration across organizations, ensuring ownership, supporting endogenous growth, knowledge management and learning and enhancing the enabling environment (policies, coordination mechanisms) to support individual and collective actions (Wickham et al., 2009).

3.6 Summary

The scholarly discourses and theories reviewed above imply the possiblity of developing a coherent picture of the complex relationship that exists between human activities, urban planning and climate change, as well as the capacity of urban planning to moderate such impacts on cities. Climate change is refocusing attention on the environment and sustainable urban development in developing countries. As a result, adjustments and adaptations to cope with the effects of climate change will be required. Integrating climate issues into urban development planning is crucial. It is because urban planning offers an important entry point, shaping urban form in very particular ways with implications on climate change. The emergence of urban planning's central role has reinforced the need for truly cross-sectoral integration to be in place as well as capacity development. Therefore, urban planning has a dynamic role in building adaptation to climate change.

Moreover, climate change adaptation is widely understood as a multi-level endeavour that requires the coordination of different levels of government and highlights the need for legislation and regulation that may support the varying impacts and circumstances experienced by different localities. Adaptation is

thus inherently viewed as taking place within political context on multiple levels, within which responses are formed by multiple interests, including those in the existing political and administrative systems. Consequently, a focus on urban governance in the context of climate change necessarily involves a focus on the way that governance systems target the needs and well-being of marginalised groups of people. A coherent application of a multi-level framework that takes the interaction between levels and how these may be shaped by the political system into account is a prerequisite for understanding the development and implementation of adaptation.

Exploring the multi-level governance in the form of vertical and horizontal co-operation may require a flexible conceptual framework to understand the complex web of interaction between different levels of government and with the private sector and non-governmental stakeholders, as well as addressing climate change adaptation issue (Betsil and Bulkeley, 2004; Bulkeley and Schroeder, 2008). The multi-level relationships on climate change will involve different configurations of actors and priorities on the scale and scope of decision making. These different spheres of authority have been found to have profound effects on the ways in which climate change is governed in the city, and each is considered below in turn. Hence, the study will draw on experiences from climate planning in HCMC case to discuss the ways in which climate change enters into a multi-level policy setting.

Moreover, the way in which climate change impacts and adaptation are treated by actors on different levels is to a large extend dependent on differential adaptive capacities, including financial resources, access to information, decision-making structures and other institutional features. The growing number of failed governance attempts to deliver efficient, reliable, and optimal ecosystem good and services has led to calls for more adaptive governance regimes capable of dealing with the inherent complexity and uncertainty of socio-ecological systems. Deriving from institutional theory, the

concept ‘adaptive governance’ - ‘a continuous problem-solving process’ (Plummer & Armitage, 2007) or ‘by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organised process of learning by doing’ (Folke et al., 2005) - is used in this research as a promising approach for improving climate change adaptation governance.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1 Introduction

Chapter four provides an overview of the research process underpinning this thesis. Following the two chapters of literature review and development of a theoretical review, this chapter presents the methodology, methods and techniques of data collection and date analysis used to answer the research aim and objectives. To answer the question of how institutional conditions apply the appropriate context for integrating climate change issue in urban planning processes, the research will use a multi-method case study approach. One of the reasons for this is that urban planning and urban development management is a complex process of negotiation between different actors over what are the desired outcomes of development (Healey, 1997; 2003; Sandercock, 1998). This study, therefore, provides a contemporary view of the processes that characterise climate change and its problems in the case of HCMC. The strength of the case study approach is that it integrates different types of data about an example (Robson, 2002). The case studies will test the framework which was built in the literature review chapter, through the exploration of particular example. This will make clear the somewhat conflicting objectives while maintaining sensitivity, rigor, and objectivity when engaged in highly relational research.

The study has been structured deductively, but the use of qualitative method allows the freedom to think narratively and work inductively, while also ensuring research rigor. Therefore the research can best be described as a continuing interweaving of deductive and inductive analysis. This chapter is structured in five sections: the research approach, research strategy and methodology, field research methods, and data analysis.

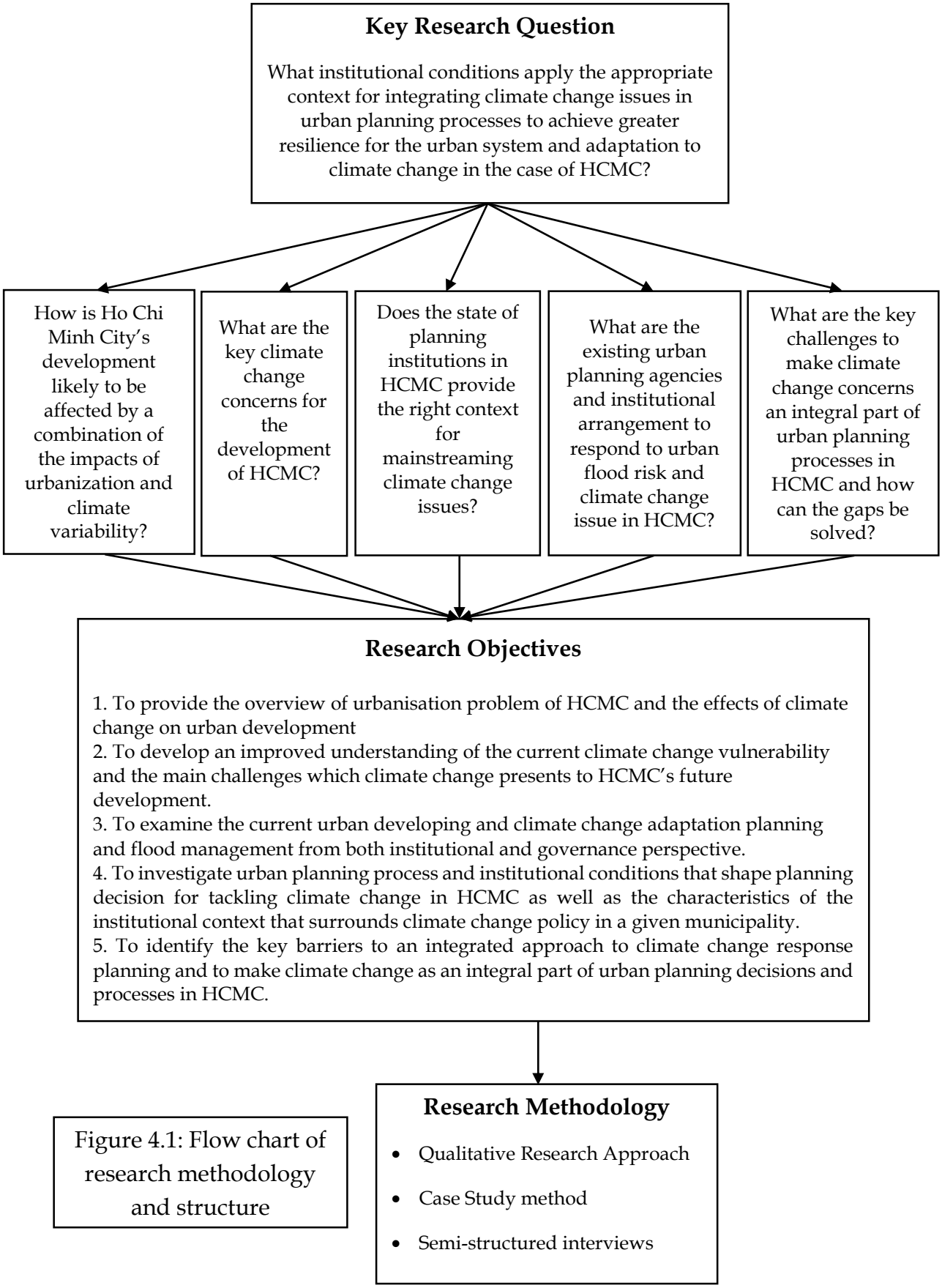


Figure 4.1: Flow chart of research methodology and structure

Figure 4.1 (page 90) illustrates the key research question and sub-questions, as well as the research design and methodology that will be utilised to fulfil the objectives described in Chapter 1.

4.2. Research approach

In the first stage of research, an overview of the causes and impacts of unavoidable climate change and the relationships between climate change and urban system were assessed. This part of the work examined the policies at different levels as well as the relevance of literature on urbanisation and development as well as climate change impact assessment and adaptation that can be applied to the case of the coastal cities of Vietnam and eventual conclusions will include recommendations about urban planning in the multi-level governance of climate change.

As discussed in chapter 1 about the rationale for selection of HCMC as a case study, following the initial literature review, the research identifies HCMC as a case study for further in depth work. The case study work includes analysis of national, regional and city level policy development and include semi-structured interviews with relevant officials, political leaders, policy makers, planners, lecturers, and urban experts at municipal and community scale. In this stage of the work, the research also focuses on an assessment of the current and future vulnerable areas in HCMC using map-based techniques and documentary review. The research then explores how HCMC prepare for adaptation planning by recognising the key agencies involving in climate change action plans as well as assessing the adaptive capacity of these agencies in tackling with climate change. This stage of research, aims to improve an understanding of how institutional arrangement shape and constraint actions at different levels of governance; and provide a basis for suggestion on how critically improve the competence of urban planning responses to climate change in HCMC.

The research then goes on to analyse in detail the two key institutions: the Department of Planning and Architecture (DPA) and the Steering Centre for Urban Flooding Control (SCFC) which are directly involved in the process and decide the results of planning and flood management in HCMC and therefore with the likely hazard impacts of climate change.

4.3. Research strategy and methodology

In order to answer the range of research questions of this exploratory research, a method flexible enough to accommodate the variety of data is needed. This section outlines the research approach.

4.3.1 Qualitative research approach

In this research, qualitative research design was chosen for the investigation of the research question. A qualitative research study is particularly useful in the investigation of people's perceptions and their lived experience as they relate to particular events. It is also important for understanding the meaning which individuals attach to a social phenomenon (Creswell, 2009). According to Dingwal (1997), qualitative approaches are strategies which researchers employ to observe aspects of social life. Qualitative research is described by Denzin and Lincoln (1998:2) as "*a complex, interconnected groups of terms, concepts and assumptions*". In this sense, Taylor and Bogdan (1998) stress that, in fieldwork a qualitative approach is "*research that produces descriptive data-people's own written or spoken words and observable behaviour*". Thus, qualitative research is considered to be a broad approach to the study of social phenomenon. The characteristics of qualitative research and qualitative researchers who practice it are summarised (table 4.1) by Marshall and Rossman (2006) as below:

Qualitative Research	The Qualitative Researcher
➢ Take place in the natural world	➢ Views social phenomenon holistically
➢ Uses multiple methods that are interactive and humanistic	➢ Systematically reflects on who he/she is in the inquiry
➢ Focuses on context	➢ Is sensitive to his/her personal biography and how it shapes the study
➢ Is emergent rather than tightly prefigured	➢ Uses complex reasoning that is multifaceted and iterative
➢ Is fundamentally interpretive	

Table 4.1: Characteristics of Qualitative Research and Researchers
Source: Marshall and Rossman (2006: 3)

The methodology applied in this research is best described as an interpretive approach in which values, beliefs and perspectives are formed through experiences and explorations. The accumulation of knowledge in a specific research area is not only acquired from observation, but also through experiencing and interpreting to obtain a deeper understanding of the issue. The study is based on a combination of various methods: qualitative in-depth interviews, policy analysis and literature review. In-depth, semi-structured interviews are used because they are considered an excellent method for gaining access to information about events, opinions and experiences. The semi-structured format allowed for a number of predetermined issues to be discussed and for control over the interview, while encouraging digression for increased detail (Berg, 2001). As interviewees are purposefully selected, some topics/issues are emphasized and elaborated based on the knowledge and experiences of the interviewee.

4.3.2 Case study method

A case study is a selection of the entity to be studied (Stake, 1998). It is a methodological approach combining a variety of data sources to obtain sufficient information on a particular. The term 'case study', thus, is labelled interchangeable with fieldwork (Stake, 1998; Yin, 2003). In this research, the case study research strategy is chosen because it can used to investigate a phenomenon in it real life context (Yin, 2003; Merriam, 2004). The case study should strike a balance between the extensiveness of information collected through a variety of methods, and the intensive exploitation of the information (Kitay and Callus, 1998). As Yin (2012) argues, the main benefits of choosing a case study is that it covers some unique situations and the research findings of a case study can be applied to other situations. It also allows the researcher to examine theoretical hypotheses empirically (Yin, 1994). The case study approach enables researchers to focus on contextual aspects of real world entities such as organisation, community or individuals in their natural settings over a period of time (Berg, 2001; Yin, 2003).

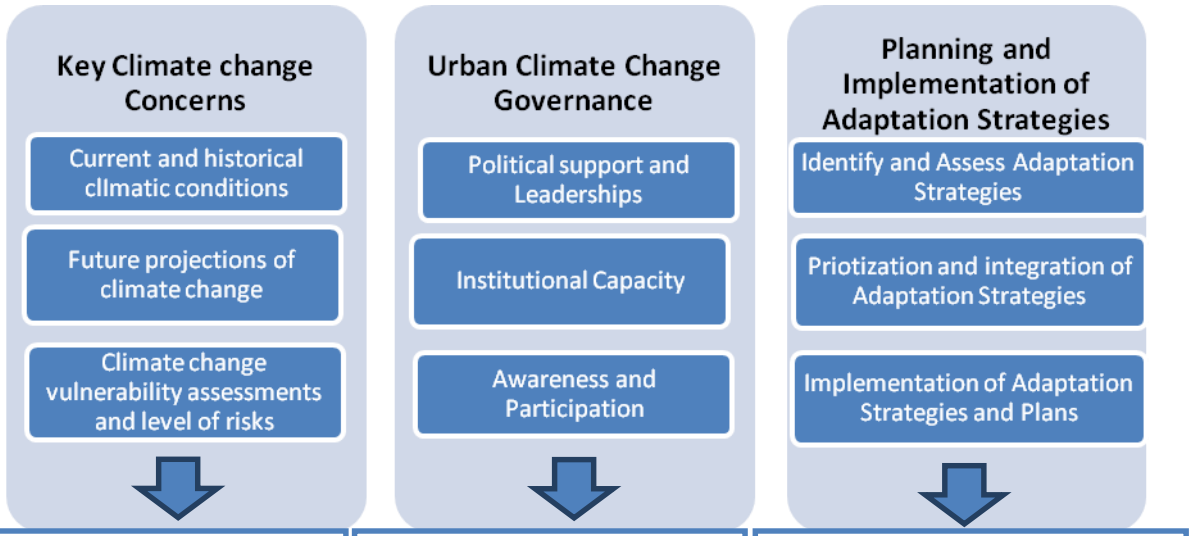
In this study, case study research was chosen allow the detailed investigation of understanding the climate change concerns within urban planning decision and processes; specifically, how planners and decision-makers from governance institutions at different levels of HCMC respond to these uncertainties associated with climate change impacts in order to achieve urban climate resilience. A distinguishing feature of the case study strategy is that it allows a detailed contextual analysis of how the potential hazards of climate change could impact on the development of HCMC. This is particularly important for HCMC, where urban planning and management do not keep up with the rapid urbanisation. The weakness in governance, failure of planning and inappropriate urban planning laws and policies as well as the threats of climate change put all levels of HCMC government under great pressure. Therefore, through the case study strategy, the specific contexts such as local

conditions, physical structures, and institutional structures etc. that influence current and future urban development trends of HCMC will be explored and documented.

Thus, the case study in this research is an example of current urban climate change issues and the government's policies response to issue of climate change in fast-growing coastal city, HCMC, Vietnam. The case study does not adhere strictly to any single research methodology, and the approach is based on three major components: interviews, observation, analysis of documents, and literature review. To conclude, a case study strategy is likely to be the most appropriate method for this research.

4.4 Assessment framework

Preparing for the research fieldwork, an assessment framework (table 4.2, p.97) was developed to help to explore climate change adaptation response of HCMC. This qualitative fieldwork focuses on multi-sectoral governance approach including interviews with government officials, urban experts in the field of urban planning and governance. The research focuses on analysing how vulnerability in HCMC is characterised and how HCMC is affected by climate related extreme events. The multi-level systems and cross-scale networks in HCMC case study have been analysed (institutional assessment). The adaptation barriers as well as institutional governance barriers for developing and implementing adaptation strategies are also analysed. This approach will help to understand how decisions are being made to adapt, who are the key actors involved in making these decisions, and what planning tools are most relevant to building adaptive capacity.



- If HCMC has conducted assessment studies to observe the historical trends of sea level, urban flooding, temperature, and precipitation change - If HCMC has conducted studies to project the intensity, frequency of extreme events - If HCMC has assessed its vulnerability or risk to climate change, while taking into consideration it adaptive capacity	- Focusing on the level of leadership in formulating and implementing HCMC's climate change initiative - If the HCMC has a special agency to govern climate change adaptation process - If the climate change adaption has been addressed by other key actors from academic, scientific fields, international NGOs… - How planning institutions coordinate to support the integration of climate change issues in urban planning decisions.	- How far HCMC identified and prioritized key adaptation strategies. - How far HCMC has incorporated climate change issues into urban planning and development, policies or management strategies - How far climate vulnerability assessment outcomes and adaptation strategies are integrated into urban planning (master plan) or planning policies - If planning tools and technique are available to be used to help the decision maker to manage climate change uncertainties in the future.

Table 4.2: Assessment framework research fieldwork

4.5. Data collection

This research used various data collection techniques, including primary and secondary sources such as perceptions of stakeholders regarding urban flooding management, climate change concerns, urban planning and management; formal discussion with government officers, urban experts, and practitioners in the field of urban planning and governance; observed events

and actions concerning management practices; legal documents and government reports on the state of climate change adaptation measures in HCMC; media coverage and other relevant literature. The methodological techniques outlined above are discussed in more detail below.

4.5.1 Semi-structured interviews

The semi-structured interview technique was one of the qualitative research methods used to collect data for this study. The selection of potential interviewees was meant to cover all necessary perspectives, with special focus on people who had an intimate understanding of the issues to be studied. The interview aims to examine the actual experiences of participants' involvement in urban planning and governance and flood management in the case of HCMC. The interviews focus on three categories: (i) climate change impacts, (ii) urban governance, and (iii) planning and implementation of adaptation strategies.

In order to collect the data through interview, the semi-structure interview questions which were developed in the first period of the research were used again. After being piloted, the researcher used the semi-structured interview questions with a topic guide to go to each participant and carry out an interview. Interview participants were selected through a snowballing process (Crang, 2002). Therefore, a key contact within each intervention provided an initial list of potential participants, and participants themselves offered suggestions of further participants. The range of participants were selected to provide a cross-section of variety of positions across the interventions, including local level community co-ordinators, leaders, managers of the intervention, planning and evaluation positions and key personnel from partnering institutions. In the field trip, semi-structured interviews were conducted with 69 participants (Appendix A) who were divided into two groups: urban experts (including scientists, practitioners, academics and

researchers at institutes and universities) and policy makers, political leaders, and government officials working in agencies of urban planning, land use planning and urban flooding management as well as other relevant stakeholders in HCMC. Further explorations will be done via unstructured interviews (conservations) including current sectoral coordination between key government agencies and departments, future actions and opportunities or any evident improvement of the local strategy and policy in management practices.

Most participants were approached in the first instance via email or phone contact. All participants were given the choice of where the interview would take place. This was to ensure that the setting place would be most comfortable for the interviewee. The interviews are divided into different categories at different levels: national, municipal and local (table 4.3, p.100). At the national level, the questions will focus on macro-level policies, capacity for responding to hazard events, and preparedness levels in Vietnam. On the local level, the similar issues will be questioned, focusing on awareness and understanding of climate change, risk management, local capacity to response to flooding, and development priorities.

The interview questions were very specific and helped to answer the main or sub-questions of the research. In total, sixty nine interviews were carried out in the field trip in HCMC case. The interviews were between one hour and one hour and half in duration and were semi-structured. A list of key questions was prepared but the interviewees determined how and how much they wanted to respond to the mainly open-ended questions. The researcher was able to seek clarification and follow up new ideas. Except for the interviews with non-Vietnamese interviewees, all interviews were conducted in Vietnamese. The quotations from the interviews in this thesis were translated into English by researcher.

Interview Category	Departments, Institutes, and Organisations
1. National level: NGOs and Development Agencies	**International NGOs:** - Asian Development Bank (ADB) - UN-Habitat, Hanoi - German Agency for Technical Development Co-operation (GTZ) – MegaCity Project in HCMC
2. HCM municipal level: key informants	- HCMC Institute for Development Studies (HIDS) - Department of Construction - Department of Urban Planning and Architecture - Department of Natural Resources and Environment - Department of Agriculture and Rural Development (DARD) - Architecture Research Centre - Climate Change Steering Board - Steering Centre of the Urban Flood Control Program (SCFCP) - Urban Planning Institute (UPI)
3. Local level: key informants	**Universities:** - Ho Chi Minh city University of Architecture - Ho Chi Minh city University of Polytechnic - Centre of Water management and Climate change- Vietnam National University - HCMC Urban Development Management Support Centre (PADDI) **Institutes:** - Sub-Institute of Hydrometeorology and Environment of South Vietnam (SIHYMETE) **Agencies:** - HCMC Environmental Protection Agency (HEPA)

Table 4.3: Interviewees' organisations in Ho Chi Minh City

4.5.2 Secondary data collection

This research us various data collection techniques, including primary and secondary sources (table 4.4, p.102). Documentation analysis was the second research method. It was used to fill gaps in data collection. A diverse range of document sources is important to obtain a non-biased view of the organisations and their operations (Bryman, 2008). This technique enables the researcher to trace back past events (Marshall and Rossman, 2006), policy analysis as well as supporting data cross-checking. Moreover, documentation was of particular importance for analysis at the provincial and national levels.

Secondary data collected in terms of the political and institutional aspects of local governments in HCMC were prioritized, focusing on the analysis and understanding of to what extent the local governments prepared to deal with the challenges posed by climate change, specifically, urban planning capacity to tackle with climate change. Insight provided by these documents were elicited as they provided detail of events which interview participants may have mentioned, but did not go into detail themselves. Then official documents were analysed, including regulations, procedures, norms, decrees, official programs, government publications, official statistics, newspapers and magazines, records of meeting, project reports, internal reports from major planning authorities, and also web pages and the internet, as well as policy papers, researches published by non-governmental organizations (NGOs) and community organizations that were organized in a database.

Once documents and records are gathered, the analysis of those contents is crucial in presenting what has been done and what remains to be researched. This will be enabling the researcher to answer questions and address the objectives. Documents are considered to be sources of data which supplement the data obtained from semi-structured interviews (Yin, 2009). Documents take different forms viz; written sources (majority), visual sources and even sounds (music), etc. all of which add value to the research.

Sources of data	**Departments, Institutes, and Organisations**
Primary data	Local and national governments at study fields
The selected key informants	Government officials, policy makers, political leaders, legal experts, city planners, practitioners, scientists, experts at institutions, universities and NGOs
Secondary data	Local and national governments, HCMC Statistic Office
Policies, Decisions, Instructions, etc.	Vietnam government's website and relative ministry's websites. HCMC's website and relative department's websites.
Documents, reports, special researches, maps, etc.	From the above DoNRE, DoC, DoPA, DoC, SCFC, and local government, etc.

Researches, reports, science papers, journals and magazines, etc.	Universities, libraries, internet libraries, papers and journals, etc.
News and magazines	National and city newspapers and magazines, such as the news of Saigon Giai Phong, Saigon Times, Tuoi Tre, Thanh Nien, Viet Bao, etc.

Table 4.4: The sources of data collection

4.5.3 Direct observation

Observation offers the social researchers a distinct way of generating data. As Marshall and Rossman (2006) categorised observation is a primary method to obtain data in the social setting and concluded that "*observation is a fundamental and highly important method in all qualitative inquiry*". This method is usually used to explore the interactions, events, behaviours and objects in natural social setting. It does not rely on what people say they do, or what they say they think. It is more direct than that. Thus, this method requires a holistic description of events and behaviours. Observation is based on the premise that for certain purposes it is best to observe what actually happens. According to Wadsworth (1998), observation could be as a passive observer or active participant. In this sense, Marshall and Rossman (2006) suggested that observation could range from complete observation to full participation. Therefore, in order to facilitate the observation process, the use of field notes, observational checklists, event recording, and photographs taking notes during the process of observation. Skills using during the process of observation are watching, listening, and taking notes (Neuman, 2006). In this view, he suggested that most data from observation is rendered in the form of field notes, such as maps, diagrams, photographs, memos, and object from setting. In this research, participant observation approach was used quite flexible and led to additional data being generated apart from interviews. An extensive observation was performed independently by the author in a series of flood areas in HCMC. These observations include directly or indirectly

participating in various activities such as photographic recordings, videos, and event taking notes.

4.6 Data Analysis

According to Blaikie (2003), the purpose of data analysis in social science is to find answers to the research questions or to examine posed hypothesis. In this view, Jorgensen (1989) defined data analysis as the process of "breaking up, separating or disassembling of research materials into pieces, parts, elements or units" in a comprehensible manner. Data processing and analysis is the process of bringing all raw collected data and manipulating them in manageable ways to categorise, interpret and understand (Marshall and Rossman, 2006). The stage of data analysis involves several procedures such as collecting, organising, categorising, coding, interpreting, validating, presenting and concluding (Jorgensen, 1989; Neuman, 2006).

The qualitative data were analysed based on the identification of important themes and their relationships. The results of this study generated both numerical and textual data. At each stage of the data collection process, notes were taken during one-to-one interviews and they are also tape-recorded. Then these data from (recorded interviews and notes) was translated and transcribed electronically. All empirical data was then systematically grouped under three categories: (i) climate change impacts, (ii) urban governance, and (iii) planning and implementation of adaptation strategies. The field notes and relevant documents are recorded in electronic form (if not already). When the data collection was completed, interview transcriptions, documentary materials, and notes from observations were imported into Nvivo 9, a qualitative data analysis software programme used to organize and code text. The Nvivo programme enables researchers to organise and analyse complex non-numerical or unstructured data, as well as examining complex relationships in the data (Richard, 1999).

The data of this study was classified by cases and sub-categorised by data sources. Then, major underlying themes were identified after a thorough reading of all the materials. Data that support the same themes were automatically gathered into groups of evidence, or 'nodes' as called in NVivo 9. This 'noding' process was grounded on the key themes that emerged from the empirical data, as well as that informed by the conceptual framework and research questions. This method of data grouping allows for the analysis of single cases, actor-based and cross-level relations, as well as the consideration of different sources of data. When the data are analysed from different angles, it is possible to capture the patterns, themes and relationships that together form answers to the research questions.

4.7 Research challenges

The process of data collection and acquisition has faced some hurdles that are typical of semi-structured interview, including non-response, vague interpretations of questions and contact/appointment failure. The researcher was asked to take notes only instead of tape recording when making appointments with elite government officials for interviews. Most of Vietnam government staff/officials are less amenable to formal interviews being recorded because this could expose their responsibilities and degree of involvements. This is a common issues for conducting research in developing countries (Devereux and Hoddinnott, 1992) because the planning phase and mechanisms that put plans into practice are generally highly political. The interviews were carried out during the working day. As a result, some appointments were delayed or cancelled due to time constraints and other priorities; very few senior managers were unwilling to be interviewed. Those challenges and hurdles may affect or diminish the quality of the research. However, in some unexpected cases when the researcher could not make an appointment with the interviewees, the questions would be sent directly by

hand or by email to respondents with a clear explanation about the study. There was, however, a contingent strategy to follow-up interviews by telephone to collect data in case the questions were not completed properly and adequately. The research was funded by the central government of Vietnam, therefore, in order to overcome these barriers the author had to ask for an introduction letter from central government to approach the local authorities (HCMC government).

4.8 Conclusion

This chapter presented the research methodology which is used to achieve the aim of this research. For the strategy of the research, multi-method case study strategy is the most suitable in studying social issues. The research methodology mainly focuses on the planning system through interviews of government and other planning officials rather than focusing on grounded case studies. The reason for adopting this methodology is that urban planning and management is a complex process of negotiation between different actors over what are the desired outcomes of development. In the context of climate change, as analysed in chapter 3, urban planning plays a vital role in building adaptation as it offers an important entry point, shaping urban form in very particular ways with implications on climate change. The research approaches the interviewees in government, especially planning officials, as they are the key decision-makers, policy –makers in the decision – making process in urban planning and management. Therefore, examining the actual experiences of participants' involvement in urban planning and governance and flood management in the case of HCMC allows the detailed investigation of understanding the climate change concerns within urban planning decision and processes; specifically, how planners and decision-makers from governance institutions at different levels of HCMC respond to these uncertainties associated with climate change impacts in order to achieve urban climate resilience. Moreover, climate change is a new issue facing HCMC,

thus, there is not much research or case studies about dealing with climate change for comparison or taking into account as a grounded case study.

The research methods employed in this study include semi-structured interview, documentation analysis and direct observation. Data collection includes primary and secondary data. Primary data come from the author's observations of what was happening, survey based on interviews. Secondary data are conducted through library search, documents from institutions and departments of local and national governments, and plans of the areas. The results emerging from subsequent content analysis are contained in Chapters 5, 6, 7 and 8.

CHAPTER FIVE

URBAN DEVELOPMENT AND CLIMATE CHANGE IN HO CHI MINH CITY: CHALLENGES AND PROSPECTS

5.1 Introduction

This chapter builds on the discussion in chapter 3 on approaches to understanding climate change and urban sustainable development and the approach to the research set out in Chapter 4. The chapter presents the first stage of findings from the field work. It starts with a brief description of the environmental context of HCMC, outlines the perceived environmental challenges, and sets these alongside the recent history of urban development and the dynamics of urbanisation and their linkages with climate change.

The chapter examines the relationship between major issues arising from the rapid pace of urbanisation of HCMC, including a degradation of the landscape, infrastructure, urban flooding and urban environmental, ecological problems. The view of planners and others interviewed in HCMC is that problem s have been (and will be further) exacerbated by climate change. With the rapid recent development of HCMC, climate vulnerability is not only related to hazards of space (a significant risk from climate change due to the possibility of the physical loss of land, displacement of place-based identity, discontinuity of places, destruction of infrastructure) but also increasing risks and fragility of basic urban systems (water, power, transport, communication, etc.). Therefore, the chapter explores the dynamics and drivers of urbanisation and the impacts of urban climate vulnerability in HCMC. As set out in Chapter 1 an initial aim is to generate a better understanding of the prevailing situation in order to be able to assess prospects and challenges facing by HCMC today. Drawing on the fieldwork the Chapter identifies the relevant policies, action plans and other development programmes on climate change adaptation in HCMC, and also examines policy related to social protection, and disaster risk reduction from national to provincial level in order to understand the current situation and identify the gaps that need to be addressed as the city responds to climate change.

The first part of the chapter provides essential background information on HCMC, including geographical location, natural, demographic and climatic conditions, and trends in socio economic growth. The second part focuses on understanding of urbanisation trends, urban development of HCMC and the relationship between urban development and climate change. In order to understand the HCMC situation, it is important to bear in mind the national context of Vietnam as well as the socio-economic development plans from Vietnam government which directly influence the situation at the local level. The next part of the chapter therefore deals in more detail with climate change trends and climate change impacts in relation to action plans for climate change adaptation planning in HCMC. The final part provides the overview of institutional responses, the public administration and the appropriate policies to deal with climate change in the country.

The following sections draw on documentation gathered in the pilot and main field work in HCMC.

5.2 Background to Ho Chi Minh City

5.2.1 Geography and Environment

Ho Chi Minh City, formerly known as Saigon, was founded in 1698. After reunification in 1975, Saigon was renamed Ho Chi Minh City (HCMC). HCMC was originally a small fishing village known as Prey Nokor (mean "forest city" or "forest land"). The area that city now occupies was originally marsh and swamp land, and was inhabited by Khmer people for centuries before the arrival of the first Vietnamese settlers in 1698. After a long and turbulent history, HCMC celebrated its 300th anniversary of establishment and development in 1998 (HCMC People's Committee, 2006). Located in the complex hydrological regime of the Saigon - Dong Nai watershed, in the South

of Vietnam (figure 5.4, p.117), HCMC is now the largest and the most dynamic city in Vietnam. Since the central government began the 'Doi moi' policy[2] in 1986, HCMC has experienced rapid industrial and urbanisation and has become a major cultural and socio-economic growth hub. HCMC has been attracting an increasing number of migrants from rural areas in Vietnam. Consequently, it has become the most densely populated city in Vietnam and is the heart of the Mekong Delta region.

5.2.2. Natural and Climatic Condition

HCMC is located at 10^0 10' to 10^0 38' North and 106^0 2' to 106^0 54' East. It has an area of 2,095.01 sq km. The distance from North to South is about 120 km, and from the Eastern point to Western point is about 50 km. Its neighbouring provinces includes Binh Duong in the North, Tay Ninh in the Northwest, Dong Nai and Ba Ria-Vung Tau in the Southeast, and Long An in the West and Southwest (Dan., et al, 2006; HCMC People's Committee, 2006).

HCMC features a diverse terrain that is part of a transitional region with different characteristics between the South eastern and the Mekong Delta region. The terrain is lower from north to south and from east to west (figure 5.1, p.110) and its topography can be divided into three main areas, as follows:

2. The era of change, renovation, and newness that was officially launched in 1986. The major renovation affecting agricultural production in the early phase after 1986 were Resolution 10 of the Politburo (1988), which allocated collective land to individual farm households on a long-term basis, and the price reforms of 1989, which liberalized all prices, including interest rates and the foreign exchange rate. A particularly important reform was the 1993 Land Law which increased security of tenure and allowed transfer of land-use rights to others. Vietnam's economy has seen impressed improvements, moving from a highly centralized planned economy to a socialist-oriented market economy.

- Area 2: Altitude of this area ranges from 2 to 5m. This area includes urban centres, population-concentrated areas comprising Hoc Mon, Binh Chanh and the south of Cu Chi District. They are densely populated residential areas and tenured agricultural land with cultivated vegetables and crops, fruit-trees and industrialise crop production.
- Area 3: The altitude of this area varies from 5 to 25m, and is mainly occupied by the remainder of Cu Chi District, the North of Thu Duc District and Go Vap District. This area includes a large proportion of the urban population and industrial areas of the city.

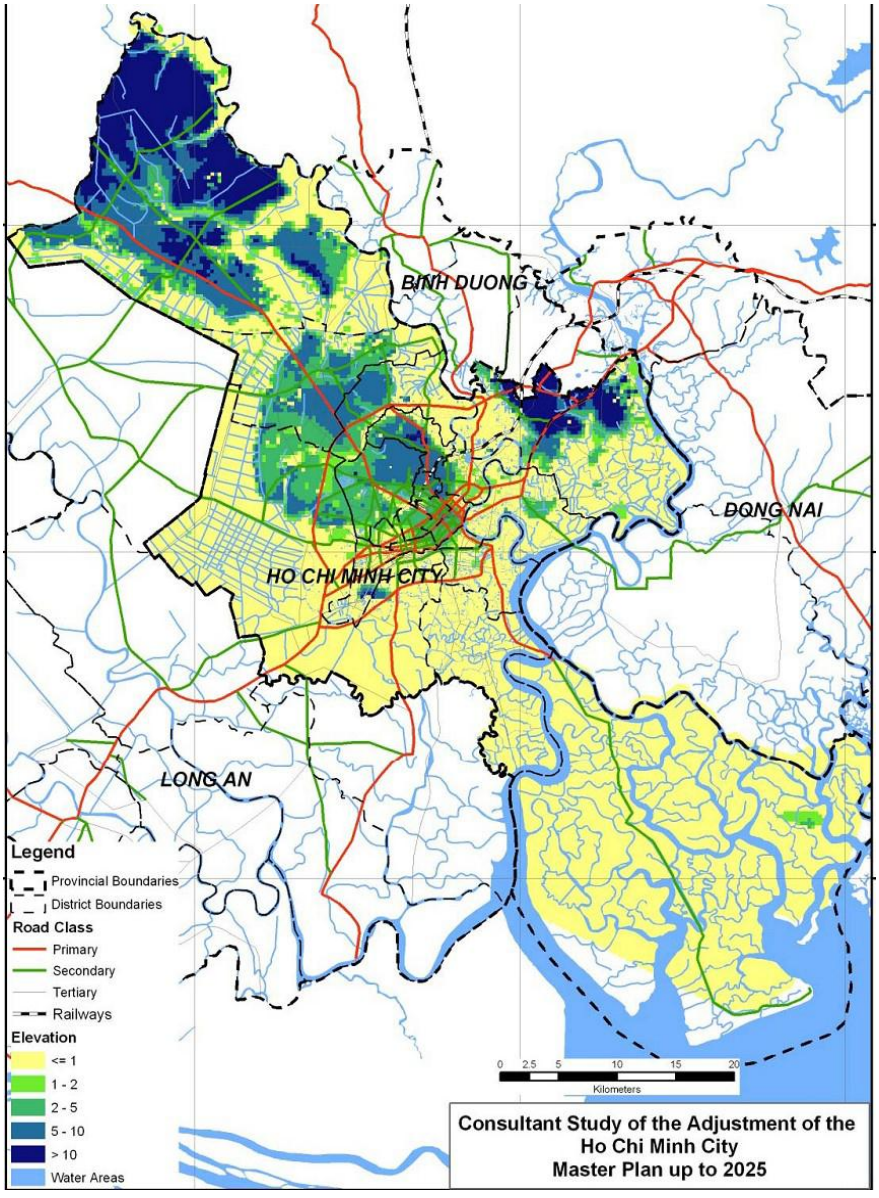


Figure 5.1: Elevation ranges of HCMC (*Source*: DPA)

HCMC is situated in the sub-equatorial and tropical zone. Thus, its climate is monsoonal with a high level of solar radiation, a relatively stable temperature, and with clearly divided rainy and dry seasons. The dry season is from November to April while the wet season lasts from May to October. The annual average temperature is 26^0C - 27^0C. The highest daily temperature is 35-36^0C and the lowest is 24-25^0C. Urban areas have average temperature higher than the surrounding sub-urban by 1-1.5^0C. The highest temperature increase in HCMC since 1990s has coincided with the accelerated urbanisation in the area. In the last 50 years, the annual average temperature in the rainy season has risen by 2^0C. Some climate change predictions suggest the annual average temperature will rise 1.4^0C above the baseline period (Nguyen and Duong, 2007; ADB, 2010).

A recent statistical analysis of the maximum temperature during the rainfall season in HCMC has revealed that the temperature has been increasing over the past 20 years (Ho, 2007) and this trend is believed that is the cause of climate change induced by global warming. Study from MONRE (2009), based on the observation data, highlighted that the annual average temperature in HCMC during the period (1991 - 2000) was plus 0.6 ^{0}C higher than the period (1931 - 1940). The trend has continued into the first decade of the 21st century. The modelling date shows that the temperature in the rainy season (June - November) can increase faster than those in the dry season (December - May) (MONRE, 2009). The table 5.1 (page 112) summarizes temperature predicted changes by periods of years in the medium emission scenario. The annual mean temperature in 2020, 2050, and 2090 are increasing from 0.4 ^{0}C, 1.0 ^{0}C to 1.9^0C respectively, relative to the baseline period (1980-1999). Additionally, the annual mean temperature by the end of the 21st century is projected to increase by 2.0 ^{0}C.

Periods	Decades in the 21st century								
	2020 (^{0}C)	2030 (^{0}C)	2040 (^{0}C)	2050 (^{0}C)	2060 (^{0}C)	2070 (^{0}C)	2080 (^{0}C)	2090 (^{0}C)	2100 (^{0}C)
Dec -Feb	0.3	0.5	0.7	0.8	1.0	1.3	1.5	1.8	2.1
Mar - May	0.4	0.6	0.8	0.9	1.2	1.5	1.9	2.1	2.7
Jun - Aug	0.5	0.7	0.9	1.2	1.5	1.8	2.2	2.6	2.9
Sep - Nov	0.6	0.7	1.0	1.2	1.5	1.8	2.1	2.5	2.9
Annual	0.4	0.6	0.8	1.0	1.3	1.6	1.8	1.9	2.0

Table 5.1: Mean temperature change (^{0}C) in the South relative to the average for 1980-1999, medium emission scenario (B2) (Adopted from MONRE 2009)

However, the rapid urbanisation of HCMC has had a direct impact at the local scale by changing the urban climate through the urban heat island effect with indirect effects like modifying the urban water-cycle increasing and increasing energy consumption.

Located in the monsoon tropical zone, the climate in HCMC is generally humid. The annual average humidity is 70-80%. During the rainy season, humidity reaches 85-90% and falls in the dry season to 60-75%. In HCMC the annual average rainfall is about 1,950mm. The rainy season accounts for 80-85% of yearly rainfall. High rainfalls occur in June and September, averaging 250-330 mm/month, and maximum rainfall is up to 640 mm. The highest annual rainfall was recorded in 1908 at 2,718 mm and in 1958 at 1,392mm. Projected rainfall changes in specified years using the medium emission scenario are summarized in the table 5.2 (page 113). The total annual rainfall in 2020, 2050, and 2090 are increasing from 0.3%, 0.8% to 1.4% respectively, relative to the baseline period (1980-1999). Nevertheless, regarding seasonal periods, the rainy season's rainfall would increase while the dry season's rainfall tends to decrease distinctly in the South. The rainfall is not distributed evenly and tends to increase from the southwest to northeast.

Periods	Decades in the 21st century								
	2020 (^{0}C)	2030 (^{0}C)	2040 (^{0}C)	2050 (^{0}C)	2060 (^{0}C)	2070 (^{0}C)	2080 (^{0}C)	2090 (^{0}C)	2100 (^{0}C)
Dec -Feb	-3.0	-4.4	-6.2	-8.1	-8.7	-11.4	-12.8	-14.2	-15.4
Mar - May	-2.8	-4.1	-5.8	-7.5	-9.1	-10.6	-12	-13.2	-14.3
Jun - Aug	0.3	0.5	0.6	0.9	1.1	1.2	1.4	1.5	1.6
Sep - Nov	2.6	3.8	5.3	6.8	8.3	9.6	10.9	11.9	13.0
Annual	0.3	0.4	0.6	0.8	1.0	1.1	1.2	1.4	1.5

Table 5.2: Rainfall change (%) in the South relative to the average for 1980-1999, medium emission scenario (B2) (Adopted from MONRE 2009)

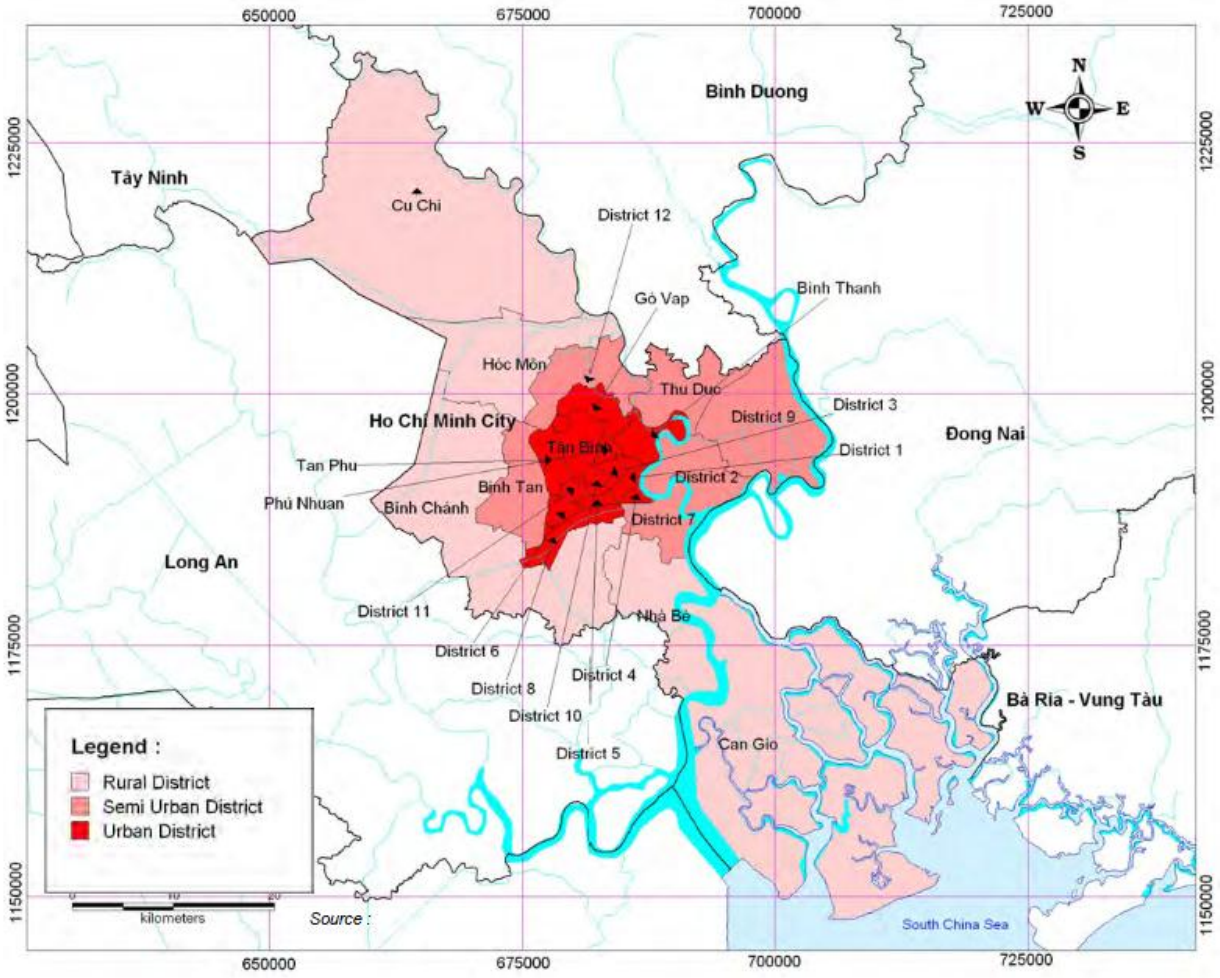


Figure 5.2: Urban and rural Districts in HCMC (*Source*: HIDS)

Most central districts and northern districts usually have higher rainfall than districts in the south and the southwest (HCMC People's Committee, 2002,

2006). The Can Gio suburban district has the lowest rainfall from 1,300 mm - 1,700 mm. Cu Chi and Thu Duc districts have the highest rainfall, ranging from 1,900 mm - 2,100 mm. The potential evaporation in the area amounts 120.4 mm per month with the highest is 173.2mm in the dry season. The wind direction in the dry season is from East to Southeast and in the rainy season from West to Southwest. The average wind speed is about 2.5-3.5 mm/s.

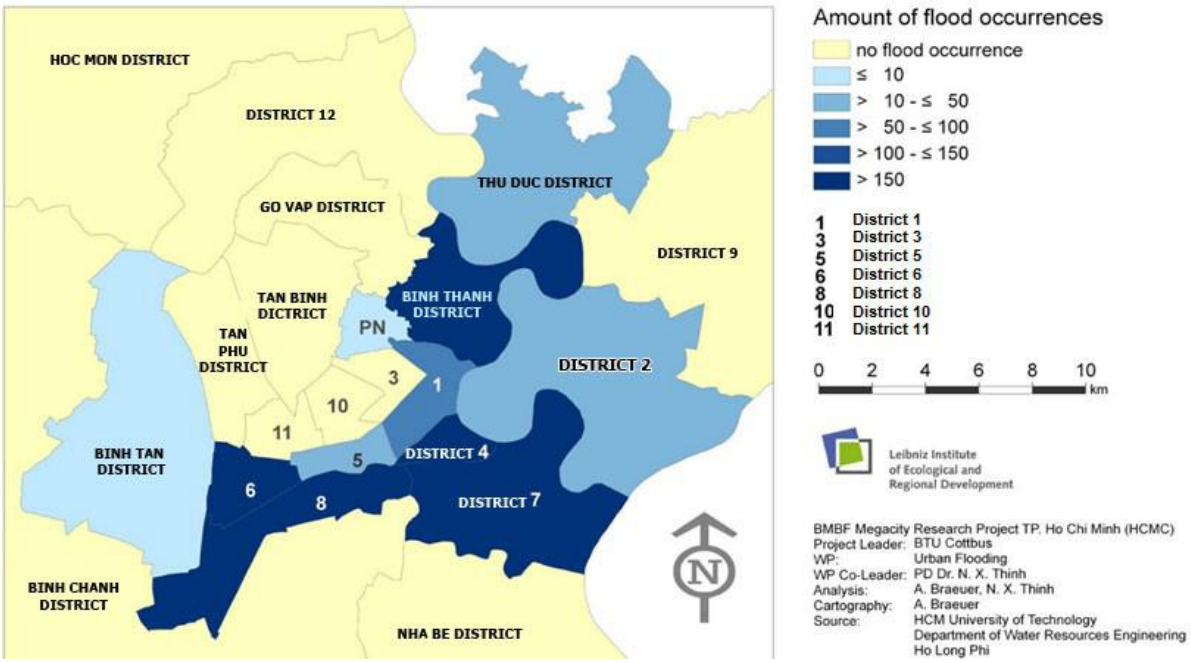


Figure 5.3: Districts affected by flood in HCMC (*Source*: HIDS)

The large population and its economic assets in this low-lying location and changing climate are therefore vulnerable to increased urban flood risk and the impacts of climate change (figure 5.3, page 114). Rapid growth of population, urbanization and industrialisation increase the vulnerability in HCMC. The dynamic economy draws migrants from all over the country, and the vast majority of the growing population will settle in low-lying and thus unfavorable areas. As a result, millions of people could be at risk from flooding. Moreover, inadequate and unsustainable urban development

practices associated with complex natural settings and societal structures led to the high degree of physical and social vulnerability.

In addition, in term of rapid urbanisation and climate change, some parts of the city have experienced more change and more vulnerable than others.

Hydrology: HCMC is situated next to the Saigon River, which joins the Dong Nai River to make northern and eastern boundaries of the city. The Dong Nai River has a minimum flow of approximately 100 m^3/sec. It originates from the central highlands of Vietnam and flows through Dong Nai and Ho Chi Minh City with tributaries from other provinces. The total catchment area is 42,665 km^2 and total flow volume is 30.6 km^3/year. Forests cover approximately 30% of the basin.

The upstream area in the lowland part of the river is the present Cat Tien National Park. The Tri An reservoir and hydropower plant is located downstream nearby. Further downstream of the river it is joined at Nha Be area of HCMC by the Saigon River. Inside the city a hydrological network of five canals acts as the natural water drainage: Nhieu Loc - Thi Nghe (9 km), Tau Hu - Kinh Doi - Kinh Te (19.5 km), Ben Nghe (5.9 km), Tan Hoa – Ong Buong - Lo Gom (7.2 km), and Tham Luong - Ben Cat - Vam Thuat (14 km).

Before finally reaching the sea, the Dong Nai River passes through a coastal mangrove forested delta area with many interconnecting riverlets. This Can Gio area forms the "green lungs" for Ho Chi Minh City. This 75,740 ha area is rich in biodiversity and was designated in 2000 as a Man and Biosphere (MAB) Mangrove Reserve area by UNESCO.

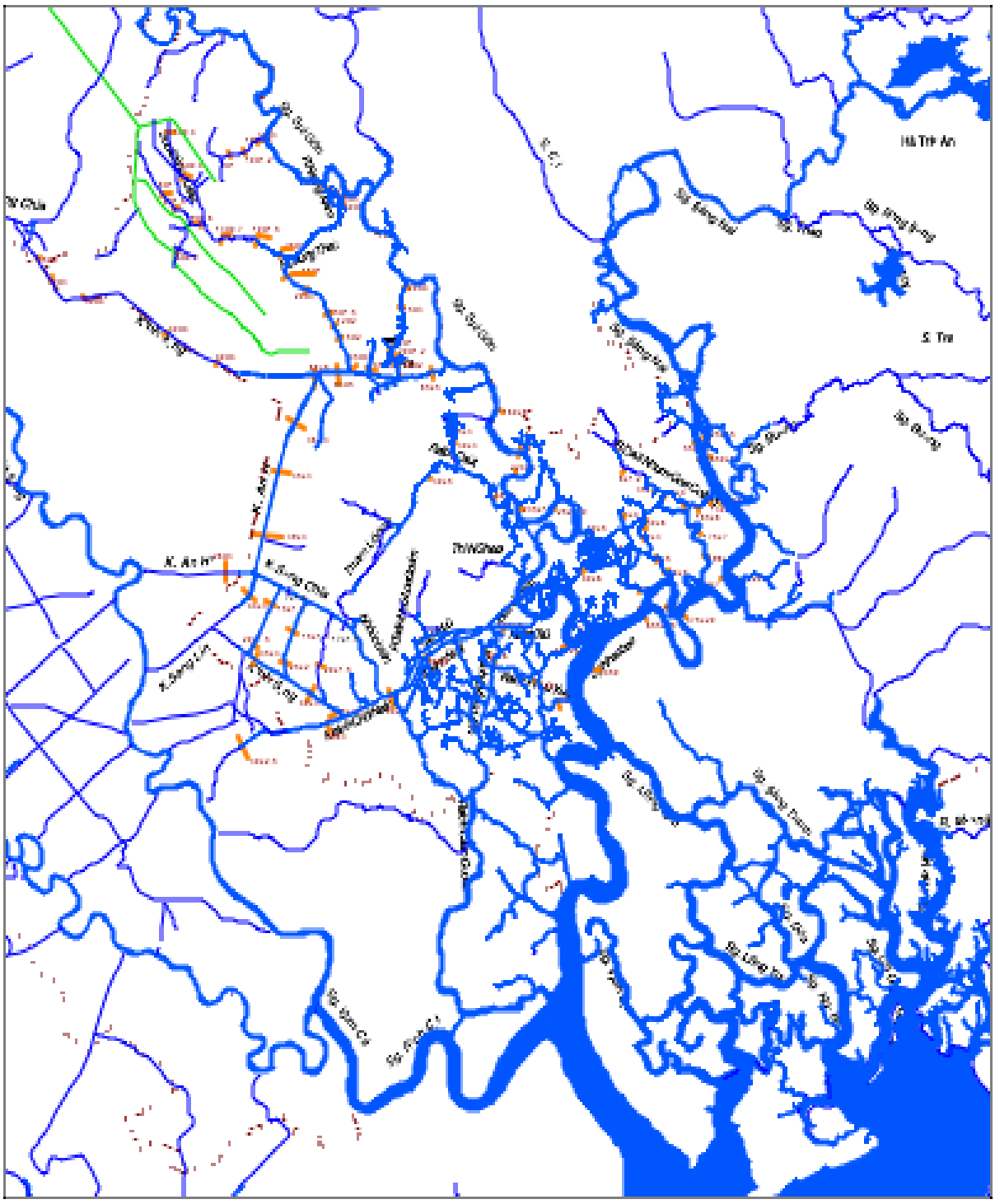


Figure 5.4: The river and channel systems in HCMC.

(*Source:* HCMC Planning and Architecture Department)

5.3 Urban Development and social and economic change

5.3.1 Urban development

The demography and population pattern of HCMC dramatically changed after 'Doi Moi' reforms of 1986. Its population has doubled over 25 years from 2.5 million in 1975 to 5.17 million people in 2000. By 2004, the mid-term census indicated the population figure has accelerated to 6.1 million people, accounting for 7% of the country's population in which 5.2 million habitants live in urban districts and 0.9 million people in suburban and rural areas (HCMC Statistical Office, 2005; HCMC People's Committee, 2006). Due to the rapid population growth, population density steadily increased up to 2,987 inhabitants per km^2 in the mid-2005 (Demaine, 2005).

By 2005, the urban population increased to 6.2 million (HCMC Statistical Office, 2007). The population in 2012 was 7,750,900 people equivalent to about 8 % of the total population of Vietnam. The population density is about 3,699 inhabitants per km^2 (HCMC People's Committee, 2011). However, in reality, the population in HCMC is more than 10 million people if the temporary residents, who are temporary workers, students, foreigners, tourists, traders…etc., are accounted for.

The HCMC administrative area consists of 19 urban districts and 5 outlying suburban districts (figure 5.6, p.119). The five outer suburban districts are named Can Gio, Nha Be, Hoc Mon, Cu Chi, and Binh Chanh, accounting for 79% of the City's total area (1,601 km^2) and 16% of total urban population. Of five suburban districts, Can Gio and Nha Be are the two coastal districts. Eighty-four percent of the City's population is located in urban districts (figure 5.2, p.113) (HCMC People's Committee, 2012).

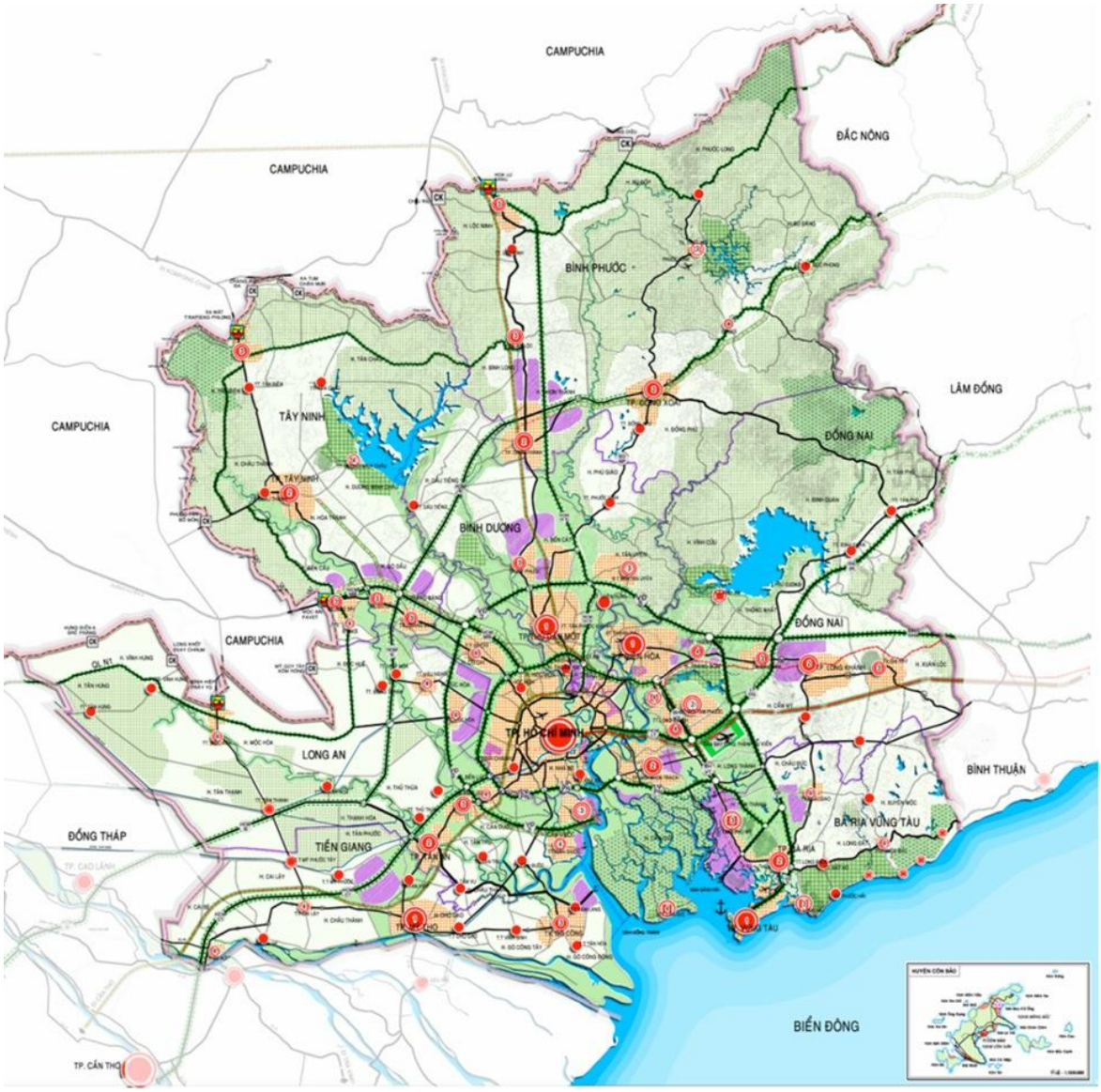


Figure 5.5: HCMC Regional Plan

(*Source*: HCMC Planning and Architecture Department)

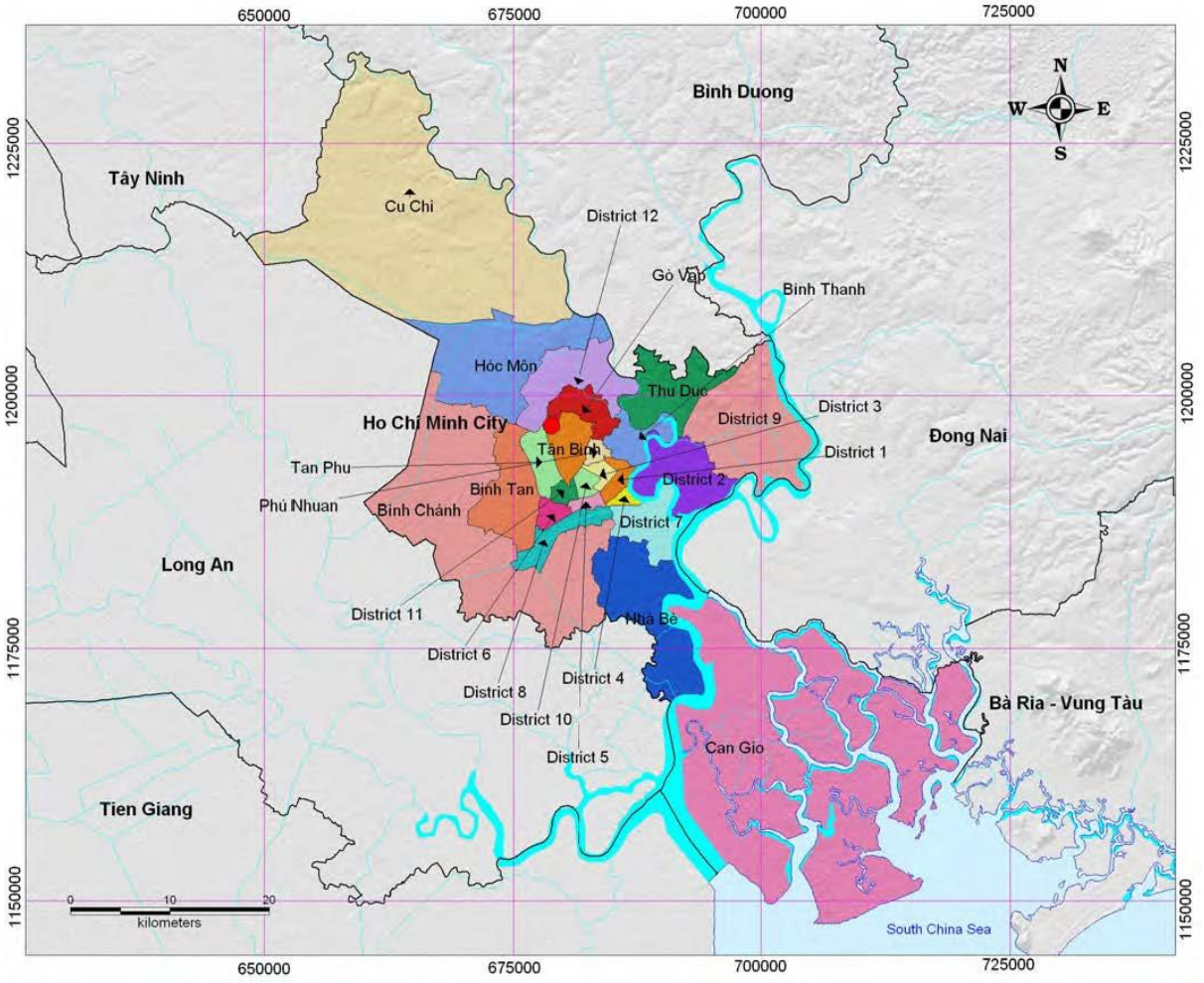


Figure 5.6: Administrative districts in HCMC (Source: HIDS)

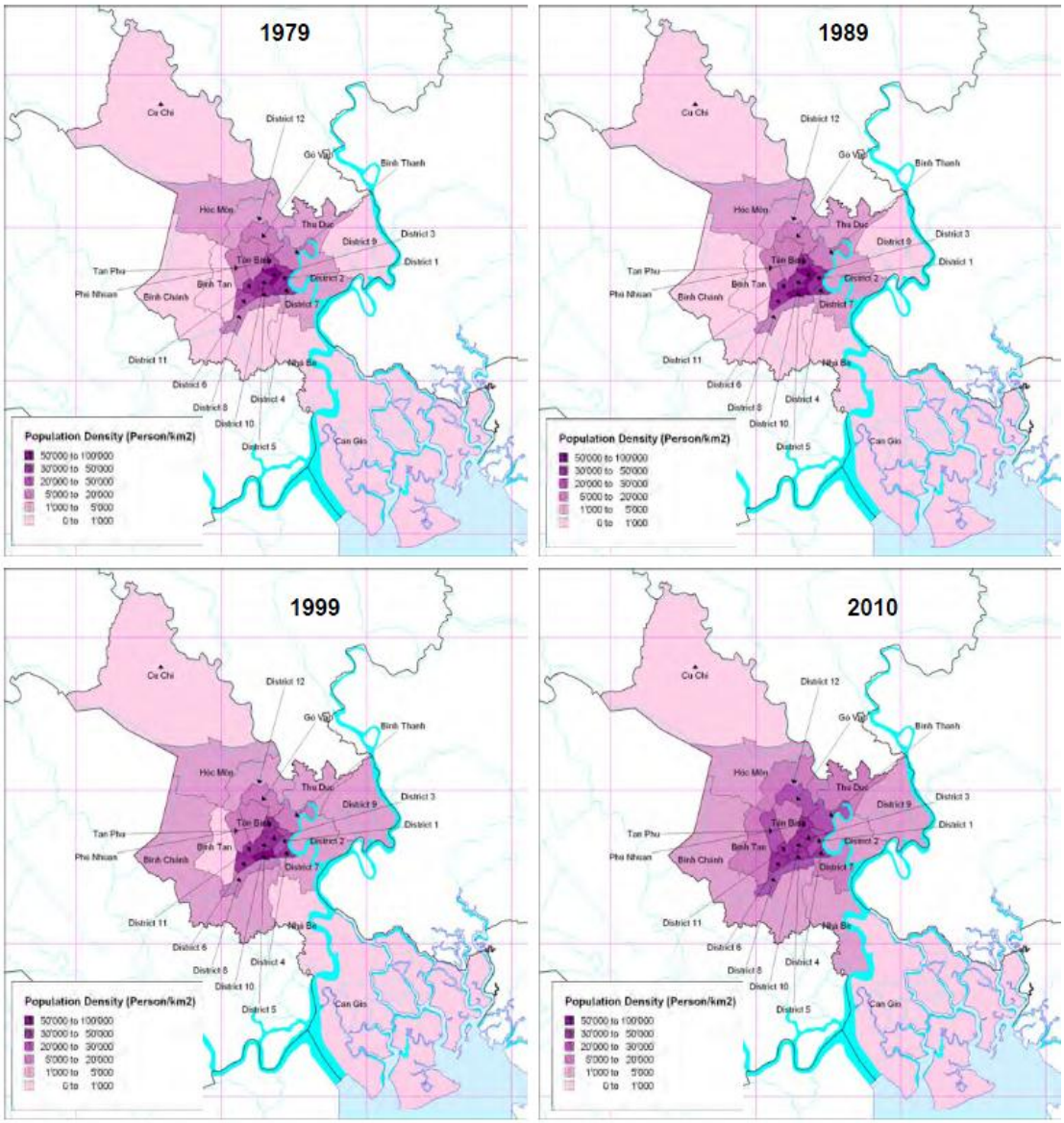
A United Nation's study in 2001 (population report) predicted that the urban population of HCMC reach 6.2 million people by 2015 with the rate of urban growth of 2.02% (United Nations Population Division 2002). However, the urban population exceeded 6 million by 2004 (HCMC People's Committee, 2006), 10 years earlier than the United Nations prediction and the city will become megacity. This leads to pressure on urban services and city environment as well as posing high challenges to urban planners, policy-makers when they plan the future sustainable development for HCMC.

5.3.2 Population trend in HCMC

HCMC is the largest city in Vietnam and is the economic hub of the country. The rapid urbanisation of HCMC started in the late 1980s after implementing the 'Doi moi' policy. The economic prosperity was the driving force for population growth of more than 60 percent within 15 years, increase from 3.9 million in habitants in 1989 to more than 6.2 million in 2005 (HCMC People's Committee, 2006). However, if we count the estimated two million migrants and temporary workers, the actual population will exceed far from ten million inhabitants.

The inhabitants have been concentrated in the high density urbanised areas with compact scale: approximately 40 percent of the city's population was concentrated in four centre districts, including District 1, 3, 5 and 6; and 60 percent in inner core districts (figure 5.7, p.124). As for an increase of population, the districts surrounding the existing urbanized areas including Inner Fringe and Urban Fringe districts increased rapidly between 1999 and 2004, while those of the four central districts decreased by 1.5% per year (Le, 2007).

The rapid increase population of HCMC since the late 1980s has occurred at West and North districts, especially Tan Binh District. The annual population growth of Tan Binh District from 1980-2004 was 5.6% in average, while that of other districts of HCMC was just 2.6%. Recent data shows that Binh Chánh District has the highest population growth, with annual population growth rate at 16%. It is because this district is a place where the poor people, the migrants, and workers in industrial zones live.



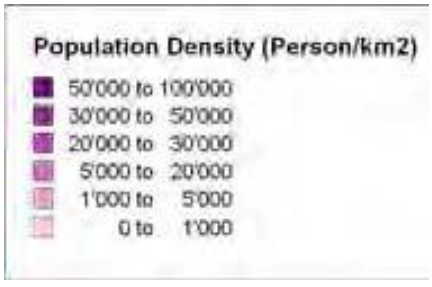


Figure 5.7: Density population Development by District in HCMC 1979-2010. (Source: HCMC's statistical Department)

5.3.3 Economic growth in HCMC

Under the 'Doi moi' policy associated with the globalisation process, the economic structure of HCMC has been changing rapidly since 1990. The policy triggered the so-called 'industrialisation and modernisation' in which (i) industrialisation led by massive FDI in the 1990s, and (ii) overall modernisation of industry with emergence of the private sector after 2000. As a result of 'Doi moi' policy, HCMC has witnessed a remarkable economic growth with a pace of more than 10% annually in the 1990s. The gross regional product (GRP) growth rate of the industry was 14.8% per year in the period of 1991-1999, while the growth of the service sector obtained 10.3% annually. The manufacturing sector was the leading sector for economic growth of HCMC in the 1990s, which was facilitated by FDI.

Despite accounting for only 0.6% of Vietnam's total area and 6.6% of the country's total population, HCMC made an important contribution to Vietnam's GDP in 2000. The City's GDP steadily accelerated during the period 1995-2000 and its contribution to total GDP was 16.7%, 18.9%, and 19.3% in 1995, 1999 and 2000 respectively (HCMC People's Committee, 2006). HCMC's economy continuously obtained high economic growth with an average annual GRP growth of 11.3% during 2000-2008. In this time, the trade and service sector became a driving force for economic growth.

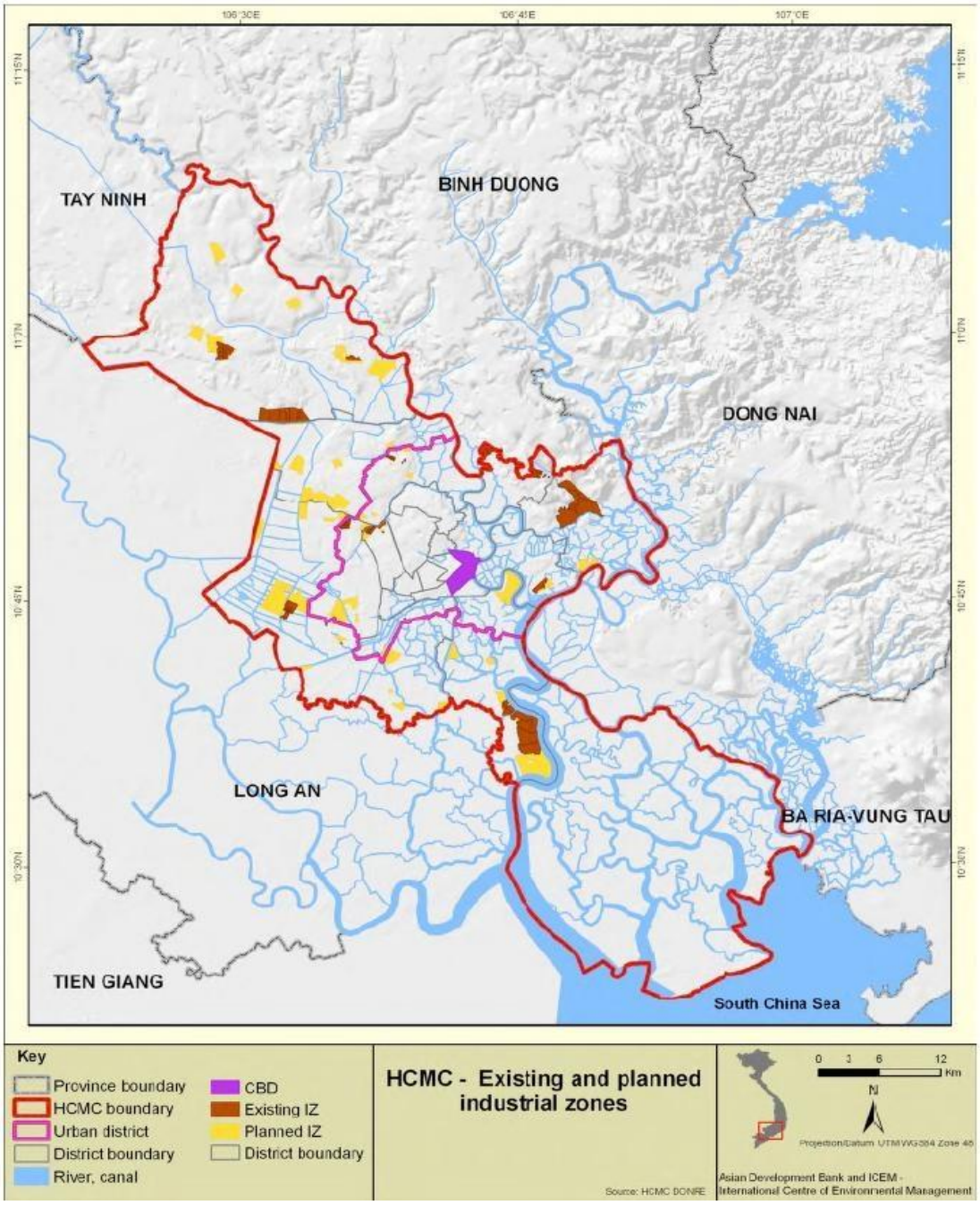


Figure 5.8: Existing and planned industrial zones in HCMC

(Source: ADB, 2010)

In order to understand the HCMC situation, it is important to bear in mind the national context of Vietnam as well as the socio-economic development plans

from Vietnam government which directly influence the situation at the local level.

After the country's reunification in 1975, Vietnam was among the poorest country in the world facing an economic crisis, including serious food, energy shortages, high inflation, low productivity, and inefficient management of economy. This is the result from decades of war, which had left a damaged infrastructure, millions of people dead and injures.

Thanks to the effective adoption and implementation of 'Doi moi' policy - the era of change, renovation, and newness - that was officially launched in 1986, Vietnam's economy has seen impressed improvements, moving from a highly centralized planned economy to a socialist-oriented market economy. Vietnam made a shift from being among the poorest countries in the world to entering the ranks of middle-income countries by 2011.

Vietnam's growth experience since the start of 'Doi moi' era can be distinguished into three phases:

- The first phase (1986-1991) ended with the macroeconomic stabilization that paved the way for a reintegration into the world markets. This time, the average gross domestic product (GDP) growth rates of 7.5 percent per year.
- The second phase (1992-1997) marked the great success and highest growth rates of Vietnam economy until the outbreak of the Asia financial crisis in 1997. The GDP rose by an average of 8.9 percent per year. According to the World Bank, there were only five countries achieved that rate over the same period.
- The third phase of growth, which started in 1998, Vietnam has benefited from a programme of internal modernisation, a transition from its agricultural base toward manufacturing and services, while external

liberalization continues. During this time, Vietnam fully integrated into the world market, such as Vietnam joined the Asian Free Trade Area (AFTA) in 1995, became a full member of the Asia-Pacific Economic Cooperation Forum (APEC) in 1998, and became a member of World Trade Organization (WTO) in the early 2007, and ongoing negotiate the Trans-Pacific Partnership (TPP) with United States. From 1990-2004, the average annual growth rate was 7.5 percent and then rose above 8 percent during 2005-2007 and reach a peak in 2007 with 8.5 percent. The year 2008 created a significant break for the country's growth aspirations. Due to the global economic crisis and a number of domestic fiscal challenges, the GDP growth of Vietnam decreased under 6 percent.

Rapid economic growth and a rising population had led to many urban problems which developing countries now have to face. Many problems, of economy, society, culture and community health, have been proved to have their roots in urbanization which lacks a comprehensive consideration of natural processes, social aspects and economic influences of urban development. Environmental pollution, for instance, has been increasingly recognized to play a critically important role for the life of human beings and other creatures as well as the earth itself. Many Asian countries have urbanized rapidly. This continent, where over 40 percent of the world's urban population is living, has been facing the co-existence of a large informal economy as a result of the growing interdependency of the global economy.

Basically, in the process of socio-economic development, economic growth and poverty reduction have dialectic relations. In Vietnam, economic development has boomed since the 1986 Reformation of the government. Thank to high economic growth, Vietnam has achieved outstanding success in hunger eradication and poverty alleviation (IMF, 2006). This is evidenced in the reduction of the poverty rate from 15% to 8% in only 15 years (Chandler

and Prassor, 2006). The economic meeting of APEC (Asia Pacific Economic Corporation) was held in Hanoi and recognition of the 150th member of WTO (World Trade Organization) in November 2006 has started a period for economic development in relationship with global context. Vietnam has recently become the Asia's second-fastest-growing economy (Chandler and Prasso, 2006). According to General Statistics Office of Vietnam (GSO), Vietnam growth index was 8.3% in 2007 (GSO, 2007).

The urbanization driven by economic growth has boomed in the larger cities in Vietnam in which HCMC is the most dynamic. Being located on the northern edge of the Mekong Delta, the city is contained within the Saigon River and part of the Dong Nai River watershed. With a population of over 8 million in 2014 and planned to be 12 million inhabitants in 2025 based on a scenario with an annual growth rate of 3.4 percent, this is also the largest city in Vietnam and is a significant centre of industry, education, administration, finance, commerce, tourism and international communication.

5.3.4 The changing pattern of Urbanisation

The process of urbanization in HCMC had several stages. Growing on an ancient alluvium island surrounded by tropical dense forests, Saigon had the character of a canal city. Rapid economic growth after the 1986 'Reformation' created dramatic pressures and where urban planning was not appropriately considered, the natural values of the local landscape were considerably damaged by urbanization. The ideas and strategies of open space to meet public recreational needs, maintain social equity and ecological sustainability were not fully considered in urban plans.

In 1790, Saigon, the previous name of HCMC, was planned and laid out by the French. The layout was designed mainly for defense purposes. The canal

system formed a complex waterway system with the rivers in order to provide a network for transportation and defense.

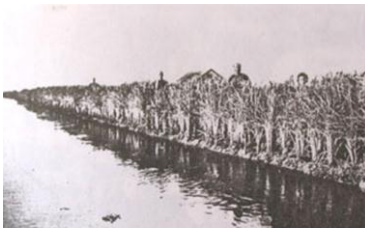


Figure 5.9: Agriculture production in the Mekong

Source: HIDS - *Vietnam through ancient texts and pictures*

From 1859 to 1945, under French governorship, the first comprehensive HCMC plan was designed by Coffyn, a French town planner, to established HCMC's role as an administration centre for southern Vietnam and planned for a million people population. During these one hundred years, many canals were filled to allow the development of roads. Waterways, however, continued to be used for the transportation of goods between the surrounding provinces and HCMC.

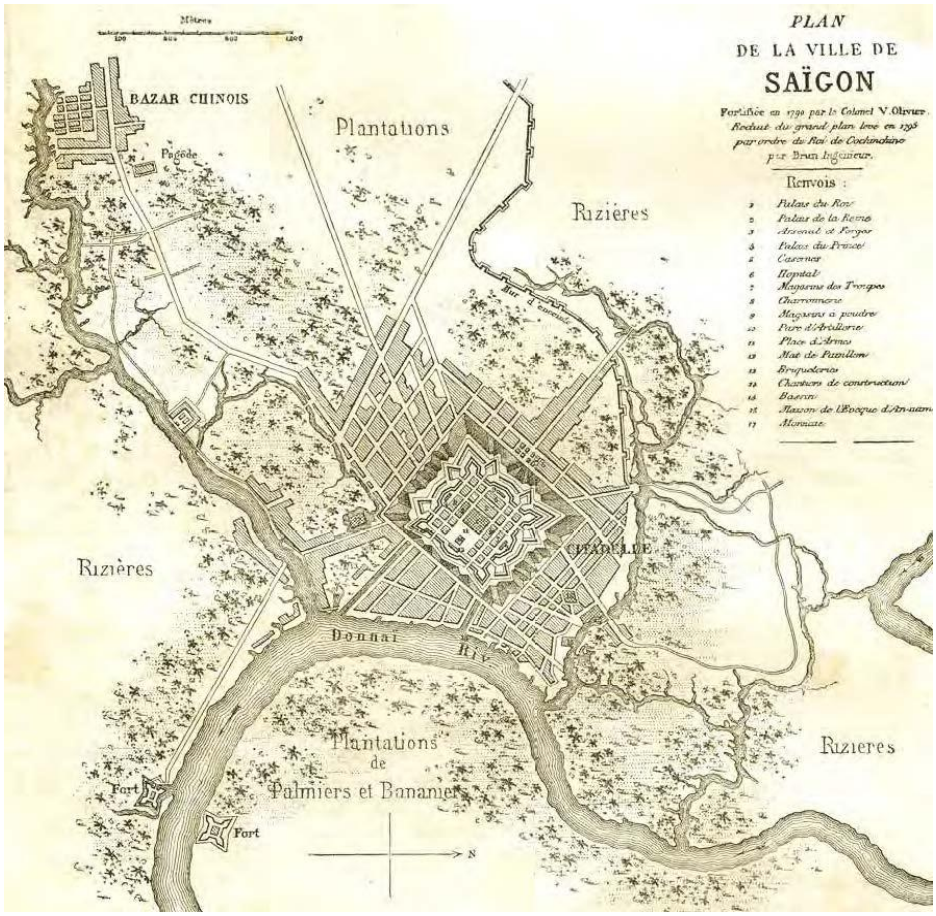


Figure 5.10: The map of Saigon in 1791 (Source: Planning and Architecture Department)

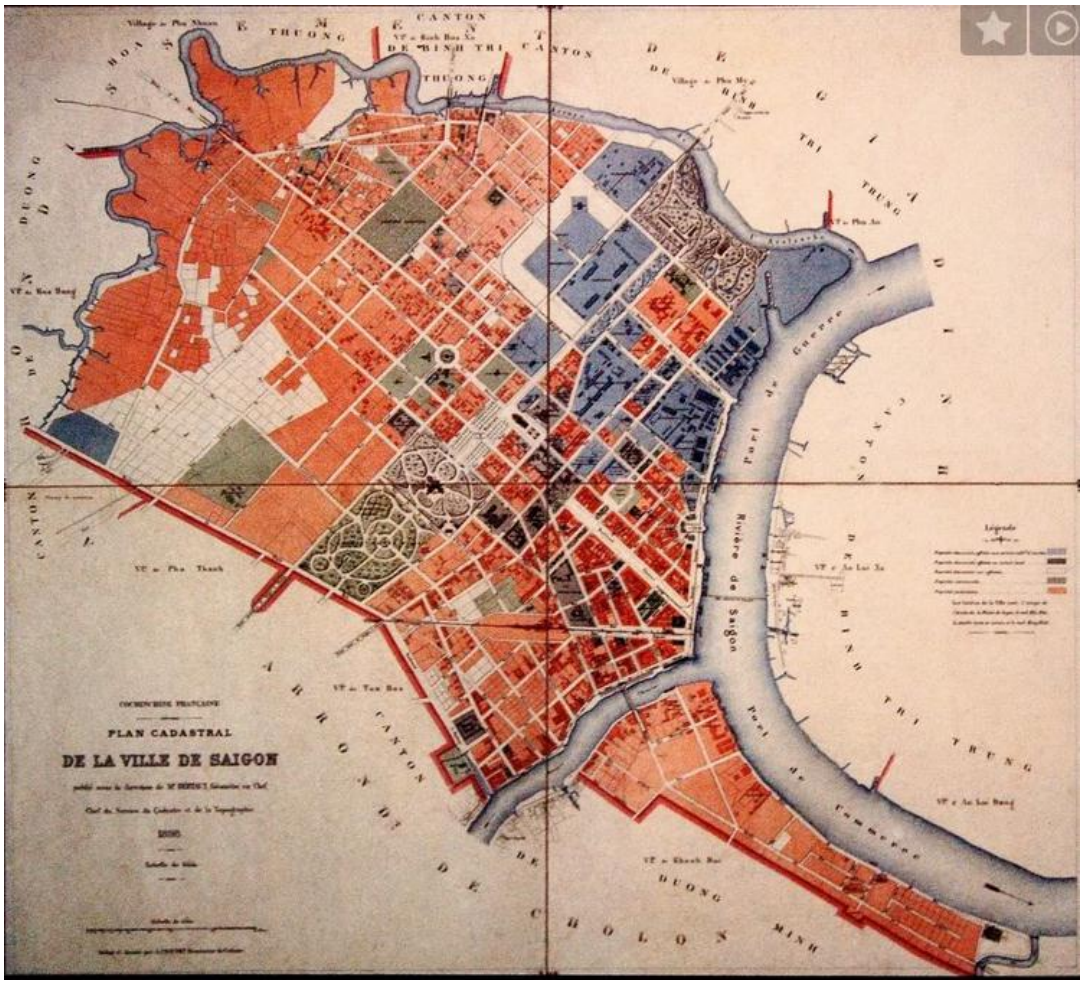


Figure 5.11: Saigon 1896 plan (Source: Planning and Architecture Department)

Many canals were filled to allow the development of roads. Waterways, however, continued to be used for the transportation of goods between the surrounding provinces and HCMC.

There were many commercial and residential activities along the riversides. The most popular activity was floating markets. These activities happened at the intersections of waterways and roads. Markets located on the waterfront took advantage of both waterway and road traffic.

From the early 19th century, marshes were filled in to provide land for urban development. There were some industrial plants established along the Saigon

River that served the production and exploitation aims of the French colonial governor (Nguyen, 1985). During this period, together with the degradation of the natural resources and further development of the land, the canal-river system was considered to have a major value for transportation but its ecological values were not recognized. Urban areas were confined within the ancient alluvium area, which is higher than the surrounding marsh areas. At the end of the 1940s, the city's population was about 500,000 people.

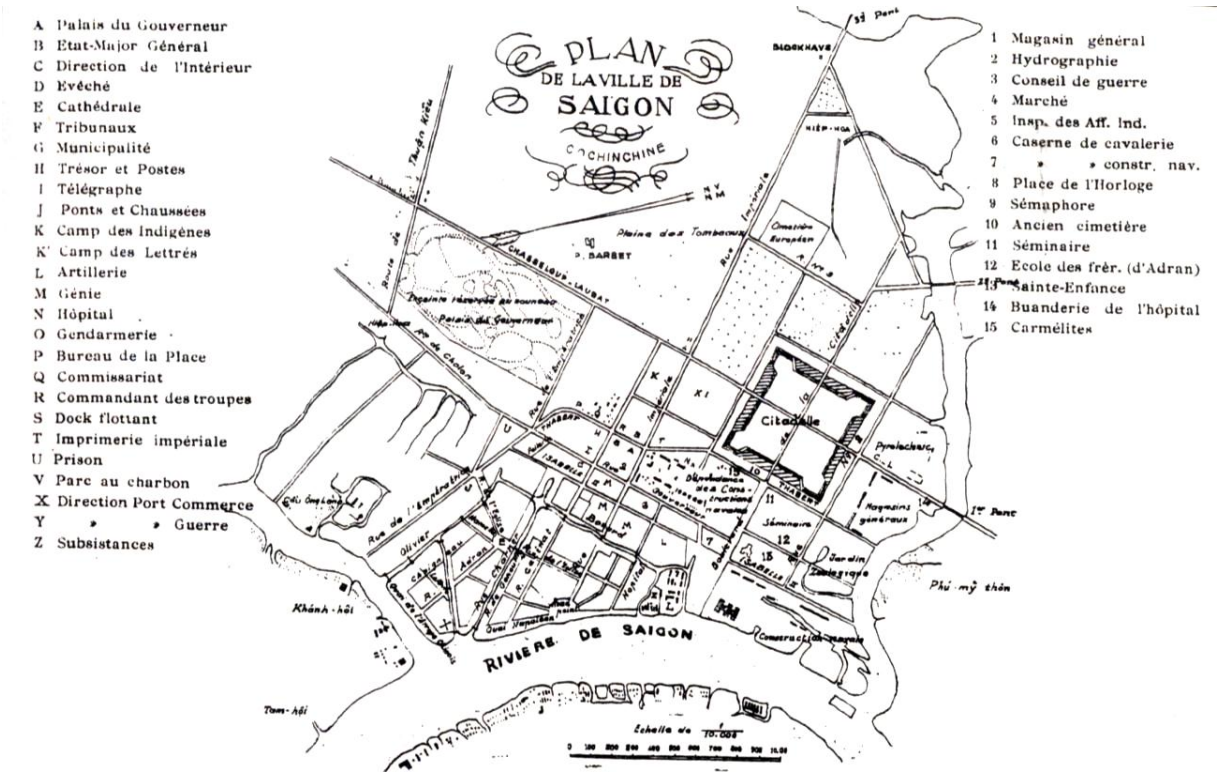


Figure 5.12: Saigon 1897 plan showing a map layout of road and initial parks of Saigon.
Source: HCMC Planning and Architecture Department

The French colonial plan for Saigon took full advantage of water to create a transportation system. Wetland areas were retained as huge open space areas which surrounded the old city. Urbanized major open spaces included waterfront areas, the main palace and the botanic garden, but no public parks

or community gardens were incorporated. From this situation, urban expansion started and gradually expanded over the low land marsh land areas which were subject to flooding.

Saigon 1945

HCM City 1975

HCM City 2002

Figure 5.13: Saigon 1945-2002 plans
Source: HCMC Planning and Architecture Department

After the French withdrawal in 1954, the American occupation from 1954-1972 with its military activities caused considerable damage to the ecosystems.

The Can Gio Biosphere Are, the place that played a major ecological role in the area, was overcome with toxic chemicals destroying most of the fauna and flora systems of its tropical forests. Along the canal systems, slum areas proliferated uncontrollably, causing massive environmental problems including water, soil and air pollution. Aquatic eco-systems almost disappeared. During this time, the urban area was still located on the ancient alluvium area, and flooding had not been recognized as a regular event. In 1975, the city population was 4 million people.

From 1975 to 1985, centralized economic policy did not kick start the urbanization process until the 'Doi moi' policy in 1986 known as the 'Reformation'.

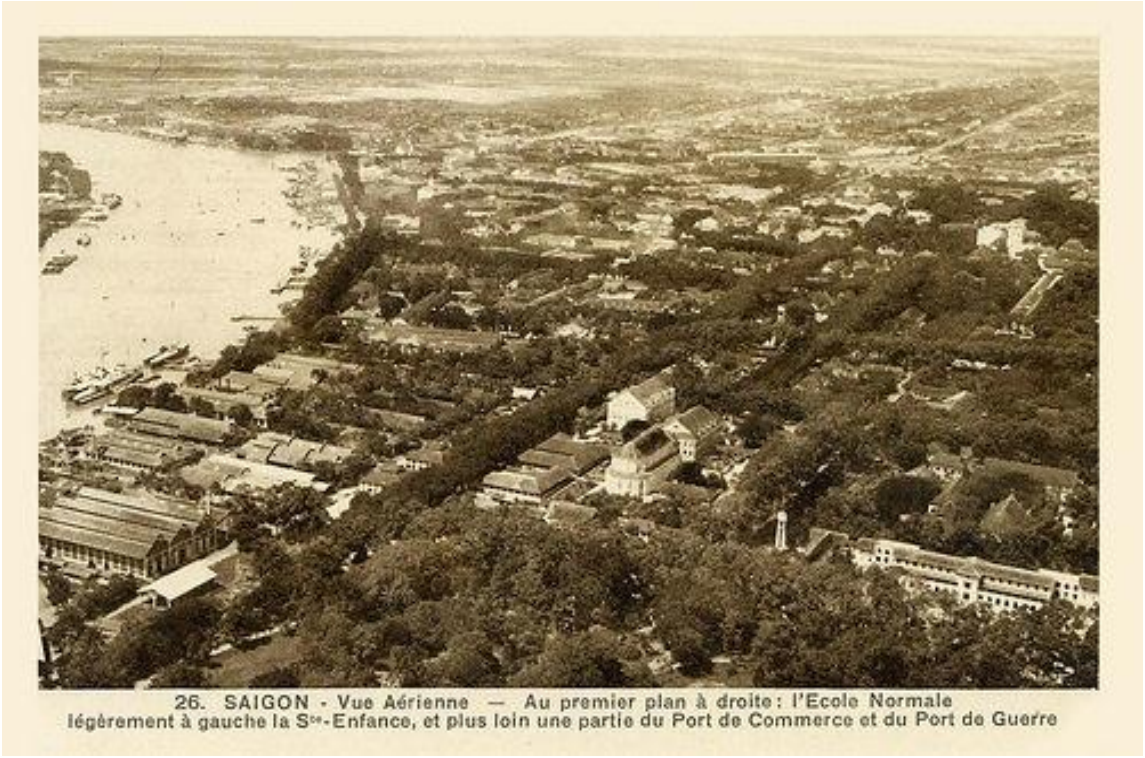


Figure 5.14: Saigon River in 1900's.

Source: HCMC Planning and Architecture Department

As a result of this new policy, a market economy developed and created considerable changes in many aspects of people's lives and the city. Urbanization occurred very quickly. Different private economic groups were encouraged and this provided more employment. Consequently, this led to increased migration from rural areas to HCMC. The population had risen to 5 million in 1990.

The urban infrastructure was not able to accommodate the rapid changes caused by the booming market economy. The planning system applied for HCMC followed the planning method of nations with centralized economies. This method tends to be subjective and to lack an evidence base (Nguyen, 2007).

The changes in the market economy after the "Reformation" brought about changes in economic and social aspects of the city. Urban sprawl, including slum areas caused many problems along the canal systems, with environmental pollution and land speculation. Much political effort has been exerted to reduce the negative impacts of over-population, especially with regard to environmental pollution. Many slum areas were cleared; and the polluted canals were dredged to allow drainage water to be released into the Saigon River.

Figure 5.15: Saigon in 1960s (Source: HCMC Planning and Architecture Department)

However, polluted run-off and sewage water still flow in the drainage system today and are directly released into the Saigon River. This caused, and continues to cause, water pollution and erosion along the Saigon River banks.

Reforestation has however successfully been undertaken in the Can Gio area. The area was recently recognized internationally as the first biosphere reserve in Vietnam.

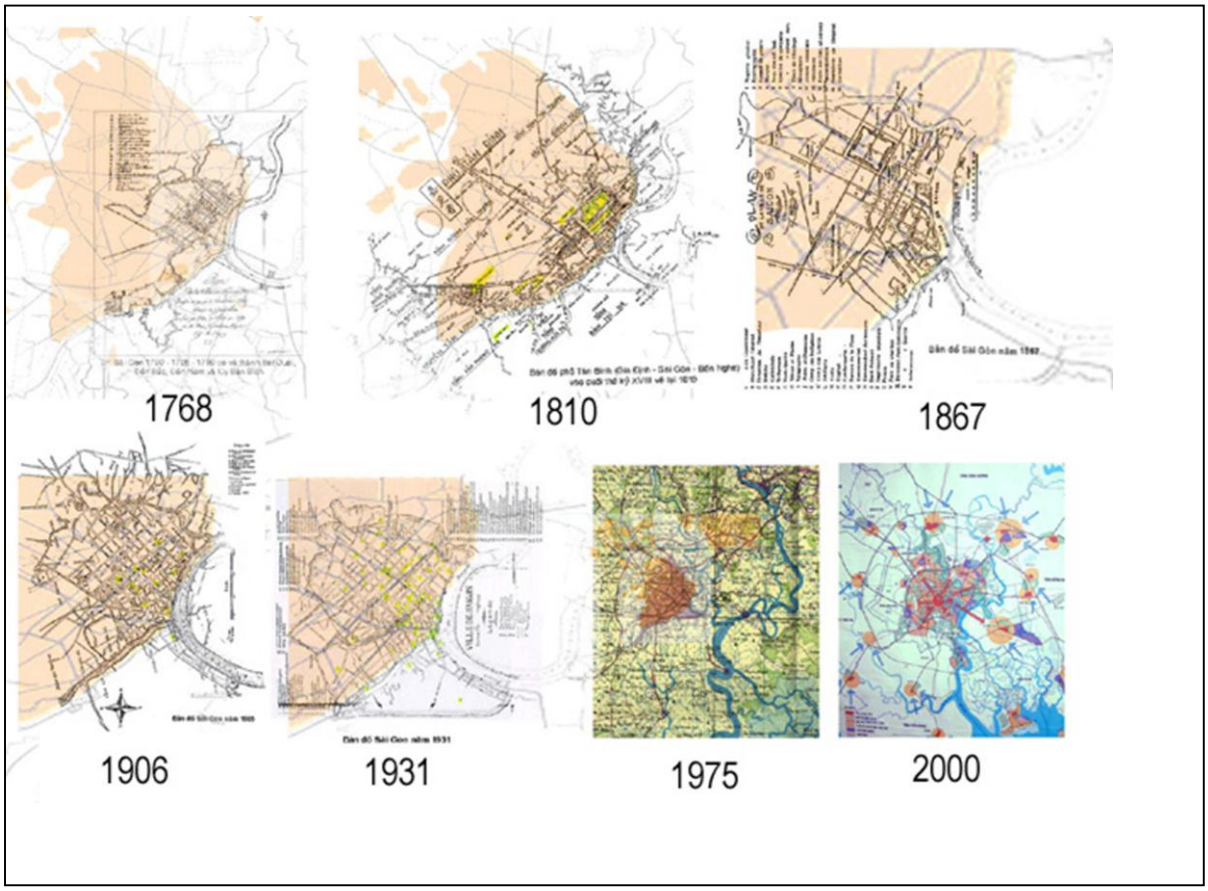


Figure 5.16: Maps of 300-year city development show the urban expansion on the island area (*Source*: HCMC Planning and Architecture Department)

The maps in the figure 5.16 above shows that over nearly 300-years of development, Saigon has been growing on an ancient alluvium island (in light brown area of the above maps). Since the early 1990s, the city has expanded beyond the natural border of the ancient island and developed on the low wetland areas. The structure of the tropical ecological landscape has been destroyed: the canal system has been filled in with soil, rubbish and polluted substances; wetlands have been covered by hard surfaces and bitumen. The hydrological cycle has been disrupted. Separate green areas have been planned based on criteria of a specific area per person, rather than being

considered as a part of whole ecological system. These are among the root reasons for the environmental problems, including natural hazards, which now face HCMC. For example, areas affected by regular flooding are District 6, District 7, District 8, Tan Binh and Binh Thanh Districts.

In summary, the urbanisation of HCMC started from two urban centres: Saigon and Cho Lon. After the 'Doi moi' policy in the late 1980s, the built-up area between Saigon and Cho Lon connected, and the northern area of Saigon (the District 1) became urbanized. During the rapid urbanisation in the 1990s, the large area of northern and western part of the urban centre had become built-up area. The population tendency in HCMC is population in the central areas have been decreasing while those in suburban areas have been increasing (Le, 2004; World Bank, 2011). The characteristics of urbanisation in HCMC (Le, 2004) can be summarized as follows:

- Decrease of population in Central area: The districts in the centre includes Districts 1, 3, 4, 5 ,6 , 8, 10, 11, Phu Nhuan, Binh Thanh have been decreasing in population. This situation is considered to be caused by the large-scale infrastructure projects and the rapid increase of land prices in the central areas.
- 'Donut-shaped' urbanisation: urbanisation process in HCMC looks like a common phenomenon of the urbanisation process of major metropolises in the world. The districts with higher population growth rates are located around 10 km from the city centre, showing likes the shape of a donut.
- Clock-wise urbanisation: The urbanisation of HCMC has occurred in clock-wise direction: from west (Tan Binh, Tan Phu Districts) to North (Go Vap District) to East (Thu Duc District) and to South (District 7).
- Distance and directions of current urban sprawl: Recently, the districts located around 10-15 km from the urban centre showed higher growth rates, and it seems that urban sprawl already reached to this distance in northeast, northwest, and west direction.

- Characteristics of urbanisation: In the rapidly urbanising west and northwest areas, mainly less-regulated and small-scale houses have been developed surrounding factories where living conditions have been being deteriorated due to the lack of technical infrastructure.

Peri-urbanisation in HCMC

The peri-urbanisation is known as an area includes not only districts surrounding the inner city but also the new districts in the transitional area between the inner and the suburbs of HCMC. The peri-urban areas in HCMC have witnessed relatively fast change. Urbanisation has taken place in the former periurban districts, including: Tan Binh, Go Vap, Binh Thanh and District 8, which has run out of farmland and become inner city districts.

The inner-city expansion policy in 1997 gave a chance to develop five new peri-urban districts, including Thu Duc, District 2, District 7, District 9 and District 12 (figure 5.2, p.116). The fast urbanisation pace has changed the land use structure of HCMC. The reduced agricultural land acreage of periurban areas in the last few years has brought an increase in the land use for industrial zones and residential areas. The table 5.3 (page 139) shows the total area of centralized industrial zones exceeded more than 2,200 ha in 2008. The new districts facilitated the establishment of such new industrial zones as Tan Thuan industrial-export processing zone in District 7 and Linh Trung industrial zone in Thu Duc district. The planning for industrial clusters or zones has been being implemented. Of the total industrial zones in HCMC, those located in the new districts make up 40%. It means the new districts have reserved as a considerable area for industrial and export processing zones in HCMC (figure 5.18, p.139).

	Centralized industrial export processing zone (EPZ)	Location	Year	Area (hectare)
1	Tan Thuan EPZ	District 7	1991	**300**
2	Linh Trung 1 EPZ	Thu Duc district	**1992**	**62**
3	Linh Trung 2 EPZ	Thu Duc district	**1997**	**63**
4	Tan Tao industrial zone (IZ)	Binh Tan district	**1996**	**381**
5	Binh Chieu IZ	Thu Duc district	**1996**	**27**
6	Tan Binh IZ	Tan Phu-Binh Tan	**1997**	**134**
7	Tan Thoi Hiep IZ	District 12	**1997**	**28**
8	Cat Lai IZ	District 12	**1997**	**124**
9	Vinh Loc IZ	Binh Tan, District 12	**1997**	**259**
10	High-tech zone	District 9	**2001**	**872**
11	Total industrial zone area in newer suburban districts			**2,250**

Table 5.3: Industrial zone areas up to 2008 in new districts

Source: HCMC industrial-export processing zone management board, 2008

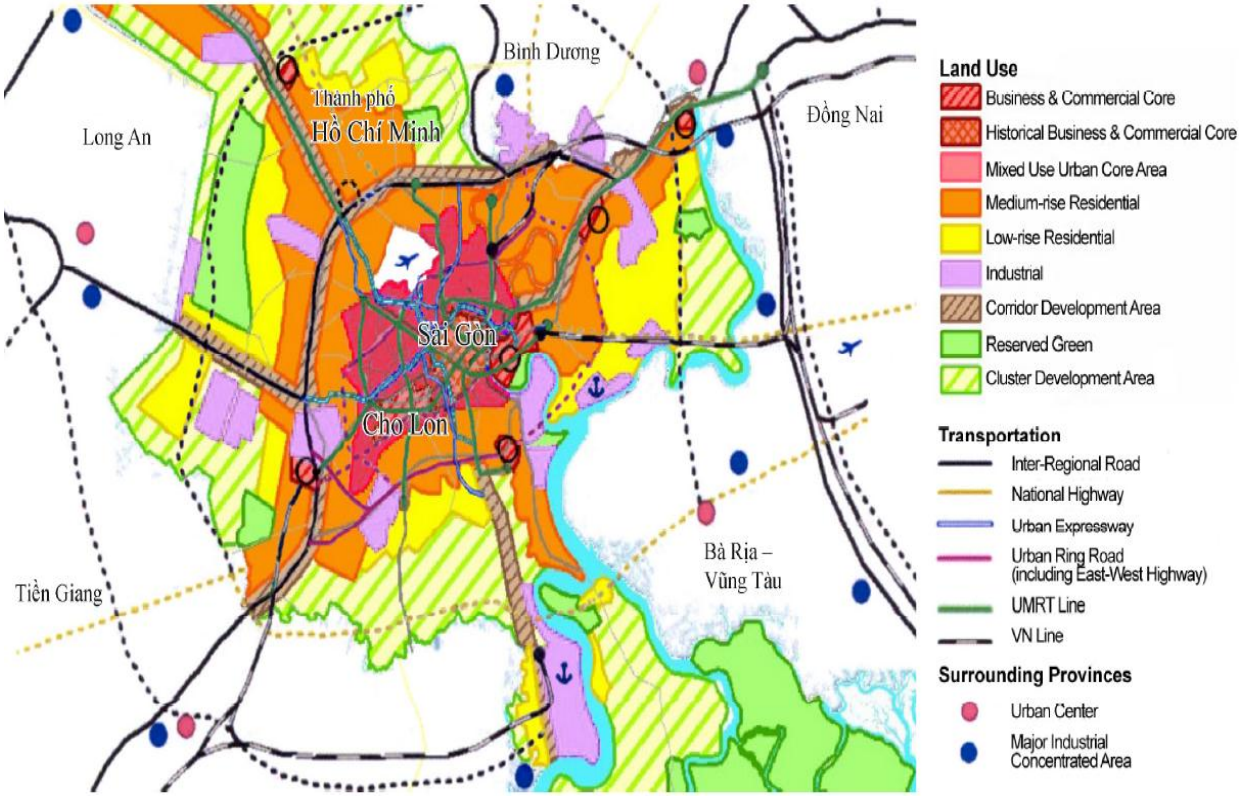


Figure 5.17: Centre of HCMC map (Source: DPA)

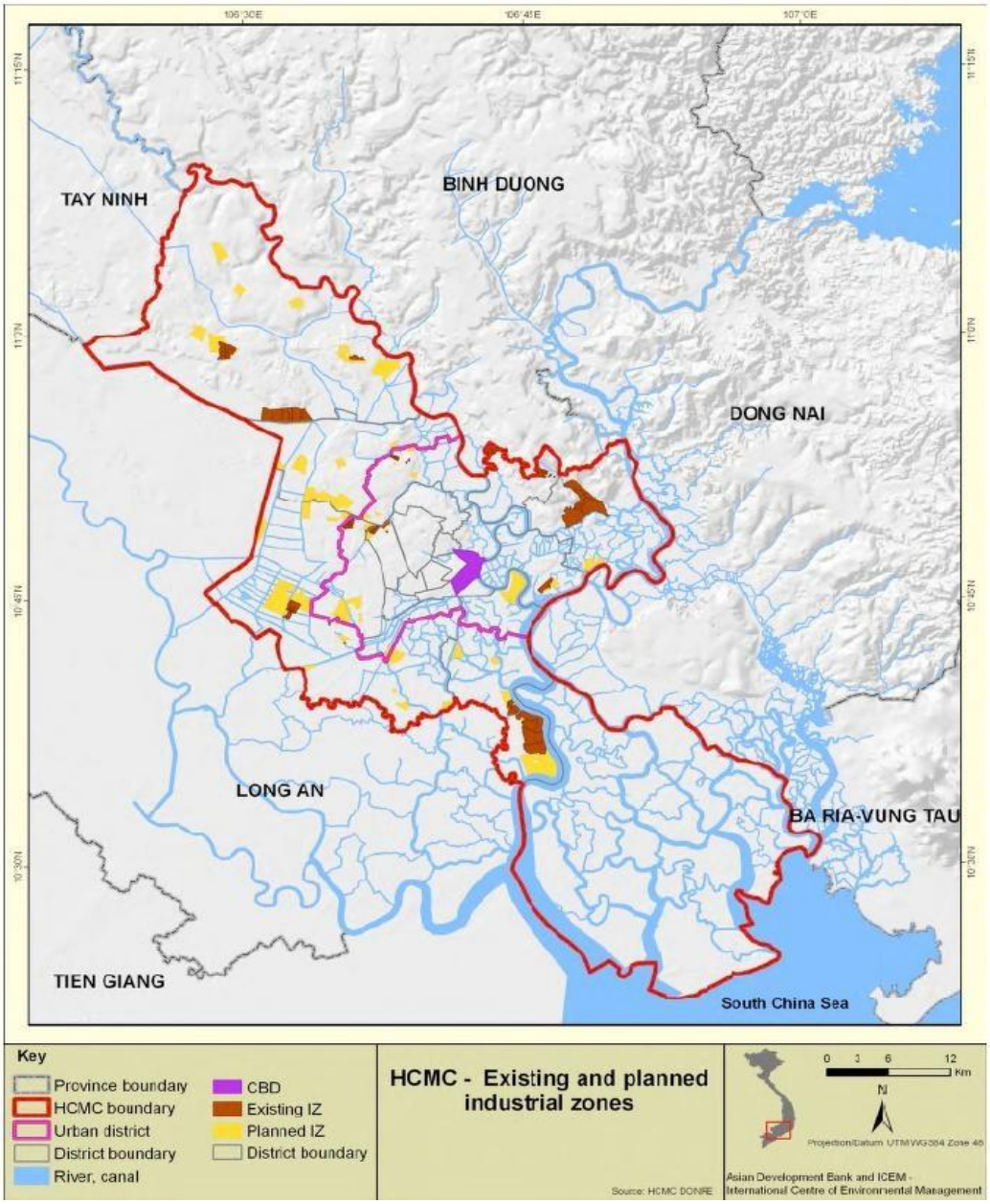


Figure 5.18: Existing and planned industrial zones in HCMC (*Source*: DONRE)

5.3.5 Acknowledged Urbanisation problems in HCMC

HCMC's rapid urbanization is perceived to have led to many problems. The recent documentation gathered during field work and interviews emphasise particular issues. These include urban infrastructure degradation and urban

ecology problems, including water pollution, water resource deterioration, inadequate drinking water and sanitation, coupled with health problems from water-related diseases, air pollution, flooding, heat island effects, solid waste management; and limitations of the existing urban planning method. There have many efforts to solve the problems in HCMC. Many scientific conferences have been held in the last five years to find proposals resolving the following problems (HIDS, 2014).

Existing studies highlight the following issues:

i) Environmental Pollution

Water resources in HCMC have become impaired for two reasons:
Firstly, the Saigon River has been polluted by point sources from the existing canals running through the urban areas. Surface water pollutants from urban surfaces are brought into the river and canals and continue to pollute the aquifer resources. The old historical drain system that mixed run-off water and drainage water has made the pollution more serious. Moreover, because the Saigon River runs through the urban centre, this is made worse by the influence of the bi-diurnal tidal regime causing pollutant sedimentation.

Secondly, at the end of the dry season, sea water is more dominant in the river. This results in sea water penetration further inland, thereby, increasing salinity in the rivers. In addition to the water problem, soil is also polluted by industrial sites, and ineffective run-off management. Air pollution and noise pollution are other problems caused by traffic overload on the degraded transportation infrastructure.

ii) Degradation of urban infrastructure and ecology

HCMC's urbanization and rapid increase in population have caused huge impacts on the urban infrastructure. Over-population and growth of the urban economy have created heavy pressures on the old urban infrastructure built in the French Colonial time for one million people. Traffic congestion, flash floods, and water pollution are becoming more and more common. Large sums of money from the state budget have been used to resolve environmental pollution and the urban infrastructure problems.

The public transportation infrastructure system (rail lines, underground etc.) was not built to accommodate the quick urban growth. Motorcycles dominate the street space because of the convenient way they can move in and between the small urban quarters. Motor use abuse has caused serious traffic jams and raised the numbers of casualties to higher levels than ever before. From January to August 2006, number of fatal cases in traffic accidents increased by 577 comparing to the same period in 2005. There are at least two motorcycles in every household in HCMC (Chandler C., 2006:39). Traffic jams are common and little has been done to plan for pedestrian routes or separate cycle paths.

The duration of flood waters after heavy rain or high tides usually lasts for several hours. The main reason is that the city drains are so seriously degraded that cannot carry the run-off. Uncontrollable city expansion into new low land area with no green space has significantly reduced the area of permeable surfaces. Many natural canals that have had an important role as natural drains have been filled by litter and illegal dumping from residential areas along water edges, or polluted by slum areas.

Due to land speculation and the high price of urban land, there has been a wide case loss of open space. Additionally the large increase of hard surface

by urbanization has considerably increased the temperature of the city and run off into drain streams and rivers. River bank erosion is also an issue.

iii) Loss of landscape quality and value

Saigon used to be a rich ecological area. Uncontrolled urbanization has dramatically increased the loss of habitat and thus it has influenced the natural environment, landscape character and landscape quality. The natural landscape value of the canal system was degraded due to urban sprawl and water pollution. Huge green areas with canal natural drainage have been disappearing. These issues will be explored in more detail in the following chapters where the process of how Public Open Space (POS) in HCMC has changed is discussed.

iv) Informal settlements

Informal settlements have been a dilemma of developing world; and HCMC is not an exception. The problem is the encroachment process of informal settlements which has been taking place in the peri-urban of HCMC since the city economy started to grow in the 1990s. There are 260,000 owners of illegal houses mainly in the city peri-urban, registering their houses in early 2006, following a guideline of the city government[3]. The encroachment process of informal settlement in the city peri-urban shows the continuing failure of formal land and housing markets of the city. Main demographic drive is the poor rural migrant which make up a major portion of population growth of big cities in developing countries.

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[3] Decision 207/2005/QD-UBND on December 1 2005 of Ho Chi Minh City People's Committee regulates the registration of illegal houses built before July 1 2004, following Decision 39/2005/QD-TTg on February 28 2005 of the state government. Time for registration was planned from January to June 2006; however has to be extended more three months because of the large number of illegal houses. There are 260,000 houses registered in the first six months.

Their housing demand increase scarcity of serviced land and make informal settlements to expand further to the peri-urban. Ho Chi Minh City population grows 3.4 % per year, including 2.2 % of net emigration rate and 1.2 % of natural increase rate.

Immigrants are from not only rural areas but also other cities and towns. Population growth rate in the peri-urban districts is much higher than the suburban ones; while in the central districts there is de-urbanization trend, happening from 2001. Informal settlements are housing opportunities not only for immigrants but also for non-immigrants who are poorer. The movement of poverty creates socio-economic issues in informal settlements in particular and in outer districts in general. The encroachment process which has taken place over a short period of time shows disadvantages and challenges for the city government in dealing with current informal settlements as well as land management in the city. Moreover, informal settlements are causing a lot of flooding problems due to their location within the city and it is likely to be strongly impacted by climate change in the future. Collectively, informal settlements lead to urban sprawl that will affect sustainable urbanization and slowdown socio-economic development process of HCMC.

Recognising the problems of informal settlement, HCMC government brought some special policies and programs to deal with this issue. For example, HCMC's housing strategy includes five programs; among them are two that related directly to informal settlements in the city. The first one is 'Clearance of Canal Area' which is moving away 32,000 families living in canal area. Projects which are clearance 11 thousand houses are done completely and remain issues of people's relocation. The second is 'Replacement of Slum Houses' which is to develop the water/drainage system and new apartments to replace 17,000 slum houses both inside and outside the canal. Residents will live in the same area after slum clearance. The program is close to the approach

of re-blocking and densification. These two programs focus much on informal settlement in the city center. Some projects fail in resettlement of target population which partly establishing new slums in the peri-urban. Besides, upgrading programs are done but in small scale with participation of the whole communities. Data from the DOC in 2015 indicates that there are currently 17,000 slums along the canals that need to be clear. However, with the limitation of finance for this project, there is a delay in clearance and relocation these slum in this time.

Gradually with acknowledgement of informal settlements, more advanced approaches and planning tools are considered and referred, it changes from mandatory role to strategic and intervening role and participatory based. Currently, the formal planning system are dealing with this issue by using the master plan to control the informal settlements. However, there is a lack of details for development control of informal settlements. General planning policy seems go on neglecting the urban sprawl which caused by informal settlements. Therefore, there is a need to take advantage of effective planning actions (sufficient detailed) and stronger control system (land registration and building management) in place.

Finally, it is acknowledged that the urban planning and management system has not been kept up with rapid urban transformation

After the Economic Reform in 1986, changes to the economic structure in Vietnam from a centralized system to a decentralized system caused the changes. A shift between economic sectors, especially from agriculture to industry and services, created considerable impacts on the natural and socio-economic environment. A huge movement of low-skilled people from rural areas caused population pressures on the existing city.

Moreover, the weaknesses in socio-economic forecasting and the lack of supportive planning information lead to poor city planning and development management (Thanh, 2007). Urban infrastructure, especially public transport, has not developed sufficiently to keep up with development. Thus, many slum areas have grown up, causing more environmental and social problems.

HCMC in recent years has received more climate pressures with more effects of tropical storms, sea-level rise, and heavy rains. The internal force of urbanisation has been the originally important reason that forced flooding increase in this city. The challenge of rapid urbanisation combines with climate change issue put all levels of HCMC government under high pressure. Hence, this research continues to review the institutional context in which these issues are being addressed will be examined in the next chapter.

5.4 Climate change vulnerability and impacts in HCMC

Urban flooding

Ho Chi Minh City is located in the central catchment area of Saigon – Dong Nai River with a high density of canal system forming a complex network affected by tide. The majority of the lands in HCMC are situated in low-lying areas; over 50% of the city land is less than two metres above sea level (Ho, 2011). A significant part of HCMC is regularly flooded due to a combination of tides, storm surge, heavy rainfalls, and man-made structures (figure 5.19, p.142) (Storch, 2008; ADB, 2009). More than 7,880 km of rivers and canals (about 33.5 sq.km water surface) link to the large rivers of Saigon, Long Tau, and Soai Rap, where the city is strongly affected by diurnal and semi-diurnal tide regimes.

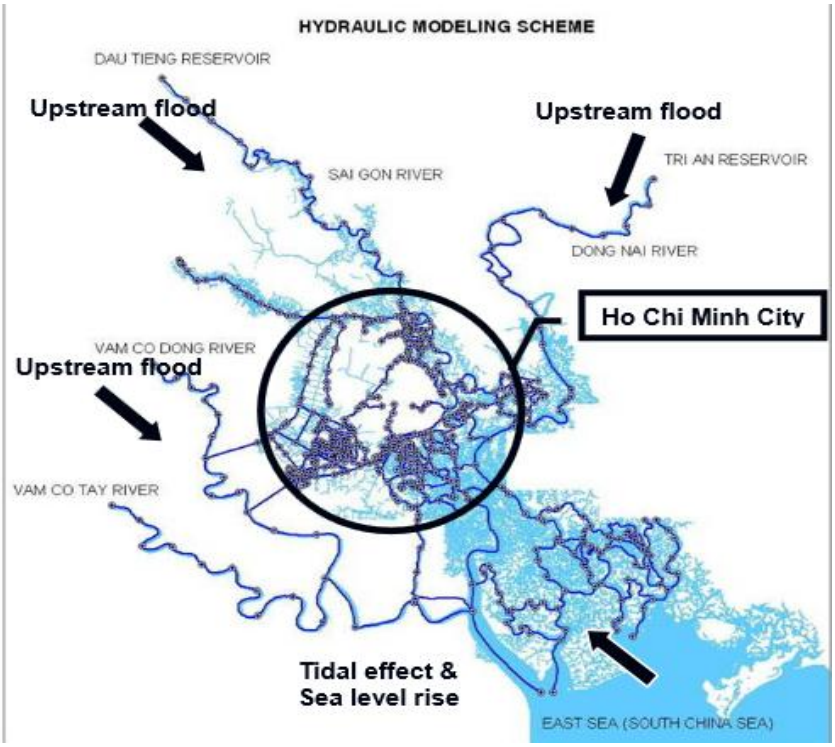


Figure 5.19: Hydraulic Modelling Scheme of HCMC (Ho, 2007)

When the rains come this time, heavily or long in duration, the large volume of water causes flooding expansion in large areas. Flooding will be higher and seriously impacted in areas where the drainage systems area inadequate (Trinh, 2008).

Moreover, ongoing rapid growth of both planned and informal expansions into its lower-lying and former wetland surroundings make HCMC is vulnerable to flood. The flood risks to HCMC are increasing and are expected to continue to increase under impending urban growth and a changing climate (Storch et al, 2011). Ho (2007) assumed that 'recent studies on the urban flooding problem in HCMC have proven that local impacts of climate change, rising water levels, land subsidence and urban sprawl are among the most direct causes of the flooding that caused millions of dollars in losses damage each year'.

Saline intrusion is expected to extend substantially further during regular flooding and during periods of drought. As a result, use of rivers, canals and groundwater in the city for domestic or industrial purposes, and for plant irrigation and agriculture will be limited (ADB, 2009). The long-lasting flood has brought more waste and sediments to residential and housing areas and caused the environmental pollution. Traffic jams happen quite often in the rainy season due to flooding. The increase of flood hazards lead to environmental shocks, health risks to households and communities and damage to houses and infrastructure.

Urban climate

In the metropolitan region of HCMC the climate is generally hot and humid. Rising in temperature will increase the number of extreme hot days and it will further exacerbate the urban heat island effect. High temperature will lead to deterioration of air quality and surface water quality. This is negatively affected to human productivity and an increase in illness.

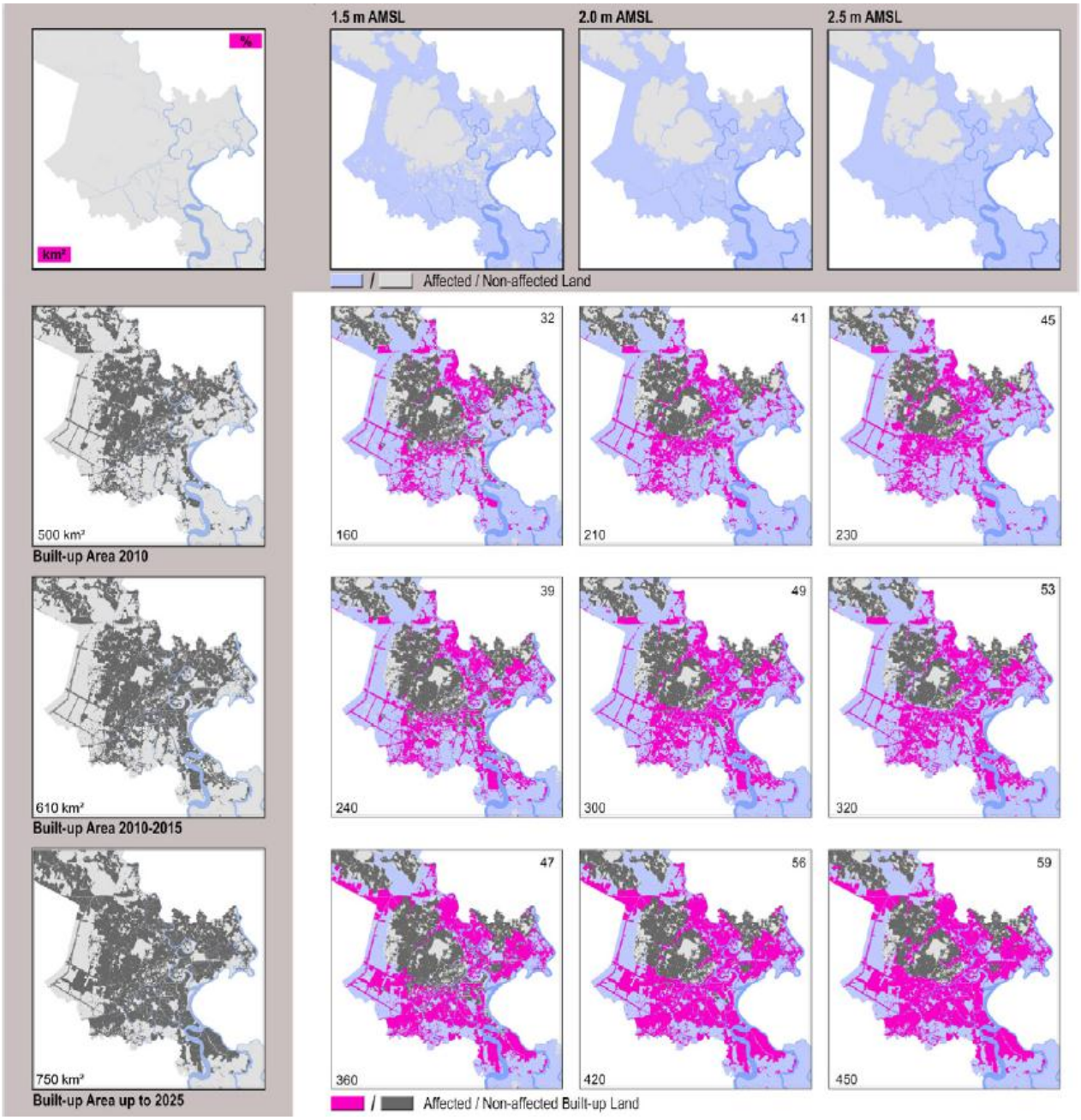


Figure 5.20: The interrelationship of urban development scenarios and potential changes in sea-level for the current and future HCMC (Storch et al, 2011)

Urban transport

Flooding exposure has brought many problems and obstacles to the city's infrastructure. Flooding could immobilize large part of city and significantly disrupt economic activity. Flooding could prevent commuters getting to work, and the movement of goods to and from ports and industrial areas, and inhibit relief work in the event of extreme flooding. The traffic-jams normally happened after the heavy rains and on the flood streets. These jams sometimes lasted several hours and took people more time on the streets.

Flooding also has the potential to damage roads, especially embankments and culvert that prevent the cross flows of water. Road intersections are key points in the road system and flooding can disrupt traffic flows in at least four directions. It is predicted by ADB that over half of the existing and some 80% of planned intersections in HCMC will be affected by extreme flooding 2050 (ADB, 2009).

Table 5.4: Summary key climate change issues and impacts in HCMC

Issues	**Impacts**
Urban flooding	This wide-spread phenomenon affects the lives of more than 9 million people; impacts on infrastructure, transportation
Sea level rise	The city already is often flooded and sea level rise will have further impact on the city
Water availability	Water (quality and reliability), salinity intrusion which damages the crops and plant
Rising urban temperature	The temperature in the city, and in particular the densely build areas in the city, is increasing

5.5 Short case study on climate change adaptation planning in Vietnam

Danang City case study:

Danang City is the third biggest city in Vietnam. It is one of Vietnam's five independent municipalities which under control by the central government. Danang covers an area of 1,256 square kilometres. The population of the city is about 1.1 million (in 2015) and an annual population growth rate of approximately 1.5 per cent. The population density of the urban areas is about 2,852 persons per kilometre compared to 152 persons per kilometre in the rural areas (IDS, 2007). Likely other central provinces, Danang City is subject to severe climatic hazards such as typhoons, floods, and forest fires. These events are worsening under climate change. Rapid urbanisation in Danang City leds to environmental problems that impact on socio-economic development. Sustainable development is threated by inadequate planning, increasing human activity, inter-agency conflicts and lack of a coordinated management approach.

To respond to climate change, Danang City established the so-called 'Danang Steering Committee for Response to Climate Change and Sea Level Rise' under Decision No. 1281/QD-UBND dated 17 February 2011 and Decision No.4995/QD-UBND dated 15 June 2011.

The Steering Committee provides interdisciplinary consultation for the People's Committee by researching, proposing, guiding, coordinating, collaborating and supervising climate change response programs and projects at local, national, and international level.

Danang City has been coordinating with some NGOs such as Rockefeller Foundation, ADB, ACCCRN (Asian Cities Climate Change Resilience Network), ISET (Institute for Social and Environmental Transition –

international) to carry out research on climate change adaptation planning. Studies from NGOs highlighted the most climate change related initiatives in Vietnam has been at the national level, little has taken place at the city or local levels in terms of integrating climate change into urban planning or supporting the citizens most vulnerable to climate risks. There is lack of public participation in decision – making process in Danang City. Besides the natural disasters, the city is facing further environmental issues due to inadequate planning and lack of coordination amongst sectors and agencies, lack of adaptive capacity of government officials to carry out adaptation strategies.

The studies on Danang City is one of the good case for research to compare and discuss on the same issue of dealing with climate change in Vietnam in general and in HCMC particular.

5.6 Conclusion

In this Chapter the survey of economic and urbanisation trends points to complex relationship between urbanisation and climate change. Urbanization and climate change are an ever growing challenge to sustainable urban development and public policy has acknowledged a number of issues. Together with its large population, its economic assets, HCMC's rapid growth of both planned and informal expansion into its low-lying and former wetland surroundings make HCMC a hotspot of vulnerability to the impacts of climate change. Rapid urbanisation in HCMC is the main cause leading to the loss of agricultural and undeveloped lands, urban sprawl, industrial operations, and environmental degradation. Climate change is expected to have devastating impacts on the economics, infrastructure and people in HCMC that are located near water bodies. HCMC may face increasing challenges as climate induced

migration forces greater numbers of individuals to flock to already overflowing, densely populated city.

Recent studies about HCMC indicate that urbanisation has contributed significantly to increasing temperature, rainfall, and flooding over the last two decades. There is likely to be an increase in the percentage of population affected by extreme events. A warning from Asian Development Bank (ADB) to HCMC to address the climate change threat states that if appropriate planning measures are not adopted to address flooding issues, more than 70 percent of the city could be affected by extreme flooding. The impact of climate change and rapid urbanisation is most likely to manifest itself in pressures on the urban infrastructure systems. For instance, lack of housing, increased demand for energy, inadequate water and sewage systems leading to exacerbate socio-economic and political tensions. The key climate change issues and impacts in HCMC are summarized in the table 5.4 (page 151).

CHAPTER SIX

CHAPTER SIX

ADAPTIVE CAPACITY, GOVERNANCE AND INSTITUTIONAL VULNERABILITY

6.1 Introduction

General trends in climate change create a specific set of challenges in terms of ensuring sustainable development in the fast-growing coastal city of Ho Chi Minh, with its particular history of flood management. The thesis investigates whether ongoing policies and management initiatives can provide impacts which positively respond to these growing challenges. Drawing on the documentation and interviews gathered in the fieldwork, the present chapter explores the relationships between appropriate practical and policy responses and the capacities of the institutions of government to deliver these responses.

This chapter examines the roles, capabilities, and authority of local government: leadership attributes, municipal competencies and responsibilities, resources, vertical and horizontal coordination and urban political economies. It seeks to clarify the characteristics of the involvement of actors in the governance process. Specifically, it seeks to clarify the institutional situation in its local context, and to assess institutional capacity of HCMC government.

The chapter begins by exploring the urban institutional framework (structure) at the national and local level and how each of these levels are working. The multi-level systems and cross-scale networks of governance in the HCMC case study will be analysed in detail.

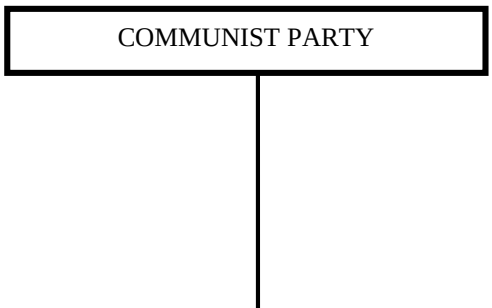
The subsequent section examines processes of urban planning, decision-making processes in urban planning and management, as well developing flood control programmes. This part of the research focuses on analysing in detail the two key institutions in Ho Chi Minh City: the Department of Planning and Architecture (DPA) and the Steering Centre for Urban Flooding Control (SCFC) which are directly involved in the process and decide the policies on planning and flood management. This key element of the research aims to help to improve wider understanding of the current government

arrangements as understood from fieldwork. It investigates relationships between relevant stakeholders in the process of planning and flood control, and how planning and flood control themselves relate to each other. The detailed examination of institutional structures, tasks, and project procedures offers critical insight into institutional strengths and weaknesses.

6.2. Government and Administration in Vietnam

The Communist Party of Vietnam (CPV) is the only party allowed to participate in Vietnamese politics and has considerable authority. The CPV has the central role on the policy making process (figure 6.1, p.151). The governing principle of 'democratic centralism' under the top-down decision-making process of CPV is laid down in the 1992 Constitution (Article 6, GoV 1992) and the Resolution of the Seventh Party Congress which states that centralism depends on the Party's supervision of macro-economic decisions (Government Portal of Vietnam). The 1992 Constitution represented a modest downgrading of the role of the CPV in relation to the 1980 constitution. Nonetheless, the Party remains by far the most important force in Vietnamese politics, with the Government, the military and the administration all effectively subordinate to its guidance.

The Party's strategic leadership body - the *Politburo* (Political Bureau), currently comprised of 18 members - is elected by the 150-member Central Committee at National Party Congresses (held approximately every five years), and largely sets Government policy. The overlap between Party and State remains pronounced. The top political figures are all Party members and involved in Politburo discussions about strategic decisions.



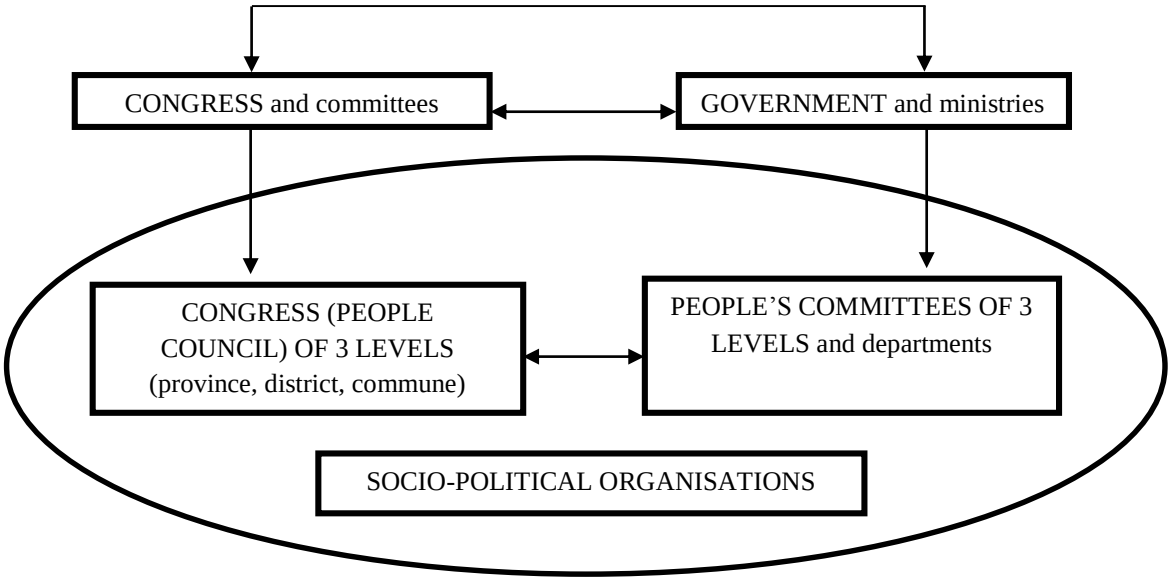


Figure 6.1: The Communist Party structure of Vietnam (author)

'Government' refers to particular institutions identified in Vietnam's constitution which have the power to make and implement policies and law, and these may refer specifically to the prime minister, deputy prime ministers, and ministers and deputy ministers of national ministries and departments. As outlined in the introduction chapter the Central Government is comprised of 18 Ministries, 5 Ministry-type organisations and 26 agencies. The executive branch of the national Government of the Socialist Republic of Vietnam is effectively headed by a three-person leadership committee, comprised of the General Secretary of the Communist Party of Vietnam (CPV); the Prime Minister[4]; and the President[5].

4. The Prime Minister appoints deputy Prime Ministers drawn from the pool of NA members. The Prime Minister proposes a Cabinet, which is then appointed by the President, subject to the ratification of the National Assembly (NA).

5. The President is elected by the National Assembly (NA) from amongst its members, and serves a five-year term. The President appoints the Prime Minister from among the members of the NA.

Important pronouncements by any one of these are vetted by the others - which is an aspect of the consensus approach to policy-making described in more detail below.

Constitutionally, the National Assembly (NA) is the highest government organization and the highest-level representative body of the people (figure 6.3, p.156). At the central government level, the National Assembly has the power to draw up, adopt, and amend the constitution and to make and amend laws. It also has the responsibility to legislate and implement state plans and budgets. The National Assembly, a 498 member unicameral body elected to a five-year term, meets twice a year. The assembly appoints the President (head of state), the Prime Minister (head of government), the Chief Justice of the Supreme People's Court of Vietnam, the Head of the Supreme People's Procuracy of Vietnam (or 'Supreme People's Office of Supervision and Inspection'), and the 21-member Cabinet (the executive). The NA promulgates the Law on urban planning. This Law provides for comprehensive urban planning activities including elaborating, evaluating, approving and adjusting urban planning; organizing the implementation of urban planning and managing urban development according to approved urban planning (Ministry of Justice).

In Vietnam, the Communist Party is the only political party which operates at all levels of administration. At each successive lower level of local government, there is an elected decision-making assembly – the People's Council – and an executive body – the People's Committee – appointed by the People's Council. The multi-layered administrative structure is therefore highly centralised, with local governments reliant on the central government for approvals and budget allocation (figure 6.2, p.159).

The Supreme People's Court is Vietnam's highest court of appeal, headed by a Chief Justice, although it is also answerable to the National Assembly (NA).

The Supreme People's Procuracy observes the implementation of state organs and makes sure that Vietnamese citizens follow the law. Beneath the Supreme People's Court stand the provincial municipal courts and numerous local courts. As in other single party states (e.g. China) political coordination is distinctive (Dumbaugh and Martin, 2009). The General Secretary of the Communist Party performs numerous key administrative and executive functions, controlling the party's national organization and state appointments, as well as setting policy. Practically, the legislators and the ministries are the administrators, legislation follows these steps: (i) a law drafted by a relevant ministry, consented first by the government and then approved by the NA; (ii) an implementing decree drafted by that ministry and issued by government; (iii) an implementing circular issued by the same ministry.

Year	City under direct central rule	Province	Urban district	Provincial city	Town	Rural district	Commune	Ward	Townlet
1995	3	50	21	16	62	475	8,862	856	503
2000	4	57	33	20	62	507	8,929	1,018	565
2005	5	59	43	29	58	541	9,069	1,219	588
2012	5	58	47	60	44	549	9,055	1,454	636
06/2013	5	58	47	60	46	550	9,052	1,461	634

Table 6.1: Number of Administrative Territorial Units of Vietnam (1995-2013)
Source: Institute for State Organisation Science – Ministry of Home Affairs

Vietnam's administrative system consists of four levels: the central and three levels of local government (Province/municipal, District and Commune/Ward). Figure 6.2 (page 159) shows different categories of administrative units at four levels. Under central government, Vietnam has

five municipalities (Hanoi, Ho Chi Minh, Hai Phong, Danang and Can Tho) under direct control of the central government, and a further 58 provinces; 60 provincial cities, 46 towns, 47 urban districts and 550 rural districts; 634 town-lets, 1,461 wards and 9,052 communes (table 6.1, p.158).

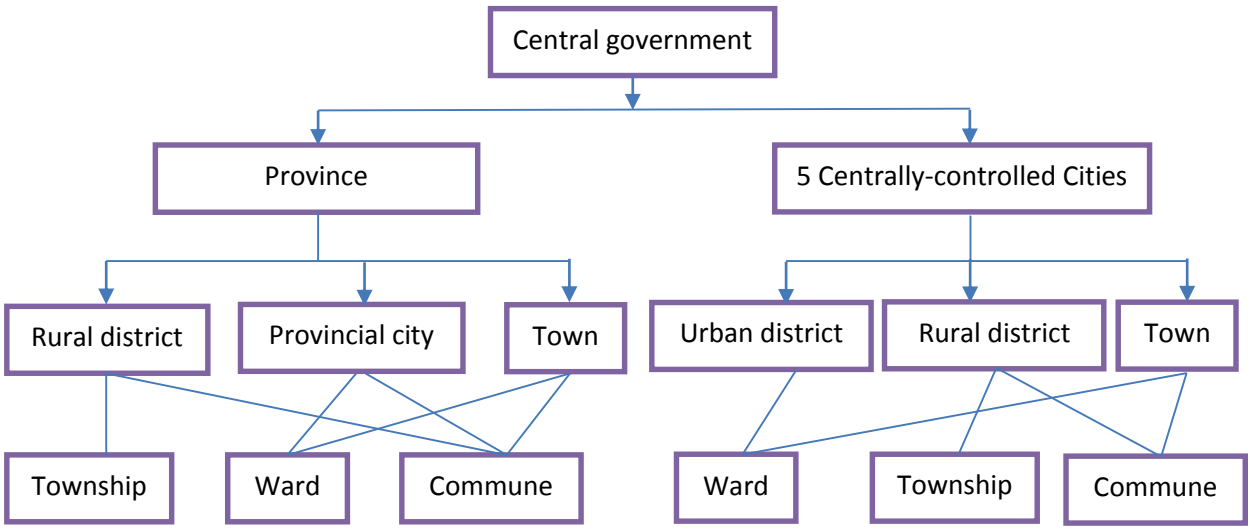


Figure 6.2: Government structure of Vietnam

Source: Institute for State Organisation Science – Ministry of Home Affairs

Ho Chi Minh City is one of the five centrally-controlled cities. Like all provinces of Vietnam, HCMC is structured by the 2003 Law on Organisation of People's Council and People's Committee (Ministry of Justice). In Vietnam, the municipalities directly under Central government are the centres for economics, politics, culture, science and technology. They play a vital role in development of their respective regions. Each level of state administration at the province/municipal, district and commune has its own representative body (People's Council) and an executive body (People's Committee). The People's Committee is the executive agency of the People's Council at that level. The People's council is elected by the local people and the candidates for people's council are nominated by the Vietnam Fatherland Front and approved by the higher level administrative unit. The chairman and vice

chairman of the people's committee are each selected by the people's council. The election of members of the provincial People's Committee must be approved by the Prime Minister. The municipal People's Committee has budgetary and administrative responsibilities. It is responsible for reviewing and approving the socio-economic plans within their delegated authorities; maintaining law, order and national security within its jurisdictions; forwarding budget requests to upper levels; and undertaking duties as assigned by upper levels of administration.

As a 'special city' with the largest population, an important economic centre, and as a leading urban area contributing over one fifth of the national GDP, Ho Chi Minh City is a driving force for the country's development. The Politburo agreed to allow HCMC deal with issues encountered during its process of growth. This followed the National Assembly Resolution (No. 26/2008/QH12), issued in the mid November 2008, concerning the pilot programme which set out to abolish the use of People's Councils in 67 districts, 32 urban districts, and 483 wards, across ten provinces and centrally cities. Ho Chi Minh City and Danang City were chosen to apply first. This pilot is on-going in HCMC and its impacts are currently being assessed by central government.

The pilot programme started in 2011, when the government carried out a pilot program, removing people's councils at the district and ward level and adopting a 'Two-in-One' model for senior positions. This forms part of Vietnam's efforts at administrative reform. The motivations behind this programme is to simplify the Nation's administrative systems and to reduce the number of overlapping responsibilities and functions of lower-level authorities, while giving more power to higher level representative agencies. Another benefit from this programme is that operating costs will decrease, decisions will be implemented faster, without waiting for the bi-annual meetings of the People's Council to formally approve and implement

decisions. Ten selected cities and provinces are involved in this program; Ho Chi Minh City, Hai Phong, Danang, Lao Cai, Vinh Phu, Nam Dinh, Quang Tri, Phu Yen, Ba Ria Vung Tau and Kien Giang. The removal of the people's councils at district and ward levels can serve as a stepping stone to implementing city-wide changes administrative objectives.

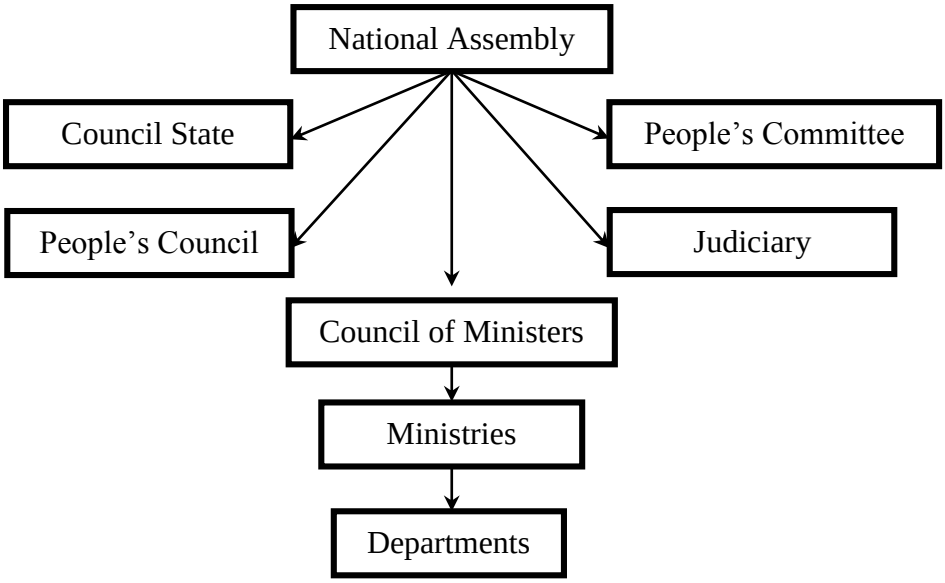


Figure 6.3: National Assembly structure of Vietnam

Source: Institute for State Organisation Science – Ministry of Home Affairs

In summary, Vietnam in 2015 remains a one-party state, governed by the Communist Party (CP). The role of CP in state management is dominant. All policies are made and promulgated in a 'top-down' way, guided by CP. Given its significant and unique economic and political contributions to the country, HCMC enjoys special policies, namely "oriented autonomy". Attempts at decentralization for HCMC have been initiated but the process is still in progress. In order to develop insights into the nature and influences of the policy-making process in HCMC a solid understanding of the official institutions at the national level (ministries) is required. Therefore, the next part of chapter places particular attention on the national ministries involved in climate change adaptation planning.

6.3 National institutional response to climate change:

Vietnam has long-standing experience, preparedness for - and history of - active response to natural hazards such as floods and storms. The government has created the institutional arrangement and conceptual response to disaster risk reduction and now for responding to climate change. Vietnam has set ambitious goals for adaptation to climate change (Quang et al., 2012). The national policy and national institutional framework for responding to climate change will be analysed in the following.

6.3.1 National policy framework

Laws and legislation related to climate change adaptation:

Recognizing the importance of climate change issues since the early 1990s, the Government of Vietnam developed climate-related national strategies and action plans, integrated climate change in development plans, and committed to important international protocols and frameworks targeting climate change. Vietnam signed both the UN Framework Convention on Climate Change (UNFCCC) in 1992 (ratified in 1994) and the Kyoto Protocol in 1998 (ratified in 2002). In Vietnam, climate change policy can be broadly divided into two themes: (i) adaptation to climate change effects, and (ii) mitigation of greenhouse gas emissions.

Vietnam has The Second National Strategy and Action Plan for Disaster Mitigation and Management from 2001-2020 (NSADM), which is the central policy instrument of Ministry of Agriculture, and Rural Development (MARD) and the National Target Program (NTP) to Respond to Climate Change, which is implemented by the Ministry of Natural Resources and Environment (MoNRE). These policies and umbrella programmes are guiding framework for disaster risk management in the context of climate change and

specific climate change measures. In 2003, the government of Vietnam launched the '*National Environment Protection Strategy by 2010-vision towards 2020*' (Vietnam Government, 2003). This strategy places emphasis on promoting clean technologies, cleaner production processes, and reducing pollution through more environmentally-friendly fuels and materials. One year later, the Government passed the '*Vietnam Sustainable Development Vision*' (Vietnam's Agenda 21) for the national sustainable development on the basis of the close coordination of society, economy and environmental protection for a balanced development. Agenda 21 includes 5 main parts and identifies priorities in social and economic development, natural resource utilization, environmental protection and pollution control for the sustainable development.

In addition, some other documents have been formulated by different ministries such as the "*Action plan framework on climate change adaptation and mitigation of the agriculture and rural development* sector" and the "*Action plan on climate change adaptation and mitigation of the water resources and irrigation sector*". However, these documents apply only for one specific sector and their main concern is disaster risk reduction rather than climate change adaptation.

The Second National Strategy and Action Plan for Disaster Mitigation and Management (NSADM):

The National Strategy and Action Plan for Disaster Mitigation and Management (NSADM) 2001-2020 was prepared by Ministry of Agriculture, and Rural Development (MARD) in order to replace the first NSADM 1990-1999. The first plan focused exclusively on water-related hazards in Vietnam: river floods; flooding from the sea; increased runoff; erosion and siltation of river beds; slope instability, mudflows, and landslides; torrential rains in combination with strong winds; failures of water-retaining structure; and sea water intrusion into ground water. This first plan had three main goals:

forecasting and warning, disaster preparedness and mitigation, and emergency relief. However, this strategy neglected to consider the long-term trend, in particular, to consider climate change.

The second NSADM for the period 2001-2020 aims at minimizing the number of people killed and injured, reducing economic losses, establishing a disaster fund worth two percent of the country's GDP, and putting a strong emphasis on preparedness and forecasting. One of the significant principles of the strategy states: 'Co-operation and co-ordination between the central level of government, local level of government, state agencies, non-government organisations, and the general public must be well established using a bottom up approach starting at the grassroots level. Similarly, cooperation and coordination of external assistance needs to be strengthened and aggressively pursued'.

National Target Programme (NTP) to Respond to Climate Change:

A National Target Programme (NTP) - to integrating climate change issues into socio-economic strategies and plans - was prepared from 2006-2008 by the Ministry (MoNRE) in collaboration with other national ministries and local areas; and was officially approved in 2008 by Prime Minister (Decision No.158/QĐ-TTg, 02/12/2008). The decision required all provinces and cities in Vietnam to develop their own action plans (addressing both climate change mitigation and adaptation) according to guidelines from the NTP. This is officially the basis for the most important legal and guiding strategic documents on responding to climate change in Vietnam. It therefore calls for adaptation efforts at all levels and in all sectors, and it calls for the mainstreaming of climate change adaptation into general planning processes. The strategic objectives of the NTP are fourfold; to assess climate change impacts on sectors and regions in specific periods, to develop feasible action plans to effectively respond to climate change in the short-term and long-term

to ensure sustainable development of Vietnam, take opportunities to develop towards the low-carbon economy, and to join the international community's efforts in mitigating climate change and protecting the climatic system. The programme has three phases: (i) starting up (2009-2010), (ii) implementation (2011-2015), and (iii) update and development of appropriate steps (after 2015).

In this context, the MoNRE plays a key role in developing climate change scenarios, as well as solutions and action plans to cope with climate change, and also to raise public awareness of the situation. However, the NTP is the only national technical guiding document supporting the development of provincial action plans. Thus, the programme remains very vague on what adaptation is expect to look like in detail; its framework remains very general, while the capacity of local people in this area is very limited (ADB, 2010).

Moreover, the programme did not formalise an overall government structure for adaptation action. Instead, it only sets up a general advisory committee made up of several government ministries (McElwee. et al., 2010). Yet, the overriding emphasis is on the adaptation of the physical environment rather than on re-thinking institutionalised management paradigms or organisational dimensions to increase institutional capacity or the role of local action and social capital in building resilience. To date, there has been no mechanism for cross-sector and cross-level coordination or any clear integrated structure to support climate change related activities.

Year	Law	Number
20 May 1998	Law on Water Resources Management	08/1998/QH10
3 December 2004	Law on Forest Protection and Development	29/2004/QH11
29 November 2005	Law on Environmental Protection	52/2005/QH11

Table 6.2: National Laws on Natural Resources and Environment (Vietnam Government)

Year	Policy
Mid-1980s	The first National Strategy for Environmental Protection (NSEP) was drafted under the National Environment Agency (NEA) which provided an action plan for the period 1991-2000, including the creation of a system of state management agencies at the national, provincial, and sectoral levels. It also raised awareness among government officials, in addition to that of businesses and communities
1990s	Some progress was achieved although a reviewed of the first NSEP found that environmental planning need to be integrated into economic development. Also, investments in the environment were limited and spread too thinly across a variety of sectors
June 1992	Signed the United Nations Framework Convention on Climate Change (UNFCCC), which was ratified in November 1994 and entered into force in February 1995.
1993	Viet Nam National Assembly approved the Environmental Protection Law
December 1998	Signed the Kyoto Protocol (KP) and ratified in September 2002. Established the National Action Plan of Viet Nam for climate change issues, carried out by the Hydro- Meteorological Service (HMS)
Early 2000's	The focus was on developing greenhouse gas inventories and devising strategies to reduce these emissions. With the realization that climate change was occurring, (regardless of achieving emission reductions or even stabilization), it became necessary to incorporate climate change adaptation (CCA) into national planning and development
June 2000	The second NSEP was drafted for the period of 2001– 2010. The general objectives of the strategy are to protect and improve the environment in order to raise the living standards and health of the people and to ensure sustainable development with activities to be undertaken in collaboration with the Ministries of Industry, Commerce, Culture and Information, Foreign Affair, Fisheries, and others and also business, NGOs, and People's Committees
August 2002	Ministry of Natural Resources and Environment (MONRE) set up, pursuant to Resolution No.02/2002/QH11, to specifically tackle environmental problems, including climate change; under MONRE, the National Office for Climate Change and Ozone Protection (NOCCOP), established and responsible for the national co-ordination of work on climate change, the construction of national policies to deal with the impacts of climate change, and the encouragement of international cooperation in climate and climate change issues
December 2003	Completed Initial National Communication and submitted it to UNFCCC Secretariat
2007	National Strategy for Natural Disaster Response, Prevention and Mitigation to 2020 has been approved. This states the need to promote international cooperation and integration to implement the UNFCCC, KP and Hyogo Framework for Action.

September 2008	Action Plan Framework for Adaptation to Climate Change in the Agriculture and Rural Development Sector Period 2008-2020, approved by MARD. This action plan has general objective of enhancing the Government's capabilities of adaptation and mitigation to climate change in order to minimize its adverse impacts and to ensure sustainable development of the agriculture and rural development sector, including disaster prevention, and mitigation.
December 2008	The National Target Program to Respond to Climate Change prepared by MONRE in collaboration with other ministries and sectors and approved by the Prime Minister. Being recognized as a immense and complex program, the NTP has strategic objectives: to assess climate change impacts on sectors and regions in specific periods and to develop feasible action plans to effectively respond to climate change in the short-term and long-term to ensure sustainable development of Viet Nam; to take opportunities to develop towards a low-carbon economy, and to join the international community's efforts in mitigating climate change and protecting the climatic system.

Table 6.3: Timeline of climate change policies in Vietnam (adapted from Sinh et al., 2010:4)

6.3.2. Institutional arrangement for climate change adaptation planning:

There are numerous actors involved across the various scales of government from national to provincial level:

- At the national level: Ministry of Natural Resources and Environment (MoNRE), Ministry of Agriculture and Rural Development (MARD), Ministry of Construction (MoC), Ministry of Planning and Investment (MPI), Ministry of Finance (MoF), Ministry of Science and Technology (MST), Ministry of Transportation (MoT), Committee for Flood and Storm Control (CFSC).
- At the municipal/provincial level: the municipal/provincial People's Committees, all the related province departments of the ministries, the province People's Councils and sectoral committees.

Ministry of Natural Resources and Environment

In 2003, the Ministry of Natural Resources and Environment (MoNRE) was designated by Prime Minister to be the main central government institution responsible for environmental, land-use planning, and leading climate change policy in Vietnam, including climate finance planning. Its structure has a 4-tiered arrangement in line with the national administrative structure, with the next tier being the Department of Natural Resources and Environment (DoNRE) responsible at city and provincial levels (figure 6.5, p.165).

Within the Vietnamese administration, MoNRE has a highly structured institutional framework with a complex system of layers; the decisions made by national committees leading to limitations in local decision making. Land-use planning, mostly zoning areas for specific functions (eg. forests, agricultural land, etc) at the comprehensive national level is carried out by MoNRE. At the city level, urban land-use planning is however done by municipal authorities under MoC's directions.

Among 30 institutions under MoNRE, two agencies play a vital role in coping with climate change: (i) **The Department of Hydro-Meteorological and Climate Change** is the management agency for climate change issues; (ii) **The National Hydro-Meteorology Agency** is a technical agency in charge of weather forecast, sea level rise, and hydrological information.

At the municipal level, HCMC established Department of Natural Resources and Environment (DoNRE) to support the People's Committees in environmental management activities under direction of MoNRE and other relating ministries. The establishment of functional divisions within DoNRE is decided by the municipal People's Committee in consultation with MoNRE.

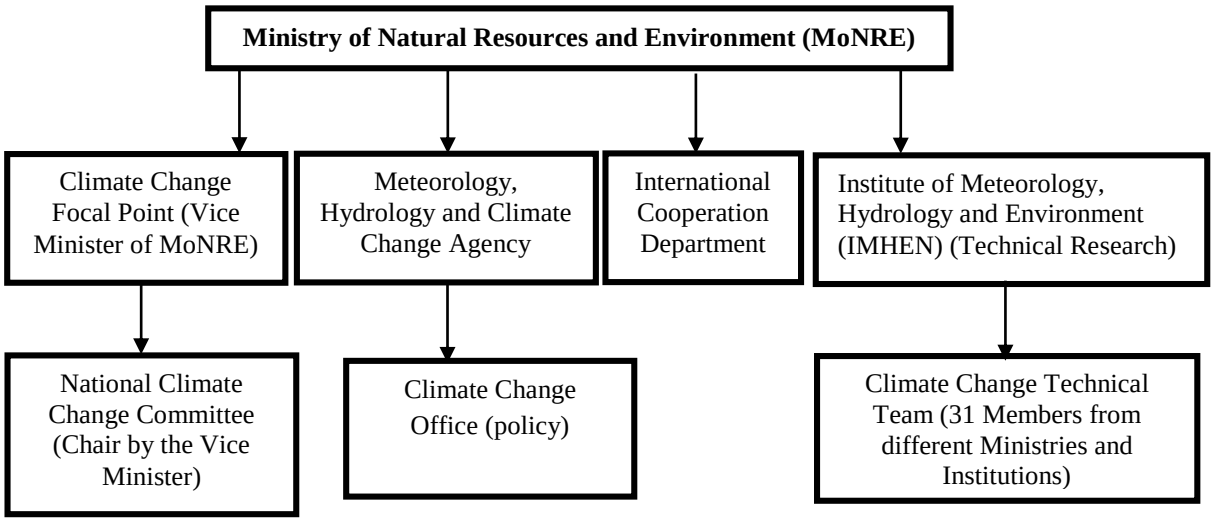
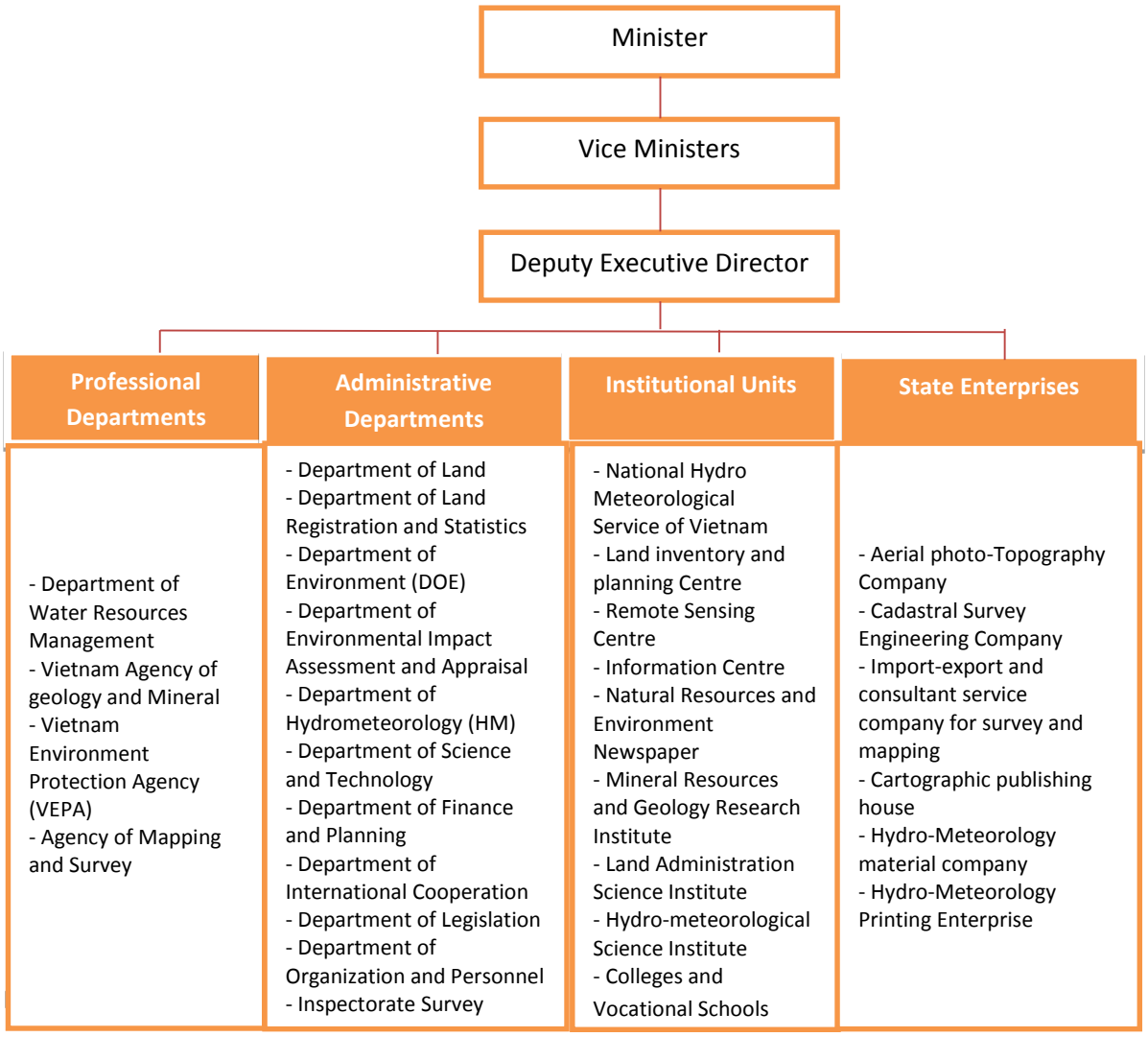


Figure 6.4: Government Institutional Arrangements for Responding to climate change (author)

Figure 6.5: Organisational chart – Ministry of Natural Resources and Environment (Vietnam Government)



Ministry of Agriculture and Rural Development (MARD)

Ministry of Agriculture and Rural Development is responsible for rural development, governance, and the promotion of agriculture, fisheries, forestry, and irrigation in Viet Nam. It is also the standing chair of the Central Steering Committee for Flood and Storm Control, responsible for organizing responses to natural disasters. It has the capacity for targeted local-level implementation of adaptation and mitigation measures through its nationwide network of 63 provincial offices and its relatively large cadre of field staff.

MARD assists the Climate Change Steering Committee in supervising, guiding, and facilitating agencies to implement climate change-responsive agriculture and rural development projects. Areas under its umbrella of responsibility include irrigation, water management, forest and marine biodiversity management, and flood control-all of which are vulnerable to climate change. Deforestation and associated land degradation, as well as inefficient intensive rice irrigation, fertilization, and processing are two of the largest contributors to GHG emissions in Vietnam. MARD therefore has a lead role in policy and planning for the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD). MARD is responsible for implementing Vietnam's national Payment for Forest Environmental Services Decree: 99/2010/ND-CP which requires collection of payments from forest ecosystem services users and disburses the funds to forest managers to support sustainable resource management and livelihoods.

Ministry of Planning and Investment

The Ministry of Planning and Investment (MPI) is an agency of the government that manages financial planning and investment, including the

provision of advice on strategies; national socio-economic development planning; policies for general economic management and for some specific areas such as domestic and foreign investment, industrial parks, and export processing zones; official development assistance sources; and business registration. The ministry also is responsible for the development of the five-year socio-economic plan that leads the development and growth of the country.

Ministry of Construction (MoC)

The Ministry of Construction is a key player in urban planning in terms of providing guidelines and regulations related to building codes and master planning. This agency of the Government also performs the function of state management of construction; architecture, planning construction of urban technical infrastructure, industrial parks, economic zones, the high technology, developing urban housing and offices; business property; building materials; State management over public services in the fields of State management of the Ministry in accordance with the law.

Under the Law of Urban Planning (June 2009), the MoC, in coordination with relevant parties, is responsible for ensuring that disaster risk reduction and climate change adaptation are mainstreamed into urban plans, as essential step toward enhancing Vietnam's resilience.

The NIURP-National Institute for Urban and Rural Planning (under the control of the MoC) is responsible for preparing spatial plans for provinces, small cities and towns, and areas considered of national importance – industrial and military zones and new urban developments with foreign investment.

Under the MoC, there are four-layered national urban administrative structures (figure 5). There are three main types of institutions under MoC –

departments (land and housing, planning and investment, construction works); agencies (inspection office, urban development), and institutes (NIURP, construction economy, architecture colleges).

Central Government Levels		**Type of Administration: Construction**
- Central	Ministries and Institutions of the government	Ministry of Construction (MoC)
- Municipal	City People's Committee	Department of Construction (DoC)
- District	Districts People's Committee	Bureau of Construction
- Communal	Communal People's Committee	Quasi-official land management

Table 6.4: Urban Administrative Structure of MoC (adapted from JICA, 1999)

In sum, MoC is responsible for urban and regional infrastructure planning and development control. It administers the national building code and through its urban planning institutes, prepares plans for most cities, towns, and other settlements in the country, and supports MoNRE in preparing their land-use plans. The MoC has extensive responsibilities for promoting and implementing climate change adaptation and mitigation measures in the built and urban environment.

Like in most other countries, there are numerous agencies involving in climate change adaptation planning in Vietnam. These are summarised in the following table:

	Government Agencies	**Responsibilities for climate change**
01	Ministry of Natural Resources and Environment (MoNRE)	Assigned by the Government of Viet Nam (GoV) *(the Prime Minister)* as the leading agency for climate change in Viet Nam. - The Department of Hydro-Meteorological and Climate Change is the management agency for climate change issues. - The National Hydro-Meteorology Agency is a technical agency in charge of weather forecast, sea level rise, hydrological information.

02	Ministry of Agriculture and Rural Development (MARD)	Assigned as the leading agency for dealing with climate change in agricultural sector. - The Directorate of Forestry, is the technical agency and resident body for Reducing Emissions from Deforestation and Degradation (REDD) - The Directorate of Water Resources is the technical agency and resident body for MARD's climate change program (food security, rural development, water resources management).
03	Ministry of Planning and Investment (MPI)	The lead agency for program planning and resource (fund) mobilization and allocation for climate change programs. - The Department Science, Education and Natural Resources and Environment assigned to be in charge of policy formulation and fund management on climate change. - For ODA projects, management is assigned to Department of Foreign Economic Relations.
04	Ministry of Finance (MoF)	The leading agency for finance management, budget allocation, risk financing (trust fund, risk insurance) for climate change. - The Department of Public Finance is assigned by the MoF Minister to be in charge of policy formulation and management of fund and projects on climate change.
04	Ministry of Education and Training (MoET)	Assigned by the GoV as the leading agency for integration of climate change education into school. - The Department of Students Affairs is assigned by the MoET Minister to lead the effort to integrate climate change education into schools. This Department cooperates with other technical departments of MoET to develop curriculum, conduct training for teachers and students.
05	The Ministry of Information and Communications (MoIC)	Assigned by the GoV as the agency in charge of public awareness raising, communications, and information dissemination. It plays a more technical role in communications than the IEC or BCC. - The Department of Telecommunications is assigned by the MoIC Minister to be in charge of climate change communications.

Table 6.5: Other government agencies involved in climate change adaptation planning (author)

6.4 Planning system and planning process in Vietnam

6.4.1 Planning process in Vietnam

Vietnam's planning system is a vertical and top-down approach under a unitary system. The figure 8 shows the planning process in Vietnam which starts with instructions and framework moving from central government down to lower levels of government.

Urban planning has to be located in a wider national economic planning system preparing for the five-year socio-economic development plans (FYP), the central planning agency plays an important role in proposing the idea for FYP at the national planning conference which was usually held one year in advance with participants from sector ministries and local governments. Base on the instructions from the Central Party Committee, the Ministry of Planning and Investments will prepare the draft guidelines or framework for the next FYP and its will be approved by the State Council. And then the guidelines, methods and deadlines for sectors and local plan submission will be reported by the central planning agency at the later conference. It sets up the framework and the tone for the whole planning process.

In addition, Vietnam's planning process reflects a single party top-down governance. The central government plays a vital role in decision of what to do and how to do. The decentralization of authority to lower government levels is limited, as they have little independence on commanding issues without interference from the central government (Vu, 2008).

The central government controls mandatory powers, financial resources, political resources and informational resources of the local government. Therefore, with the vertical structure and top-down planning system, the imperative of vertical coordination tends to make coordination across and

among sectors in Vietnam's government difficult. The coordination is then less effective at the lower government levels because it is dependent on decisions from superior levels. Each agency is under a certain administration of its own sector and works independently with the other agency at the same level.

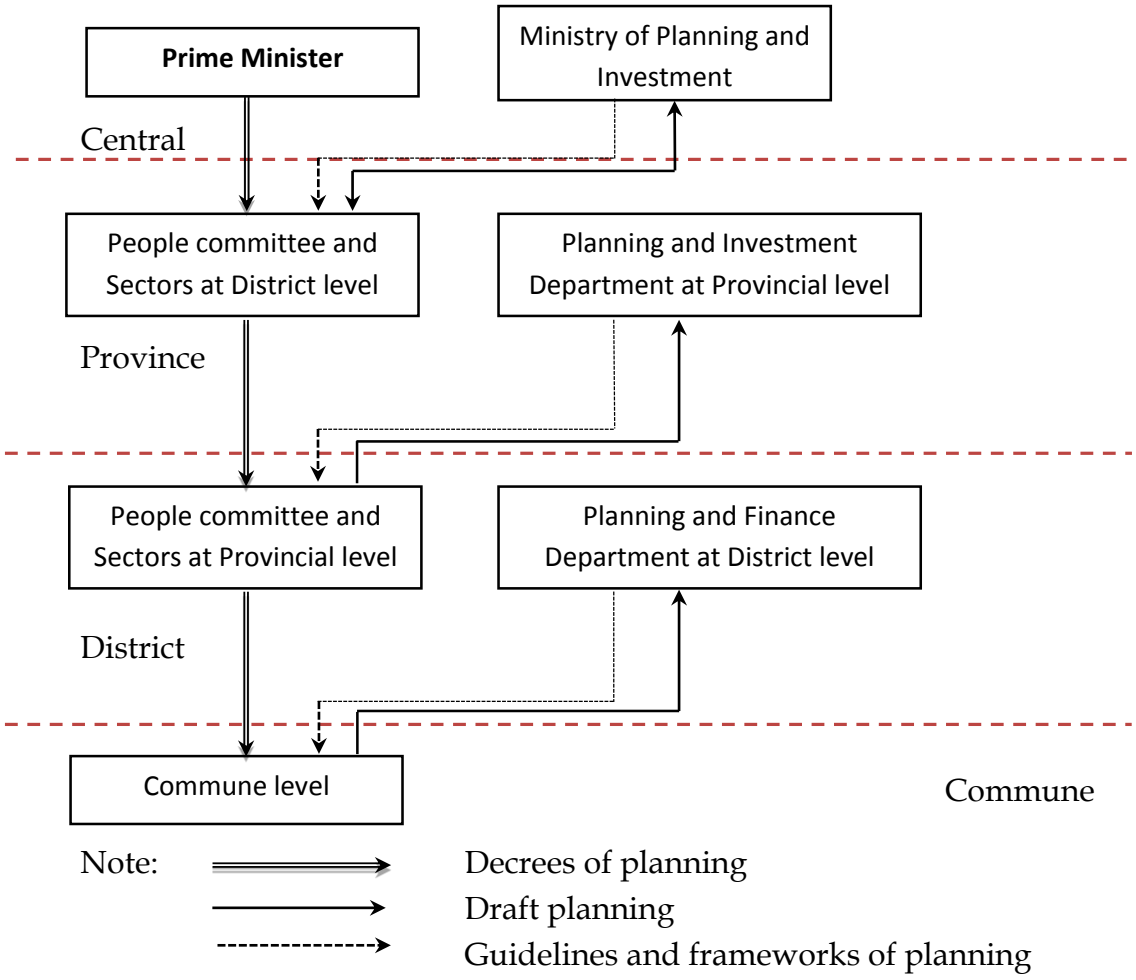


Figure: 6.6: Vietnam's Planning Process (Author)

6.4.2 Vietnam Urban Planning System

The urban planning system in Vietnam is top-down centralised multi-layered system. At the national level, the highest planning authority is the National Planning Development Committee chaired by the Prime Minister and the Ministers of State Councils. This institution formulates and formalises policies and strategies for development in the country. Implementation and responsibility in urban planning and administration such as transportation,

housing, infrastructure, and public services is directed among the respective Ministries and other relevant agencies at provincial level.

In Vietnam, the planning of urban development depends on population census figures. Functional agencies provide forecasts on the number of inhabitants for the whole country and for each region/province/city. The forecasts on population sizes are presented, discussed and approved. Once approved, these forecasts will serve as the basis for planning activities in all sectors such as health care, education, transport, and housing.

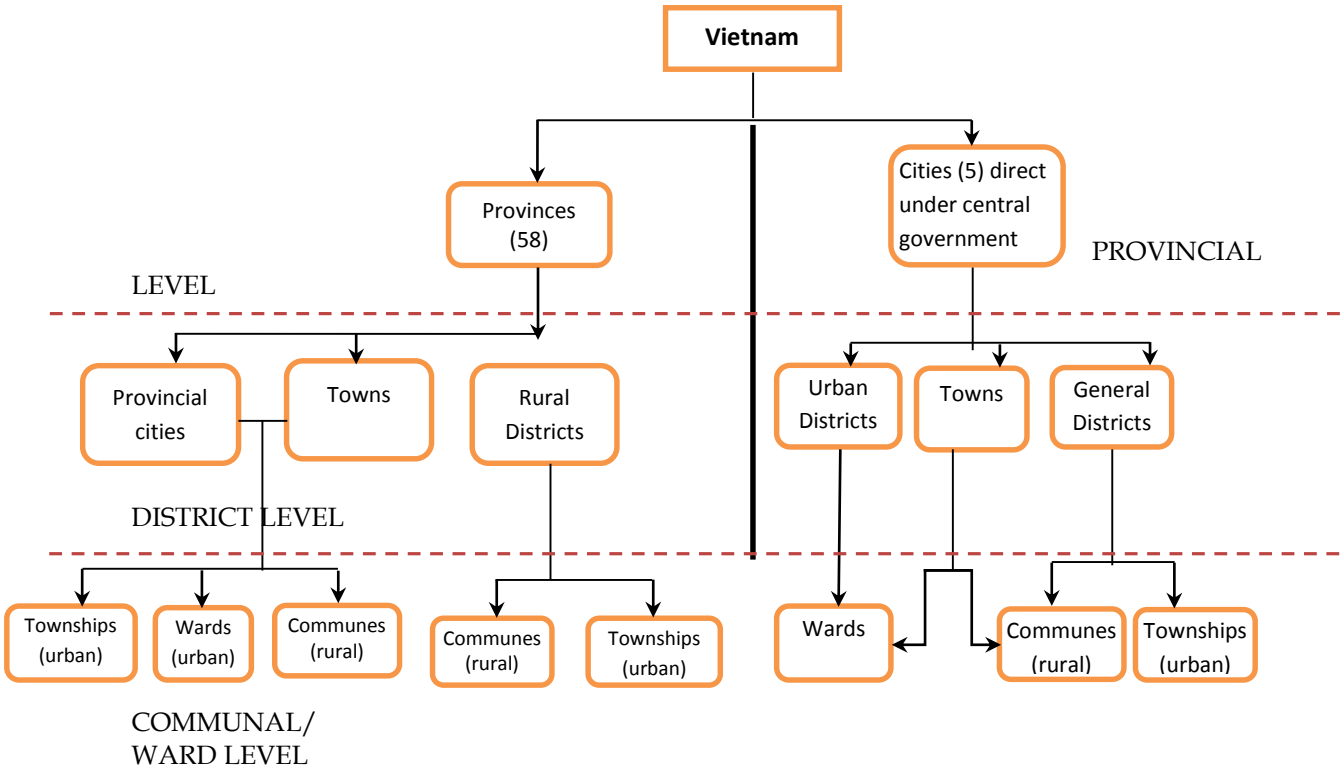


Figure 6.7: Vietnam's Regional and Urban Administration Hierarchy

At the national level

There are three main types of plans which are prepared by ministries: (i) Socio-economic plans by the Ministry of Planning and Investment (MPI); (ii) sectoral

plans by respective line ministries (water and electricity, infrastructure, roads, sewage, etc.), and (iii) spatial plans by Ministry of Construction.

The centrally-planned Socio-economic Plan includes ten-year 'Socio-economic Development Strategy' and 'Five-year Socio-economic Development Plans'. Both ten-year strategy and five-year plans are under the jurisdiction of Ministry of Planning and Investment (MPI).

Spatial plans have four levels: orientation plans (per national policy), regional plans, general plans (province, city) and detailed area plans (ward, industrial or new urban development).

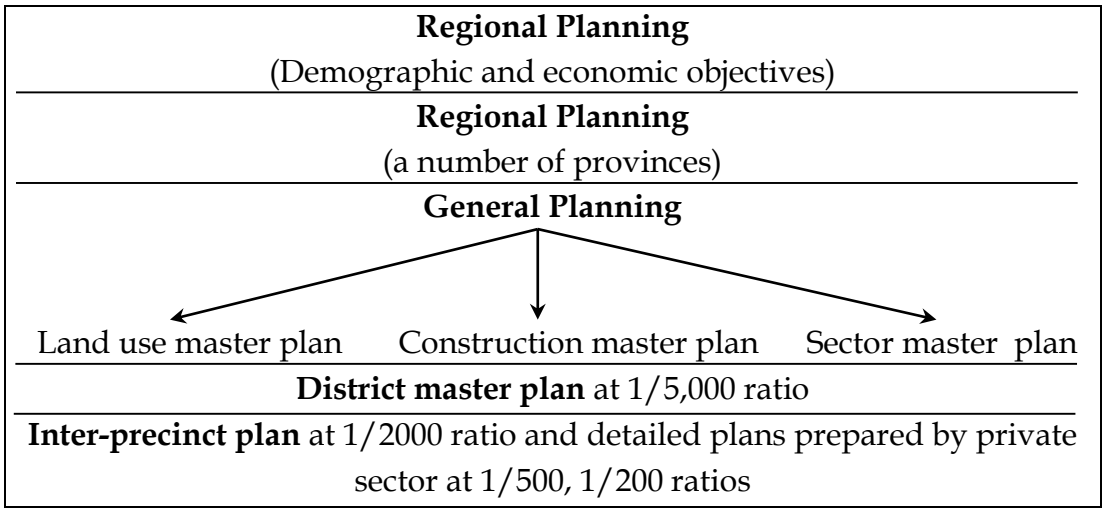


Table 6.6: Urban Planning Levels in Vietnam (Adopted from PADDI, 2012: 8)

In Vietnam, urban planning or urban development planning/urban construction planning is an essential tool for the spatial arrangement of land uses in urban areas. It is a spatial expression of socio-economic development strategies and policies.

Spatial Planning Level	
The City Master Plan (Construction master plan)	The drawing scale depends on the size of the city. Normally, the scale is 1:25.000. In smaller cities, the scale could be 1:10.000. The set of plans includes the location drawing, land use drawings and the infrastructural system. At this level, information provided by the plan is mostly at a general level, for example: the main road systems, location of industrial zones, agricultural land, urbanized areas, green areas, and the total population for each district, etc.
The District Master Plan	The drawing scale is 1:5.000. The set includes the location drawing, land use drawings and the infrastructural system. On this level, information provided by the plan is more detailed, for example: the arterial road system, new development areas, upgrading areas, different functional areas, and the total population for each ward, etc.
The Ward Master Plan	The drawing scale of these local plans is 1:2.000. This set of plans is being used regularly to manage the urban development. It includes the location drawings, land use drawings, and the infrastructural system. At this level, information is provided for every block, for example: the road system, maximum building height, projected population, building density for the block or an area, boundaries of public land like parks, open spaces, schools, health care facilities, cultural centres, shopping areas, administrative areas and other functional areas.
The Project Plan	The drawing scale is most commonly 1:500. This is the set of plans mostly being used by the developers for complex developments like housing complexes, shopping malls, factories, and school developments. At this level, information is provided for every building, for example: the setback, distance between buildings, the floor area ratio, and the building coverage ratio, etc.

Table 6.7: Spatial Planning Levels (Author)

At the municipal level – Ho Chi Minh City

The spatial planning process in Ho Chi Minh City (HCMC) is based on the centralised approval process where final approval depends on the Prime Minister's office. The City People's Committee is the key unit responsible for the planning of the whole city. Directly under the control of the national government, the central planning authority of HCMC falls on its municipal People's Committee. Under the jurisdiction of the People's Committee of HCMC are People's Committees at district and local levels in which all plans must be examined by the city government. On the basis of the broad national policies and strategies, the latter drafts its plan and seeks the approval of the

national government. After the national government approves it, the plan may be implemented.

HCMC's urban planning comprises of three types:

- Land use plan is prepared by Department of Natural Resources and Environment.
- Construction plan is prepared by Department of Planning and Architecture (DPA) and the Urban Planning Institute (UPI).
- Sector plan (such as urban transport, technical infrastructure, water supply and drainage, housing, economic) is prepared by technical departments and agencies.

These three types of planning are all applied from the city level (general city planning) to the district level (general district planning) and inter-precinct level.

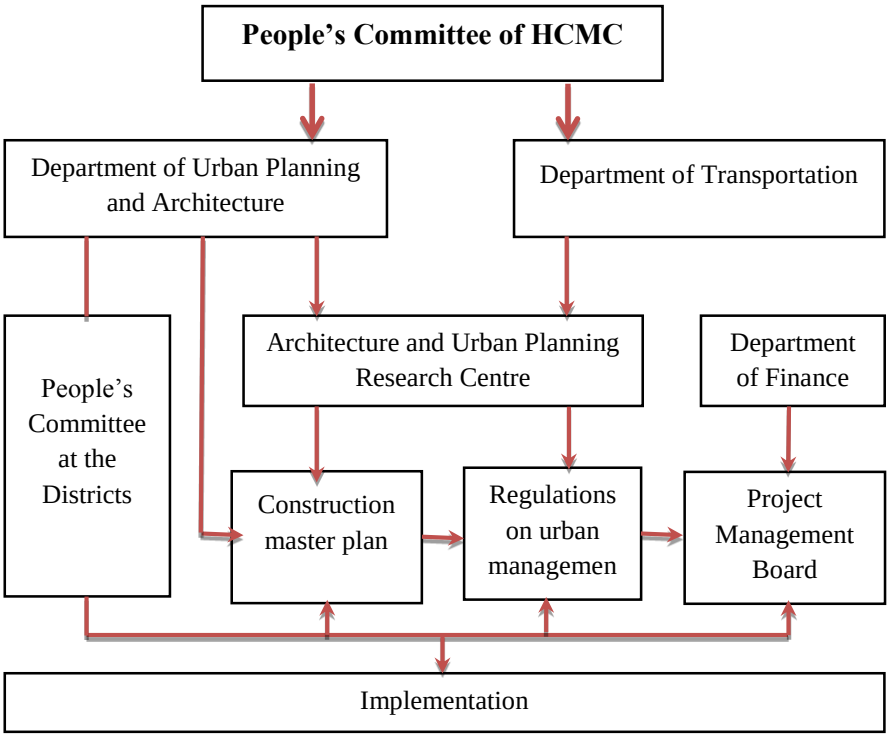


Figure 6.8: Urban planning process in HCMC (Author)

The Department of Planning and Architecture (DPA), which is under the control of the HCMC People's Committees, plays a critical role in the planning and development of the city. But as the department is technically under the MoC, all architectural, planning and construction aspects of a project have to observe Ministry regulations. All technical revisions or adjustments regarding design, construction height and other details must be approved by the Ministry. In essence, the main function of the department is not to implement planning and architecture but administrate. The department consults the City People Committee leaders on city planning, assesses planning for group B and C projects, is a link between foreign investors and the Committee, guides investors on architectural criteria and regulations, receives planning documents and solves problems and requests from citizens on architectural and planning issues, and consults districts on architecture and planning. The Department assists architects and companies in detailed designing of housing projects and public works.

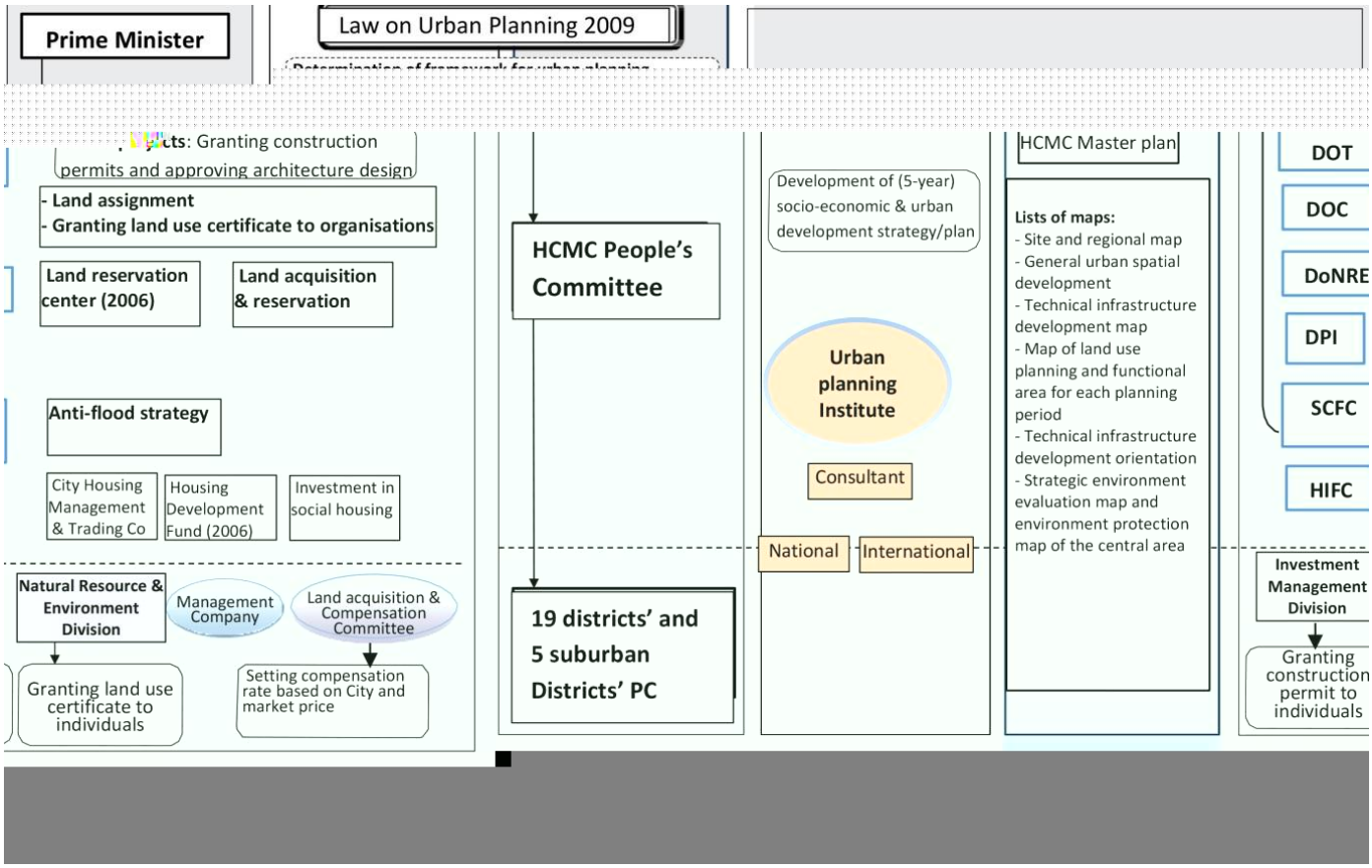
The other key agency responsible for urban development and management in HCMC is Institute for Development Studies (HIDS). HIDS is a state agency under HCMC People's Committee (established in 2008 by unifying the Institute for Economic Research and the Social Science Institute; and merging with Urban Planning Institute). Its strategic function is to carry out scientific researches; consult and advise on the matters of Socio-Economics, Urban Environment and Planning to HCM City's Party Committee and People's Committee (figure 6.9, p.177).

At the district and local level

The local People's Committees are responsible for planning and regulating development in their areas. There is a department of urban management (former name 'Housing & Land Office') in each locality, which reports to the local People's Committee and the higher level urban management

department. They will elaborate, discuss and approve local plans, which provide detailed control for the development of specific areas and for the relevance to the master plan of the whole city.

Figure 6.9: The Institutional Organisation in Urban Planning in Ho Chi Minh City (PADDI, 2010: 17).



DoC: Department of Construction	- **MPI**: Ministry of Planning and Investment
DoNRE: Department of Natural Resources and Environment	- **SCFC**: Steering Centre of the Urban Flood Control Program
DPA: Department of Planning and Architecture	- **VIAP**: Vietnam Institute for Architecture, Urban and Rural Planning
DoT: Department of Transport	- **MARD**: Ministry of Agriculture and Rural Development
DPI: Department of Planning and Investment	- **MOIT**: Ministry of Industry and Trade
HIFU: HCMC Investment Fund for Urban	- **MOIT**: Ministry of Industry and Trade
HIDS: HCMC Institute for Development Studies	- **MOT**: Ministry of Transport
MAUR: Management Authority for Urban Railway	- **MoNRE**: Ministry of Natural Resources and Environment
MOC: Ministry of Construction	- **MOF**: Ministry of Finance

The master plan of HCMC up to 2020, ratified by Decision No.123/1988/QD-TTg dated 10/07/1998, has been prepared before the Construction Law which was revised in 2003. The revision of Construction Law has provided a new perspective in basic spatial planning framework for three different construction development plans: the regional construction plan, the urban construction plan and the rural residential area construction plan.

In accordance with the construction law, the land use plan is prepared for a five-year period while its maps are drawn every 10 years. The land use plan indicates planned targets by various land use categories. Although these maps are not spatial physical plans in essence, it is sometimes understood that they specify the particular land use of a parcel of land.

In addition, there are Decisions/ Decrees related to planning regulations which are the compulsory rules for designing or setting a spatial plans in any planning project (Appendix), such as:

- Circular No. 30/2004/TT-BTNMT by the Ministry of Natural Resources and Environment dated 01/11/2004 about "Guiding the order and content of the formulation, regulation and evaluation planning and land use planning". This Circular is about regulation to improve land use planning at all levels and to surmount suspended planning via several steps from assessing current land use to building map of land use planning.
- Decision No. 04/2005/QD-BTNMT by the Ministry of Natural Resources and Environment dated 30/06/2005 about "Process of setting and adjustment Planning, Land-use plan". This Decision is about regulating the process of land use planning at regional and national level by evaluating the advantages, limitations in land use and economic-social development.
- Decision No. 24/QĐ-TTg dated 06/01/2010 of Prime Minister about 'Approval for planning adjustment of HCMC master plan in 2025'. This Decision is about developing principles for old and new inner city following

the centralized model with multi-polar, with purpose of sustainable development.

- Decree No.08/2005/ND-CP dated 24/01/2005 of Prime Minister about "Construction Planning". This Decree is about guidelines of formulation, approval and management of the construction planning stipulated by the Construction Law.
- Decision No.752/QD-TTg dated 19/06/2001 of Prime Minister about "Approval for HCMC master plan of drainage system in 2020". This Decision is about managing and operating entire urban drainage system in HCMC.

In addition, it is important to understand the government structures as well as the multi-level system and political system that influences the situation of HCMC. The next section moves on analysing the styles of planning, regulation over forward planning.

These are five general planning regulations, however, all of them mention mostly about building code or other planning regulation for many scale of planning projects. Some parts among them mention about space for water or building elevation; e.g. if planning fill up certain water area (pool, canal, etc.) by creating three-times space for water or preparing carefully building foundation for lowland area. It proved that there is no deep consideration of flooding in planning management; if yes, these measurements are quite technical and too general. Furthermore, these planning regulations do not mention about how to cope with climate change, except Draft Circular No_ /2012/TT-BTNMT by the MONRE dated _/_/20_ about "Process of setting and adjustment Planning, Land-use plan". This Circular, considered as a supplement regulation for Decision No.04/2005/QD-BTNMT, is not approved yet. However, it proves that government starts to consider climate change in setting and adjustment planning. In this circular, evaluating natural condition under impact of climate change on land use is a compulsory

planning process at any level in order to give a suitable planning implementation and adjustment for each region.

Similar to planning documents, the Decision No.752 about flood measure is also geared to engineering. After scanning the planning and flooding documents, it can be concluded that although there are some regulations for natural water protection and measure for flood control, they are insufficient consideration of comprehensive and long-term approach - lacking of non-structural measure and climate change situation.

In sum, the previous parts of chapter analysed the government structure, the administration and the urban planning systems of Vietnam as well as the institutional arrangement and response for adaptation planning that helps to understand how the central government and the local preparation for adapting to climate change. Increasingly, how decision making processes are made in the boundary of planning. And now the chapter moves on to the specifics of climate change governance in HCMC.

6.5 The planning system in HCMC, it shortcomings and the key climate change institutions

HCMC is a centrally municipal city which has the same status as a province. As a centrally managed city, the state government and ministries have an important influence on how the city is managed and developed. The administrative area of HCMC is divided into 24 districts. In terms of the present state of urbanization, the districts are generally categorized into Existing Inner Urban District, New Inner Urban District and Suburban District (Nikken Sekkei, 2007) (Figure 6.10, p.184).

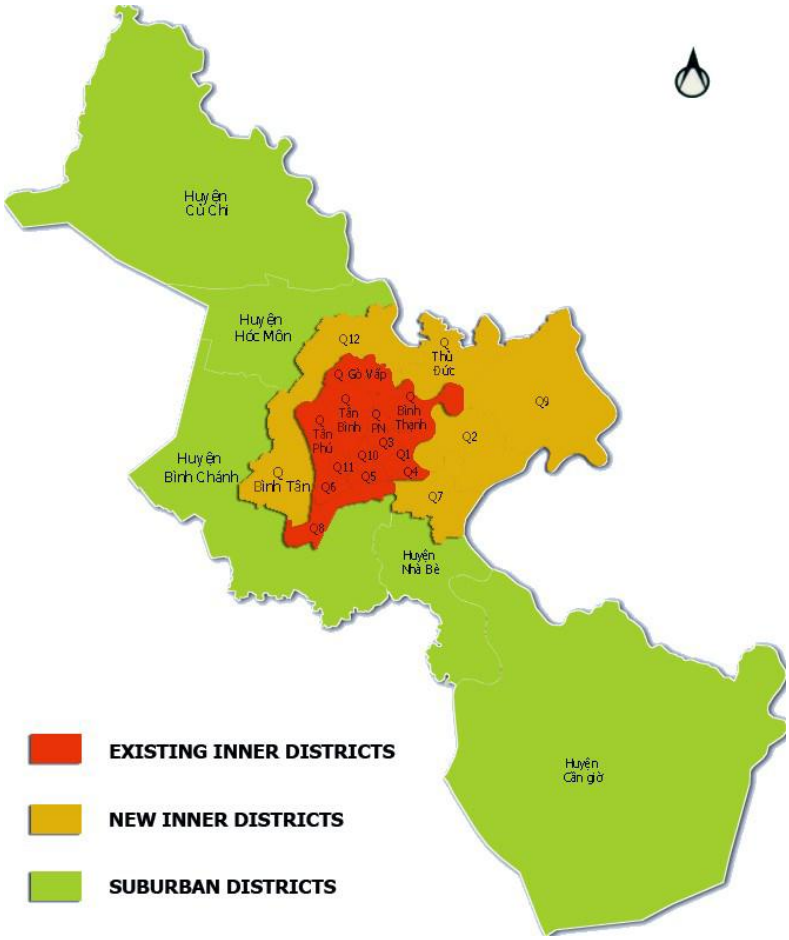


Figure 6.10: District category based on developing characteristic in HCMC (Author)

Current master plan of HCMC

HCMC is struggling with already perceptible climate-related problems, whose impacts are intensified by failures in managing the ongoing rapid urbanisation since the mid-eighties (Eckert and Schinkel, 2009). Since then, large parts, particularly in the Northern and Western territories of the city, had become built-up areas. This uncontrolled urban expansion and land use change brought about by urbanization go along with an excessive change of natural land cover to sealed surfaces, the removal of natural retention and infiltration areas for precipitation, increased traffic volumes, and increased emissions related to transportation and industrial production. As a result of the mostly spontaneous land occupation, the adequate provision of technical and social

services often lag behind in the marginal settlements on the outskirts as well as in inner city slums, causing considerable negative effects on the environment and urban society of HCMC (Carew-Reid, 2008).

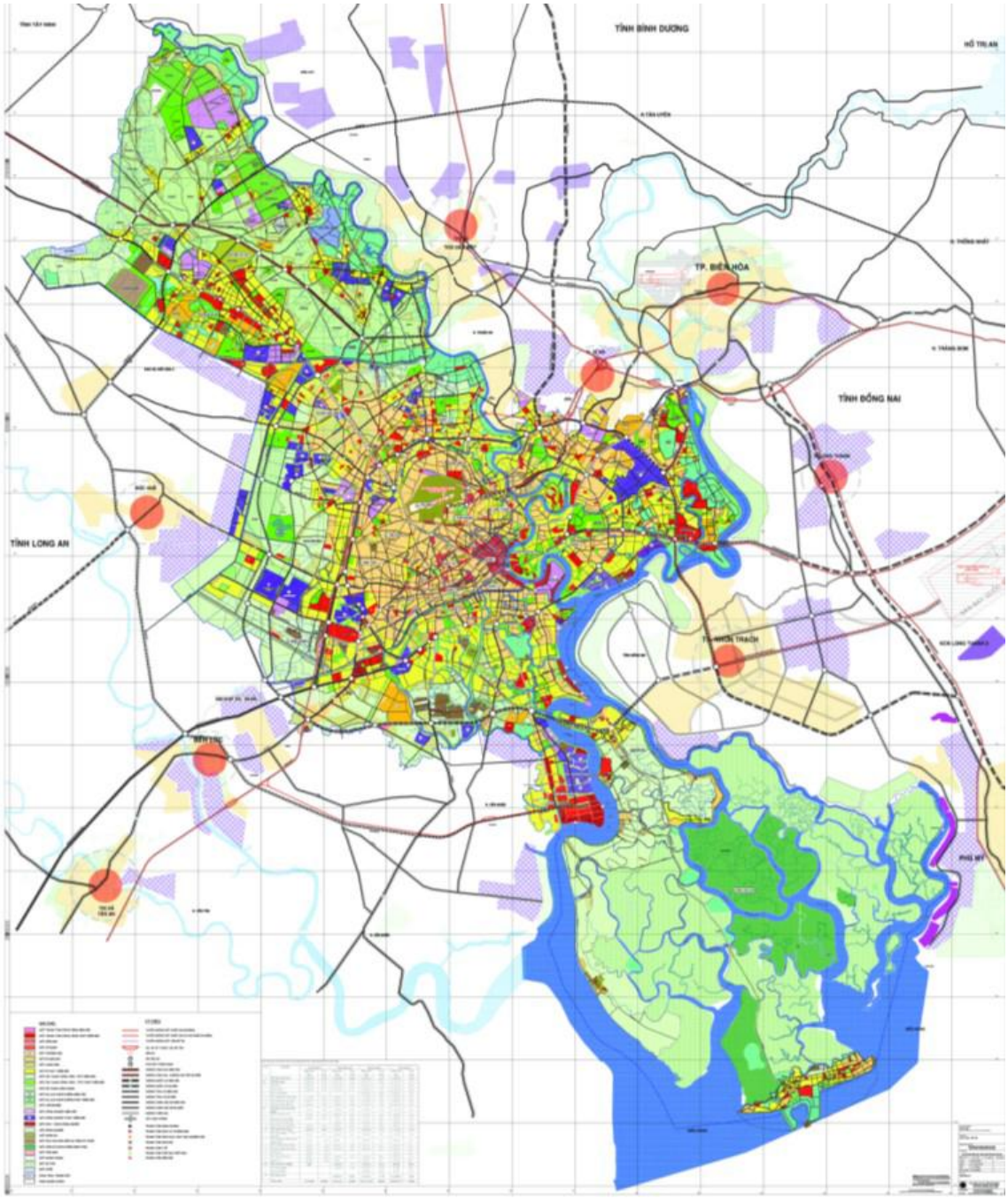


Figure 6.11: HCMC Master Plan up to 2025 (*Source*: Nikken Sekkei, 2007)

In 1998, the Prime Minister approved a Construction Master Plan for HCMC which determines urban development up to 2020 with vision of 'A

Renaissance of Shining Pearl in the Orient - Establishment of Cultural Megalopolis - HCMC will be developed as an advanced service and industrial centre of Southeast Asia, and a modern and functional megalopolis with an urban design respecting the city's culture and history'. However, the implementation process has shown that the unsuitability requires amendments of the master plan. Thus, in March 2008, the HCMC PC approved a revised master plan up to 2025 designed by Nikken Sekkei Ltd - a Japanese consultant company. Depending on economic factor, the major and minor developing directions are decided in this master plan (figure 6.11, p.182).

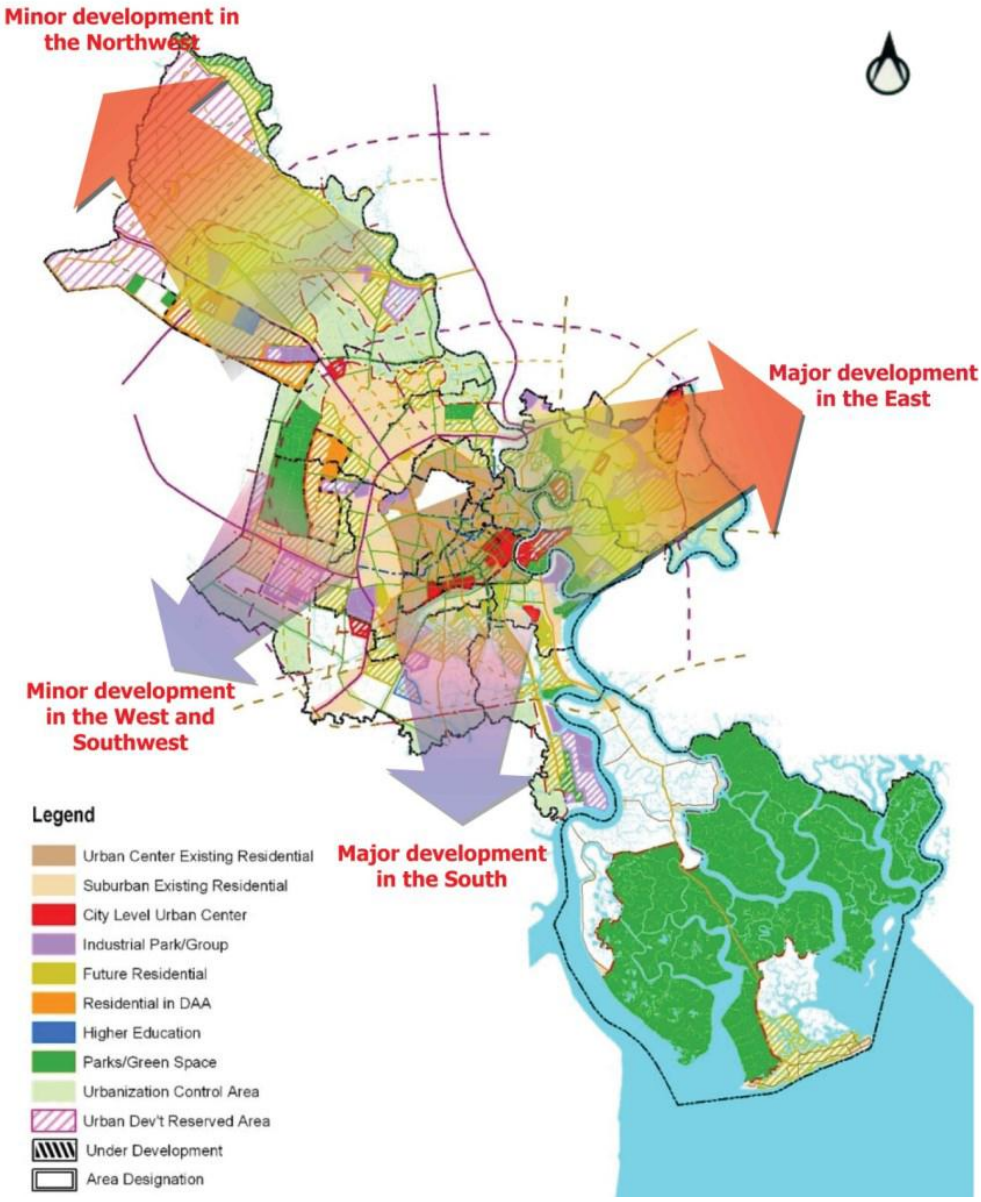


Figure 6.12: Development orientation of HCMC up to 2025 (*Source*: Nikken Sekkei, 2007)

The figure 6.12 (page 187) shows the priority directions for developing HCMC in the future:

- Major development in the East: developing corridor is the Ho Chi Minh City
- Long Thanh - Dau Giay highway and along the Hanoi highway; developing new urban areas with high building density, synchronous social and technical infrastructure;
- Major development in the South: developing corridor is Nguyen Huu Tho route with special hydrogeological conditions (many rivers and potential development for urban land and infrastructure; complying with regulations of river protection and promoting the strengths of waterscape by low building density; not reducing the water surface area which used for urban drainage;
- Minor development in the Northwest: the development corridor is the Highway No.22 (Trans-Asia Highway) with advantage of natural conditions; developing new urban areas, synchronizing modern social and technical infrastructure;
- Minor development in the West and Southwest: the development corridor is Nguyen Van Linh Highway with disadvantage of hydrogeological conditions, so the development of urban infrastructure is limited; complying with regulations of river protection, not reducing the water surface area.

HCMC planning management

Since HCMC is a centrally managed city, it has several government agencies at both the ministry and the city levels, as well as people's committees at both the city level and the district level. The HCMC People's Committee (HCMC PC) oversees wide range of departments responsible for managing urban development and providing local public services. Many of these departments are line departments of ministries but are also accountable to the HCMC PC.
In addition, management boards and state-owned enterprises[6] are organized to carry out specific public projects, belonging to the HCMC PC or line departments of ministries.

Because HCMC is a special city, there is one more institution under control of the Ministry of Construction (MOC), which is DPA, besides the Department of Construction (DOC) (figure 6.13, p.186). While the DPA has functions of appraising and approving a planning project, the DOC has functions of appraising and approving a building construction (function, quality, building code, etc). With respect to flood control, SCFC is a young specialized institution established by HCMC PC. Hence, it does not have enough power as a department such as approving for a flood control project. The main task of the SCFC is executing flood control construction (improve sewage system, building embankment, etc.), so whenever they have flood control project, they have to ask permission of the DOT. This shows some disadvantage of the SCFC's function and power, which may be barriers for flood risk management.

At the municipal level, the most important agencies which determine overall land use, spatial zoning and environmental quality in HCMC are the Department of Natural Resources and Environment (DONRE), the DPA and the DOC (Storch, 2009). While the DPA and the DOC formulates the master plan (urban development plan), the DONRE is responsible for drafting and updating of the land-use plan, which is developed from the master plan. The next update of the land-use plan will describe the medium-term development of the city until 2025.

The DONRE's land-use plan and the DPA's and the DOC's new master plan are the most influential spatial plans that will shape the nature of HCMC's urban development for the next decades (Carew-Reid, 2009).

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6. State-owned enterprises were established in 1990 and 1991 according to decisions of Prime Minister as a key pillar of Vietnam's economy to help Vietnam primarily become an industrial country by 2020. It was defined as an economic organisation, which is capitalized, set up, organized and managed by the state.

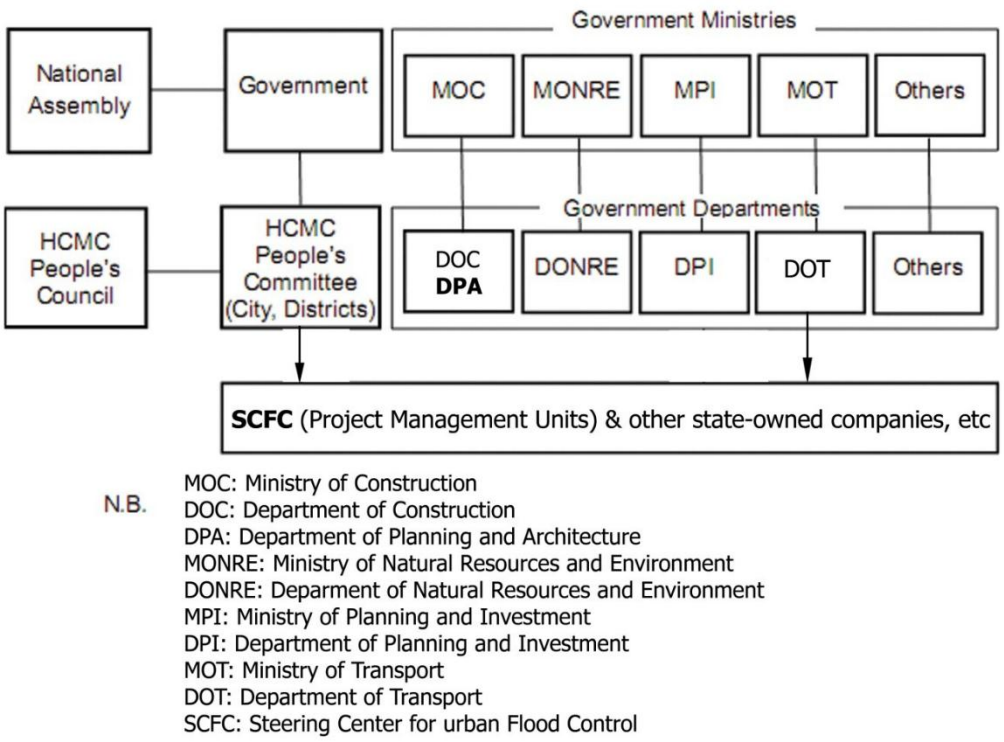


Figure 6.13: Administrative structure for urban planning and development (*Source*: Adopted from Nikken Sekkei, 2007)

The key departments involved in urban development planning and flood management are:

- Department of Planning and Architecture (DPA)
- Steering Centre for Urban Flooding Control (SCFC)
- HCMC Institute for Development Studies (HIDS)
- Urban Planning Institute (UPI)
- Department of Natural Resources and Environment (DNRE)
- Department of Planning and Investment (DPI)
- Department of Construction (DoC)
- Department of Transportation (DoT)

Organisational structure of DPA and SCFC:

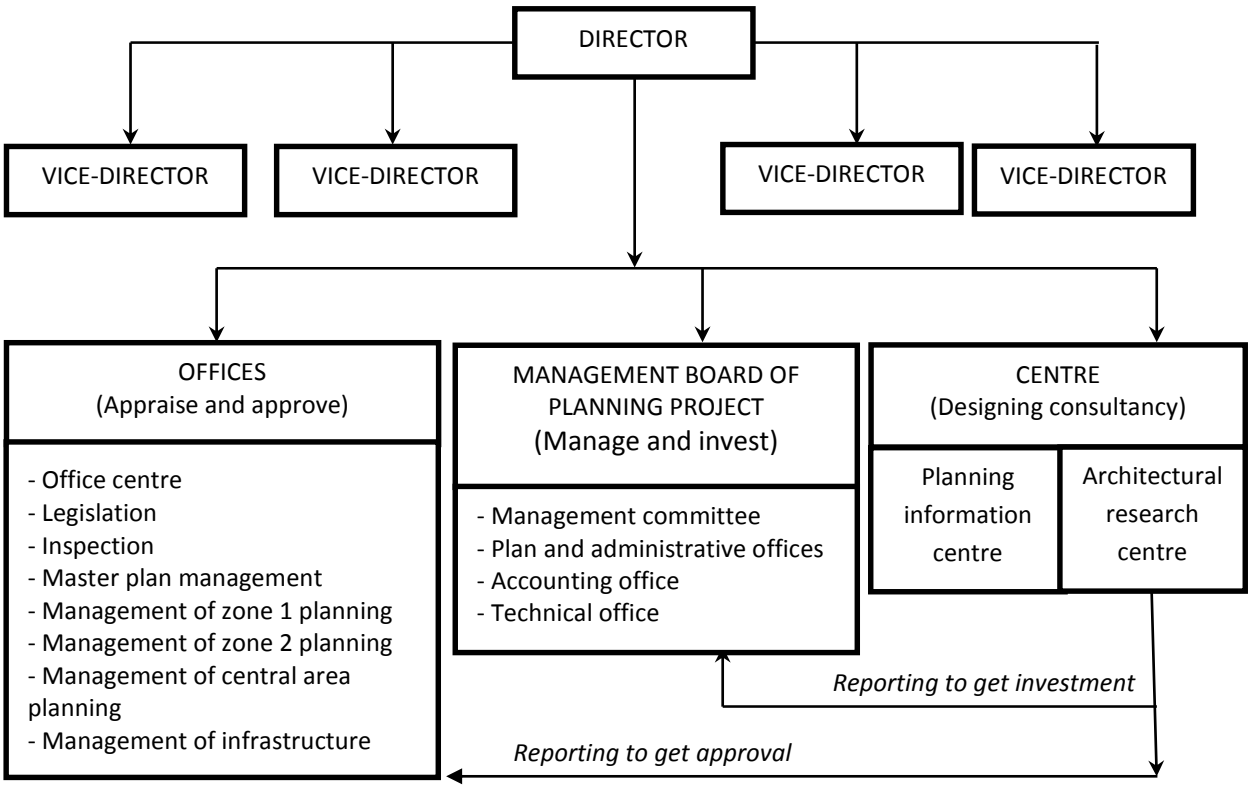
This part of research focuses on analysing in detail the two key institutions: the DPA and the SCFC which directly involved in the process and decide the results of planning and flood management in HCMC. This important part helps to improve understanding about relationship of relevant stakeholders in the process of planning and flood control. By elaborating their institutional structure, task, and project procedure will gain the insight into their roles, their barriers and learn how their work relate to each other.

HCMC Department of Planning and Architecture:

- **Organisational structure:**

The Department of Planning and Architecture (DPA) is a specialized agency of the HCMC People's Committee which helps the City People's Committee (HCMC PC) to perform the state management in the areas of urban planning, urban infrastructure, urban development and architecture (including urban and rural planning, urban architecture, landscape architecture, etc.). It is under management and direction of the HCM PC and MOC in specialized aspects; as well as under the control and supervision of other government agencies.

Figure 6.14: Organizational structure of the Department of Planning and Architecture of HCMC (Author)



The organisational structure of the DPA (figure 6.14) is divided into three main functions. The first and the most important is the Offices where receives the drawings and reports from the consultancies to appraise and approve the projects. The second is the Management Board which has the responsibility in managing the investment for government projects. Last is the centre which is working as a design and research consultancy for planning and architecture, as well as providing planning information.

- **The tasks of Department of Planning and Architecture**

- The Department of Planning and Architecture (DPA) takes responsibility on behalf of HCMC People's Committee for managing construction planning and urban architecture, by advising on issued legal documents.

- The DPA coordinates with other urban departments and the HCMC People's Committee at local level, in order to preside over the planning of construction; of organising supervision; submitting specialized master plans and detailed plans; and for guidance on setting up construction projects including urban planning and architecture. It may also approve some detailed plans for projects to be built by the HCMC PC.
- The DPA introduces construction locations, issues planning permission and reaches architectural-planning agreements for construction work.
- It proposes the orientation for conservation and development of urban architecture; requirements of architectural layout; architectural solutions, standard rules and regulations of landscape architecture in HCMC.
- It organises and implements scientific topics and international cooperation projects for HCMC urban planning and architecture; it organises and participates in international conferences and workshops which are assigned by the People's Committee.
- It collects and manages information, documents and survey data about the city and surrounding areas, as related to construction planning and urban architecture.
- It coordinates with other departments - and the People's Committee at local level - to publicly disseminate approved plans; provides and coordinates training and professional knowledge and guidance about management of planning and architecture.
- It collaborates with the DOC, the People's Committee at local level and other related agencies involved in inspections of implementation of planning and architectural management.
- It meets with members of the public and professional to resolve complaints from citizens and organizations in relation to responsibilities of the DPA.

- It is a permanent member in the City Council and participates in the review and approval of construction projects.

- **The Planning Procedure:**

The figure 6.15 (page 191) shows the relationships between relevant stakeholders involved in the construction planning process in HCMC. At the design phase, investors from the private sector or government hire a consultant company to design a planning project. The consultancy may be from the government institution such as the Urban Planning Institution (UPI) or the Architectural Research Centre (ARC) or may also be from a private company, depending up on the characteristics and scale of the project. In some special projects, the consultancy may be an agency from the Ministry of Construction such as the Institute for Urban and Rural Planning (VIUP).

A planning design prepared by the consultancy will be submitted to DPA for checking, and the DPA will then report to HCMC PC to get approval and planning permission in the form of a planning licence. If it fails to be approved, it will be returned to the investor, to be revised and resubmitted. In the construction phase, the main involved stakeholder is the constructor which is responsible for investing and a building project. After receiving planning permission, the constructor also needs permission from DoC before carrying out the project. The DPC officially has a key role in supervision of the construction project. The Urban Management Office (UMO) and the Project management Board (PMB) are two key agencies which help DPC to examine whether that project conforms to regulations or drawings. However, this inspection is not comprehensive.

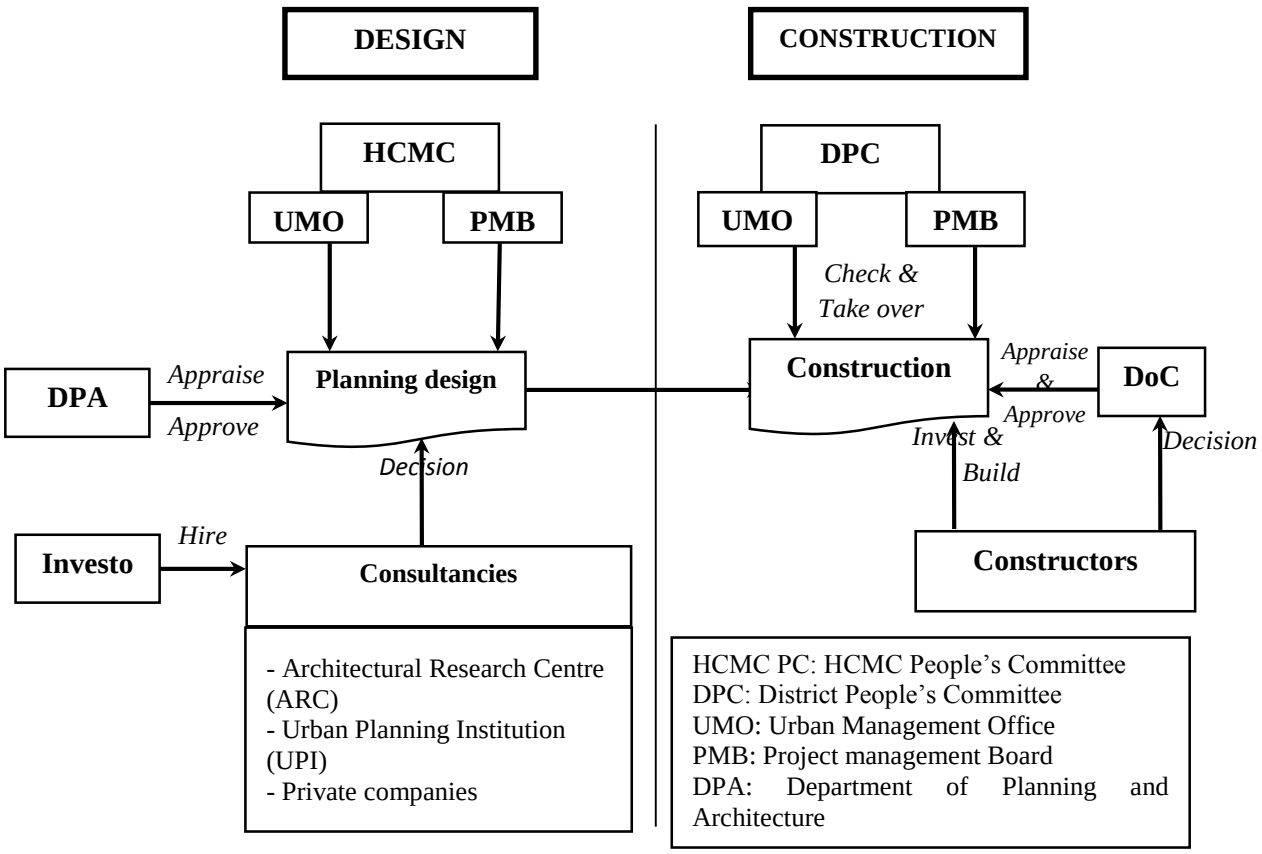


Figure 6.15: Basic planning procedure with relevant stakeholders in HCMC (*Source*: Department of Planning and Architecture)

In general, the key institutions (HCMC PC, DPA, and DoC) have the most power in the planning approval procedure. Almost all institutions taking part in planning decisions come from government, whereas the private actors are involved only in the design phase. The participation of local residents is particularly unremarkable, solely a cynical gesture to keep up 'appearances', to comply with planning regulations, 'Residents' meetings in the planning process are just a formality because local residents do not have sufficient knowledge about urban planning to understand the projects and the implications related to future urban development. Their concern is their personal stake in planning projects instead of concerning benefit to the whole living environment" – a viewpoint of interviewee from DPA (HG-17).

Therefore, planning in Vietnam as well as HCMC is top-down and it has government characteristic. As figure 6.15 clearly shows, during planning process, the DPA works quite separately from other institutions, especially the SCFC. This not able point indicates lack of cooperation between spatial planning and flood management in HCMC.

HCMC Steering Centre for Urban Flood Control (SCFC):

- **Organisational structure:**

The SCFC is a new specific agency under control of HCMC PC. It was established in 2008 with the purpose of helping HCMC PC to manage the urban flood programme, urban drainage, wastewater, and sanitation (figure 6.16).

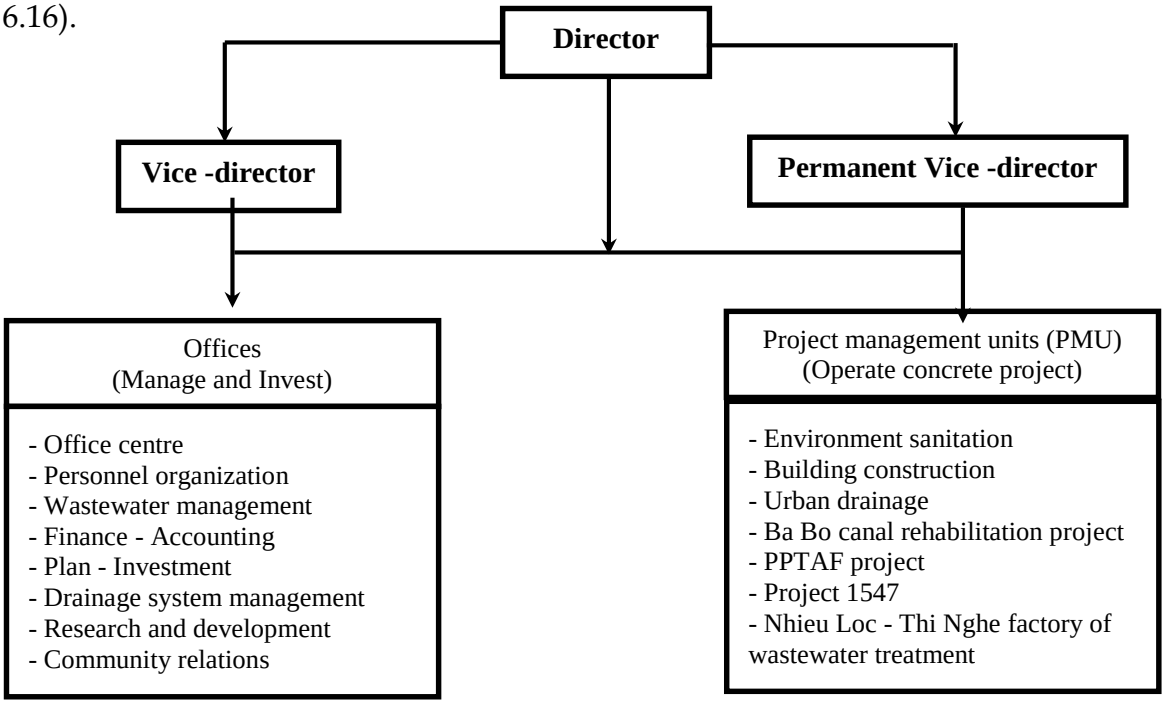


Figure 6.16: Organizational model of SCFC (Author)

Currently, the main function of SCFC is to prepare medium – to - long term strategies and annual plans for flood risk management in HCMC. The SCFC plays a role not only as an owner of flood management projects but also as a

leader in preparing master plan for flood risk management. In the latter role, they update the regulations/standards, apply new technologies and carry out surveys and data collection for flood management. Aside from performing the tasks assigned by HCMC PC, they coordinate with relevant ministries and agencies, preparing and carrying out training and capacity building programmes (HCMC People's Committee).

- **The tasks of SCFC:**

- Researching, developing strategies and solutions to control flood and tidal effects in the city and surrounding areas are all parts of SCFC's roles. It identifies priority projects and divides implementation phases for each area; coordinating activities, drainage projects in order to resolve fundamentally flooding problems in the city.
- It has task of developing long-term, mid-term and annual drainage plans including priority plans regarding flooding and drainage in the city.
- SCFC has the task of collecting, measuring, surveying, analysing statistics, storing full data, evaluating data related to flood and predicting flooding situations, emergency scenarios in the city in order to advise measures to prevent, combat and overcome problems and emergencies.
- SCFC is the focal point for research towards setting of a general planning program for coping with flood and drainage projects in the city; examining design projects and actively coordinating and proposing measures in order to ensure consistency in the management of, and problem- solving approaches towards flooding and drainage issues of HCMC.
- SCFC has the role in owning investment projects about anti-flooding programs, and in deciding and proposing mechanisms for capital investment in the city. It organise, inspects and monitors progress of

flooding and drainage projects during implementation, in order to assess and propose effective solutions for HCMC PC.

- SCFC has the role in researching, updating and proposing competent agencies to consider issuance or amendment of permissions; and if it is no longer appropriate, supplementing the absence of regulations, standards, technical and economic norms related to drainage, waste water treatment, boundary determination methods protecting rivers, canals, channels of rivers; regulating technical dredging as a basis consistent in design, test, and coordinating drainage projects in the city.
- SCFC coordinates inter-sector and inter-basin water in general. It manages the implementation of drainage projects in particular, in order to implement effective anti-flooding and drainage program in the city.
- SCFC researches and applies domestic and foreign scientific innovations, technology and methods in the fields of drainage and flood prevention and flood management. It also holds scientific conferences about drainage and urban flood prevention.
- The SCFC has an organizational structure with authority under national laws to provide an advisory role and to implement flood prevention program. It builds training programs and trains human resources and scientific experts in technology about research, design and operational management in the fields of domestic and foreign water management and in international cooperation.
- The SCFC is implementing the project "Irrigation planning for researching solutions for coping with flood in HCMC". This project of the Ministry of Agriculture and Rural Development (MARD) was approved by the Prime Minister, according to the functions and tasks that the HCMC PC has assigned to SCFC. These were to identify prior projects and to divide implementation phases for each area, and to coordinate activities on drainage projects in order to address flooding in the city.

- On behalf of the HCMC PC, the SCFC manages the entire drainage system and waste water treatment system in the city.
- On behalf of the HCMC PC, the SCFC monitors, adopts and operates projects for improving water environment in the catchment areas; Tau Hu - Ben Nghe - Doi Channels, the Te Channels (Phase 1) and it operates the City Environmental Sanitation Project (Nhieu Loc - Thi Nghe basin).
- The SCFC presides over building and proposing schedules and plans for environmental protection for waste water, in order to report to the competent authority for planning approval. The SCFC develops effective plans to deploy this revenue.

➢ **The project procedure:**

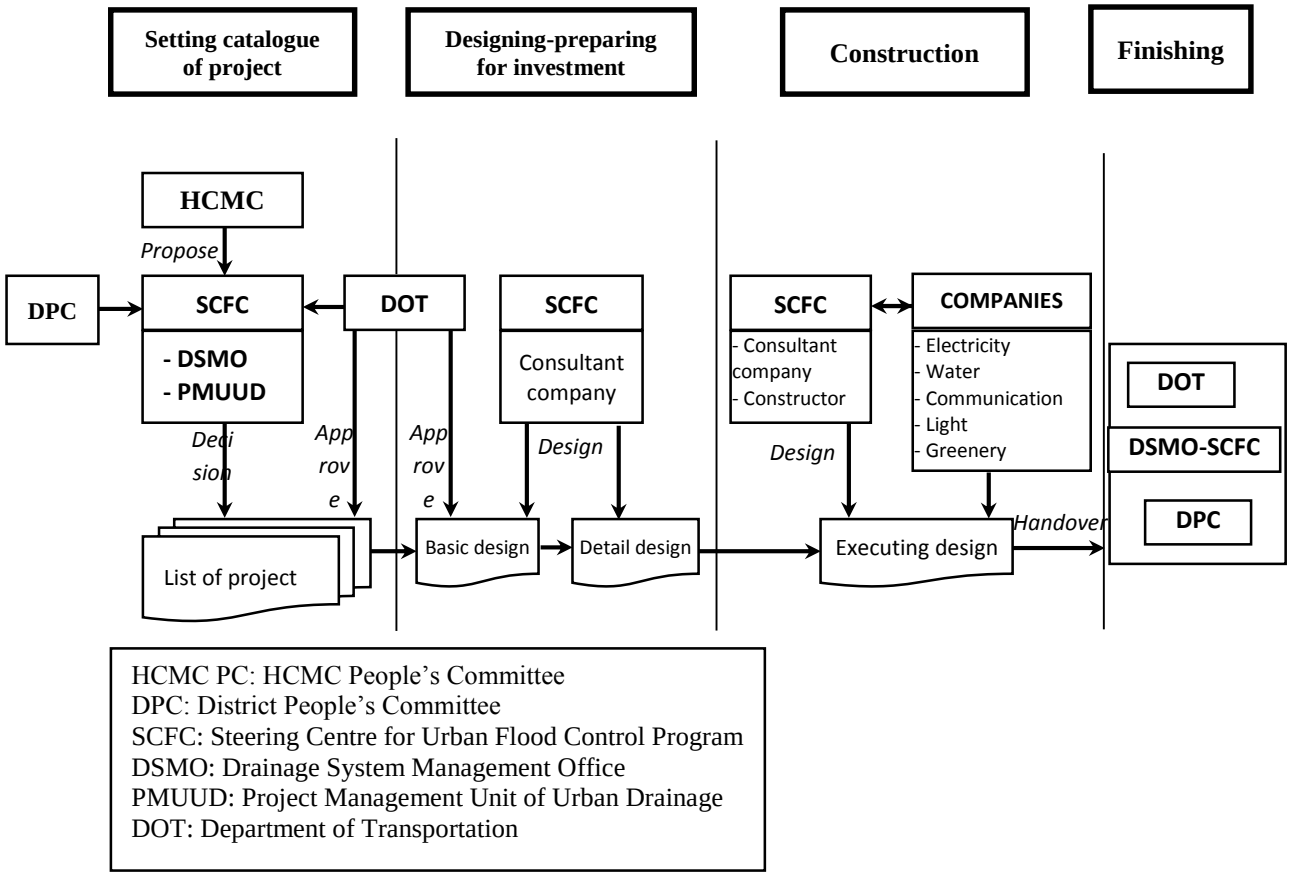


Figure 6.17: Procedure of Flood protection project in SCFC (Source: SCFC)

The SCFC works on processes which follow the Decision number 752/QD-TTg – 19/06/2011 (Master plan for drainage systems in HCMC by 2020) and Decision 1547/QD-TTg – 28/10/2008 (Irrigation Planning to prevent flooding) of the Prime Minister. The process stages of a normal flood management project in SCFC can be viewed as four main steps (figure 15). At each step, different institutions play different roles and have different relationships or dependencies in respect to each other. In the first step – establishing programme of the project, the three key institutions involved are the HCMC PC, SCFC and the DPC. Together they will make the decision on prioritising the list of flooding projects. Based on the practical situation, the HCMC PC, the DPC and DOT will suggest the flooding locations for the SCFC to address. The DSMO (Drainage System Management Office) and the PMUUD (Project Management Unit of Urban Drainage) are two special offices consulting with the SCFC in determining the list of possible projects. These projects will be checked by many institutions by means of site visits. However, in the design phase, the DOT is the most important institution, having the right to approve the technical design of a consultant company which is hired by the SCFC. After the construction phase, with the participation of relevant utility companies such as electricity, water, communication, light and greenery, the completed work will finally be checked by the DOT, the SDMO and the DPC.

In conclusion, it can be seen that in terms of flood management, the DOT plays a very important role in the decision making process throughout the four phases described. Actually, most of the flooding management projects in HCMC run by SCFC involved renovating drainage systems under existing roads; so their approach is still practical and tactical rather than strategic. It is a passive or reactive role because work is done reactively whenever flooding occurs in an existing road. Hence, "*they are always in the passive situation because their solutions are just for existing flood sites, instead of actively preventing flood in advance*" (HG-05).

The planning system of HCMC is influenced by strategic planning which is comprise of the socio-economic development plan, the construction master plan, and the land use plan (Nikken Sekkei, 2007). Among these plans, the socio-economic development plan plays an important role in laying the foundation for the spatial planning system, which provides a context for the Urban Development Plan and the Land Use Plan (Storch, 2009). The construction master plan and the land use plan need to be coordinated with one another. In fact, these plans are formulated by different institutions at different levels of administration, so they are sufficient harmonised. In general, planning at urban and district levels is formulated by the HCMC PC and the District People's Committee (DPC). Establishing the construction master plan involves the participation of the DPA. However, all plans will be approved by the HCMC PC or the Prime Minister, depending on the sphere of influence of each project. Therefore, the final decision-makers still belong to central government. It proves that planning system still keeps top-down approach and has a strong vertical management hierarchy.

Table 6.8: Institutional Responsibilities for Preparation of Development Plans for HCMC (Author)

Type of Plan		Formulated by	Approved by
Socio-economic Development Plan	Whole country	MPI	National Assembly
	HCMC	HIDS	State Government
	District	District PC	HCMC PC
	Commune	Commune PC	District PC
Construction Master Plan	Regional Construction Plan - Key region, inter-provincial region, etc	MOC	The Prime Minister
	Urban Construction Plan - General Master Plan - Detailed Plan	HCMC PC DAP (UPI) District PC	The Prime Minister HCMC PC
	Rural Residential Area Construction Plan	Commune PC	District PC
Land Use Plan	Whole country	MONRE	State Government

	HCMC	HCMC PC, DONRE	State Government
	District	District PC	HCMC PC
	Commune	Commune PC	District PC
	National Defence and Security	MOD, MOPS	State Government

Note:
- DPA: Department of Planning and Architecture
- DONRE: Department of Natural Resources and Environment
- HIDS: HCMC Institute for Development Studies
- MOC: Ministry of Construction
- MOD: Ministry of Defence
- MONRE: Ministry of Natural Resources and Environment
- MOPS: Ministry of Public Security
- MPI: Ministry of Planning and Investment
- UPI: Urban Planning Institute
- HCMC PC: Ho Chi Minh City People's Committee
- District PC: District People's Committee

Another characteristic of planning in HCMC is that the District Master Plan is formulated for each urban district, which is the only case of this city in Vietnam. The District Master Plan is prepared by the Urban Planning Institute in cooperation with district authorities and is then approved by the HCMC PC (Nikken Sekkei, 2007). However, in the case of large important projects (e.g. national roads, transportation nodes, large-scale neighbourhood developments, or national security) where decisions are required from the state or the city, then that project has to be reflected in the District Master Plan as having implications beyond the district. This leads to delay in formulation of the District Master Plan. On the other hand, the district's intent is emphasized in estimating future projects and population within its own administrative boundary, and with little regard for the balance of the city as a whole. Some of the decision-making process has been decentralized to the provincial and district people's committees. Taking into account this movement towards decentralization, the relationship between the city and its districts should be reviewed to make administrative procedures more effective in attaining the uniform objectives of the whole city.

In addition, given the strongly vertical and hierarchical of the planning system as shown in the analysis above, the current problems of urban planning and development systems in HCMC and in Vietnam in general fail in their implementation. This point is confirmed in the summary of the opinions of the interviewees in the fieldwork in HCMC: "*Planning design is nice and standard, but the management in implementation is difficult because there is no single responsible agency to manage it, and the role of the institutional agencies is unclear*" (HE-03). The problems may come from a lack of financial resources to synchronize infrastructure systems, or from a lack of coordinating management, or from other factors like technology or information.

6.6 Climate change adaptation planning

As argued in Chapter 5, climate change puts great pressure on all levels of city government. The urban planning authorities are already overburdened with the problems that are typical of fast-growing coastal cities in developing countries. The city is suffering from urban flooding, air and water pollution, environmental degradation, insufficient governmental capacity to cope with fast growth, inward migration pressures, and increasing socio-spatial fragmentation.

With their experience of environmental hazards and of the worst scenarios of climate change, HCMC's urban planners and decision-makers - as well as the general public - have become increasingly aware of threats deriving from global and local environmental change.

Recognizing the importance of climate change and its impact on socio-economic development, HCMC has been implementing several action plans to respond to climate change in the period 2011-2015. Joining the C40 Cities Climate Leadership Group in 2009 was a milestone for international cooperation in responding to climate change.

In order to coordinate and integrate all activities related to climate change, HCMC People's Committee established the so-called HCMC Climate Change Steering Committee (CCSC) to implement an action plan to respond to climate change (Decision number 4842/QD-UBND, October 21, 2009). An activity regulation for the Steering Committee and advisory group helped the Steering Committee in planning the actions to cope with climate change related uncertainty (figure 6.19). This is at local initiative, and it is the first legal basis for administration and implementation of the action plans to respond to climate change in HCMC. This working group brings together all relevant departments, including the sectors of construction and planning, to discuss the challenges of - and responses - to climate change.

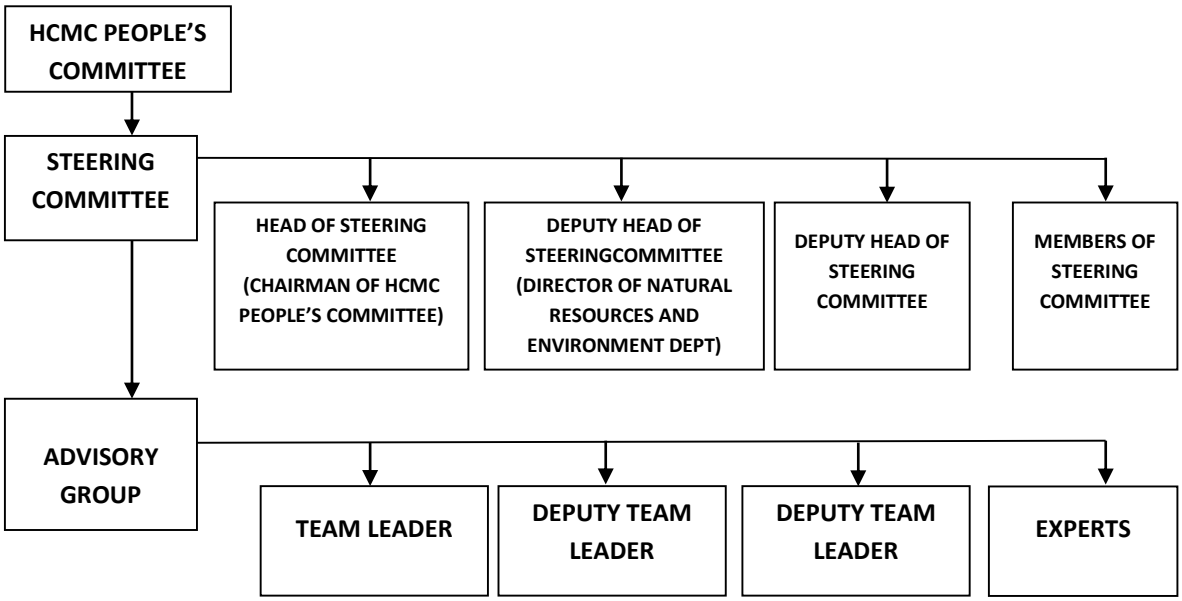


Figure 6.18: Climate Change Committee in HCMC (Author)

The target program to respond to climate change for HCMC, prepared by Steering Committee, was approved by the Chairman of People's Committee of HCMC (Decision number 4796/QD-UBND, October 27, 2010). The goals of this program are to assess the impact of climate change on all sectors and industries; to identify solutions and develop plans to respond to climate change to ensure the sustainable development for HCMC. Existing policies

and strategic documents, such as the Socio-Economic Development Plan for 2025, are currently being revised and updated to integrate climate change adaptation into the planning process. However, the arrangements in HCMC to tackle climate change are focused on action plans in the short term - five years - and will be revised every five years in order to keep up with the future change.

6.7 Key institutions involved in climate change adaptation planning in HCMC since 2009

The key organizations which play a vital role in planning for climate change in HCMC are:

- Department of Planning and Architecture (DPA)
- Department of Natural Resources and Environment (DNRE)
- HCMC Institute for Development Studies (HIDS)
- Steering Centre for Urban Flooding Control (SCFC)
- Department of Science and Technology (DST)

Currently, the action plan is being prepared in the spirit of a summary of key points from departments and agencies' action plans, to ensure that the response to climate change will address most of the relevant problems in HCMC. At this stage, action plans are aimed at building awareness of climate change and at connecting agencies' strategies with climate change preparedness. In this action plan, HCMC authorities have determined how the fields of urban development and planning will play a strategic role in responding and adapting to climate change.

The aims of the action plans are: (1) to assess the impact of climate change in HCMC, (2) to identify adaptions as solutions for climate change effects, (3) to build scientific and technological research on climate change, (4) to strengthen

institutional capacity, policy on climate change, (5) to raise awareness and to develop human resources, (6) to improve international relationships, (7) to integrate climate change impacts into development strategies, programs, and planning.

Table 6.9: Structure of institutions involved in planning for climate change adaptation in HCMC (Author)

	Organizations	Responsibility	Key people	Position
1	People's Committee of HCMC			
2	Department of Natural Resources and Environment (DoNRE)	- Play the leading role in planning, deployment and guiding other agencies to implement the action plans to respond to climate change - Building plans for human resources training, upgrading the management capacity, technique to respond to climate change - Promoting cooperation with other organizations at national and international level in responding to climate change	Mr. Dao Anh Kiet	Director
3	Dept of Planning and Architecture (DPA)	Revise the HCMC urban strategy and plan to set out the spatial land uses, controls and safeguards for adaptation	Mr. Nguyen Dinh Hung	Deputy Director
4	HCMC Institute for Development Studies (HIDS)	- Assisting to HCM City's Party Committee and People's Committee in analyzing and evaluating actual circumstances; proposing the solutions to strengthen the policy implementation in socio-economics, urban and environment	Professor. Nguyen Trong Hoa	President

		- Carrying out studies on socio-economics, environment and urban in order to advise HCM City's Party Committee and People's Committee in formulating strategies, policies for the short, medium, and long-term development as well as the city's annual development schemes		
5	Dept of Agriculture and Rural Development (DARD)	Conducting the action plans related to climate change in agriculture, forestry, irrigation, fisheries, rural development, plant and animal	Mr. Le Thanh Liem	Director
6	Dept of Construction	Revise and pilot the Building Code in the City so that it responds to climate change	Mr. Quach Hong Tuyen	Deputy Director
7	Dept of Transportation	Audit existing infrastructure and development plans and orientations.	Mr. Tat Thanh Cang	Director
8	Dept of Planning and Investment (DPI)	Co-ordinate with other agencies in planning the socio-economic development to adapt to climate change	Mr. Lam Thanh Khoi	Deputy Director
9	Dept of Science and Technology (DST)	- Apply the scientific research and technology to cope with climate change - Managing, evaluating, approving, monitoring and implementing scientific research related to climate change	Mr Nguyen Trong Cuong	Deputy Director
10	Steering Centre of the Urban Flood Control Program (SCFC)	- Support each commune and district in reviewing and revising their specific contingency plans to protect and cope with more extreme flooding and storm events, and identifying the key assets and residential areas that need to be protected, up to and including evacuation of residents if necessary. - Improve early warning systems for floods, storms, tidal conditions and drought.	Professor Ho Long Phi	Deputy Director

		- Support ports, airports and rail authorities in developing contingency plans in the event of major flood events. - Develop early warning system for traffic and alternative transport routes in the event floods.		
11	Sub-Institution of Meteorology, Hydrology and Environment of South of Vietnam (IMHEN)	Research and development of science and technology on meteorology, hydrology, oceanography, water resources and environment.	Professor Nguyen Ky Phung	Deputy Director
12	Dept of Education and Training (DET)	Integrating climate change knowledge into educational programs at all level	Mr Nguyen Hoai Chuong	Deputy Director

6.8 Conclusion

This chapter has reviewed features of urban development and climate change in the overall political, institutional, and socio-economic context of Vietnam. In order to understand HCMC situation, it is important to understand the hierarchical levels of the political system of the Vietnamese government, which directly influences the situation at the local level. Formulation and promulgation of policies in Vietnam belong to the domain of central government. The multi-layered administrative structure is highly centralised, with local governments reliant on the central government for approvals and budget allocation. Therefore, the analysis of the local situation which is to follow has to rest upon the overarching national context which was described in this chapter.

Climate change places great pressures on urbanisation and sustainable development in Vietnam. The government has recognised climate change as the cause of impacts on vulnerable sectors and groups and on socio-economic

development. Thus, the government has created institutional arrangements and policies, and it has developed national strategies and action plans to integrate climate change into development plans. In this context, the Ministry of Natural Resource and Environment, the Ministry of Agriculture and Rural Development, and Ministry of Construction are the three most important agencies involved in coordinating the implementation of National Target Programme (NTP). The latter is the national guideline framework for development of action plans to respond to climate change. However, this framework remains too general for implementation at the regional and local levels, and the capacity of local people in this area is limited. The ambitious goals for adaptation to climate change, as well as seriousness about addressing the effects of climate change shows that the NTP means more to the government than 'window dressing'. However, it is difficult for planners to know where to begin, what process, which methodology, and which tools should be used, who should coordinate this work, and who needs to be involved, among other things. A review of the available literature found that improved coordination, as well as better management and communication across government are needed to efficiently increase the city's capacity to adapt to climate change.

As Vietnam's biggest City, HCMC will be extremely vulnerable to climate change impacts in the future because of its topography. In the twenty-first century, urban flooding has become a wide-spread phenomenon and is a major concern that has accompanied HCM city's rapid growth and rapid urban development. HCMC has developed institutions and carried out action plans to deal with climate change, especially mitigation and adaptation measures. However, weaknesses in governance and the inadequacy of planning to reduce flood risk currently put high pressure on all management level of HCMC government. There has been no mechanism for cross sector and cross level coordination, nor any clearly integrated structure for supporting climate change adaptation related activities. Moreover, insufficient

financial resources and inadequate educational backgrounds, poor levels of transparency and accountability, and mismanagement across different scales of government administration have been cited in field work interviews (reference) as hindering effective management. Therefore, improving the response to climate change will require attention to the effectiveness of institutions.

CHAPTER SEVEN

DISCUSSION ON THE MAJOR ISSUES ARISING AND THE WAY FORWARD

7.1 Introduction

This chapter is developed based on the discussion of the major issues arising from planning for climate change in HCMC as outlined in chapters 5 and 6. In chapter 5, the research examined the issues arising from the rapid pace of urbanisation of HCMC and its linkage with climate change. HCMC's rapid growth of both planned and informal expansion into its low-lying and former wetland surrounding areas make HCMC likely to be a hotspot of vulnerability to the impacts of climate change, particularly urban. Chapter 5 pointed out the conclusion that the urban planning and management system of HCMC have not kept up with rapid urban transformation leading to constraints at all levels of HCMC government and that the problem has been exacerbated by climate change.

Chapter 6 focused on analysing the institutional situation in the local context and an assessment of the institutional capacity of HCMC in dealing with climate change. The multi-level system and cross-scale networks at national and local level are examined. Analysing the role of relevant stakeholders in the process of flood planning and management for floods and climate change adaptation in HCMC highlights the important roles of two key institutions: Department of Planning and Architecture and Steering Centre for Urban Flooding Control. Findings from the fieldwork show that almost all participants (government officials, urban planners, and urban experts) in the interviews concluded that in order to achieve urban sustainable development, local government should play a key role in addressing adaptation. Thus, the local approach to planning is likely to be the most important in adopting effective responses. Assessment of the current adaptive capacity of government agencies indicates that the current weakness in governance and failure of urban planning in reducing flood risk puts all levels of HCMC government under great pressure. Respondents believe that climate change is a new challenge for urban development in HCMC and should be integrated

into urban planning process. The urban planning authorities seek to cope with the consequences of climate change through incorporating future climate risks into existing decision-making process.

The present chapter draws on the interviews and documentary reviews from the fieldwork and focuses in particular on significant ideas and opinions of interviewees about the key challenges making climate change an integral part of urban planning decisions in HCMC and how to resolve the perceived gap between necessary actions and existing capacities. The interviewees' opinions is summarised in three main themes: strategic spatial planning, flood management and recommendations for coordination. Drawing on different perspectives and expertise, the highly valuable ideas from respondents will be worth incorporating into research conclusion and recommendations as well as offering a new contribution to knowledge in this area.

7.2 Urban planning, urban flooding and climate change - the challenge for integration

Literature indicates that spatial planning should play a major role in reducing risk related to climate change by formulating ideas, policies and programmes, as well as implementing these through collective action. The fieldwork research focused on interviewing key agencies working in the fields of urban planning and flood management. The two key institutions: the Department of Planning and Architecture (DPA) and the Steering Centre for Urban Flooding Control (SCFC), which are directly involved in the process and decide the results of planning and flood management in HCMC are examined in chapter 7. This section continues with a discussion of the challenges in mainstreaming climate change, and urban flood risk into planning process and the experts' opinion on this.

7.2.1 Integration

Recent studies have highlighted opportunities for local government to play an important role in planning adaptation and the local approach to planning for change is likely to be the most effective (World Bank, 2010; Storch, 2008). As discussed in Chapter 3, adaptation is a process by which urban planning authorities seek to address the consequences of climate change and the process of adaptation needs a planning framework to incorporating future climate risk into decision making process at the urban level. The HCMC case supports the view that climate change adaptation needs to be integrated into urban governance organisation and processes, in order to promote sustainable urban development.

All the interviewees were aware of the climate change issue, especially as it relates to urban flooding in HCMC. The vital role of urban planning in dealing with urban flood and climate change is highlighted. HCMC has an urban planning system that provides the spatial planning context for the city as a whole and the relationships between different land uses and development sectors. In general, interviewees consider the planning system a key public policy area which ought to anticipate and prevent the impacts of unavoidable climate change and to take advantage of any opportunities planned urban development might bring.

The Deputy director of DPA confirmed these points as follows: '*In the context of climate change that has been strongly affecting Vietnam cities, especially HCMC, integration of climate change into urban planning process is an urgent requirement, therefore, should be legalized as compulsory requirement during planning process through legal documents (ie.: Guidance Circular) instead of project-based and voluntary approach as of now*' (HG-09). He emphasized the need for formal changes in the system. This is reflected in other responses and there is agreement that in order to effectively integrate climate change into urban

planning process, it is required to conduct early integration including planning on space, land use, urban design, transportation, water supply, power supply, communication, rain-water drainage, technical preparation, waste-water drainage, and environmental hygiene (interviewees-DPA). However, to date, an expert from Mega Project in HCMC highlighted that climate change has still not been integrated into the master plan of the city. '*Despite many initiatives taken by HCMC authorities, existing research show that climate change in not integrated in the planning process at the municipal level and even where action plans are prepared they are not implemented*' (HE-11). Some efforts are now being taken to address this.

Integration of cross sectoral departments in HCMC administration is found to be constrained by existing structures which officials have to navigate to create legitimacy for climate actions. The urgent problem facing HCMC is urban flooding, but the master plan even does not specifically deal with flood protection '*In the master plan, it is unclear which zones are protected to what level and what is expected of developers when building in specific zones. It does not explicitly state which measures can be taken to prevent flooding, and in which sequence these measures should be taken*" (HE-04). The emphasis on formal changes in the system can be seen to reflect the strongly top-down character of urban planning governance.

In addition to legal change there was agreement that they also indicated the important responsibilities of urban planners to deal with flood-related problems in HCMC (HG-09) and specifically the urban planners in the design of planning and urban areas need to organize work-in-living in urban areas, focus on preventive factors for the future, not only providing shelter, workplace, travel and resting places, but also focusing on planning land elevation.

The scope of planning and relationships between plans also needed to change. For example: *'The urban planners should focus on developing substantial elements of urban infrastructure in terms of responding and mitigation (plans to regulate the tank according to the water level) in the direction of adapting to the natural disaster or catastrophe, but not against disaster. The proactive measures such as reducing consumption and emissions; using permeable surfaces instead of waterproof surface will be used to enhance drainage in urban environment'* (HE-03).

Another challenge for urban planning in the city is that HCMC's urban planning comprises three types of plans including: (i) land-use plan (prepared by DONRE), (ii) construction plan (prepared by DPA), and (iii) sector plans (urban transport, water supply and drainage, housing) prepared independently by technical departments and agencies. The lack of horizontal integration leads to overlapping competencies and competition among agencies (Webster and McAlwee, 2009). Each sector develops its own climate change action plan, which would afford a more concrete response. "*The coordination between the three types of planning is still lax. For example: construction planning tends to ignore the socio-economic factors, while the strategic planning of socio-economic development in the sector of investment plans seem to be less interested in aspects of space and environment. Consequently, urban planning is not realistic and feasible'* (HG-01).

Since the land use plan development is independent of the sector plans, there are no true systematic spatial considerations for infrastructure investment planning. Therefore, there is a call for unification of land-use planning (determining land use purposes) and construction planning (determining construction-related rights), as in almost all other countries, in order to simplify the planning procedures and facilitate the cooperation among the agencies and entities. There is a need for '*a unique planning product, including land use planning and detailed construction plan, it is integrated urban planning on economic, social, environmental protection and infrastructure in harmonization towards the goal of sustainable development. Integrated urban planning has flexibility*

with the participation of the state, investors and local people to make up the power to mobilize the resources. This is a management tool of the government. It will help to prevent the overlapping and wasteful in urban development' (HG-20).

Recognising the significant challenge of searching for a planning approach for enabling future sustainable urban development, in 2008, HCMC People's Committee established a special agency, 'The HCMC Institute for Development Studies'[7] (HIDS) with a mandate to integrate the process of socio-economic development planning, environment with urban master planning. This agency has the key role in assisting HCMC's Party Committee and People's Committee in analysing and evaluating actual circumstances, as well as proposing the solutions to strengthen the policy information in socio-economics, urban and environment.

Another important function of HIDS is to establish the information system for the use in socio-economic development and environment forecast in order to support effectively the City's Governance and the socio-economic development policies. However, this new concept is slow to yield results. '*The establishment of HIDS is very necessary and it shows the right decision from HCMC authority. However, in order to solve the barriers arising from rapid urbanisation, urban environment and climate change, as a highly centralised city, HCMC needs to receive more decentralisation from the central government. Because, centralisation in HCMC is intended to tightly control the city and prevent its city authorities from forming regulations or policies that could hinder investment, enhance local benefits or deviate from Party guidelines. Yet, it also restricts creativity, stifles initiative and hampers the solving of urgent issues facing the City'* (HE-13).

7. HCMC Institute For Development Studies (HIDS) was founded based on the consolidation of Institute of Economics, Social Research Institute (belonged to the People's Committee of HCMC), and the Institute of Construction Planning (an affiliate of the Department of Planning and Architecture).

Compared with other cities and provinces in Vietnam, the planning in HCMC is still executed in the top-down way. Planning targets are predetermined by upper levels, thus making planning less flexible and limiting the capacity to mobilize all social resources. The formulation of planning objectives often focuses on determining plan targets (indicators) rather than addressing basic issues and development problems. Furthermore, all planning products have rapidly become obsolete in the face of constant changes of reality.

Besides the awareness of problems of urban planning and flood management raised by interviewees, they also proposed some improvements for HCMC's planning in order to lessen these problems.

7.2.2 Evaluating the gap between urban planning and flood management

Urban planning

This section builds on the identified key constraints critical challenges faced by planners and decision-makers in integrating climate change considerations into the planning policy framework for HCMC.

Findings from the field work show that tools to evaluate and integrate climate change issues into urban planning in HCMC are lacking. Currently, in the urban planning process, environmental issues are considered a mandatory element of planning through the use of strategic environmental assessment (SEA). SEA is a valuable process and a response instrument for transferring scientifically well understood and documented problems of climate change into adapted planning systems and for selecting criteria to access these in the context of complex planning systems. Thus, it can be utilized as a tool for climate change integration. However, in Vietnam, climate change is not considered as an environmental issue. Therefore, neither the current master

plan nor the draft master plan of HCMC takes climate change into account. Because SEA does not explicitly address it.

Interviews with planners at the DPA revealed the gap in knowledge related to climate change. The DPA lacks concrete information about climate change, and they are not in a position to build solutions for urban areas coping with rising sea level. In some areas, basic data such as topography and flood risk is not available. Asked in interviews about future climate change risks in HCMC, most of the planners responded that they only have a rather vague idea of climate change impacts. Many said they have learned their climate change information only from the public media. Almost all interviewees based their assessment of future natural hazards on experiences from the past. Normally, land elevation planning for construction considers the advantageous positions to build infrastructure avoiding areas vulnerable to flooding. They also determine storm water load and catchments. However, all the information inputs on this are usually based on historical statistical data without integrating climate change scenarios such as changed precipitation pattern and sea level rise. The issue of lack of information has resulted in a failure to identify and implement policies and measures to address the climate change related risks. Lack of skills and experience to adapt to new pressure from climate change is a challenge for planners and policy, decision-makers.

Another barrier is the difficulty of accessing available information related to flooding. For example, DPA has a special agency, namely the Centre of Planning Information (CPI), but they do not have information related to flood risk management and have been unable to get the information from SCFC. They only have general information on climate change. There are no normative standards and codes practice requiring on this issue, to which can be applied technical, financial and economic factor that can force investors, designers, government agencies should apply and implement.

This problem relates to the lack of mechanisms for data sharing and public access caused by lack of co-ordination in the administration of data. This leads to difficulties for urban planners and decision-makers to identify what data is available and which body hold it. Moreover, it is common in Vietnam to charge for access to data held by a particular public organization. Thus, controlling of data provides a mechanism for generating revenue but may also place it out of reach of planners who are working with limited budgets. Another issue raised by interviewees is data fragmentation. Government departments collect data related to their own sectors as needed. There is no common database or regular system of data collection and sharing. Many sectors at all levels own various data related to planning and climate change, but in some cases, data is inconsistent between sectors and agencies. When a department needs the data beyond its purview, it must request data from other departments, which besides being inefficient, also discourages departments from developing a holistic understanding of the effects of its actions on the city.

Besides the issues related to a lack of sufficient information and data sharing between local and higher-level government agencies mentioned above, another issue arising in urban planning in HCMC relates to implementation. Planning and implementation are irrelevant as discrete components.

"*Planning design is effective and standardise, but the management of implementation is difficult because there is no responsible agency to manage and the role of the institutional agencies is unclear*" (HE-07).

The issues of lack of human resources with the appropriate qualifications and training as well as a lack of financial resources for conducting the modelling work or hiring external consultants are other constraints facing the government officials in HCMC. The fundamental problem of the planning system in HCMC seems to lie not in the lack of formal regulations, but rather

in the correct application and implementation of these. Thus, capacity building for staff members in the local administration is necessary.

Urban flooding

The Steering Centre for Urban Flooding Control (SCFC) is the special agency which plays an important role in dealing with urban flooding within the city. The term 'flood control', instead of 'flood prevention', in the title of SCFC represents its passive reactive; i.e. it only addresses problems which have already occurred. The municipality's concern with the problems of flooding, reflected its establishing the SCFC, is still not sufficient. SCFC makes its own plans following the orders of the Ministry of Transportation. It is making short term, feasible, and local projects based on the financial capacity and actual organization. Therefore, in terms of long term sustainability, SCFC's work is ineffective for the long term due to its passive and short-term characteristics. Its awareness of responsibilities and scope of work is insufficient in respect to addressing preparedness for climate change. There is no planning to build long term or climate change future oriented solutions, the organisational structure to implement these, or to test the results to find persistent problems. The principle concern of the SCFC is to apply for and claim financial government aid.

An interview with an official from SCFC admitted that floods, aside from natural occurrences, are also caused by human management, such as inadequate drainage systems, lack of dykes and silting up canals, etc. An interviewee - a manager of drainage projects in the SCFC – suggests that flooding point in the city have been reduced 60-80% comparing with 2009 although the data does not support this. He also said that different institutions play different roles and have different links with each other in each step of project. This is quite complicated and time-consuming because the SCFC is a specific centre, and does not have the right to approve projects. Although,

financial resources for flooding projects come from two main sources: ODA fund and City Budget, the SCFC still does not have enough money to invest in large-scale constructions such as regional dykes.

On the other hand, from the viewpoint of interviewees from HIDS, many large-scale projects for flood prevention provide a pretext to intervene aggressively into the natural surroundings. These projects are often based on long-term scenarios policies in their favour. The common feature of these projects is the approach of "*predict and provide*". This method is dangerous because long-term forecasts are often inaccurate, especially in terms of the uncertain conditions relating to climate change (HG-21). These large-scale solutions often will be not flexible enough to adapt to uncertain factors, and also require enormous amount of resources that are difficult for current macroeconomic conditions (HG-02). Another factor which should be noted is complicated and risky operation and maintenance of large-scale systems.

From another perspective, an interviewee from DPA suggested that the SCFC has its own tasks, under control of the Ministry of Transport. '*They work with feasible and short-term projects based on realistic finance and resources. However, their work is quite passive and ineffective when chasing to fix flooding problems existing in whole city. They also lack the sufficient concern in flooding situation and responsibility*' (HG-11).

7.2.3 Coordination issues and what might be done

This section examines the prevalent gap in coordination in multi-level governance in the context of climate change adaptation planning and urban management. The multi-level governance concept, which provides a flexible conceptual framework to understand the relationship between agencies in the cities or between cities, regions and national government, was previously analysed in chapter 3 of this thesis. The governance of climate change is a

complex, multi-level process, and the capacities of local governance and planning for climate change are significantly affected by the relations between national governments (vertical coordination) and between different agencies and policy divisions within municipal governments (horizontal coordination) (Bulkeley et al., 2009). Therefore, this part of research highlights the emerging issues from horizontal and vertical collaboration of municipal governance of HCMC in climate change adaptation planning.

Leadership and institutional coordination

As discussed in chapter 3, leadership and institutional coordination are identified as key factors shaping local capacity to act on climate change governance. The results of the fieldwork analysis show that, even more than the lack of information, the lack of coordination among government agencies including sharing of information is the key challenge in HCMC. For example, many agencies collect data and produce corresponding indicators, maps and reports, but they do not share these data or verify them with other relevant agencies.

According to an interviewee from DPA, without compulsory regulation from the higher government, planners and flood managers do not want to work together because of the time consuming nature of collaboration, and the potential disturbance to their own work programmes. However, the reasons specialist institutions do not work together is because of a lack of shared leadership. The main leader should be the HCMC People's Committee, connecting them together. On the other hand, the tasks of some institutions overlap one other in urban management; the SCFC, DOT, DPA and the Department of Agriculture and Rural Development (DARD) for example. '*There is no contradiction, but only inconsistencies between land-use planning and flood management*' (HG-33). Often the land-use planning and flood management strategies are not effectively integrated with one another.

Some interviewees from DPA and SCFC agreed, however, that in order to build up adaptation strategies and achieve urban resilience, there should be cooperation between the DPA and the SCFC in the very early phases of projects. This means sharing the same strategies, goals, and orientation, in order to generate the best solutions for a complete planning process (from design phase to implementation phase). Sharing similar opinion with the interviewee from DPA, the former vice-director of DPA concurred with this view that cooperation is a must, and recommended that it should happen regularly every week to follow easily the process (HE-09).

The main role of spatial planner is managing space for development and infrastructure. For that reason they have to work with flood managers, instead of working independently as they do at present. The HCMC PC could play an active role in linking the SCFC and the DPA. According to the Professor and Dean of Urban Planning Faculty, HCMC University of Architecture, the National Target Program on adapting to climate change, including coordinating organization and coordination mechanisms both vertically and horizontally, the importance of this collaboration is the problem of how to implement specific projects and action plans at local level. The scale of coordination and funding depends also very much on financial factors.

In addition, a remarkable point stressed by an interviewee from HIDS is that no regulations or laws define the role and responsibilities of planners and how they treat relevant actors in project. This is a fault of the political mechanism: existing low salary levels leads to a lack of responsibility and poor quality of work; and there is no strict law to control poor planning. Therefore, he suggested some improvements: '(1) *Strict law and rational regulation should be considered and suitable to market economy;* (2) *Defining a clear and concrete responsibilities for each stakeholder in a planning project (contractor, investor, inspector, designer, government, etc.)*; (3) *Improving salary levels because they effect responsibility*' (HG-05).

However, an interviewee from the Urban Planning Institution (UPI) suggested the objective of living with floods in a sustainable and reduced-risk way. In order to achieve this objective, we need to overcome many obstacles, in which we need understanding, consensus, and collaboration among related parties. Any complicated technical matters should then not be a major obstacle. He suggested: '*If we are lacking 'understanding - consensus – collaboration', we cannot mobilize the shared desire to minimize the risk of flooding and damage. There are two principles: respect for the space of water, and the principal of minimizing damage in a proactive way. Each person, depending on capacity, location, occupation and situation, will be able to come up with the most appropriate activities'* (HG-40).

According to an interviewee from the DPA, with respect to the government, they have to implement two principles as laws/regulations (HG-15). In respect of communities, they should not expect that they will be completely safe with anti-flood measures. In addition, they should actively find ways to mitigate the damage themselves, with the support of government. With respect to technicians, they should give priority to interdisciplinary ideas, proposals, and solutions, instead of working independently as they are doing now. Once agreement is made upon similarly oriented principles, consensus and collaboration will become easier to pursue.

The types of challenges identified in the research interviews suggest some potential solutions in the HCMC context. During the plan-making process, especially before the final decision is made, participation and negotiation should be in the hands not only of the policy-makers and the expert groups, but also in the hands of citizens' representatives. Moreover, the expert group should include more multi-disciplinary interaction, in particular during the first stages of the plan-making process when the basic decisions for further strategic development are made. According to the reflection of interviewees in HIDS on meeting residents, public participation should start at the beginning

of a plan-making process. Each planning project should establish a 'social' group of experts who is responsible for explaining the common interest. An individual group for local residents will help to raise the importance of their role in planning process. It is an essential step towards generating understandable and acceptable objectives, and towards ensuring efficient implementation. Although consultation and consensus - building make policy - making a slow process, the final policy decisions is more likely to enjoy wide support and effective implementation. However, in the Vietnamese situation of highly dynamic urban development, lengthy plan-making processes are likely to be avoided because of increasing capital budget costs for planning of projects.

Nevertheless, from the planning to the reality is a long distance; and in many cases, a good proposal is not enough to overcome the challenges in reality. Therefore, there is a need for some organizations or institutions to stand for the scientific and impartial perspective, to link all the factors together in terms of techniques (interdisciplinary and multidisciplinary), for training and for developing relationships (between the community, the state and the group benefits). Thus, the approach is always the multi-objective and integrated solution. The Dean of Urban Planning Faculty, HCMC University of Architecture also agreed about the importance of inter-disciplinary and multi-disciplinary coordination. He suggested that '*this coordination is not only technical but also needed in relationships between the MONRE (land area) and the MOC (building area) and other Ministries'* (HE-03).

To sum up, most of interviews admitted the overlap of tasks of some institutions in urban management, as well as the lack of coordination and cooperation between relevant institutions, between the city's offices with the district-level authorities, and between the public and private sectors. The problem in HCMC seems to be - the leadership - the issue of lacking of a main leader in connecting all institutions to tackle climate change. Thus, there is a

call for the dynamic role of HCMC People committee in carrying out this task. There is also a call for stress on implementation of planning projects, which need financial resources and cooperation capacity. Moreover, climate change information is still difficult to access; and solutions for coping with rising sea level are quite general and ambiguous.

7.2.4 The necessity of e new roles for the key agency in planning climate change adaptation:

Asked about the role of the Department of Planning and Architecture (DPA) in flood management and planning climate change adaptation, the Vice director of Architecture Research Centre (ARC) at the DPA remarked that the DPA only works solely with objective and 'structural' solutions, like building dykes, or implements to the building codes, etc. They specifically identified that there is also no interdisciplinary cooperation. There is vertical management instead of horizontal management. The main task of the DPA is applying the master plan with the long-term strategy for urban development, under the control of Ministry of Construction. In other words, they just work on paper by appraising and approving the design projects normally by consultants. In short, the DPA has a general view but it is quite impossible because of not basing these upon the financial situation and on management capacity (HG-19). The research proved that planning lacks its crucial role in the context of flood management. There is no serious consideration for non-structural measures for flood control that relate to the broader management of flood risk and development of climate change adaptation capacity, and the relationship between floods and planning is not indicated clearly in the established legislation.

Moreover, some interviewees from the DPA stressed that '*Climate change is a fuzzy concept. Because, until now, it is just expressed by general scenario instead of concrete solutions for each specific context (e.g. regulations, laws, designing solutions,*

management, investment, etc.)' (HG-10, HG-13, HG-17). Current spatial planning has not taken into consideration the evaluation of zones for emergencies such as floods, hurricanes, and earthquakes, especially in the context of climate change, when the extreme events tend to occur abnormally and unpredictably. They do not have a strategic and long-term approach; i.e. the only solution to date is raising the elevation for flood-prone area, which is a passive and short-term solution.

7.2.5 Multi-agency working

Stakeholders in urban planning do not currently work together. The DPA hires consultant companies to set up master plans (from general to detail), which in turn affects to the quality of planning projects. Then the DPA evaluates and approves the drawings. Private consultant companies automatically update information on planning (related to climate change). In the event that they do not have comprehensive knowledge, the solution will be short-term. The current planning does not take climate change into account.

From the perspective of an international planning expert with more than 10 years' experience in urban planning in HCMC, the director of PADDI[8] emphasized the weakness of existing urban planning systems in HCMC, related to functional fragmentation in the planning process (HE-13).

8. PADDI is a decentralized cooperation public entity established jointly by the Rhône-Alpes region, Grand Lyon and Ho Chi Minh City. PADDI is a public organization, which is financed by both regions, focusing on urban planning and management. Based in the Institute of Urbanism of HCMC (under HIDS' authority), PADDI is a Vietnamese centre established 24/01/2006 under decision N°08/2006/QD-UBND, and is directly under the authority of HCMC's People Committee, through the Department of Urban Planning and Architecture (DUPA).

The key plans: the socio-economic development plans (prepared by DPI), the urban master – plans (prepared by DPA), the transport and infrastructure plans (DoT and DoC) and the housing plans (prepared by DoC) are not well coordinated with one other, nor with the city level administration. They are run on different schedules and often use inconsistent data and projections in their planning. Furthermore, an interview with the former vice-director of PDA concluded that there is a dilemma between flood risk management and urban planning because flooding solutions adapting to climate change will decide the land elevation for building in city, while urban planning does not take into account climate change at present. However, the DPA is still awaiting flood policies from the Ministry of Agriculture and Rural Development in order to decide land elevation.

This waiting for coordination issues delays many decisions and makes the present work of planning become objective and prodigal in the future. '*Therefore, the main point is that flooding solutions should be concrete and clear in deciding which areas for developing and in defining target areas for flood prevention*' (HE-09).

Regarding modern flood control measures, an interviewee from DoNRE pointed out, '*Instead of only focusing on reducing the frequency of flooding, as we are doing now (flood protection), the innovative solution should be finding ways to minimize damage when flood occurs (flood resilience)*' (HG-28). This indicates there is often a good understanding of technical issues but a lack of capacity to address them.

This is a cross-sectoral issue in which the urban planning centre plays a central role. Therefore, the best form of flood risk management is to do it in parallel. Alternatively, HCMC still implements the technical preparation for large-scale projects of tidal control but is opposed by the MARD. On the other hand, the city also implements the flood control projects as required according to the perspective of the Dutch government.

In addition, the SCFC has also successfully implemented many local, small-scale projects to solve flooding problems directly and immediately, rather than relying on large-scale projects. This has brought many good results for the city.

7.2.6 Engaging communities

The importance of engaging a range of stakeholders and partners in addressing climate change locally has been emphasized in the literature on climate change adaptation measures (Bulkeley et al., 2009). Municipalities involving the public become an important issue in terms of implementing action plans and projects. The research, based on Bulkeley's suggestion, set out to analyse two strategies: (i) involving various forms of public education; and (ii) focusing on the provision of incentives, services, or implementation of specific projects. For the case of HCMC, these entail a higher degree of involvement on the part of both the community and the municipality.

Educating the public:

As outlined by Bulkeley et al., (2009), public education has been a strategy deployed at all levels of government to inform the public about the nature of the climate change problem and how individuals might change their behaviour in order to address this challenge. This research involved carrying out interviews in some big universities and institutes in HCMC, focusing on the scope for social or institutional learning among planning communities, the production and communication of climate change knowledge, issues of attitudes and behaviour. Almost all responses from interviewees criticised the lack of official websites, educational programmes, guides and checklists, and also the lack of public education campaigns about climate change. Although the HCMC municipal authority has deployed climate change campaigns at some high schools and universities, the results are not as expected. An analysis

in the three biggest architecture universities in HCMC, where more than a thousand of architects and planners graduate annually, the issues of climate change mentioned in the teaching programmes are general and very limited. There are no special teaching programmes integrating climate change issues into training. As stressed by an interviewee from HCMC University of Architecture: "*We all know about the serious effects of climate change on the urban areas and the importance of bringing climate change issues into teaching/training students in order to raise awareness of this issue for communities - but we have no policy or instruction from government to carry out change. Moreover, although the climate change issue is now increasingly mentioned as an urgent problem, we do not have enough scientific information nor the capacity to integrate it into teaching programmes at University*" (HE-04). There is a call for attempting to inform and educate citizens about climate change as a compulsory measure.

Involving communities:

As noted by Wilson and Piper (2010), climate change is multi-dimensional – not just across the mitigation - adaptation dimensions of response, but across the economic, social and cultural contexts of its causes and consequences. Thus, there is the critically important question of how knowledge about climate change is communicated; not only to professionals and experts, but also to civil society and to the lay public. In addition to public education, there are several approaches to involving communities more directly in addressing climate change. In the case of HCMC, in terms of climate change adaptation, the roles of communities and civil society participating in planning process and climate change adaptation planning are blurred. Participation planning is actively working in HCMC, but in reality, the voices of local people, of academics and of practitioner experts are not strong. The local authorities considered their opinions as a reference only. That is the reason that the research approached and interviewed the planning official in government rather than citizens or the people in civil society. Another issue is that people

and even media sometimes had no access to planning information. This lack of transparency negatively impacted the acceptance of and compliance with regulations by all actors. The disclosure of planning documents is mandatory by the 2009 Law on Urban Planning. However, the Law does not clearly specify the means of planning information disclosure and methods of voicing complaints on planning. Currently, the expression of people's opinions on planning seems to be quite limited and it should be more open. However, in climate change mitigation, there is the participation of range of communities in reducing greenhouse gas emissions. The local government has promulgated special policies in developing the eco-city, the green city, green electricity schemes or encouraging the use of renewable energy resources.

7.2.7 The Value of Expert Opinions

From the viewpoint of academic planner at HCMC National University, he put forwards a proposal that:

'One of the important criteria for floodplain management in strategic spatial planning is the permeability of the surface. People pay more attention to the material of urban surfaces (e.g.: tiling the pavement or footpath with hollow bricks, combining with the alternating grass instead of cement or concrete, using many green carpet instead of "concrete" surfaces in urban areas). These criteria can be transformed into urban management as indicators, for example: the rate of empty/ solid of the surface; i.e. turn quantified-quantification, criteria, qualitative into the evaluation quantitative index' (HE-02).

According to these academics, urban planning practitioners should pay more attention to building land elevation above sea level. Selecting land for building in the city should consider not only the horizontal relation (location, access, infrastructure, etc.) but also vertical factors (height, flooding depth, flooding risk, flooding scenario, disaster management, risk management, evacuation

routes, etc.). Moreover, planners should focus on developing urban infrastructure towards response and mitigation; adapting to the natural disaster or catastrophe. On the other hand, proactive measures such as reducing consumption and emissions, or using permeable surfaces instead of waterproof surfaces to enhance drainage in urban instances should be encouraged.

Current patterns of urban development, expansion and land use must be re-examined, because the dispersed urban forms generated are increasing the numbers of vulnerable urban areas. In low-lying areas, urban development activities have to be carefully conducted including land preparation and other infrastructure, because the construction cost in these areas are higher than in good land conditions and easily harm the local natural environment.

However, the reorientation of land use planning, including developing new areas away from the low-lying areas, and safeguarding natural mitigating functions, will require much endeavour, explicit zoning and protection (Storch, 2009). Furthermore, the wider implications of making 'space for water' – the strategy suggested of planners at the HCMC University of Architecture- should be taken account into planning catchments; i.e. attractive reservoirs, canals considered both as drainage system and as landscape element in planning projects. Protection of 'space for water' has been mentioned in the Vietnam planning framework, which is the foundation for further development of water space in planning design (CSIRO, 2000; DEFRA-UK, 2004, 2005).

In the planning process, both assessment tools – the SEA (Strategic Environmental Assessment) and the EIA (Environmental Impact Assessment) - should be applied effectively to evaluate impact of planning on natural environment, especially planning related to flood risk including taking account of climate change scenarios. These tools are already part of the

Vietnamese planning framework, and have been integrated in the planning process. Hence, full advantage should be taken of these tools for screening and assessing environmental factors in the integration of adaptation to urban development planning. Flooding assessment should be addressed in planning procedures. At the first stage of planning, flood managers work together with spatial planners to determine the key issues for the flood management system in the spatial plan, the relevant criteria and the way to translate the technical water related criteria into spatial criteria. Then planners make the plan according to these criteria. The basic idea for flood assessment is to create an open and fair environment of communication for flood managers and spatial planners working together at the very beginning of planning, in order to prevent potential negative consequences of planning management. In addition, it can stimulate the dialogue between flood managers and spatial planners learning to use the same specialist language about the water system.

From the perspective of the director of the Institute of Water Management and Climate Change (IWC) the role of urban planners is to respect the rule of 'space for water', and to promote all possible initiatives which can help the water space to adapt to climate change, while providing the feasibility for economic, technical and intellectual development. In terms of climate change uncertainty, solutions for water space need to be flexible enough in order to adapt to change over time (HE-01).

While drainage engineers can only provide input data about the required capacity and location of the main regulatory areas, in order to express them into urban solutions, we will need contributions from the urban planner (HE-02). The most sensible way would be for urban planners to discuss with the drainage engineers from the beginning to outline the best possible solutions, in which adaptive and damage reducing factors need to be considered initially, rather than relying solely upon flood prevention construction.

According to an interviewee from HCMC Institute for Development Studies (HIDS), urban planning should pay attention to the following three principles:

'Firstly, in all cases, we should not allow any additional overflow which is generated by the planning project. This is done through regulating spatial distribution. Secondly, the space for water should be allowed to expand in necessary in order to adapt to the uncertainty of climate change. Thirdly, the occurrence of flooding in vulnerable areas should be solved by the soft solutions to mitigate the damages in extreme events, rather than relying only on the anti-flooding constructions' (HG-01).

Planning in HCMC is now heavily dependent on financial economics without following rational development planning. High level regional planning has only deals with economic planning policy objectives and has not dealt with - nor has it mapped - wider land uses, certainly nor has it for environmental issues and MRAD is not currently addressing these issues in policies term. Limited financial resources have been scattered, investment has been inefficient and resources has been destroyed. There is also a tension between short-term socio-economic development goals and long-term climate change adaptation. The interviewees (urban planners/researchers) from the HCMC Institute of Urban Planning assumed that most of planning projects are chasing the economic benefits of urbanization by taking full advantage of land, without addressing about environmental and social factors (HG-43).

In sum, this overview has provided a number of insights the researcher found crucial for an understanding of existing urban planning issues and the challenges of climate change in HCMC. Experiencing rapid urbanization and being successful in economic terms and becoming a major political, socio-economic, cultural centre in Vietnam, HCMC faces challenges in urban development and management due to the current inefficiencies of the planning system. An effective climate change response in urban planning in HCMC is largely absent, although local planners and decision-makers have

become aware of the need for action. The existing urban planning systems are characterized by fragmentation or lack of strategic orientation; overlapping duties in relation to planning developments, confusion within planning law, lack of sufficiently unified planning databases, and a lack of capacity among local authorities. Moreover, the lack of a mechanism for data sharing and public access is an important barrier to the integration of climate change adaptation in planning. Urban planning from methodological, theoretical, and practical perspectives is presently centralised, therefore, it is less flexible to keep face with the speed of urbanization and market forces, especially in the context of globalization. Interdisciplinary cooperation has been quite restricted. A lack of available scientific information on climate change, as well as a lack of skills and experience of how to adapt to new pressures is further challenges for planners and decision-makers. Furthermore, climate change and disaster response practices are mainly structural and technical approaches. Non-structural and non-technical solutions receive less attention and application. Most urban planning projects have excluded any climate change response, even if included, no systematic approach is present, nor proper and appropriate integration tools.

In order to adapt to climate change, spatial planning is believed to be a key criterion for effective strategies to deal with the foreseeable challenges. Findings from fieldwork for this research indicated that the climate change response of the planning system is to a large extent dependent on institutional and political frameworks. Within the HCMC administration, there is profound awareness in regard to the necessity of integrating climate change issues into the decision-making process in the urban planning area. Therefore, in order to successfully apply the urban planning approach to urban resilience in HCMC, there is a requirement for a strong political will and a strong desire to reform the existing urban management system. It requires a new level of cooperation to emerge between politics and administration, between the different sectors

of administration and between academics, planners and decision makers in general.

7.3. Concluding remarks:

Most of the planning laws in HCMC tend to regulate building code or developing orientation which reach to economic development. There are some regulations for water areas; however, the focus of flood risk in planning documents stops at the city level. Documentation on flood management is just about structural engineering measures.

With respect to climate change issues, the attention has just started with Draft Circular No _/2012/TT-BTNMT (appendix) about 'Process of setting and adjustment Planning, Land-use plan'. While climate change is becoming a hot topic around the world, it is still limited in terms of the large policy in agenda and research in Vietnam. It needs more support from international organizations and more intensive awareness by government, especially in planning field. However, the appearance of Draft Circular should generate new interest in flood management that can cope with climate change in the future.

With respect to institutional structure of the DPA and the SCFC, it is concluded that they work quite separately to each other. The strong linkages in management relates to vertical hierarchy instead of horizontal cooperation. Additionally, working procedures are time-consuming because of certain reasons in decision and implementation. The general planning system also proved that top-down planning still prevails.

It seems that there is no consideration of natural features in planning procedures. The factor determining planning projects is still economic development with environmental private profit prevailing over public benefit

or environmentally sustainability. This also leads to fragmentation in planning, including building land elevation, infrastructure systems, urban design, etc. In other smaller developing areas, a large number of small developers do not ensure the development in the right track with large-scale orientation of municipality.

Different stakeholders have provided valuable opinions about practical solutions and recommendations for cooperation between spatial planning and flood control bodies. Some main ideas are about shifting from hard approach to soft one or adding more laws about responsibility of relevant actors in order to achieve the same goal - integration. However, they all agree in the need for interdisciplinary and multidisciplinary cooperation. Currently, the new programmes of the Dutch and German government (HCMC flood and inundation management project; HCMC moving towards the Sea with Climate Change Adaptation and Megacity project) can be considered as new opportunities to implement and change traditional perspectives in flood management with more coordination - not only nationality but also with outside world.

To sum up, although HCMC lacks cooperation, serious consideration of flood and climate change, or even trouble implementation of planning process, there are some positive signals and opportunities for a quantum of leap in flood risk management. The new Draft Circular and the international programmes, at least, raise a new perspective at management level and could trigger the transformation of the traditional flood control approach. With the threat of climate change and ongoing rapid urbanization in the future, it is clearly time to address the problems into integration of spatial planning and flood risk management.

7.4. Conclusion

HCMC is known as the most dynamic city in Vietnam - a centre of economy, administration, society, culture and finance. However, rapid urbanization puts pressure on the standards of living for citizens, especially on developing the city's infrastructure. At present, HCMC has some trouble with flooding because of heavy rain, low level topography, and uncontrolled development. Flooding is getting worse and affects many aspects of life such as daily routines, construction, economic damage and planning. In the future, the risk of climate change places more burden on government, and especially those working on flood management. Therefore, government needs to share responsibility among staff, and effective solutions with long term strategies need to be sought in cooperation with other key stakeholders, such as planners, environmentalists, engineers, private companies, and NGOs.

However, the traditional systems of management in Vietnam in general, and of HCMC in particular, are strongly vertical rather than horizontal. From administration management to specific agencies, government still plays a crucial role, and prevails over entrepreneurs, private parties or NGOs in the decision- making phase. On one hand, most planning solutions take a comprehensive integrated approach, within powerful top-down hierarchy. On the other hand, as a typical developing country, most of decisions are heavily affected by economic reasons and not by a broader sustainable development perspective. For that reason, there is likely harms to environment, society or even traditional culture. The typical case is about expanding the city into low-lying areas because these developments attract investment from foreign investors. Many long-term consequences have been witnessed, including social, environmental and even economic damaging aspects. Several studies have reported that new urban development activities in such low-lying areas have negative effects on surrounding areas, including frequent occurrence of flooding, due to the loss of permeable surfaces and an increased height of

riverbed levels (Storch, 2008; Storch et al., 2009; Eckert, R. & M. Waibel, 2009; Du, 2015).

According to the principles of strategic spatial planning, the strategy for flood risk management is a selective process involving major stakeholders who may come from central government or may be specialist experts in planning and flood management. Power and knowledge belonging to elites makes the selection process easier in HCMC, Vietnam. This does not mean that strategies in flood management deny the broad and diverse participation in their process. In this regard, Vietnamese planning procedures need time to improve the awareness of participation in planning among both managers and residents. With the uncertainty of climate change, in anticipation of internal (domestic economy, finance, policy, and so on) and external trends (international economy, flooding researches, NGOs support, etc.) will help to reduce the risk in flood events in big city like HCMC. Moreover, concentrating on limited strategic key issues will help managers solve planning or flooding problems in the most rational and effective ways.

To date, there has been no serious consideration given to flood management in legislation, nor even in general planning. Admittedly, there is no cooperation between specific institutions in particular between those connected with spatial planning and flood risk management. They work independently with their own forms of discourse. Water managers focus on engineering and technical water-based solutions while planners and urban designers focus more on spatial development and urban form where there is a lack of environmental policy relating to wide water basin management at the regional scale. Flooding concerns are currently limited to research and theory, although flooding agendas have a new approach. An example is the "HCMC flood and inundation management project" with its non-structural measures, instead of engineering solutions employed previously. This change opens a

'window of opportunity' for the participation of different stakeholders, and marks a new step for current flood risk management in HCMC.

Cooperation between urban planning and flood management is the key starting point for a holistic strategy to cope with flooding at present and climate change in the future. Most planning regulations and decisions about flooding is focused on an engineering approach, such as building dykes, upgrading drainage systems, concerning space for water, etc. without suggesting how to make these work effectively. For example, participation of different parties, cooperation between key institutions, and education for local residents would all be ways to make it effectively. Analysing some projects and master plans of HCMC have revealed the lack of integration between spatial planning and flood management - these show clearly in the master plans oriented towards development.

In addition, the opinions of key interviewees also reveal the implementation problem in planning. These are because of financial shortcomings, a lack of clear responsibility, and a lack of cooperation between investors and formal institutions. These hindrances suggest that there is a lacks of leadership, which would bridge these fragmented interests and guide towards an innovative approach. Most of the key stakeholders in the DPA and the SCFC said that they expect a clear solution for coping with climate change, and they need guidelines for responsibility and coordination. There is a paradox in that the tasks of institutions are irrelative, but sometimes overlap each other. This leads to a time consuming, conflicted and ineffective result. For example, there is a dilemma at present between flood management and urban planning, because flooding prevention solutions, in adapting for climate change will decide the building site elevation in the city. Meanwhile, urban planning does not take into account climate change at present. However, the DPA still expects flooding solutions from the MARD in order to decide building site elevations. This time for DPA waiting for policy from MARD delays many decisions and

makes the present work of planning monumental and irreversible in the future.

An inter-disciplinary approach - with cooperation between different stakeholders – appears to be the key to building a method for flood management for the present as well as for the future. However, the transformation in the way of working from a traditional approach to an adaptive one will require a long-term strategy with incremental change; step by step. With the emphasis on the internal system and with the influence of the external environment, new horizons will be opened up with the realization of innovations at management level for the developing country such as Vietnam. However, adaptive strategies for complex problems of the present flooding and of flooding uncertainty accompanying climate change are not possible as a general formulation, but depend on specific context in each country.

CHAPTER EIGHT

URBAN GOVERNANCE AND PLANNING FOR CLIMATE CHANGE OFFORTUNITIES FOR IMPROVEMENT

8.1 Introduction

In the foregoing three chapters of this study, attempts were made to explain the issues arising from rapid urbanisation and climate change, specifically urban flooding, and the constraints of the local government in dealing with these issues by discussing the overall evidence gathered. The previous chapters also suggested that the local approach to planning is the most important in adopting effective responses within a larger framework of flexible and cooperative horizontal and vertical governance. The situation of governance in HCMC, with the present weaknesses in the capacity of government agencies to adapt for climate change preparedness and with the failures of urban planning to tackle these issues, all levels of HCMC government are placed under great pressure. Ways in which urban planning processes will likely respond to climate change in cities varies according to local and institutional contexts, and the purpose of this chapter is therefore to provide recommendations on the practicality of integrating climate change concerns in urban planning decisions and processes, as well as improving the urban governance of planning for climate change in the case of HCMC.

8.2 Improving urban governance

As analysed in previous chapters, urban governance challenges for cities are arising as a result of new risks and vulnerabilities associated with climate change. Findings from the research show that the most promising means to reduce vulnerability is to increase adaptive capacity and to focus on more resilient ways to development. Given that climate change is not a problem that a single local government can solve by itself, learning and collaborating through networks would allow a city government to enhance its capacity to tackle climate change issues. Therefore, it will be important to consider the number of urban responses to climate change which highlights the importance of building adaptive capacity, as well as improving adaptation policy,

institutional capacities through a network approach, and coordination across multi-levels of governance.

8.2.1 Policy preparation

In terms of climate change, it is argued that the cities with the greatest capacity to tackle climate change are those with clear and robust policies and laws which allow urban planners and decision-makers to effectively shape the way such cities have developed (Lankao, 2008; Agrawal, 2008). Therefore, in the case of HCMC, in order to deal with urban flooding and climate change, the laws and policies which relate to urban planning and urban development control need to be modified to reflect the particular concerns presented by climate change. However, the important laws that relate to urban planning and management in HCMC are not only out of date, but also are less rigorous, and out of keeping with the current challenges faced by the city.

For example, most of the planning laws in HCMC are aimed at regulating compliance with building codes or orientations towards development for economic development purposes. There are some regulations to accommodate 'space of water' to help address urban flood risks. However, the attention to flood risk in planning documents stops at the city level. Flood documentation is making concerned with engineering measures. With respect to climate change issues, attention has only begun to turn to Draft Circular No _/2012/TT-BTNMT (appendix) with respect to the "Process of setting and adjusting planning, the land-use plan". While climate change becomes a hot topic over the world, it is still discussed in agenda and research in Vietnam. The climate change agenda needs more support from international organizations and it also needs the intensive awareness of government, especially in planning field. As discussed in the chapter six above, Vietnam developed the National Target Programme for Climate Change (2008) as a key policy, national guideline framework, but this framework remains too general

for implementation in HCMC at the regional and local levels with limited local capacity even if more specific.

The need to reform current policies is essential to the integration of climate change because it provides direction as to how the actions should take place. Furthermore, this research argues that the current legislation about the environment should be amended to address the specific concerns raised by climate change. Hence, it is urgently required to review existing laws and policies on urban planning and environment, as well as establish a clear national strategy and plans for responding to climate change in Vietnam.

8.2.2 Institutional arrangements

There is growing recognition in Vietnam of climate change is a problem that requires reshaping of policy, as well as institutional reform. Results from the analysis of the case study on HCMC in chapters 6 and 7 above indicated that institutional weaknesses, lack of coordinated governance, overlaps of tasks of some institutions in urban development and management, and conflicting objectives among different actors can all constrain adaptation. The literature examined in chapter 3 has showed that institutions have a major influence in responding to climate change, based on how they structure the problem and on how they devise responses to deal with its impacts. Thus, the way in which government institutions are organised is an important aspect of integrating climate change. In the case of HCMC, there is a need for institutional reform to deal with the issues related to climate change now.

This research argues that institutional arrangements are essential because policy and legislative changes alone are unlikely to guarantee climate change response actions, if not supported through appropriate institutional frameworks. Reforming institutions can support adaptation at different governance levels, by identifying the main challenges those institutions face,

and highlighting key lessons learned from their work. The work can be drawn upon to identify the concrete measures to enhance the effectiveness of institutional arrangements. As examined in the chapter 3 above, planning institutions play a vital role in dealing with current urban flooding and climate change. Hence, reforming planning processes, as well as planning institutions should involve not only changes to formal structure, but changes in the attitudes and beliefs of the government officials. In the case of HCMC, the DPA is arguably the most appropriate body to play this role, since it is in possession of the required information about climate change, which can in turn be disseminated to the public. Improvements in planning institutional arrangements are thus essential to invigorate the ways in which institutions are run, particularly in making planning decision-making processes more proactive in the face of climate change. Improvements need to be made at local government level, which can make use of partnerships and networks to streamline approaches to adaptation, development and resilience.

8.2.3 Improving leadership and institutional co-ordination

Leadership and institutional coordination have been identified as two key factors shaping local capacity to act on climate change. As highlighted in chapter 6 and 7, integrating climate change issues into urban planning processes in HCMC requires deliberate actions to coordinate the activities of the range of organisations affected by climate change. Therefore, in order to achieve urban resilience to climate change, the political leaders need to establish or improve leadership and coordination mechanisms are needed as these are important elements for institutional strengthening. Enhancing effective leadership is critical for overcoming fragmentation across departments in HCMC. Leadership is recognised as one of the barriers for mainstreaming climate change into urban planning and management.

Coordination is one of the most pressing challenges common to cities worldwide (McCarney et al., 2011). Coordination is needed to reconcile the different organisational priorities and policies, along with the range of interests that exists at different levels of government. However, coordination among different institutional levels, and different sectors or actors is a complex undertaking that sometimes may prove difficult to implement. Coordination is required mainly in two different forms: multi-level jurisdictional coordination of services vertically across multiple levels of government and inter-jurisdictional coordination of services horizontally across municipal area.

Multiple tiers of Vietnam government and various levels of government agencies are involved in the climate change agenda. In the case of HCMC, vertical coordination is weak or non-existent in some urban sectors. HCMC PC exists as the highest body responsible for urban flood mitigation and climate change adaptation. To help HCMC PC in the management of urban planning and development, DPA would be required to collaborate with SCFC in order to provide the various actors with the relevant climate change knowledge that they each need for integration into their own respective policies and activities.

On the other hand, horizontal coordination will be required among the various service providers. Coordination at this levels offers an opportunity for the actors to share climate change knowledge in addition to holding discussions about the specific concerns that preoccupy the various bodies. In HCMC case, as analysed in the previous chapter, existing governing institutions are horizontally fragmented, and uncoordinated. Therefore, strengthening horizontal coordination is crucial, as it can provide a useful platform for sharing and learning appropriate skills and knowledge related to climate change governance, as well as enhancing institutional capacities through learning from others.

8.3 Integration of climate change into current planning process for HCMC

As highlighted in the previous chapters, planning in HCMC in particular - and in Vietnam in general - does not take into account climate change issues in urban planning decision and processes. This is a common problem in most developing countries. The problem which these cities are facing is described as a lack of foresight in the design and implementation of development intervention (OECD, 1996). In the section to follow, the study will develop the integration framework and suggest steps to integrate climate change into current planning processes.

A framework for Integrating Climate Change into Planning Process

This part of the chapter will illustrate how climate change issues might be integrated into urban planning processes in the case of HCMC. The integration framework (figure 8.1) has been developed to provide insight into how climate change is applied to the main stages of urban planning. In this framework, the main and priority work need to carry out by HCMC PC is to determine the institutional coordinators who are responsible for integration. Then, the integration of climate change issues into planning process will base on the three key steps, namely: (i) Policy preparation, (ii) Implementation, and (iii) Key stakeholders.

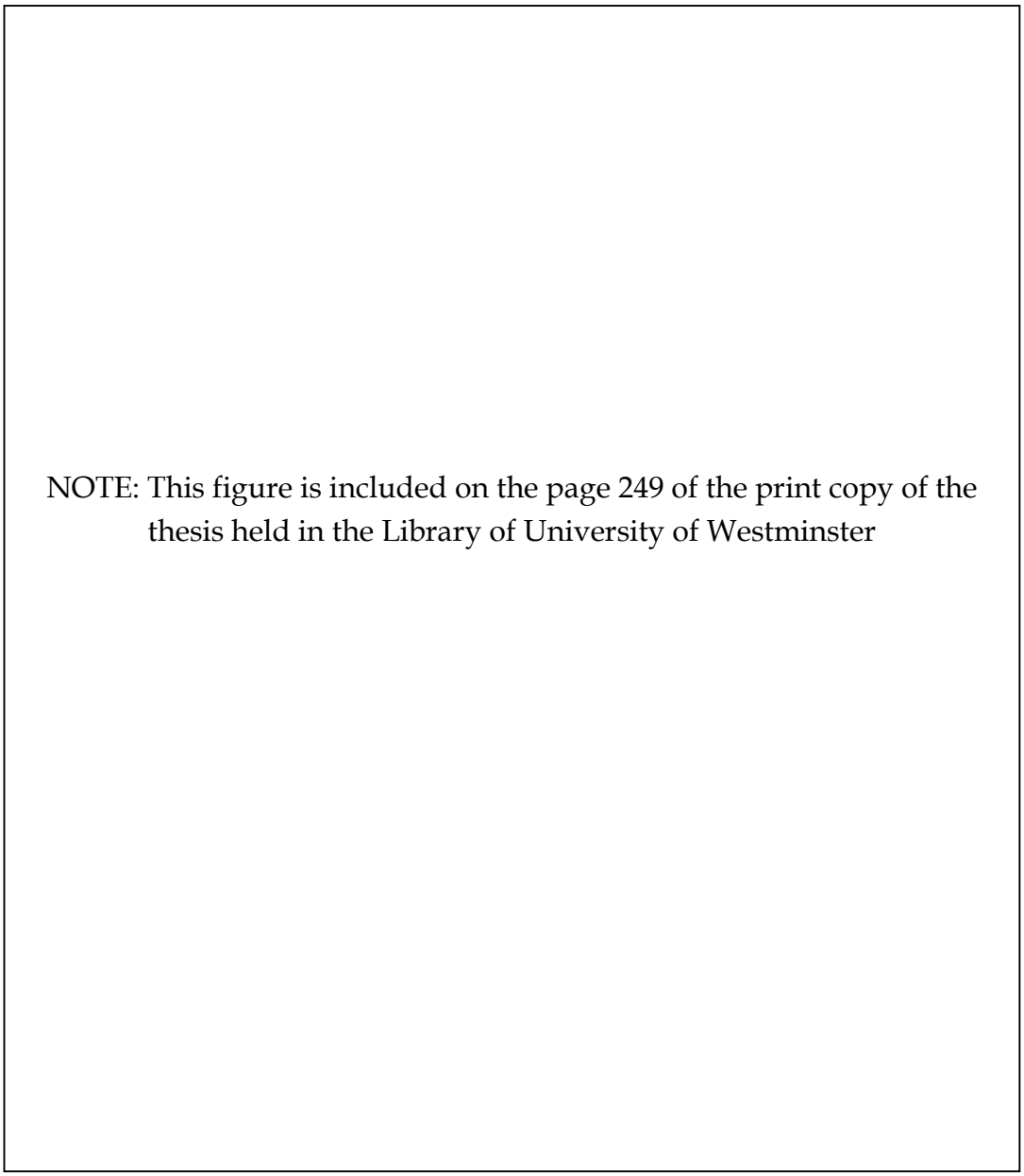


Figure 8.1: Structure of the integration framework (drawn by author)

Integrating processes:

The research suggests the integration processes in three main steps, as outlined below:

Step 1: Determination of content and which stage of planning process should be integrated.

Figure 8.2 is a diagram of all steps in the urban planning process in Vietnam from preparation tasks to planning approval. In this process, project development planning is an important stage that is modified to integrate climate change issue. Based on this process, research develops three main steps into which climate change information is integrated.

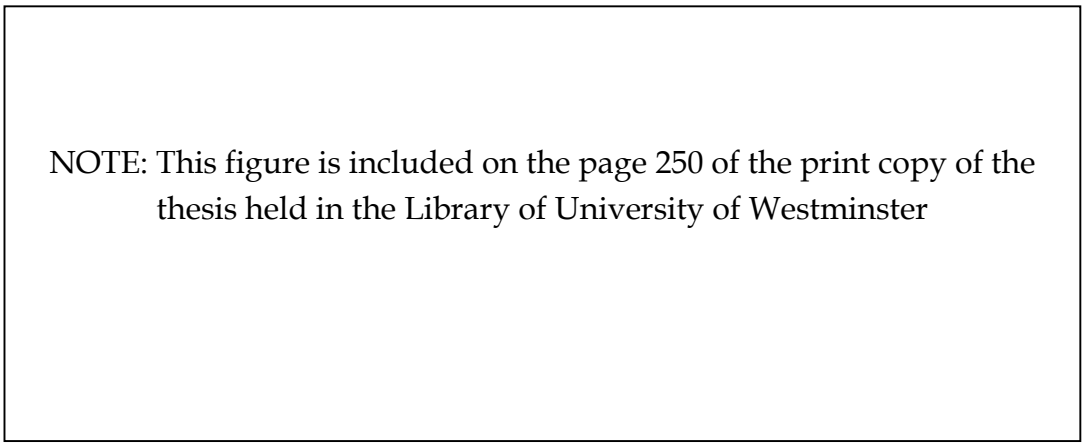


Figure 8.2: Diagram of steps in urban planning in Vietnam (drawn by author)

Analysing the current processes of formulating urban planning projects in HCMC indicates 11 steps (Figure 8.3). Based on these steps, the research will determine at which stage climate change information will be integrated and what information will be needed.

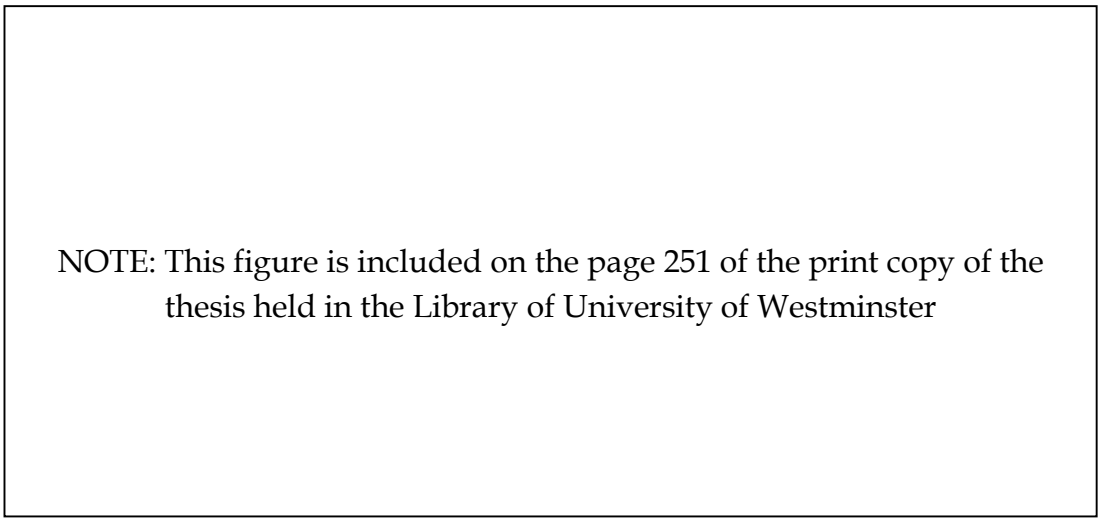


Figure 8.3: Diagram of the current processes of formulation urban planning projects in HCMC (drawn by author)

The figure 8.4 (page 253) illustrates 13 steps of integration of climate change issue in the phase of development planning project.

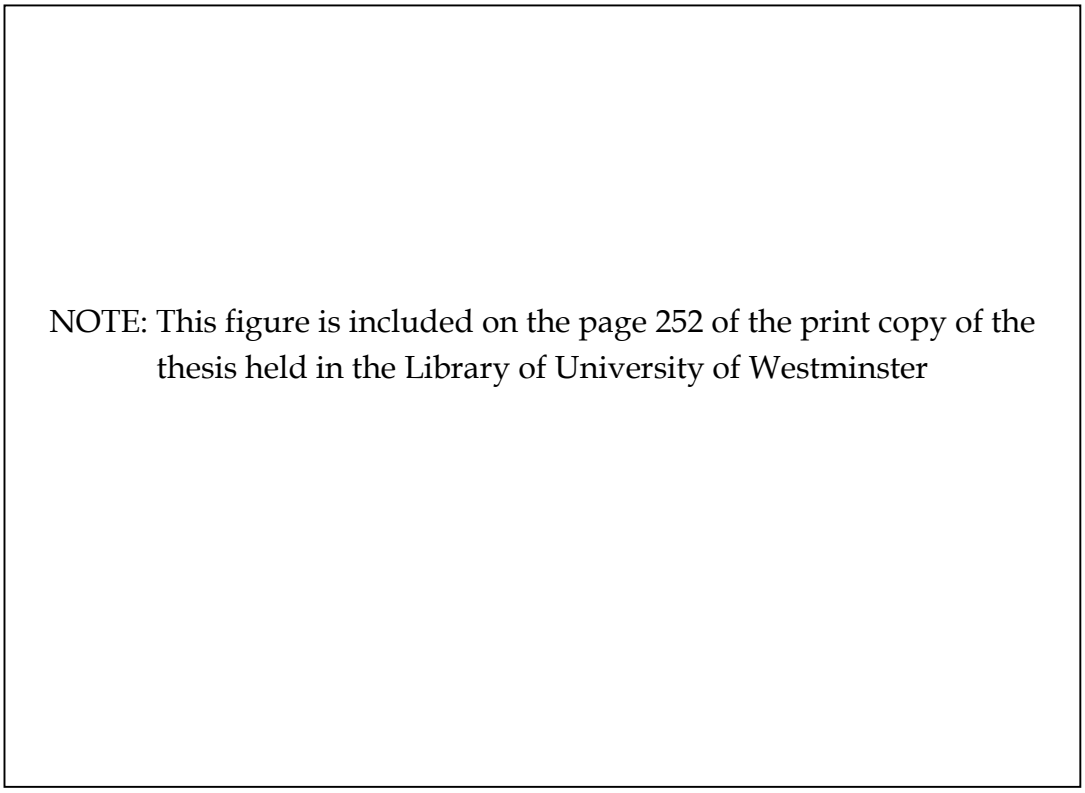


Figure 8.4: Diagram of the proposed integration of climate change in the formulation of urban planning project in HCMC (drawn by author)

Depending on the requirements, the nature of the plan, the planning mission will determine what process of urban planning should focus integration climate change into. The formulation of urban planning in particular that is the most important stage for integration of climate change issues, as well as using the rational planning solutions (zone planning) as a crucial way to achieve climate resilience.

Step 2: Collect climate change information and determine response criteria:
- Regular update and collect information, plans, regulations, and guidance related to climate change from the central and municipal in responding to climate change.

- Regularly update surveyed data, reports, and research related to climate change from national and international sources.

- Build an action plan to respond to climate change for HCMC
- Build the scientific technical standard for climate change science

- Determine the criteria and indicators to respond to climate change for planning projects, such as:

- Climate change scenarios for HCMC
- Build up the risk maps
- Ground elevations
- Solutions of green spaces, drainage, buffer zones
- Microclimate solution

Figure 8.5: Diagram of the proposed integrated content in the preparation of planning projects (drawn by author)

Step 3: Integration and processing

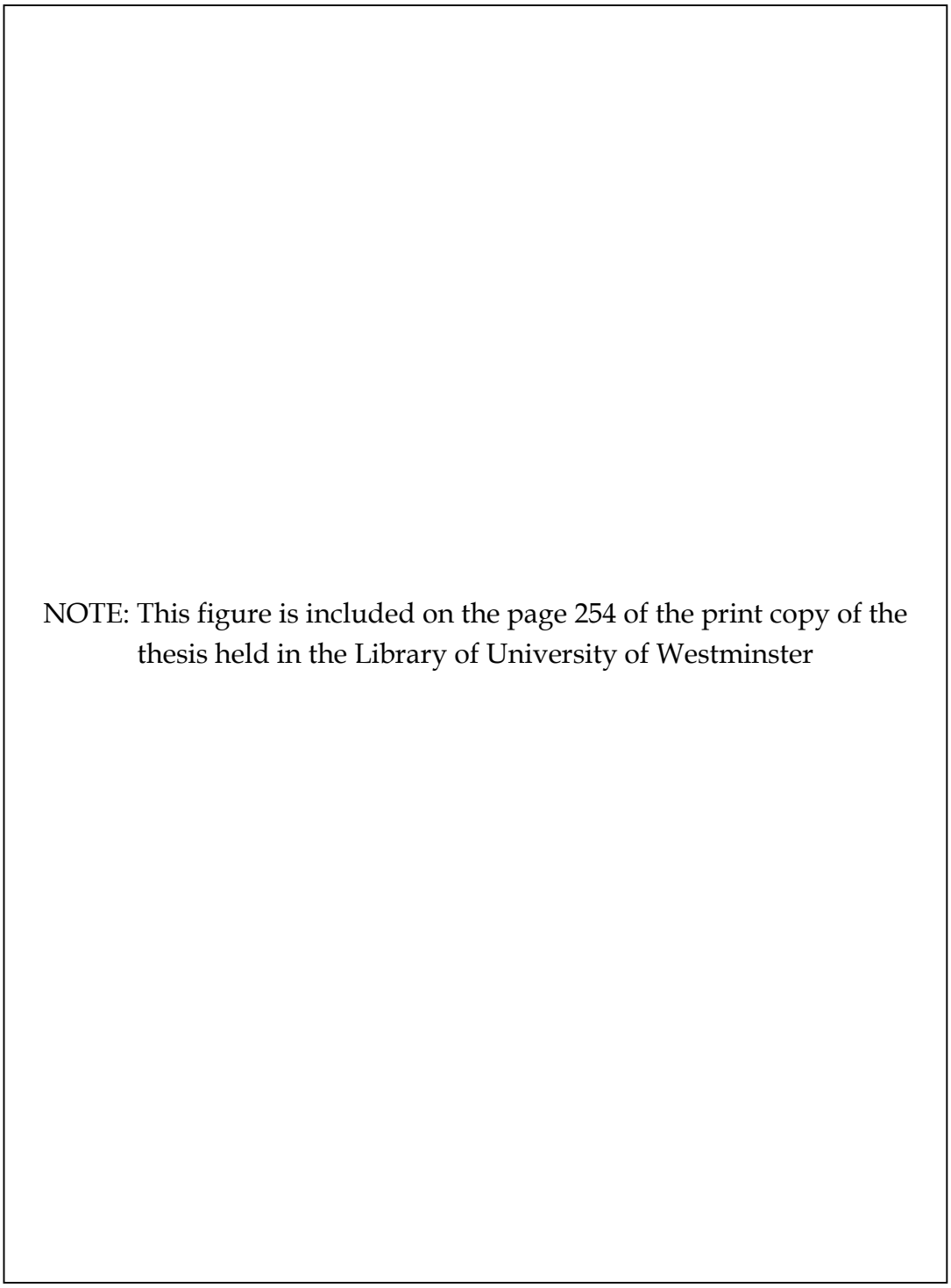


Figure 8.6: Urban planning process with additional integration of climate change factors (drawn by author)

A basic step in planning is the formulation of urban planning project. In accordance with the Law on Urban Planning, there are currently different kind

of plans: general planning (master planning), zoning planning, and detailed planning. But at the different levels, in the content and common process of planning, the following issues need to be integrated (figure 8.7):

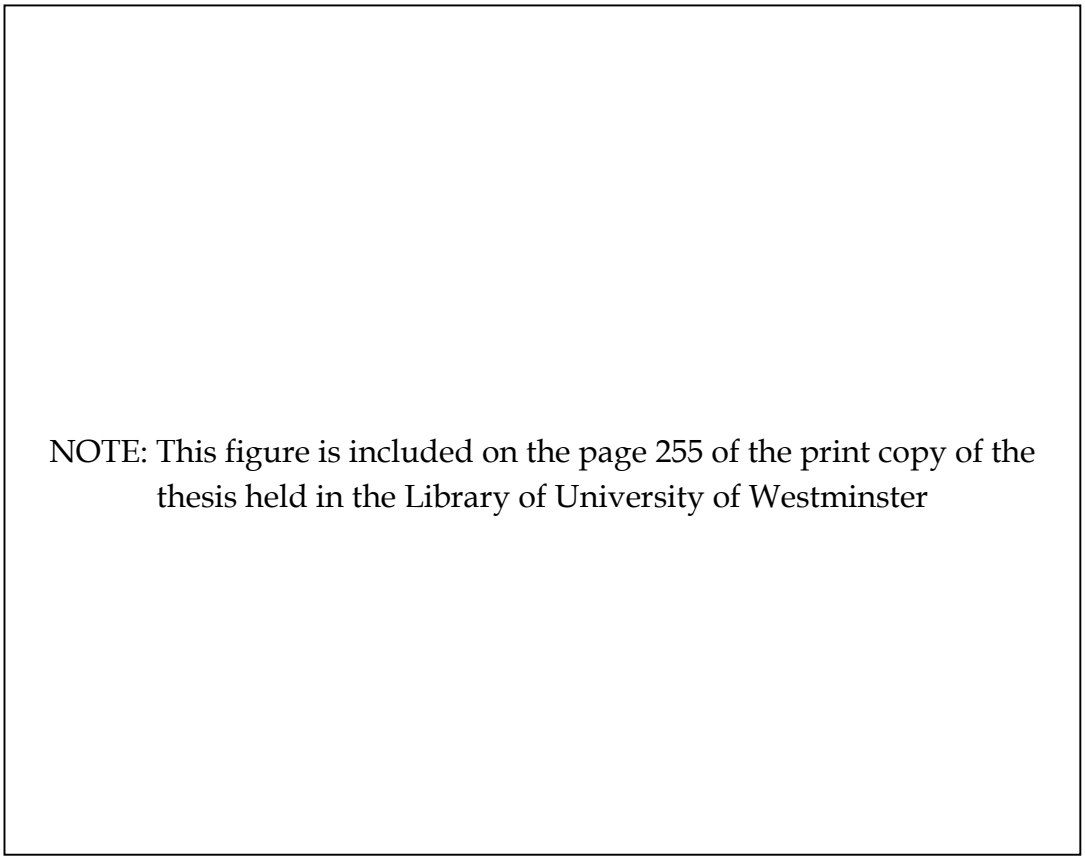


Figure 8.7: Integrating climate change factors into contents of formulating urban planning project (drawn by author)

8.4 Conclusion

This chapter has illustrated the case for the introduction of climate change considerations in a long-term urban planning process in the HCMC case. Evidence from the literature review and the HCMC case study, the thesis highlighted the ways that climate change can be integrated into urban planning through the various activities and it is required for most of the

development activities that takes place in cities. This study developed an integration framework that is mainly applicable for national and local government and other public sector bodies that take decisions relating to urban resilience in the development of cities. The current HCMC urban planning processes potentially provide an opportunity to integrate key climate change priorities into city planning. However, intensive engagement and networking are crucial to the success of integrating climate change issues into development planning.

Therefore, in the case of HCMC, the DPA is recognised as an important agency which is influential in the planning process and has responsibility for managing urban development planning. Analysing the current ways of working of urban planning, the implementation of planning in HCMC and the ways in which the DPA is organised, this research suggested detailed steps required to effectively integrate climate change concerns into urban planning processes at all scales with all relevant participants from public and private sector within the DPA – led planning process. This is important, because governments acting on their own will not be able to effectively address the numerous climate change issues for cities. To do so equally requires that the community, and other non-state actors, should all play an active role. These are the key steps ensuring climate change adaptation issues are integrated into the overall city governance agenda.

CHAPTER NINE

CONCLUSIONS AND RECOMMENDATIONS

9.1 Introduction

This chapter concludes the thesis. The thesis has explored various constraints to integrating climate change issue into urban planning decisions and processes in HCMC, by examining the local institutional, management and government arrangements as well as carrying out a survey on the city's capacity to tackle urban flooding and climate change.

The Research Question set out at the start of this work was:

'What institutional conditions provide the appropriate context for integrating climate change issues in urban planning processes to achieve greater resilience for the urban system and adaptation to climate change in the case of Ho Chi Minh City?'

The work responded to this questions by addressing this question through five sub-questions which was categorised in three themes: Urbanisation, Climate Change Concerns and Urban Planning responses. The thesis set out an appropriate framework for analysing the problem in Chapters 3 and 4. Following the phases of field work, it explored the HCMC case study in Chapters 5, 6, and 7, leading to an analysis of how planning might in future respond to climate change in Chapter 8.

This study has aimed to contribute to these debates about urbanization, climate change concerns and urban planning responses, from the perspective of cities in developing countries. It focused on the role institutions in shaping or constraining climate change adaptation actions. The tendency to ignore institutional issues is not surprising giving that most researchers have always assumed institutional appropriateness when discussing actions to deal with

climate change. There are growing number of studies focused on clarifying how climate change concerns for cities should be addressed, without considering the specific location and institutional contexts. This study has aimed to contribute to the debate from the perspective of cities by going beyond the dominant discourses to engage with the role institutions can play in shaping and constraining the creative aspects of human action. The way cities develop is part of climate problem, but it can be part of solution. Hence, the research focused on analysing the institutional governance structure within urban planning that surrounds local government work on climate change adaptation as well as understanding processes of institutionalising climate change planning within municipal agencies and building effective internal networks of climate change governance.

9.2 Summary of Key Findings

Based upon both the overall and specific findings from the study, a number of conclusions can be drawn on how planning adaptive capacity can be further enhance in the case of HCMC. The key findings of this study are discussed in the following section.

9.2.1 Urbanisation problem in HCMC

The first objective of this research concerns about the problems related to rapid urbanisation in HCMC. This relates to the first sub-question, the urbanization aspect of the research question – How is Ho Chi Minh City's development likely to be affected by a combination of the impacts of urbanization and climate variability?

Findings from study (chapter 5) indicated that HCMC's rapid urbanization has led to many problems. These include urban infrastructure degradation and urban ecology problems, including water, noise, air pollution, flooding, urban heat island effects; and limitations of the existing urban management of urban development. Over population and growth of the urban economy have created heavy pressures on the old urban infrastructure built in the French colonial time for one million people in a city with a growing population of already more than ten million. Traffic congestion, flash floods, and water pollution are becoming more and more common. The public transportation infrastructure system (rail lines, underground etc.) was not built to accommodate the rapid urban growth. Motorcycles dominate the street space because of the convenient way they can move in and between the small urban quarters and navigate traffic. Motor vehicle use has caused serious traffic jams and has raised the numbers of casualties to ever higher levels. The urban infrastructure, especially public transport, has not developed sufficiently to correspond with development. Thus, many slum areas have grown up, causing more environmental and social problems. Climate change will likely change current weather patterns and lead to on-going sea level rise and result in more frequent and extreme weather events such as heavy rainfall and heat waves. Rapid urbanisation in HCMC is considered to be the internal factor behind growing urban flooding. Hence, the increased climate hazards combined with rapid urbanisation are likely to increase strain on the capacity of all levels of HCMC governments as they attempt to respond to the vulnerabilities of the urban population.

9.2.2 The climate change concerns for HCMC

The second finding relates to the 'climate change concerns' aspect in the second sub-question: What are the key climate change concerns for the development of HCMC?

Analysing the climate change concerns for HCMC is the second objective of this research. This approach was achieved by carrying out an investigation of hazard trends and intensities, as well as the contingent conditions which make particular places more vulnerable to the existing impacts. Findings from research (chapter 6) show that, as Vietnam's biggest City, with the highest population growth rate in Vietnam, HCMC is facing to the problems of urbanisation, unmanageable housing expansion, weakness of urban infrastructure and services, and the increasing impacts of climate change with more effect tropical storms and heavy rains. Urban flooding is currently the biggest threat to HCMC and it is expected that the frequency, pattern and severity of flooding are expected to increase as a result of climate change. HCMC, moreover, will be extremely vulnerable to climate change impacts in the future because of its topography. It was found that vulnerability in HCMC differs widely between settlements and it is generally very high in many of the unstable settlements where most of the low income people with poor services and inadequate infrastructure. The intensification and spread of vulnerability is associated with the rapid urbanisation of HCMC and its wide ranging deficits in infrastructure and urban services provision. They have caused the flood increasing and brought serious problems on socio-economic aspects in the city. Furthermore, the weakness in governance and failure of planning to reduce flood risk currently put all management level of HCMC government under high pressure. The research found that most of the climate change impacts is likely to have in HCMC settlements fall within the remit of

planning. Urban planning and management system of HCMC have not been kept up with rapid urban transformation leading to the constraints on the all levels of HCMC government and it has been exacerbated by climate change.

9.2.3 Urban planning response to climate change

The third group of findings relates to how planning responds to climate change impacts. This can be viewed as a series of constraints on how planning responds in the context – particular how urban planning processes which might achieve greater resilience for the urban system and adaptation to climate change in the case of Ho Chi Minh City.

The study examined the state of urban planning institutions and urban planning processes as well as flood management identifying the key challenges to making climate change an integral part of urban planning decision making process and how to resolve the perceived gap between necessary actions and existing capacities. The research focused mainly on investigating HCMC's planning practice and a number of important related documents that guide the way the HCMC's urban planning processes and flood management take place. In doing so, specific attention was given in Chapter 7 to an analysis of the policy and legislative framework as well as the institutional arrangement for managing urban planning activities in HCMC.

A range of findings from the study show that local government plays the most important role in addressing the adaptation. Thus, the local approach to planning is likely to be the most important in adopting effective responses. Climate change is the new challenge in urban development of HCMC and climate change should be integrated into urban planning process. In doing so the urban planning authorities practically seek to cope with the consequences of climate change through incorporating future climate risks into existing decision-making process. However, effective climate change response in the

urban planning in HCMC is largely lacking, although local planners and decision-makers already became aware of the need for action.

Understanding the legal, administrative, resource, and capacity constraints in urban planning in HCMC is crucial and provides policy makers with clear knowledge about how these forces shape institutional success. Seven urban planning constraints related to the barriers for integrating climate change into urban planning - which we can view as sub-finding - were identified which are worth discussing here. The first was that the existing urban planning systems are characterized by fragmentation and lack of strategic orientation; overlapping duties regarding the planning developments, confusion within the planning law, lack of a unified sufficient planning database and lack of capacity among local authorities. The second aspect was that lack of scientific information on climate change as well as a lack of skills and experience to adapt to new pressures and lack of tools to evaluate and integrate climate change issue into urban planning. These present other key challenges for planners and decision-makers. From this perspective, practitioners lack skills on how to integrate climate change matters in their day to day planning practices such as in the preparation and implementation of municipal/local plans. The lack of mechanism for data sharing and public access is significant to the integration of climate change adaptation in planning.

The next aspect was that urban planning from a methodological, theoretical, and practical perspectives is presently centralised. Therefore, it is less flexible to keep pace with the speed of urbanisation and market forces, especially in the context of globalisation, as well as limiting the capacity to mobilize all social resources. Related to this is the fourth aspect – which the single-sector planning approach currently does not satisfy requirements in the context of risks originated from increasing natural disaster and flood extremes due to climate change. However, interdisciplinary cooperation has been quite restricted, resulting in the overlap with sectoral planning.

Another aspect of this third finding was that planning is now heavily dependent on financial economy without following the rationale of sustainable development planning. The higher level regional planning only deals with economic planning policy objectives and does not deal with or map wider land use and certainly does not address environmental sustainability issues. Limited financial resources have been scattered, giving rise to inefficient investment and natural resource destruction. The formulation of planning objectives often focuses on determining plan targets (indicators) rather than addressing basic issues and development problems.

Sixthly, there is also a tension between short-term socio-economic development goals and long-term climate change adaptation. The next finding was that climate change and disaster response practices in HCMC are mainly structural and engineering-based approaches. Non-structural and non-technical solutions receive less attention and application. Most of urban planning projects exclude consideration of climate change response and even if addressed, there has not been a systematic approach, and use of proper and appropriate integration tools.

The last aspect, which we can call sub-finding seven, relates to the implementation problem in planning which results from insufficient finance, lack of clear responsibility and an uncooperative relationships between different developers and formal institution. These hindrances show that the lacks of political leadership as a bridge means fragmentation, and this prevents an innovative approach.

This study has examined both the factors which drive and condition climate change impacts in the unique and challenging context of HCMC and the contingent conditions which shape how the city's planning responses are made and executed. This work has confirmed the importance of local

institutions in addressing climate change, especially when mainstreaming climate change adaptation into urban decision-making and planning processes.

The study has emphasised that institutions and planning matter greatly, since they provide the channel through which urban planning responses to climate change are conceived and carried out. Thus, the institutional arrangement for planning needs to be better understood in order to effectively integrate climate change concerns in urban planning processes in practice. The research demonstrates the importance of clearly describing the institutional networks of governance that local governments are creating to carry out their work on climate change adaptation in order to clarify how HCMC governments are institutionalising adaptation planning and action as well as negotiating the multiple interconnections and constraints that effect local adaptive responses. The research identified the key institutional actors driving climate adaptation work in HCMC, and examine efforts to integrate adaptation planning within municipal agencies and processes.

9.2.4 The multi-level governance coordination

Findings from study indicate that the lack of coordination and cooperation between relevant government institutions, between the city's level authorities and agencies with the district-level authorities, and between the public and private sectors is the key challenge in HCMC. Missing in HCMC is evidence of the coordinating function of leadership - the issue of the absence of a political champion in linking all institutions and aligning their approaches to tackling climate change. Therefore, in order to achieve urban resilience for HCMC, there is a requirement for a strong will and a strong desire to reform the existing urban management system.

This requires a new level of cooperation to emerge between politicians and administration, between the different sectors of administration and between academics, planners and decision makers in general. This means new mechanisms to focus on what the problems are, about different options for addressing these, about who should take which actions for both construction and management of facilities, how these actions should be coordinated; and importantly, about learning from experience locally and in other cities.

9.3 The contributions of the research to the field of knowledge

This research was made empirical, conceptual and practical contribution to established knowledge in this field.

The thesis makes a detailed analysis of climate change planning processes in Ho Chi Minh City (HCMC) which was hitherto unavailable in the English language.

By surveying and extending the literature, this thesis makes a contribution to the literature in English on urban planning for climate change in Ho Chi Minh City.

The thesis has identified seven constraining aspects of climate change planning in Ho Chi Minh City.

In figures 8.2 to 8.7 (in chapter 8), six models of planning response are mapped, suggesting ways in which urban planning methods and interventions would be developed in order to address planning for climate change in Ho Chi Minh City. Figure 8.4 indicates how additional information, integration of climate change concerns, analysis of same, and plan zoning can be grafted into the

model in 8.3 of urban planning formulation. Meanwhile, figures 8.1., 8.2., and 8.5, 8.6 and 8.7 all propose models for better integrating climate change - based planning

The study thus provides new empirical evidence of the understanding of urban planning roles in tackling climate change impacts and the governance of climate change adaptation in rapidly urbanising cities where this topic is under researched. The work contributes an in depth case study that has direct relevance to other cases in the region and on which future comparative studies can draw.

At the conceptual level the study highlights the limits of existing debate about adaptive capacity through exploration of the complex relations between governance and planning. The research develops a specific framework for the analysis of governance institutions that shows the importance of vertical and horizontal coordination in governance and the roles of urban planning.

Drawing on this analytical framework, the research detailed the lack of coordination among government agencies and then provided the base in Chapter 8 for the practical consideration of results and development of specific recommendations for achievable change in HCMC case.

The findings and practical recommendations will form the basis for future discussions with colleagues in Vietnam and HCMC as government and cities seek to develop effective institutional and planning responses to the specific challenges of climate change in the region.

9.4 Further research

There is a need for more in depth case studies and for the development of a stronger research base in the region would allow much better understanding

of both shared challenges and, importantly, of where lessons might be learned within specific and differing governance contexts.

9.5 Conclusion

This chapter began by setting out the ways this thesis has responded to the research question, in three parts; chapters 5 to the first part on urbanization, chapters 6, and 7 through the field work on Ho Chi Minh City on Climate Change adaptation. The third part relates to urban planning response to Climate Change adaptation. This concluding chapter has concurrently set out three groups of findings; urbanisation, climate change and constraints on planning responses.

This thesis is the end result of this search for a more exacting, radical, and critical basis for being hopeful about urban responses to climate change. Cities do indeed have an important part to play in steering the course of our collective climatic future. This thesis set out principles of planning for climate change related uncertainty. The research has specifically emphasised that planning has a vital role to play in limiting the effects of climate change on cities. Much of the climate change literature already assumes that planning systems have the capacity required to deal with the various challenges of cities. Therefore, in the case of HCMC, the challenges from rapid urbanisation combined with climate change can be tackled by urban planning. Its effectiveness, however, depends on the quality of the existing policies and laws, the nature of the machinery of government, the institutional arrangement, the decision making processes and the level capacity of planning. In doing so, its require planning institutions and organisations in HCMC to have the required capacity and know-how to address climate change. The thesis suggests that there is an onus on planners and urban planning as a profession to fundamentally address urban resilience. The thesis suggests changes to the current planning system in HCMC by developing the

integration framework and suggesting steps to integrate climate change into current planning processes. The master plan establishes a shared vision and set a goals for the future development of HCMC. It provides a policy foundation for the city's land use laws and regulations. Therefore, the master plan of HCMC should be used as the main delivery mechanism and should be given more powers to provide a long - range vision for tackling with climate change and the built environment of the city.

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Appendix A: List of interviews

Government Officials

	Interview code	Position	Government Agencies	Date of interview
01	HG-01	Director	HCMC Institute for Development Studies (HIDS)	26.03.2014
02	HG-02	Deputy Director		14.03.2014
03	HG-03	Head of Division		05.03.2013
04	HG-04	Deputy Head of Division		14.03.2014
05	HG-05	Planning official		21.03.2014
06	HG-06	Environmental official		20.03.2014
07	HG-07	Administrative official		05.03.2013
08	HG-08	Deputy Director	Department of Planning and Architecture (DPA)	20.02.2014
09	HG-09	Deputy Director		24.02.2014
10	HG-10	Head of Division		10.01.2014
11	HG-11	Head of Division		14.01.2014
12	HG-12	Head of Division		28.01.2014
13	HG-13	Official		28.01.2014
14	HG-14	Official		07.03.2013
15	HG-15	Official		20.02.2014
16	HG-16	Official		08.03.2014
17	HG-17	Deputy Head of Division		07.03.2013
18	HG-18	Official		08.03.2014
19	HG-19	Deputy Head of Division		08.03.2014
20	HG-20	Deputy Director	Architecture Research Centre-	21.03.2014
21	HG-21	Deputy Head of Division		24.03.2014

22	HG-22	Official		24.03.2014
23	HG-23	Official		19.03.2014
24	HG-24	Chief of Staff	Climate Change Steering Board	17.03.2014
25	HG-25	Deputy Chief of Staff		27.03.2014
26	HG-26	Official		27.03.2014
27	HG-27	Official		27.03.2014
28	HG-28	Deputy Director	Department of Natural Resources & Environment (DGNRE)	22.02.2014
29	HG-29	Official		24.02.2014
30	HG-30	Official		12.03.2013
31	HG-31	Official		12.03.2013
32	HG-32	Head of Division	Steering Centre of the Urban Flood Control Program (SCFC)	28.03.2014
33	HG-33	Deputy Head of Division		19.03.2014
34	HG-34	Official		19.03.2014
35	HG-35	Official		28.03.2014
36	HG-36	Official		28.03.2014
37	HG-37	Official		19.03.2014
38	HG-38	Official		21.03.2014
39	HG-39	Official		22.02.2014
40	HG-40	Director	HCMC Urban Planning Institute (UPI)	
41	HG-41	Head of Division		
42	HG-42	Deputy Head of Division		23.02.2013
43	HG-43	Planner		

44	HG-44	Architect		
45	HG-45	Architect		27.02.2013
46	HG-46	Planner		
47	HG-47	Head of Division	Department of Construction (DoC)	12.02.2014
48	HG-48	Deputy Head of Division		12.02.2014
49	HG-49	Official		15.02.2014
50	HG-50	Official		15.02.2014
51	HG-51	Head of Division	Department of Science and Technology (DST)	07.01.2014
52	HG-52	Official		07.01.2014
53	HG-53	Deputy Head of Division	Department of Agriculture and Rural Development (DARD)	30.01.2014
54	HG-54	Official		30.01.2014

Others: experts, planner, NGOs…

	Interview code	Position	Government Agencies	Date of interview
55	HE-01	Director	Centre of Water Management and Climate Change-Vietnam National University	

56	HE-02	Deputy Director		
57	HE-03	Dean of the Planning Faculty	HCMC University of Architecture	
58	HE-04	Senior Lecturer		
59	HE-05	Senior Lecturer		
60	HE-06	Senior Lecturer		
61	HE-07	Senior Lecturer	HCMC University of Technology	26.02.2013
62	HE-08	Senior Lecturer		05.03.2014
63	HE-09	Former Deputy Director of DPA		05.03.2014
64	HE-10	Expert	Megacity Project HCMC-Brandenburg University of Technology Cottbus	11.03.2014
65	HE-11	Expert	Megacity Project HCMC- University Kassel, Germany	28.03.2014
66	HE-12	Expert	UN-Habitat, Hanoi	13.03.2014

67	HE-13	Director	PADDI	15.03.2014
68	HE-14	Expert		15.03.2014

Appendix B: Check list of questions

A. Basic information from governmental Organisations/Agencies

1. What is your role/title in this organisation/agency? What is the main objective of this organisation?

2. What sort of tasks does your work entail? Are people participating in climate change adaptation discussions in your agency?

B. Hazard impact assessment (exposure/sensitivities)

1. In the past, which have been the most significant natural disasters?

2. What is the city's main climate hazards based on historical data?

3. Which areas within the city have the highest population exposure to hazards/climate change? Indicate the location of urban poor settlements.

4. What is the level of exposure of the settlements to climate change and natural hazards?

5. What are the key drivers of change and threats in HCMC?

6. Which specific areas and populations at high risk of disasters and climate change impacts have been identified?

7. How can these elements of climate change vulnerabilities be realized and assessed?

8. How is HCMC's development likely to be affected by a combination of the impacts of urbanization and climate variability?

9. In the context of urbanisation, how do you recognise the importance of climate change in the course of socio-economic development of HCMC?

Hazard	Effects	Losses

C. Institutional assessment

1. Which governmental institution is responsible for taking actions when there are extreme climatic hazards, such as typhoons or floods?

2. Which institutions/organisations are involved in planning climate change in HCMC? Is there a leading agency coordinating the disaster risk management activities of the City?

3. Do you think HCMC is well prepared for responding to this issue?

4. What is the current adaptive capacity of HCMC in term of climate change? What adaptive strategies are currently being used in HCMC?

5. What are the main factors you consider in your future planning?

6. What do you think are the advantages of starting to adapt to climate change now?

7. To what extend is climate change accepted as an issue for planning in HCMC? In what type of planning?

8. Is climate change embedded in city plans and policies? If so which one? In what ways?

9. Where do you get your information on potential future trends in HCMC?

10. Can you give me a sense of what your agency has done to date in term of adaptation in HCMC?

11. What are the key policies guiding your activities and decision-making?

12. How do you operationalize policies about climate change? How do you plan for uncertainty?

13. In terms of function and management, what are advantages and disadvantages of your agency's capacity?

14. What are the most important issues your agency must address when making planning decisions?

15. Do you have any further comments?

Institution	Headed by/level	Major Function

Appendix C:

Overview of relevant legal documents in urban planning and flood management in HCMC

Legal Document	Main Objective	Principal/qualities to achieve	Key concepts/Steps
1. Circular No. 30/2004/TT-BTNMT by the Ministry of Natural Resources and Environment dated 01/11/2004 about "Guiding the order and content of the formulation, regulation and evaluation planning and land use planning".	- To surmount the irrational regulations in Circular No. 1842 by amending and supplementing new contents how to suit reality, to meet quality requirements and to ensure the feasibility of building and implementing planning. - To improve land use planning at all levels and to surmount suspended planning.	To set up the concreted regulations, specific scope and object of the application in planning. To regulate symbol system and sample used in land use planning; To regulate the contents of planning and the land use plan at national, provincial and local level	- To assess potential and current use of land. - To evaluate the consequence of previous land use planning in whole nation. - To determine the direction and objectives for land use planning. - To build land use project. - To analyse economic, social and environmental efficiency in land use planning projects in order to select the rational one. - To divide period of land use planning. - To build map of land use planning.
2. Decision No. 04/2005/QD-BTNMT by the Ministry of Natural Resources and Environment dated 30/06/2005 about "Process of setting and adjustment Planning, Land-use plan"	- To regulate necessary legal conditions and measures in order to implement the inspection and land use planning. - To identify the advantages, limitations in land use and economic-social development. - To evaluate the State management of land, the current land use and its change over time, in order to build land use planning suiting to long-term direction, mission, and goals of	- To regulate the process of land use planning at regional and national level. - To build the synthesis reports and other relevant documents about land use planning. Then they are applied to competent authorities for deciding land-use planning; after approving, they are announced to public.	The order and content of land use planning at regional and national level Step 1: Preparation Step 2: To investigate, collect information, documents, data and maps. Step 3: To evaluate natural conditions, economic - social impacts of land use Step 4: To evaluate the result of previous management and potential of land use in the future. Step 5: To build and choose the land-use plan.

	national socio-economic development.		Step 6: To build the synthesis report; and to evaluate, approve and publicize land use planning.
3. Draft Circular No _/2012/TT-BTNMT by the Ministry of Natural Resources and Environment dated _/_/20_ about "Process of setting and adjustment Planning, Land-use plan"	- To analyze the advantages and limitations of natural resources, landscape and ecology. - To evaluate the characteristics socio-economic development and climate change. - To planning targets of other resources relate to land use.	Evaluating natural conditions, economic and social impacts of climate change related to land use (attach with diagrams, charts, maps, miniature, tables, and analysis data). Analysing and assessing impact of climate change on land use - The impacts of sea level rise, flood tide, saltwater intrusion on land use - The effects of desertification, soil erosion, landslides on land use	The order of implementing and adjusting land-use planning at District level includes 3 steps: Step 1: Investigating and gathering additional data about economic - social condition, climate change and implementation of land use planning. Step 2: Adjusting the land use plan. Step 3: Developing synthesis report about the land use planning; then approving and announcing land use planning.
4. Decision No. 24/QĐ-TTg dated 06/01/2010 of Prime Minister about "Approval for planning adjustment of HCMC master plan in 2025"	Developing HCMC sustainably, harmonizing economic development with conservation of historical vestige, culture and environmental protection. Ensuring security and national defence by regional connection in order to become a civilized and modern city, which contributes to the development of the Southern region and the whole country. Gradually became a centre of industry, services, science and technology in	- Development principles of old inner city: renovating existing situation based on the combination between cultural preservation (architectural value) and modern infrastructure; clearing slum along canal and in high density neighbourhood; moving polluted factories and industrial facilities out of inner city. - Development principles of new inner city: focus on the construction of new urban areas in large-scale, synchronizing social infrastructure and technical infrastructure; e.g. Thu Thiem New Urban Area (District 2) will complement the tourism	Urban development following the centralized model with multi-polar, i.e. central area is inner city area with a developing radius of 15km and 4 developing poles: - Developing a multi-central city with synthetic centre in old inner urban areas and other city centres in four directions of development; - Developing city following two main directions: East and South towards the sea; and the two minor directions: West - North and West, West - South; - No development in the strict conservation area - Can Gio Mangrove, the

	Southeast region and Asia.	functional, multi-disciplinary services for existing central area which is not capable of development. - Development principle of suburban areas: focus on building the rural area following new rural model and investing modern satellite towns in order to ensure sustainable development and protection of the urban environment.	special-use forests, protection forests in Binh Chanh District and Cu Chi District. - Developing city with the goal of ensuring security and national defence.
5. Decision No.752/QD-TTg dated 19/06/2001 of Prime Minister about "Approval for HCMC master plan of drainage system in 2020"	① Assessing the status of rainy and wastewater drainage systems in HCMC. ② Identifying the basic orientation; improving the drainage and sewage system in HCMC; identifying priority projects for the period 2001 - 2005; ③ Building the Program of investment, renovation and upgrading drainage system for the period 2001 - 2020; estimating the total investment; identifying investment sources to eliminate urban inundation and to reduce urban pollution; building the Program of raising capacity for management and operation drainage system.	- Taking full advantage of existing drainage systems; upgrading and developing the drainage system suiting to general development of HCMC. - To existing urban areas with common sewer systems (storm water and waste water): build sewer to collect wastewater and transfer to treatment area. - To new urban areas: build common drainage system at first, later build its own sewer system in planning process if applicable. - Wastewater from manufacturing agencies and public services must be treated locally following the current regulations before discharging into public sewer system.	HCMC Drainage Company in is responsible for managing, operating and maintaining entire drainage system; for building training program for staff ; for buying materials and equipment; and for planning investment to build the urban sewer system.
6. Decree No.08/2005/ND-CP on Construction Planning	Providing guidelines of formulation, approval and management of the	The Urban Construction Plan comprises the general plan and the detailed plan. Decree	In Decree No.08/2005/ND-CP, the detailed plan is required to determine the

	construction planning stipulated by the Construction Law	No.08/2005/ND-CP provides that the general plan shall contain the following matters depending on characteristics and dimensions of a city. ① Analysis and assessment of natural conditions, socio-economic conditions, etc. ② Identification of potentials and motives for urban establishment and development for each period of urban development ③ Orientation for urban space development including Inner Districts and Suburban District ④ Orientation for development of urban technical infrastructure ⑤ Identification of items which are given priority for development and resource for implementation ⑥ Urban designing ⑦ Assessment of urban environmental impacts and measures to minimize bad impacts on environment in the general planning design	following mains in detail. ① Determination of scope of detailed planning, land use area in the designed zones ② List of proposed construction works including: new construction works, renovation works, preservation works in designed zones ③ Determination of technical-economic indicators in terms of land use, technical and social infrastructure, requirements on space, architecture, urban designing and other specific requirements for each designed zone