Chapter 46
Integrating Climate Change Adaptation into Urban Planning of Vietnamese Coastal Towns toward Sustainable Development

Pham Thanh Huy

Abstract This chapter deals with the content of urban planning and sustainable development for Vietnamese coastal towns adapting to climate change. We use some methodologies of the research such as specialist method, method of investigation and assessment, etc. in order to summarize, investigate, and analyze several existing urban structures of these coastal towns in the context of climate change, then classify these towns into some groups of urban characteristic in the research location like seafront towns, littoral towns and coastal mangrove towns with some different criteria. The chapter also analyzes the impacts of climate change on urban structure and vice versa, integrating into sustainable urban development. As a result, the methodology of systematization models is used in order to propose three models of urban spatial structure and solutions of urban land use adapting to climate change for the coastal towns toward sustainable development.

Keywords Urban planning · Climate change · Adaptation · Sustainable development · Vietnamese coastal towns

1 Introduction

Climate change, which is the most challenging factor for the living environment of human, has recently impacted heavily on global temperatures. The climate change, with sea level rise, has affected seriously the process of urban development of Vietnam's coastal areas. The process of urbanization and the expansion activities of residences into the areas of natural disasters have many risks while infrastructure has still not been developed for urban development. The process of development of

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Vietnamese coastal cities has still lacked in mainstreaming climate change into urban planning.

According to the Orientation for development of the Vietnamese urban system to 2025 and the vision to 2050 under Decision No. 445/QD-TTg, it is predicted that population is approximately 52 million of urban people, accounted for 50% of Vietnam population and reach at 1000 of cities to 2005 year (Vietnam Government [VG], 2009a, 2009b, p. 2). There are six urban zones that are distributed based on six national economic-social regions, including Northern Midland and Mountainous, Red River Delta, North Central and Central Coastal region, Central Highlands, South East and Mekong Delta. The Mekong Delta that consists of one city (Can Tho city) and 11 provinces: Dong Thap, Vinh Long, Ben Tre, Tra Vinh, An Giang, Tien Giang, Hau Giang, Soc Trang, Kien Giang, Bac Liêu, and Ca Mau under Decision No. 1581/QD-TTg on approving the Regional Planning for the Mekong Delta to 2020 year, the vision to 2050 (Vietnam Government [VG], 2009a, 2009b). The Mekong Delta is identified to become the one sixths of Vietnam's main urbanization zones. These urban systems would be developed as concentrated-multipolar model that integrates with the economic corridors of cities along the systems of principal rivers and head roads.

The research location and scope include 15 coastal cities and towns in the Western zone of the Mekong Delta (belongs to the Western coastal zone from Ca Mau Cape to Ha Tien town of Kien Giang province and Ca Mau province) (Fig. 46.1). Kien Giang province includes Rach Gia city, and towns: Ha Tien, Kien Luong, Hon Dat, Minh Luong, An Bien and An Minh. Ca Mau province includes Ca Mau city, and towns: U Minh, Song Doc, Tran Van Thoi, Cai Doi Vam, Cai Nuoc, Nam Can and Rach Goc. This research location is also the zone No.7 of the Climate Change, Sea Level Rise Scenarios for Vietnam published in 2012 (MONRE, 2012), which is the heaviest impacted by sea level rise in Vietnam. These 15 coastal cities can be easily vulnerable, harmful economy and affects in urban sustainable development if they are not adjusted the process of urban planning adapting to climate change and integrated with the Climate Change, Sea Level Rise Scenarios for Vietnam following to each stage of the next years (2030, 2050, etc.). Therefore, it is necessary to have an effective method for urban planning adapting to climate change for the master plan of the cities. The contents of urban master plan propose the solutions to the towns adapting to climate change, such as urban structure, spatial planning, land use planning and infrastructure planning.

The object of the research is urban planning, mainly the type of master plan, particularly concentrating to create models of spatial structure for the case study.

These cities and towns, which have three identities, are classified into three groups of seafront towns, littoral towns and coastal mangrove towns by each category of criteria (Table 46.1).

The process of development of Vietnam coastal cities has still lacked in mainstreaming climate change into urban planning, and the expanding activities of residences into the areas having risks of natural disasters contain many risks while infrastructure has still not developed for urban development (MONRE, 2012).

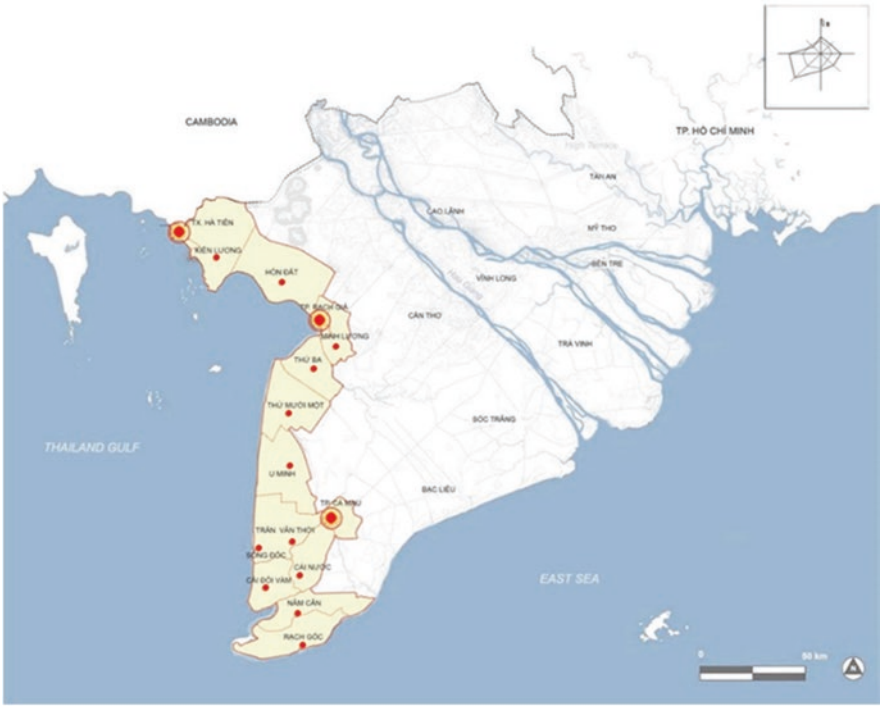


Fig. 46.1 The system of coastal cities and towns in the western zone of the Mekong Delta

Table 46.1 Criteria of classification for the seafront towns, littoral towns, and coastal mangrove towns

Urban locations	Named	Significant identities	Distances from the coastline
Seafront towns	Ha Tien, Kien Luong, Rach Gia, and song Đoc	With or without the river mouth	Approach to intertidal area
Littoral towns	Ca Mau, hon Đat, minh Luong, an Bien, an minh, U minh, and Tran Van Thoi	Higher ground than seafront towns, crowded population	Higher 10 km far from the coastline
Coastal mangrove towns	Cai Đoi Vam, Cai Nuoc, Nam can, and Ngoc Hien	Into Ca Mau coastal mangrove forest	From coastline to inside Ca Mau coastal mangrove forest

Source: Pham Thanh Huy (2016)

The impacts of climate change are likely to affect urban spaces as flooding, erosion, land decreasing, infrastructure and ecosystem destroying (VIUP, 2015) (Table 46.2). Climate change can also impact urban spatial structure, such as urban center and system of public services, residences, green space, industrial zones, transportation and infrastructure, in some aspects. Climate change affects individual town and each group of towns in the coastal zone of the Vietnam's South West.

Table 46.2 The summarization of climate change risks in Kien Giang and Ca Mau

Zones	Climate change phenomenon						
	Storms	Flooding	Coastal erosion	Highland erosion	Sea level rise & tides	Drought	Salinization
Kien Giang	++	+++	+++	o	+++	++	+++
Ca Mau	++	o	+++	o	+++	++	+++

Notes: +++ max impacts; ++ medium impacts; + minimum impacts; o without impacts
Source: VIUP (2015)

Table 46.3 Sea Level Rise Scenarios for Vietnam in 2012 at medium level (measuring unit: centimetres)

Zones	Each stage in twenty-first century								
	2020	2030	2040	2050	2060	2070	2080	2090	2100
From Ca Mau province to Kien Giang province	9–10	13–15	19–22	25–30	32–39	39–49	47–59	55–70	62–82

Source: MONRE (2012)

The research location is in the West of the Mekong Delta zone, which is predicted to be heavily impacted by sea level rise in Vietnam. This also is in the zone No.7 area of the Climate Change, Sea Level Rise Scenarios for Vietnam (MONRE, 2012), following to each stage of the next years (2030, 2050, etc.) (Table 46.3).

In this context, however, the cities and towns have significantly developed economic aspects, and therefore, these towns have not still considered toward sustainable development and climate change adaptation. The existence of these cities and towns is assessed following to each group.

1.1 The Group of Seafront Towns

The seafront towns include Rach Gia, Ha Tien, and Kien Luong (Kien Giang province); Song Doc (Ca Mau province). These towns symbolize some urban structures' characteristic as urban land runs along coastline, urban center is at river mouth, the main roads run along coastline and riverside (Fig. 46.2).

1.2 The Group of Littoral Towns

The littoral towns consist of Ca Mau, U Minh, and Tran Van Thoi (Ca Mau province); Hon Dat, Minh Lương, An Bien, and An Minh (Kien Giang province). These towns symbolize some urban structures' characteristic as locating approximately 10 km from coastline, the higher ground than seafront towns, urban center gather at

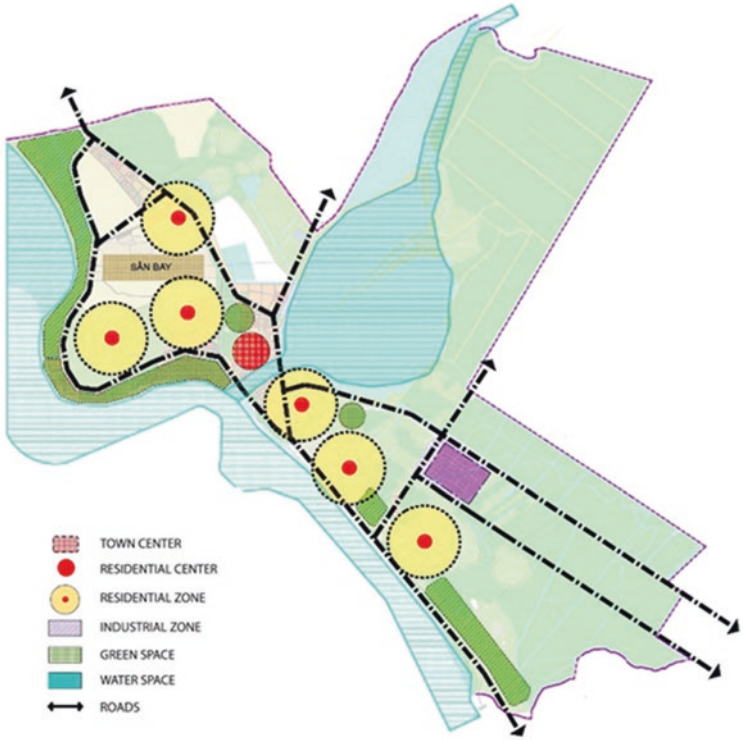


Fig. 46.2 Ha Tien's urban structure of the master plan in 2008 (KGG, 2008)

the interaction of rivers and main roads with surrounding urban functional areas (Fig. 46.3).

1.3 The Group of Coastal Mangrove Towns

The coastal mangrove towns consist of Cai Doi Vam, Cai Nuoc, Nam Can, and Ngoc Hien towns located in the Ca Mau mangrove system. These towns symbolize some urban structures' characteristic as locating into Ca Mau coastal mangrove forest, high density of canals, urban centers expand in each interaction of main canals with main roads, urban functional areas surround these interactions (Fig. 46.4).

Most of the urban planning in the research location, especially master plans, implemented from 2000 to present have not integrated with climate change in urban structure, land use, green space, and infrastructure. Therefore, it is difficult to adapt to climate change if local governments still implement these master plans. There are some problems in research and application of urban planning for the western zone of the Mekong Delta:

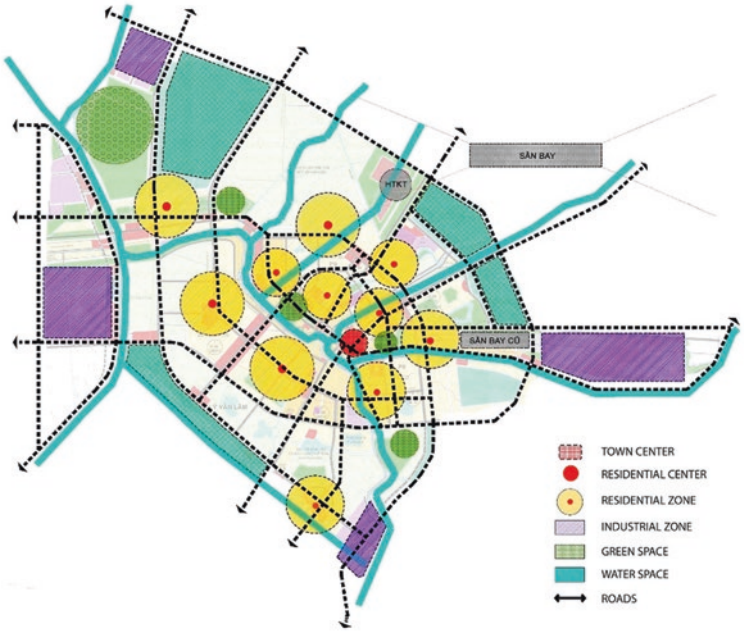


Fig. 46.3 Ca Mau's urban structure of the master plan in 2008 (CMG, 2008a)

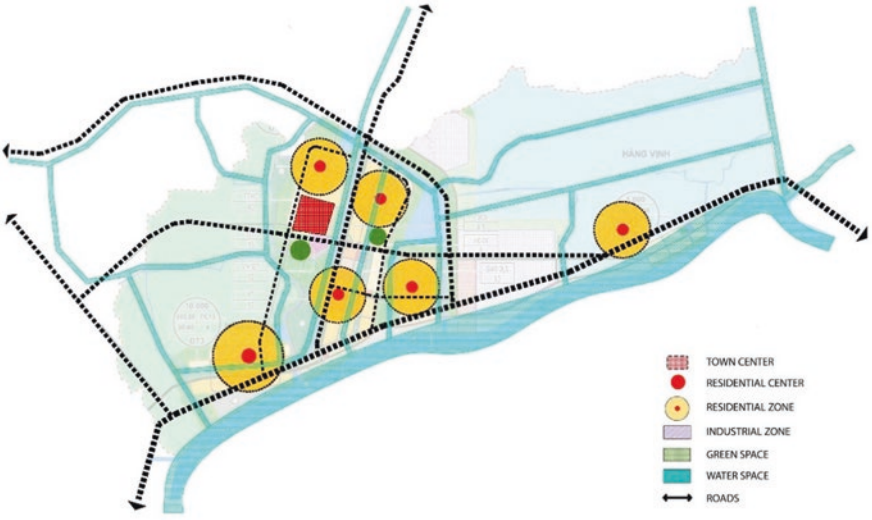


Fig. 46.4 Nam Can's urban structure of the master plan in 2008 (CMG, 2008b)

- Urban planning methodology: these urban planning significantly concentrated in the aspects of technology and artistry to organize urban spatial structure without protecting environment and achieving the benefit of urban economy that support to adapt to climate change.
- Urban planning contents: There are still lack of assessing, analyzing the impacts of climate change and sea level rise in urban planning. Also, urban spatial structure, land use planning, and infrastructure have not applicated for climate change adaptation. The projects of urban development focused significantly on increasing land budget and urban resources without concerning sustainable development and conserving eco environment.

If the urban planning is not adjusted to integrate with climate change, especially mainstreaming with the Climate Change, Sea Level Rise Scenarios for the western zone of the Mekong Delta for each stage, the coastal cities and towns would be vulnerable, increase urban economy, and affect sustainable urban development.

2 Vision for the Urban Planning of the Coastal Cities and Towns Adapting to Climate Change

The IPCC (2007) identified one of the ways to increase climate resilience by implementing sustainable development planning in land use planning and infrastructure design and disaster risk reduction measures. Coastal regions have the most complex and vulnerable environmental systems in the face of climate change and sea level rise. Therefore, coastal climate change adaptation must be integrated into the sustainable development plan and maximize future economic benefits from the coastal areas (Isaac, 2010).

In Vietnam, due to the important transformation dynamics of growth and change, sustainable development has become a new national standard and vision of the Agenda 21 in Vietnam (Vietnam Government [VG], 2004). Facing the challenges of climate change, the key criteria of sustainable urban development need to ensure adaptation to climate change in terms of economic development, environmental responsibility, social progress, urban management and urban infrastructure. Sustainable urban development must work towards climate change mitigation and adaptation. In the current context, climate change has a direct impact on a wide range of areas, ecosystems and resources. The current ecosystem is under pressure from many climate change series (Yohe, 2007). Therefore, research on ecological urban and sustainable development in the context of climate change is now important in the orientation of developing urban climate change adaptation, especially for coastal cities. According to Richard (2013), sustainable ecological cities are low-spread, low-density urban areas, which are transformed into a network of medium- or high-density urban residential areas of limited scale separated by green spaces; most people live and work within walking and biking distance.

Urban elements such as urban structure, urban spatial organization, land use, building density, green space, transportation, and energy use are impacted by climate change, and vice versa; these elements also affect an increase in climate change (Ralf, 2012). The principal elements of city like urban form, land use, and developing frame can be impacted by climate change. Kahn (2006) pointed out that the progression of urban spatial structure in the context of global climate change illustrated that urban structure ensures climate change adaptation successfully. Therefore, the urban planning in the research location need to be adjusted in order to adapt to climate change, integrating with each stage of the Climate Change, Sea Level Rise Scenarios for Vietnam to mitigate urban risks, economic decrease, and impact to urban sustainable development. Lujia (2009) also supports that the spatial structure of coastal town affects both the increase and mitigation of climate change, thus urban planning identifies urban structure and CO_2 emission.

A general vision of urban planning for the western zone of the Mekong Delta is to create an urban spatial structure toward sustainable development and eco-city to adapt climate change. Models of urban spatial structure for climate change adaptation and mitigation are proposed by distributing, linking and mixing urban functional zones: urban center and system of public services, residences, green space, industrial zones, transportation and infrastructure, etc. and integrating with the control of land use density with three levels as high density, medium density, and low density to adapt climate change effectively.

3 Solutions

3.1 Models of Urban Spatial Structure for Climate Change Adaptation in the Western Zone of the Mekong Delta

The mainstreaming of urban functions and infrastructure with the natural characteristics of the research location will lead to the distinctive development of urban spatial structures for the western zone of the Mekong Delta. Proposing models of these structures adapting to climate change is to distribute reasonably urban functions among main urban elements; it also satisfies several solutions such as protecting, adapting and avoiding impacts of climate change. These elements include:

- Urban center, resident center, and the system of public services: Adding more news commercial and tourism service center is to reinforce new multipolar centers which will support present urban center and prevent the risk from climate change.
- Districts and new neighborhood units: Identifying inner city and suburban area and interleaving green space among urban functions is to create buffer zones in order to adapt effectively to climate change.

- The system of green space: Enhancing the areas of green space into urban structures, which can result in room for water and corridors for flooding drainage.
- Transportation system and infrastructure.
- Industrial zones.

These elements can be integrated to control land use at high density, average density, and low density for climate change adaptation. Models of urban spatial structure are proposed based on the classification of urban character as model of spatial structure for the seafront towns, model of spatial structure for the littoral towns, and model of spatial structure for the coastal mangrove towns in order to adapt to optimal climate change.

3.2 Proposing the Model of the Seafront Towns' Spatial Structure

The identity of the group of seafront towns is that most of urban functions runs along the coastline and river mouth. The elements of urban spatial structure are located below (Fig. 46.5). Linear urban structure spreads gradually from inner city to suburban area.

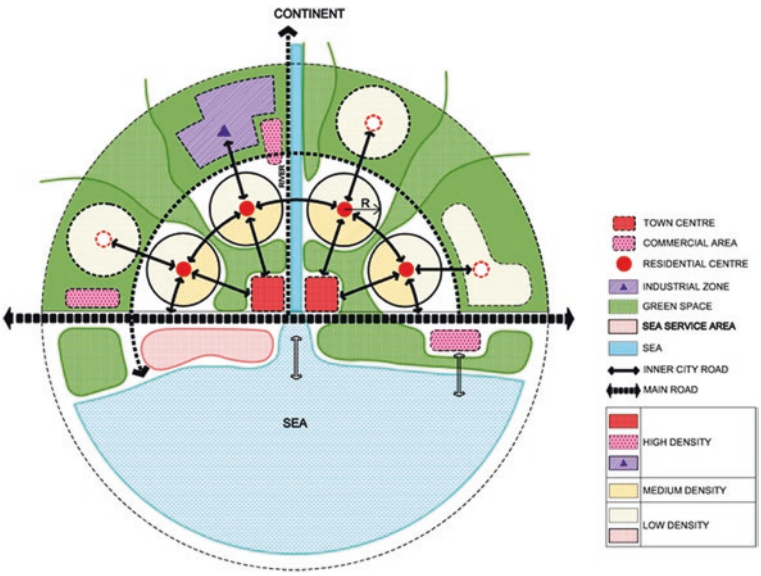


Fig. 46.5 The model of the seafront towns' spatial structure adapting to climate change

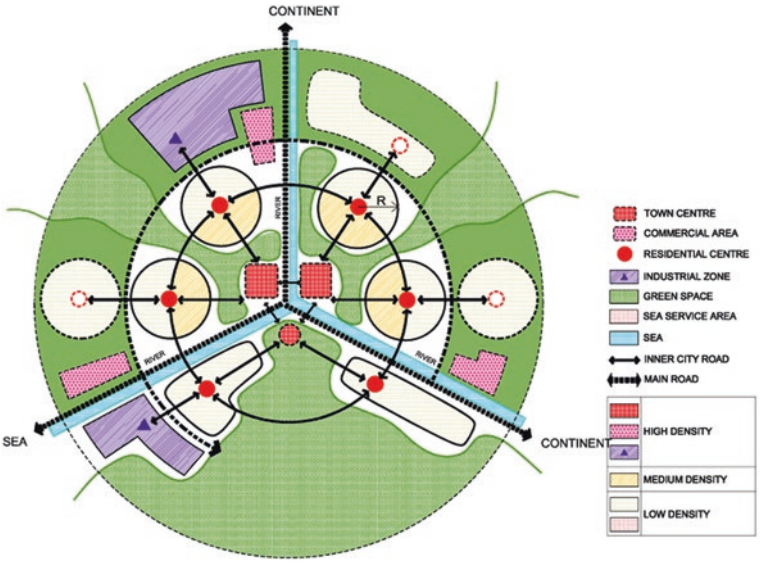


Fig. 46.6 The model of the littoral towns' spatial structure adapting to climate change

3.3 Proposing the Model of the Littoral Towns' Spatial Structure

The identity of the group of littoral towns is that the towns locate 10 kms far from the coastline, higher ground than the seafront towns, crowded population at the interaction between main rivers and main roads. The elements of urban spatial structure are located below (Fig. 46.6). Linear urban structure spreads gradually from inner city to suburban area.

3.4 Proposing the Model of the Coastal Mangrove Towns' Spatial Structure

The identity of the group of coastal mangrove towns is that most towns locate inside Ca Mau coastal mangrove forest. Urban structure tends to spread along rivers and canals. The elements of urban spatial structure are located below. The elements of urban spatial structure are located below (Table 46.4 and Fig. 46.7). This structure represents distinctive form of coastal ecosystem and green space.

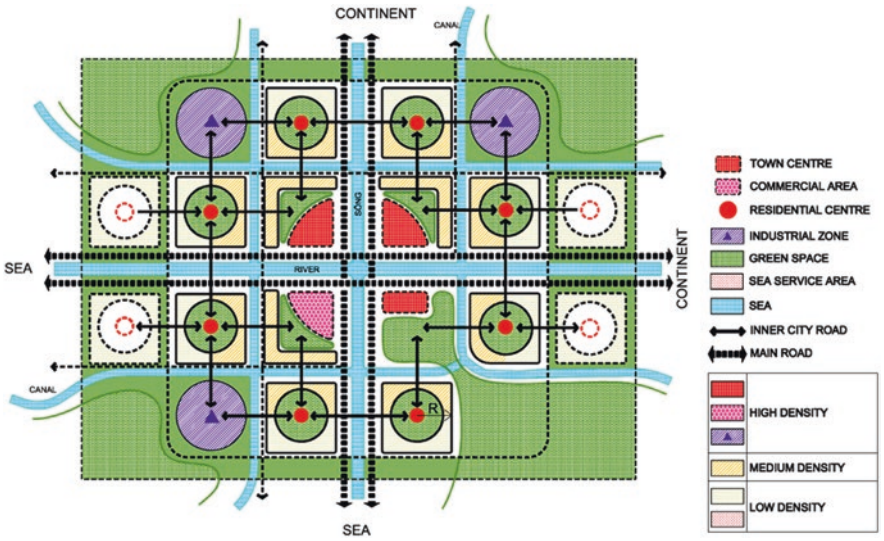


Fig. 46.7 The model of the coastal mangrove towns' spatial structure adapting to climate change

4 Land Use Planning and Controlling Urban Development for Climate Change Adaptation in the Western Zone of the Mekong Delta

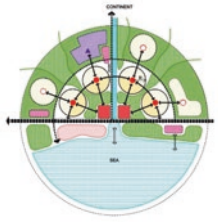
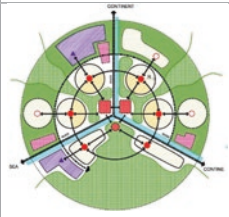
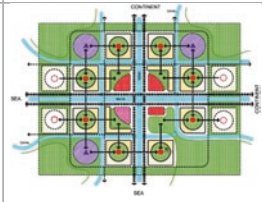
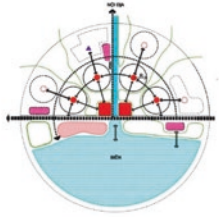
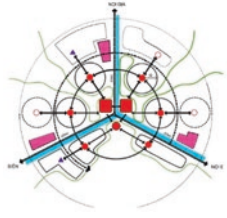
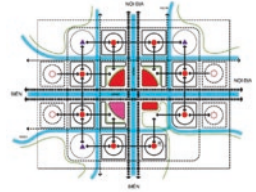
4.1 Land Use Planning

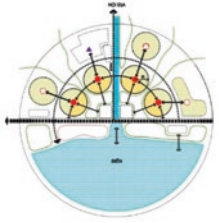
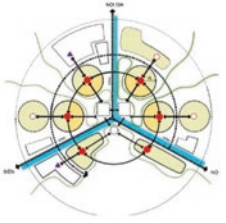
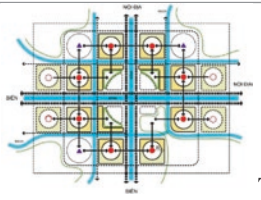
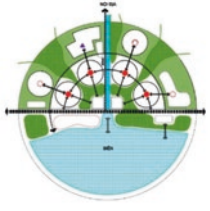
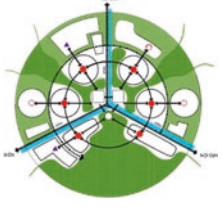
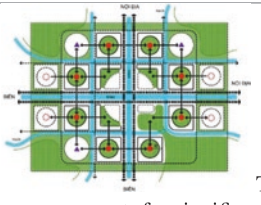
The measure of urban structural reform integrating with the land use management is to reinforce the adaptive capacity to climate change by some orientations:

- Planning the value lands for investment, and developing infrastructure is to make more competitive ability despite this urban land are impacted by climate change.
- Planning the safety areas and unsafe areas is to manage better the using of urban citizens in public services, such as health care, education, entertainment, etc.
- Identifying the land areas that can be affected by climate change is to construct city. Also having the strategy planning is to prevent and mitigate climate change risks.

Land use planning for the western zone of the Mekong Delta relates to the process that controls the density of land use, reduces the land use density where there are risks of erosion or high tides. This is to be replaced by green buffer zones along coastline and riverside or canal bank without building expansion in location that can have the risk of natural disasters. The methods of the land use planning highly integrates with the aspect of urban economy also each type of coastal towns (seafront

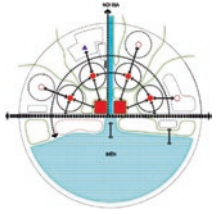
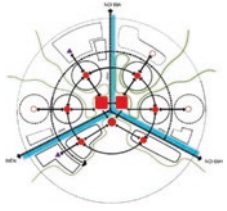
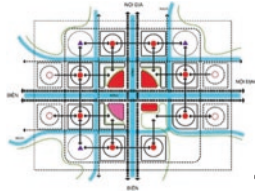
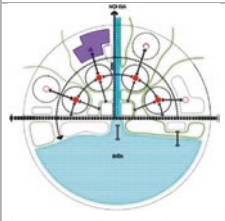
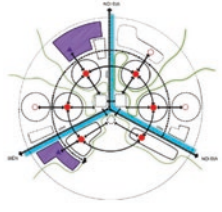
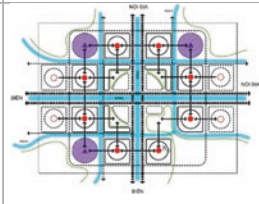
Table 46.4 Comparing and contrasting the distinctive aspects of three models of urban spatial structures

Order	Urban functional elements	The models of urban spatial structures		
		The seafront towns	The littoral towns	The coastal mangrove towns
	The model of the spatial structures adapting to climate change	 The model of the seafront towns' spatial structure adapting to climate change	 The model of the littoral towns' spatial structure adapting to climate change	 The model of the coastal mangrove towns' spatial structure adapting to climate change
1.	Urban center, resident center, and the system of public services	 Locating at seafront land and river mouth is to catch sea's strength. Implementing the solution that protects completely urban center to face the negative impacts of climate change. Buildings of public service in resident center have ≤500 meters radius (for average towns) and ≤ 1000 meters radius (for small towns).	 Locating at the interaction between main roads and rivers. Implementing the solution that protects completely urban center to face the negative impacts of climate change. Buildings of public service in resident center have ≤500 meters radius (for average towns) and ≤ 1000 meters radius (for small towns).	 Locating at the interaction between main roads and canal system. Implementing the solution that protects completely urban center to face the negative impacts of climate change. Buildings of public service in resident center have ≤1000 meters radius (for average towns) and ≤ 2000 meters radius (for small towns).

2.	Districts and new neighborhood units	 The medium level of building density will apply for districts that are closer to urban center. The low level of building density will apply for districts that are further from urban center.	 The medium level of building density will apply for districts that are closer to urban center. The low level of building density will apply for districts that are further from urban center.	 The medium level of building density will apply for districts that are closer to urban center. The low level of building density will apply for districts that are further from urban center.
3.	Green space	 The area of green space accounts for small proportion of urban land. Creating green buffer zones between towns and sea. Creating room for water and flooding.	 The area of green space accounts for remarkable proportion of urban land. Creating green buffer zones between towns and rivers. Creating room for water and flooding.	 The area of green space accounts for significant proportion of urban land. Creating green buffer zones between towns and canals. Creating room for water and flooding.

(continued)

Table 46.4 (continued)

Order	Urban functional elements	The models of urban spatial structures		
		The seafront towns	The littoral towns	The coastal mangrove towns
4.	Transportation system and infrastructure	 Beside the main road runs along coastline, adding several new main roads that parallel to the coastline are backward compares to the coastline. Adding new radial roads is to connect urban functions to sea. These result in shorter movement that can reduce CO_2 emission.	 The main road runs along principal riverside. Adding new radial roads and ring roads is to connect urban functions to river. These result in shorter movement that can reduce CO_2 emission.	 The main roads are parallel and perpendicular to canal system. Limiting diagonal roads that tend to run radially. Waterway is used like the main transport.
5.	Industrial zones	 Including heavy industry, light industry and supplementary industry. Implementing the level that protects completely for heavy industry, light industry to resolve the negative impacts of climate change	 Including heavy industry, light industry and supplementary industry. Implementing the level that protects completely for heavy industry, light industry to resolve the negative impacts of climate change	 Including supplementary industry. Implementing the level that adapts to climate change for supplementary industry

towns, littoral towns, and coastal mangrove towns) which be impacted by climate change in order to evaluate the cost-benefit in each concept of urban planning. For instance, the way to choose the seafront towns' land use is likely to affect to the high level of ground, urban infrastructure, buildings, sea dikes, seaports, and so on. An assessment frame of land use can make an essential role to adjust land use in coastal areas that are possible to be vulnerable. Existing land use and new exploitation land fund must be consistent with this frame as well as the level of coastal risk, environment issues and the Climate Change (CC), Sea level rise (SLR) Scenarios (Table 46.5).

Table 46.5 Land use control for the western zone of the Mekong Delta

Stage of the term in the CC, SLR Scenarios 2012	The levels of sea rise in the CC, SLR Scenarios 2012	Distances from the coastline	Planning of coastal land use	Type of building level
Now to 2020	9–10	≥ 50–100 m	Zone I: Construction for coastal protection, ecological buffer zones, marine tourist	Avoid building because of less effect.
To 2030	13–15	≥ 100–200 m	Zone II: Unsettled buildings, auxiliary buildings, tourism service buildings in short term; unsettled houses and coastal public services; buildings for coastal protection	The type of level-IV buildings should be used in the short time, nearly 20 years
To 2050	25–30	≥ 200–300 m	Zone III: Tourism buildings, residential buildings, and coastal public services	The type of level-III buildings should be used in a period of 20 years to nearly 50 years
To 2070	39–49	≥ 300–500 m	Zone IV: New districts, administrative buildings, cultural buildings, hospitals, schools, kindergartens, elder health care center	The type of level-II buildings should be used in a period of 50 years to nearly 100 years
To 2100	62–82	≥ 500 m	Zone V: New districts, administrative buildings, cultural buildings, hospitals, schools, kindergartens, elder health care center.	The type of level-I buildings should be used over 100 years

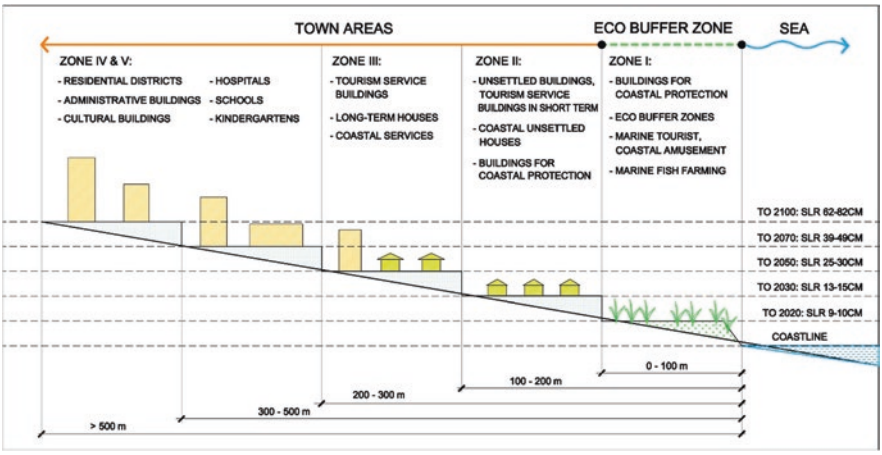


Fig. 46.8 The selection for land use of the coastal spatial zone

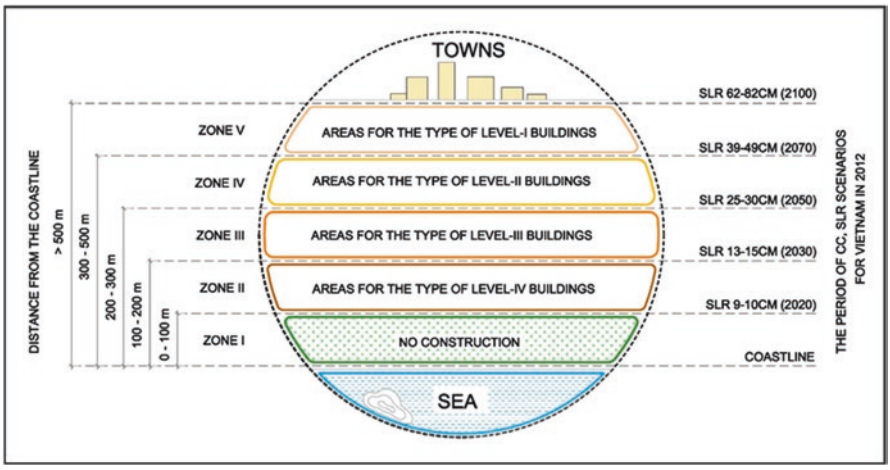


Fig. 46.9 Distributing the land use planning of coastal area

4.2 Controlling Land Use

Controlling the land use is applied to for majority of coastlines which face many risks. It is proposed that the constructive boundary of coastal buildings is similar the constructive boundary inside city, must to move backward from coastline. These coastal constructive boundaries are identified in short term until 2020 to long term between 2020 and 2100 (Figs. 46.8 and 46.9).

- Zone I: In the scope of the distance from 0.0 m to 100 m (from the coastline), construction in this area needs to be banned because of its negative effects. According to the CC, SLR Scenario for Vietnam 2012 to 2020, the western zone of the Mekong Delta will be directly affected by sea level rise, high tides, and erosion. It can be built for coastal protection, ecological buffer zones, marine tourist, marine fish farming, etc. within the scope of ≥50–100 m (to 2020).
- Zone II: In the scope of the distance from 100 m to 200 m (from the coastline), this land area should be used in the short time until 2030 because of sea level rise, high tides and erosion; only the type of level-IV buildings is permitted. Unsettled buildings, auxiliary buildings, tourism service buildings in short term; unsettled houses and coastal public services; buildings for coastal protection within the scope of ≥100–200 m (to 2030) are permitted.
- Zone III: In the scope of the distance from 200 m to 300 m (from the coastline), this land area should be used in the mid-term until 2050 exception to apply higher constructive technology adapting to CC because of sea level rise, high tides, and erosion; only the type of level-III buildings or less are permitted. Tourism buildings, residential buildings, and coastal public services within the scope of ≥200–300 m (to 2050) are permitted.
- Zone IV: In the scope of the distance from 300 m to 500 m (from the coastline), this land area can be used in the long term until 2070 for buildings in each next stage because of sea level rise, high tides and erosion; only the type of level-II buildings or less are permitted.
- Zone V: In the scope of the distance ≥500 m (from the coastline), this land area can be used in the long term until 2100 for most buildings because of sea level rise, high tides, and erosion; only the type of level-I buildings or less are permitted. New districts, especially hospitals, healthcare center and schools, should be located outside of coastal risk areas within the scope of ≥300 m (to 2070) and ≥ 500 m (to 2100) in order to avoid the increase of facing some potential risks in coastal areas.

4.3 Controlling Urban Development

Some solutions of controlling land use are to control the urban development for the coastal towns in the western zone of the Mekong Delta for climate change adaptation:

- There are measures for new districts: concentrating to build the apartments having medium height; controlling density for residential buildings, offices, and so on; reducing the split of residential areas into each small unit which can lead to waste of coastal land.
- Proposing technical criteria integrating with the criteria of land use value is to pressure the investors that must adapt to financial effects in order to make the good solutions of land use which suit to most used demands.

4.4 Mainstreaming the Risks of Natural Disasters into Land Use Planning

The hazards of natural disasters and the risks of climate change in the research location need to be integrated into urban planning, particularly for land use planning in each stage and field:

- Mainstreaming the hazards when planning the land use for economic-social development and other fields in Kien Giang province and Ca Mau province.
- Mainstreaming the risks when assessing the environment issues for land use planning which can be affected by climate change and vice versa.
- Integrating the risks to some solutions that can prevent and adapt the natural disasters such as sea dikes, supporting infrastructure, lakes for waterfall and flooding and coastal protective forest.
- Integrating the risks to adjust the present urban planning to update the new Climate Change, Sea Level Rise Scenarios. It is also necessary to mainstream and supervise climate change adaptation in the process of implementing urban planning.

5 Conclusions and Discussion

Proposing to renew the methodology of urban planning which integrates with climate change. Adding new research is to improve the content of mainstreaming for climate change adaptation in urban planning via methodology and the process of mainstreaming. Making the research methodology of climate change impact on cities and urban planning. Mainstreaming climate change adaptation for cities via the planning measures for spatial structure, orientation of spatial development, and land use planning.

Proposing the models of spatial structure and the solutions of urban planning adapting to climate change for the coastal cities and towns of the Vietnam's South West (belongs to the West coastal zone from Ca Mau Cape to Ha Tien town of Kien Giang province and Ca Mau province). These are the models of seafront urban spatial structure, the model of littoral urban spatial structure and the model of spatial structure of coastal mangrove towns which are applied into the groups of seafront towns, the groups of littoral towns, the groups of coastal mangrove towns, respectively. Proposing the planning measure of spatial development and land use for urban center, inhabited areas, green space, transport and infrastructure, industrial zones, etc. adapting to climate change.

Proposing three models of urban spatial structure for climate change adaptation in the Western zone of the Mekong Delta, which links with three groups of urban characteristics, is a fundamental measure to implement the type of master plan for the cities and towns adapting to climate change. The method of systematization

models is used in order to propose three models of urban spatial structure and solutions of urban land use adapting to climate change for coastal towns toward sustainable development. These models would be referenced for Vietnam coastal cities that have similar natural conditions and identities.

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