

Chapter 7

Resilience Concepts and Planning Realities: How Quy Nhon Is Becoming a Resilient City by Integrating Climate Change Adaptation into Master Plans?



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7.1 Introduction

Resilience is a new concept in urban planning. The term was introduced by Hollings into the field of ecology. It originated from the Latin word “resilience” which means “to bounce back” (Hosseini et al. 2016). There are three popular views on resilience. They are ecological, engineering, and evolutionary (Davoudi et al. 2012). Some scholars also classify resilience into two broad categories as ecological and engineering (Holling 1996; Liao 2012). As discussed in detail in Chap. 1 of this volume, the engineering approach to resilience is less popular in planning because it emphasizes the rigidity of the system and its capacity to bounce back after facing shock. It assumes the absorption of external shock without losing core functions of the system (Nelson et al. 2007). Ecological resilience is the original concept of Hollings which conceptualizes resilience as the capacity of a system to absorb the disturbances before it changes to a different regime. According to evolutionary resilience, the system will enter a different normal state after experiencing the shock. It recognizes the importance of acknowledging unpredictability, chaos, and uncertainty (Davoudi et al. 2012). Davoudi and others argued the relevance of evolutionary resilience in planning. Another perspective on resilience recognizes the relationship between society and ecology. Here, a system changes while

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retaining structure and functions, has a capacity of reorganization and maintains capacity for learning (Nelson et al. 2007). This perspective considers the nexus between society and ecology to maintain the resilience of the system.

Contemporary planning problems are “wicked” which are untamable with rational processes and scientific efforts (Rittel and Webber 1973). It is realized that the contemporary planning theory is not being able to address the neoliberal challenges in cities in terms of adaptive capacity, self-organization, and transformability (Eraydin 2013). The dominant planning theories are mainly focusing on the processes, whereas newer problems in the substantive side are increasingly pushing the planning profession towards a new direction and demanding new responses (Eraydin 2013). The resilience thinking can inform city planning through three ways: providing new metaphor on nature of structural change in linked and complex systems, providing new frameworks and tools for analysis of complex social-ecological urban systems, and providing options for a more adaptive governance (Wilkinson et al. 2010). Resilience thinking can be that new direction in planning.

Urbanization and resilience are two major concepts that are relevant in the context of cities of developing countries. The urban growth in developing countries is rapid and relatively unplanned. Multiple initiatives are emerging to make cities resilient to different internal and external shocks. Of the frequently discussed shocks are natural disasters and climate change impacts. Cities in developing countries, especially in Asia, are continuously facing disasters such as flooding, typhoons, and droughts. They have been proof of human societies to adapt to changing conditions including climatic events (Hamnett and Forbes 2011). But disasters are more complex in the 21st century. They are interacting with climate change and urbanization, and became more aggressive, prolong, and frequent. The climate change adds extra stress to cities in developing countries which are already facing different sources of risks (Hamnett and Forbes 2011). Making these cities resilient is a daunting task requiring serious efforts from multiple stakeholders including governments and NGOs (Malalgoda et al. 2013).

Under the uncertainty of climate change and disaster risks, land use planning can be an effective measure for building resilient communities (Berke and Stevens 2016). Integrating natural hazard mitigation into land use planning can make communities more resilient through enhancing awareness, strengthening problem-solving skills, and advancing creative planning and management strategies (Burby et al. 2000). Resilient land use plans limit the development of risk-prone areas (Burby and Dalton 1994) while reducing the vulnerabilities (Burby 1998). But planning agencies around the world are facing challenges in order to make cities resilient to disasters. There are empirical studies on challenges in addressing climate change and disaster risks in the course of land use planning. In case of Batticaloa, Sri Lanka, the major challenges are inadequate financial and human resources, lack of knowledge about vulnerabilities, the absence of political commitment, lack of clear responsibilities and coordination, and lack of appropriate land use regulations (Malalgoda et al. 2013). These challenges are context specific. The change in governance and institutions can

facilitate the effective use of land use planning as a tool to improve community resilience in an urban environment. Development of frameworks for urban resiliency assessment is an effective way to integrate resilience in the planning process (Sharifi 2016; Sharifi and Yamagata 2014). But the majority of those frameworks are context specific and many of them have limited replication value. Some of the empirical frameworks to operationalize resilience are Natural Disaster Density Indicator (NDDI) (Su 2015), resilience action planning (Shah and Raghieri 2012), resilience framework (Nelson et al. 2007), city resilience framework (Ove Arup and Partners International Limited 2015), subjective well-being approach (Nguyen and James 2013), etc. These frameworks vary in terms of their focus and scope. Developing context-specific measures to assess resilience is the first step to improve the adaptive capacity of cities to deal with the impacts of climate change.

This research tries to explore and evaluate the role of land use planning to improve community resilience in the context of Quy Nhon city of Central Vietnam. Using awareness, assessment, and action framework, this research assesses the resilience of two master plans of the city. Integration of climate change adaptation into land use planning is a determinant of resilience in this research.

7.2 Study Area: Quy Nhon City

The study was conducted in Quy Nhon city of Central Vietnam. It is the largest city of Binh Dinh Province located on the coast with tremendous economic opportunities. Quy Nhon city is the capital of Binh Dinh province. The city has an area of 285.53 square kilometers in total, and a population of over 283,000 people (Challenge to Change et al. 2009; Chi et al. 2015; Quy Nhon Sub-office of Statistics 2013). The city contains 16 wards with 258,010 people, which belong to urban administrative body and 5 communes with 25,430 people, which belong to the rural administrative body. It has high development potentials having a connection with Central Highland of the country.

The town of Quy Nhon was established in 1898 as a small trading town. The development of Quy Nhon after Doi Moi in 1986 (the economic renovation or reform process) has been remarkable with three stages: population development, administrative changes, and spatial expansion. From a small city with eight wards, six communes and 160,000 inhabitants in 1986, Quy Nhon has added two more wards, Bui Thi Xuan and Tran Quang Dieu, to the old Phuoc Long Commune of Tuy Phuoc District. In 1998, several city wards were divided, and Nhon Binh and Nhon Phu communes became city wards. In 2006, the city's administrative boundaries expanded into Phuoc My Commune and it remains the same until present. However, the administrative area of Quy Nhon has slightly increased from 285.529 to 286.1 square kilometers due to the landfill activities along the coast in the Thi Nai lagoon (Binh Dinh Statistical Office 2016). According to statistical yearbook of Binh Dinh (2016), currently 13.5% of the area is

agricultural production land, 42.3% is forestry land, 18.9% is specially used land and 3.7% is homestead land. Figure 7.1 presents the current administrative boundaries of the Quy Nhon city and Fig. 7.2 shows the city expansion which was derived from different sources such as Landsat satellite images and literature (Chi and Hang 2017).

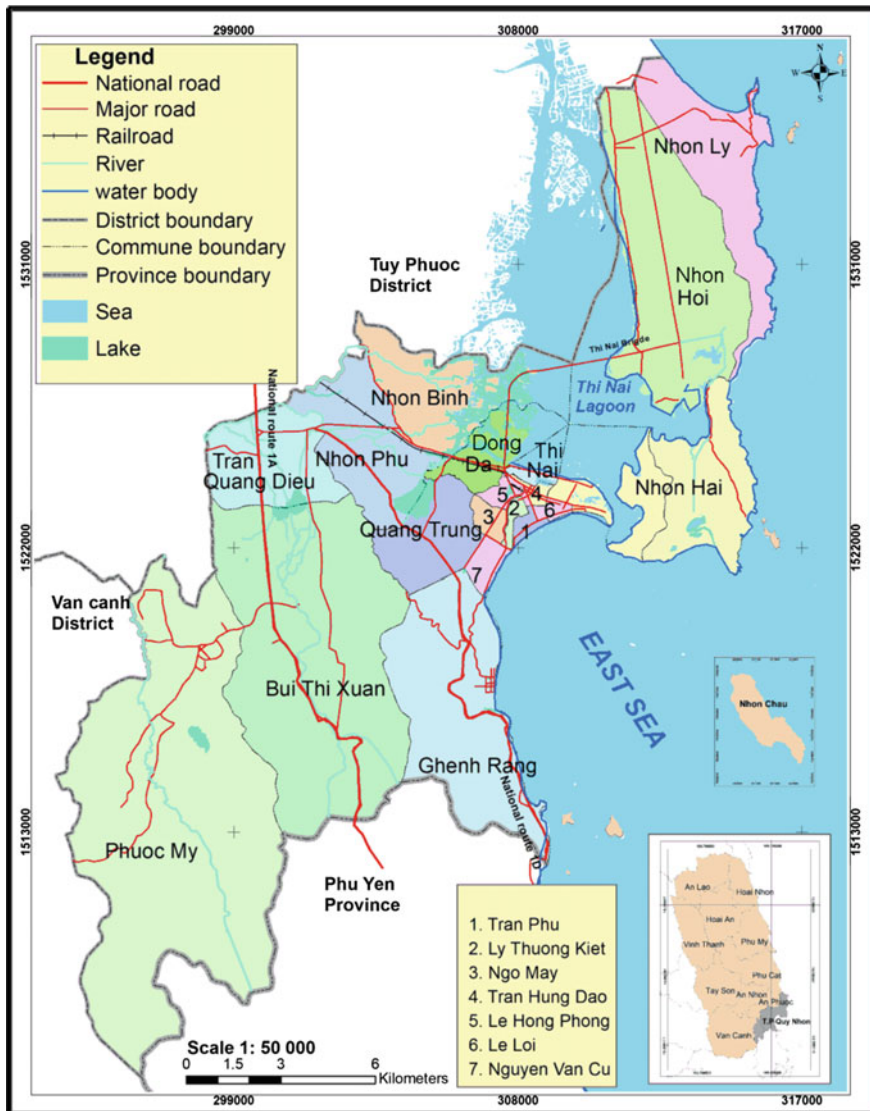


Fig. 7.1 Administrative map of Quy Nhon city

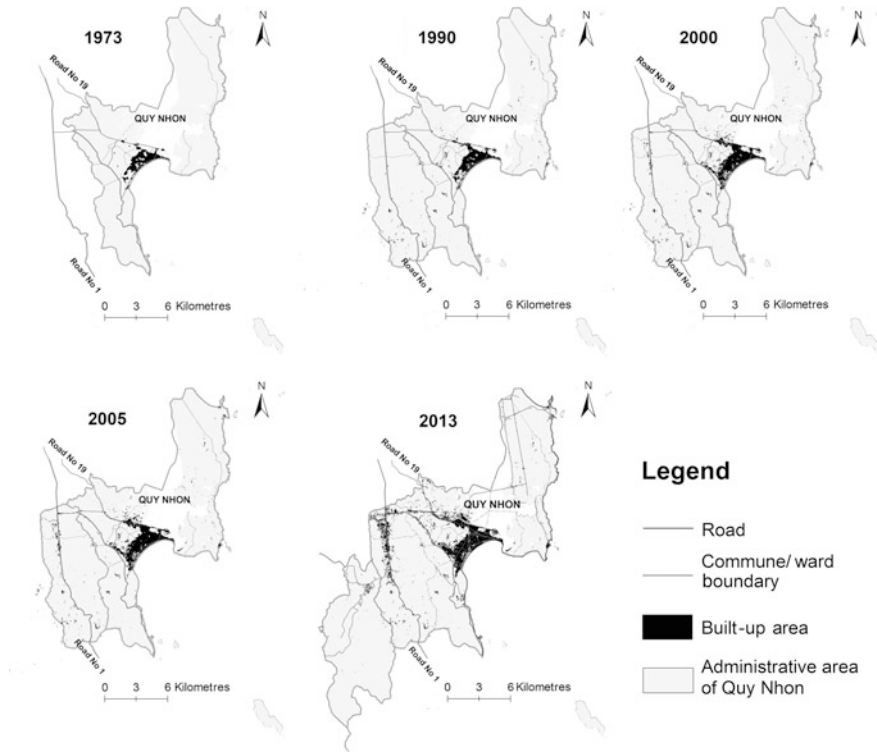


Fig. 7.2 Expansion of the administrative and built-up areas in Quy Nhon city (Chi et al. 2015)

7.3 Methodology

Despite strong interests in plan evaluation, systematic evaluation of land use plans, focusing on resilience and climate change adaptation is scarce. Different criteria are recommended to evaluate the plan quality (Baer 1997). Despite the presence of interest and knowledge in plan evaluation, there is still a gap on assessment of land use plans because they are highly contextual and future-oriented (Berke and Godschalk 2009). There are studies focusing on the evaluation of local plans from the perspective of hazard mitigation, and land use approaches (Lyles et al. 2014). There are also specific studies focusing on the evaluation of climate change adaptation plans (Anguelovski et al. 2016). The role of land use plans is strongly realized in the literature related to disaster risk reduction and climate change adaptation (Berke et al. 2015; Berke and Stevens 2016). In case of newer focus of plan evaluation, the underlying principles of a concept such as a climate change adaptation can be used to determine the criteria for evaluation. In case of sustainable development, Berke and Conroy used six principles of sustainable development to assess the extent of compliance of 30 comprehensive plans to the principles

of sustainable development (Berke and Conroy 2000). A similar approach can be developed to assess the plan qualities in terms of climate change adaptation.

Plan evaluation studies have used quantitative analysis to conduct the evaluation. They included multiple plans in the course of analysis. But, in case of this study, there is a comparison of two plans to assess how the climate change knowledge is being used (if any) in the plan documents to determine the policies, strategies, and regulations of different socioeconomic sectors of the plan. The qualitative content analysis (Weber 1990) is used to assess climate change adaptation measures in Master Plans of Quy Nhon City. Plan evaluation was supplemented with interviews with decision-makers and planners at Provincial and City levels to understand the practices of climate change adaptation in the course of land management within the city. The interview method is used in previous research to collect opinion on resilience among local decision makers (Kuhlicke 2013).

Plan evaluation considers different factors. One way to assess climate change adaptation aspects in land use plan can be through awareness, assessment and action (AAA) (Baynham and Stevens 2014; Luers and Moser 2006; Moser and Luers 2008; Tang et al. 2009; UKCIP 2003). Others have used theory-based evaluation approaches. One study uses rationalism, pragmatism, sociological idealism, collaboration and communication, and, political economic mobilization as theories to determine different variables to assess the plan quality (Tang and Brody 2009). The AAA approach has been used to evaluate climate change adaptation in land use plans (Baynham and Stevens 2014; Tang et al. 2009), climate action plans (Tang et al. 2010), and preparedness of local governments to address impacts of climate change (Tang et al. 2012; UKCIP 2003). This framework is used to assess the Master Plans (2004 and 2015) of the Quy Nhon city from the perspectives of climate change adaptation and disaster risk management. The measurement criteria for each component of the framework are shown in Fig. 7.3.

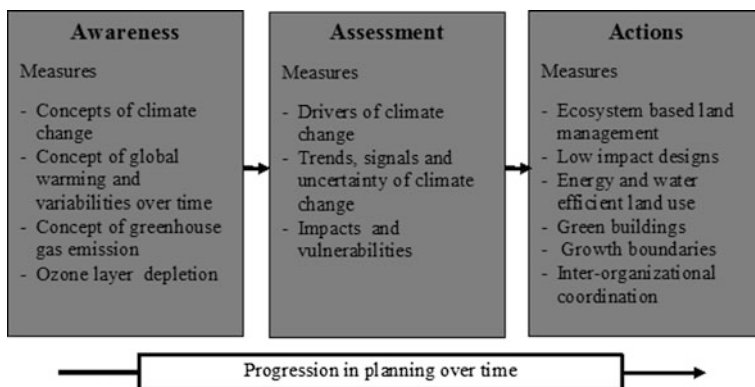


Fig. 7.3 Awareness-Assessment-Action Framework of climate change adaptation in land use planning (adapted from Tang et al. 2009)

- Awareness: From the perspective of planners, decision-makers, and politicians, the first step will be having awareness about the potential impacts of climate change. It can be applied to public and private sectors. The awareness can be improved through improvement of climate science. One of the examples is that a higher level of awareness among the state agencies in California is facilitated by the role of climate science (Moser and Luers 2008). Evaluation of awareness of climate change can be contextual and subjective, and also depends on the scope of the research. Evaluation of the level of awareness about climate change can cover issues such as:
 - knowledge of climate change, variabilities, and global warming
 - Concept of greenhouse gas emission
 - Concepts of ozone layer depletion
(Tang et al. 2009).
- Assessment: “Analysis” is another terminology to cover this step. It is the step in which decision makers and planners assess the potential impacts of climate change in their sectors. The study conducted by Moser and Luers (2008) among resource managers in California shows good knowledge and assessment capacity of climate change but the challenge is the lack of compatibility of scientific information with the existing decision-making procedures (Moser and Luers 2008). It includes following variables. But the list is not exhaustive. The assessment is basically having a good grasp of the climate change impacts in the selected sectors or geographic area. For example, in case of land use planning, it may include the risk and vulnerability assessment, historical pattern of climatic disasters in a certain geographic area, and modeling future impacts. Specific issues to be considered are:
 - major drivers, contributors to climate change
 - the trend, signals, and uncertainty of climate change (temperature change, precipitation change, sea level rise, extreme events)
 - Impacts and vulnerability (ecosystem, food security, settlements, society, water resources, human health)
(Tang et al. 2009)
- Actions: This the most crucial step of addressing climate change in the course of land use planning. Actions are dependent on the interest of users. They also depend on the context. Some variables that are included for land use planning are:
 - Green building and green infrastructures (i.e. urban forests, park and open spaces, natural drainage systems)
 - Watershed-based and ecosystem-based land management
 - Low impact design for impervious surface
 - Energy-efficient land use
 - Risk/vulnerability assessment
 - Multi-modal transportation corridor improvements

- Water sensitive land use (agriculture or industry)
 - Waste and stormwater management
 - Public awareness and participation
 - Control of urban service/growth boundaries
 - Zero waste/high recycling strategy
 - Mixed use or compact development
 - Pedestrian/resident friendly, bicycle-friendly, transit-oriented community design
 - Inter-organizational coordination procedures
 - Infill development and reuse of brownfield sites
 - Disaster-resistant land use and building codes
 - Vegetation (forest/woodlands) protection
 - Creation of conservation zones or protection areas
 - Vehicle emission reduction
- (Tang et al. 2009)

Above mentioned variables for each component may not be relevant in the context of Quy Nhon city. Overall, the awareness is about concepts and basic information of climate change, assessment is evaluating the impacts in the context of Quy Nhon city and action is related to designing interventions to deal with the impacts.

7.4 Quy Nhon Master Plans—Resilience Through Climate Change Adaptation in Land Use Planning

Two master plans are included in this study. The rationale behind evaluating Master Plans in this research is to identify and assess the land use planning activities/policies in plan documents that are relevant for climate change adaptation. Two Plans are Quy Nhon Master Plan Update of 2004 and Quy Nhon Master Plan of 2015. Master Plan Update of 2004 has 5 chapters and one appendix that added new provisions and updates on the Master Plan of 1998. It is a 54-page document. Master Plan of 1998 was not included in this analysis because of lack of accessibility to the document. Further, serious integration of environmental issues into planning and policy-making in Vietnam occurred from the beginning of 21st century, making an investigation of previous plans less relevant. Master Plan of 2004 has detailed provisions on economic and social development.

Unlike Master Plan Update of 2004, the Master Plan 2015 details layout of the goals, objectives, strategies, and actions of urbanization of Quy Nhon because it is the new and complete Master Plan for the city. It is a 296-page document with 10 chapters and 3 appendices. As in the 2004 Master Plan, this also starts with the rationale behind the establishment of the Master Plan in Chap. 1. Chapter 2 details layout of the context including climatic conditions, geology, and hydrology. It lays out a detailed description of the industrial zones, water supply, tourism

development, transportation, cultural preservation, urbanization, power distribution, air and water pollution, wastewater and solid waste management systems, and potential impacts of climate. This chapter also provides the achievements and challenges of implementation of Master Plan 2004. Chapter 3 covers an international case study of small city planning from Marseille, France which is relevant to Quy Nhon. Chapters 4 and 5 are focusing on the socioeconomic development and spatial strategies of urbanization. The land use planning is covered in Chap. 6. This chapter is about the architectural and historic preservation of the city. Chapter 8 covers the physical infrastructure development and Chap. 9 forecasts the future of urban expansion, land use change and industrialization in the city. Chapter 10 presents the regional importance of Quy Nhon city for Central Vietnam.

7.4.1 The 2004 Master Plan Update

The consideration of climate change in Master Plan Update of 2004 is minimal. This is the update of 1998 city Master Plan of Quy Nhon. There is no mentioning of the word “climate change” in the whole document. This plan focuses on the socioeconomic development and the land management in the city. It has a projection of population growth. It is projected that the population growth rate of the city was 1.62% in 2004. The total population in 16 wards of the city were 223,305 people in 2000, out of which about 57% is active labor force. The total area of the city is mentioned as 21,644 ha including 14,531 ha in the inner city and 7113 ha in the outskirts. Most of the contents of the plan are related to economic performance, especially the industrial development of the city, and its contribution to the overall economy of the province and status of the city at the national level. For example, the city is designated as one of the three tourist centers in Central Vietnam; the Phu Tai Economic Zone of the city provides employment to 8846 people and its area has been enlarged to 140 ha from 101.7 ha. The trade sector has contributed 47.8% of total GDP of the city in 2000 which was equivalent to 716.9 million VND. As background information for the land use planning, urban service management, and industrial expansion, the plan mentions environmental aspects. Considerations are not specific to the impacts of climate change or potential risks from the disasters such as flooding, typhoon, sea level rise, drought, etc. Rather, they are taken into account in the course of urbanization such as residential area expansion, management of drinking water, waste management, industrial park planning, powerline expansions, etc.

7.4.2 The 2015 Master Plan

The potential impacts of climate change are widely mentioned in the Master Plan. According to this plan, one of the challenges of Master Plan Update of 2004 is the

restriction of urban expansion caused by the terrain. Also, there is a limitation on urban development in old areas in the bank of Ha Thanh River because the old areas are heavily affected by flooding and uncertainties created by the climate change (Chap. 1). As in Plan Update of 2004, it contains the population projections for the city. It mentioned population projection under six scenarios (for 2025, 2035 and 2050). The first three scenarios are with petroleum processing center (named as “Victory Project”) in the Plan and second three projections are without petroleum processing center in Nhon Hoi Peninsula. Without Victory Project in the city, the population growth is estimated to be 545,000; 640,000; and 740,000 by 2025, 2035 and 2050, respectively. With Victory project, the population size will be estimated to be larger because it attracts more workers of different skills to the city. With Victory Project, the population of the city is estimated to be 620,000; 680,000 and 740,000 by 2025, 2035, and 2050, respectively. It has mentioned the population growth in the city and outskirt territories.

This Plan points the lack of consideration of climate change in the course of urban growth as another limitation of Master Plan Update of 2004. It states:

According to the Quy Nhon city’s construction master plan up to 2020 approved by the Prime Minister in 2004, minimum construction height is $H \geq 2.5$ m and the maximum ground slope is 0.4%. Up to now, detailed plans have been approved and some have been implemented, most of which are basically built to comply with approved QHC standards. However, the 2004 blueprint does not address the issue of global climate change due to sea level rise as the QHC plan of Quy Nhon City and its vicinity is until 2030 and vision to 2050.

(The 2015 Master Plan)

Especially, impacts of flooding are mentioned in almost all chapters of the Plan of 2015. The discussion on standards of Type I city to adapt to erratic rainfall, sea level rise and the flood is also mentioned. Cities in Vietnam are classified into five classes (I–V) based on socioeconomic development, population size, population density, non-agricultural labor proportion, and infrastructure development (The Socialists Republic of Vietnam 2009). Comparing these two master plans of the city there are significant shifts in the narrative on climate change in Master Plan of 2015 compare the 2004 updates.

The Table 7.1 shows that climate change and its impacts are mentioned and addressed in Master Plan of 2015. The flooding has been most widely mentioned in the Plan. In five chapters, there are more than 30 citations of flooding and its adaptation and mitigation measures. There is a discussion of the building standards to deal with impacts of climate change including flood, high waves, sea level rise, etc. For example, it has mentioned the exact height of foundation of houses near shore where the waves can cause damage. Measures are different for different areas. These measures are connected to the ground level of the city. Unlike the Master Plan of 2015, the 2004 updates did not have any discussion on any of the impacts of climate change.

Table 7.1 Awareness, assessment, and actions on climate change in Master Plans (2004 and 2015)

Climate change and its effects	Master Plan update 2004			Master Plan 2015		
	Awareness	Assessment	Action	Awareness	Assessment	Action
Mentioning “Climate Change”	X			√		
Sea level rise	X	X	X	√	√	√
Tidal impacts	√	X	X	√	√	√
Temperature change	X	X	X	√	√	√
Rainfall change	X	X	X	√	√	√
Flooding impacts	X	X	√	√	√	√
Typhoon impacts	√	X	X	√	√	√
Drought impacts	X	X	X	√	√	√

X Component not covered in the plan

√Component covered in the plan

7.5 Findings and Discussions

Quy Nhon is progressively becoming resilient through climate change adaptation in land use planning. But the achievements are mainly in terms of awareness. There are no significant efforts to develop coordinated actions to address climate change impacts in land use planning even though there is a discussion of actions in the Master Plan of 2015. There is no citation in the Master Plan that the recommended actions in the Plan are aimed at addressing the excessive flooding in certain parts of the city caused by anomalies of rainfall as a result of a change in climate. Both Plans have detail priorities and actions for urban expansion and economic development. The Master Plan of 2015 has high priority of oil refinery project in the city. There are clear measures of pollution control by enforcing national standards. The climate change is a multisectoral and complex issue. Promoting collaborative efforts among sectors is an effective measure to deal with it. In the Master Plan of 2015, there are not enough details on how prescribed actions will be coordinated among different sectors. The flooding has been the most widely discussed impact in the city but the proposed concrete actions are mainly focused on the sea level rise and tidal variations. The uncertainties of impacts and lack of clear standards to address them are some of the challenges that need to be addressed in order to take account of climate change in the course of land use planning. It has been attested by government officials during the interview. One interviewee mentioned:

....Until now, from the Ministry of Construction, they have the problem of only talking about the climate change, the climate change is only in discussions, we discuss how it can be integrated but there is no standard or a strong guideline to say that in the Binh Dinh province, the sea level rise will increase this much and this area will be impacted, and we need to raise the height of the bridge and construction to adapt with that.....

(Personal communication 2014)

Higher attention to climate change and disaster risk management is in the Master Plan of 2015. The Quy Nhon Master Plan Update of 2004 does not have any description of potential climate change impacts. It has a partial recognition of risks from flooding, typhoon, and tidal impacts. Master Plan of 2015 has mentioned impacts of flooding, typhoon and sea level rise in the city. It has ameliorated the mainstreaming of climate change impacts in land use planning. It details potential impacts of climate change and flooding in different segments of the plan. It has covered climate change scenarios in Chap. 8. It also discusses potential flood impacts in the new development in the city and elevation requirements for structures to adapt to those impacts. The elevation height is determined based on the flooding level in the area. It is different for different parts of the city. This raises the major question on why Master Plan of 2015 is ubiquitous regarding climate change risk assessment and adaptation. If the duration of 2004 to 2015 is observed, the major intervention between 2004 and 2015 is the introduction of Asian Cities Climate Change Resilience Network (ACCCRN) in the city. The ACCCRN project has the role to improve the awareness, assessment, and actions of climate change of climate change in the city.

ACCCRN has brought tremendous changes in thinking among communities, policymakers, and cities in Asia. The Rockefeller Foundation has launched a new initiative among 10 example cities in order to improve their resilience to tackle present and future challenges of climate change. Cities are shown in Fig. 7.4. The

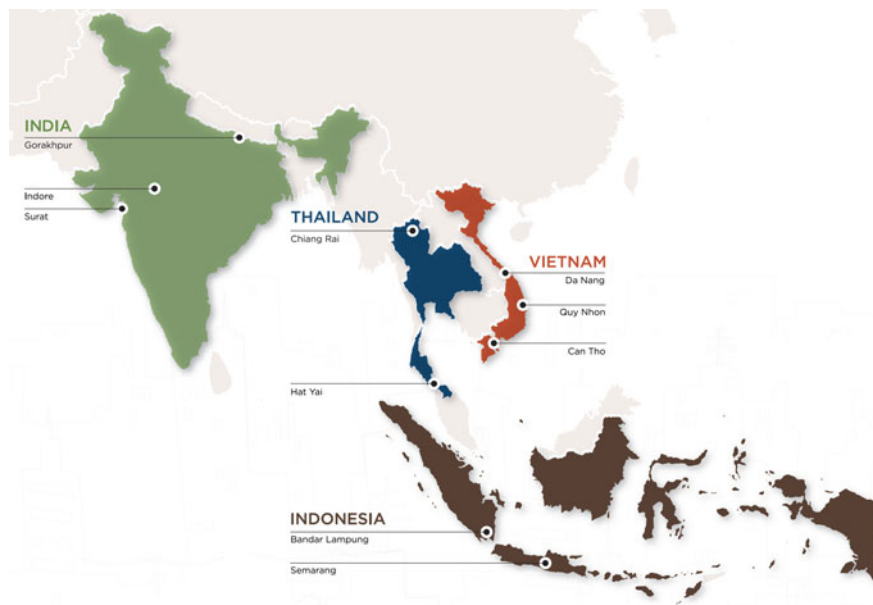


Fig. 7.4 10 Asian cities under ACCCRN (The Asian Cities Climate Change Resilience Network 2014)

Initiative was launched in 2008 with about USD 59 million for 9 years. The major driving force behind the launch of this Initiative is the importance of urban resilience to address the impacts of climate change. It is believed that the impact of climate change in cities was less discussed even though more than 50% of the global population was living in cities and Asian cities were becoming economic powerhouses (The Asian Cities Climate Change Resilience Network 2014). In this context, The Rockefeller Foundation has launched this Initiative in 10 small and medium-sized cities to fill the vacuum of intervention. The major goal of this initiative is "...to measurably enhance the resilience of ACCCRN cities' institutions, systems and structures to current and future climate risks, and through this, measurably [to] improve lives of poor and vulnerable people." (Bahadur and Tanner 2014). All 10 cities did not follow the same model of implementation of this initiative. There are six different models of resilience building among these cities. They are:

1. Community empowerment neighborhood/ward focused approach
2. Technocratic project approach
3. Multi-stakeholder engagement approach
4. City climate cell—CCCO
5. Choice of entry point—climate specific or problem identification/governance
6. Light touch city facilitation

(The Rockefeller Foundation and Verulam Associates Ltd 2014)

By 2014, this model is extended in more than 30 cities in Bangladesh, India, Vietnam, Indonesia, and Thailand (The Asian Cities Climate Change Resilience Network 2014). This has created big movement on climate change adaptation in Asia; especially in urban areas. The City Climate Cell or Climate Change Coordination Office (CCCO) approach is the Vietnamese approach to implementation of ACCCRN. Two cities (Can Tho and Da Nang) of Vietnam established CCCO under the jurisdiction of the city, and Quy Nhon city has CCCO under provincial people's committee. CCCOs are intended to play the role of coordination, interpretation, and collection of climate change related data for risk assessment, developing strategies of city resilience, building technical capacities on resilience planning, and coordinating external funding and climate change projects at the local level (Taylor 2017). During the interview with planners, scientists and international experts on climate change, they mentioned ACCCRN and its activities in the city as their effort to adapt to climate change. The implementation of the program is coordinated among many Provincial Departments and offices. That led to broader ownership of the program activities. Similarly, the establishment of Climate Change Coordination Office (CCCO) under Provincial People's Committee has established a new culture of duties and responsibilities to deal with climate change. The CCCO was established to implement ACCCRN project in the city. In the course of the interview, many representatives have mentioned the same project as their own project.

The climate change is a relatively new topic in Vietnam. Although there is the difference in opinions between scientists and policymakers on how and when the

projects, programs, and national prioritization was started on climate change, the evaluation of Master Plans (2004 and 2015) illustrates that the initiatives on climate change were started after 2004. Regarding the initiatives on climate change, one interviewee mentioned:

Because climate change is a very new topic in Vietnam you said that it is 20 years but I say that it is not actually 20 years. It was started from 2005 [until now], they have to conduct a lot of training [for] activities in this area in this field; [even] they do not have enough basic information about the climate change, they misunderstand about the disaster and climate change.

(Personal communication 2014)

The Master Plan of 2015 shows higher awareness of climate change impacts in Quy Nhon City (and includes assessments and actions) compared to Master Plan Updates of 2004. It has clearly realized that the major impacts of climate change for Quy Nhon city will be sea level rise, flooding, drought, and typhoons. Therefore, in every section, when it talks about disaster risks in the city, it has some discussions on the potential role of climate change. It has pointed that the flooding will increase in the future due to climate change. It further mentions:

...Flooding tends to increase in terms of the frequency of occurrence, combined with sea level rise will create deeper floods with longer durations. Potential impacts are:

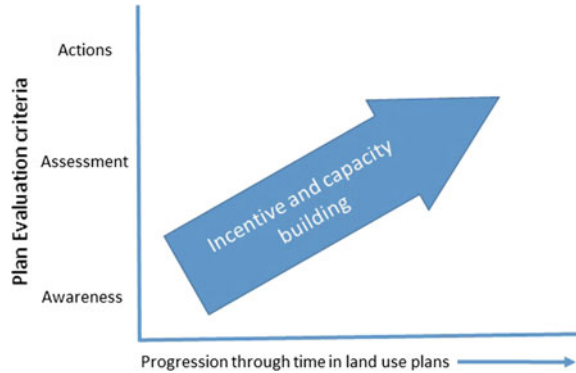
- Threats to life (especially children).
- Impacts on livelihoods: fishpond shattering; change of crops season; reduces tourism activities.
- Economic damage: loss of crops, interruption in agricultural production, costly recovery; funding for the upgrading of roads, raising the house basement; increased operating costs for irrigation systems for agricultural production.
- Environmental issues and public health: environmental pollution caused by rotting plants and dead animals; wastewater from drainage system; disease outbreak.
- The sectors that are most vulnerable to flooding are agricultural production, infrastructure, irrigation, and aquaculture.

(The 2015 Master Plan)

There is a separate section on trends of climate change and natural disasters in the second chapter of the plan. It has been realized that the flooding has been serious in terms of frequency, duration and impacts of events. It has also realized that one of the major causes of increasing impacts of flooding in the city is increasing unplanned development in flood-prone areas such as wetlands and riverbanks (Chi and Hang 2017). The Plan has realized this nexus between climatological disasters and rapid urbanization.

Based on the case of Quy Nhon, continuous support (technical, financial and institutional) is required to integrate adaptation and mitigation into the city planning process to improve urban resilience. Figure 7.5 shows that the land use plans adapt and mitigate to the climate change impacts through awareness, assessments and actions over time if there is a continuous incentive and capacity building for planners and decision makers.

Fig. 7.5 Continuum of awareness, assessment, and action in the land use planning



With the effort of ACCCRN, tremendous awareness has been achieved. During an interview with 29 government officials, leaders, and project managers at the provincial level, they mentioned that they are aware of climate change impacts in the city and province. They provided examples of those impacts. In the same manner, the Master Plan of 2015 enshrines detailed information about the climate change. Even though there is no complete assessment and actions to address all the potential impacts of climate change, there are examples of assessment and actions for flooding and sea level rise. The City Resilience Strategy of has identified the spatial distribution of potential impacts of climate change (Dinh et al. 2010). It has also proposed potential interventions in different sectors to deal with those impacts. But the implementation is not in practice yet. Government offices are participating in the dialogue of climate change through the institutional setup of CCCO. But there is a gap on how they can operationalize recommendations of Master Plans and the City Resilience Strategy in their decision making. Therefore, it is required to have continuous support to city focusing on mainstreaming climate change in land use planning and decision making. This includes providing different decision support tools, establishing intergovernmental coordination and improving governance and institutions to address climate change impacts in the planning process. That way, the strength of city towards assessment and action will be improved in land use planning and implementation. One of the major limitations mentioned by a government official during the interviews was not having enough resources (especially financial, human and technical) to carry on climate change related projects and programs in the office.

7.6 Conclusion

The 2015 Master Plan is more aware of climate change compared to the 2004 Master Plan Update of the city. Although the land use planning has been proven an effective approach to reduce climate change impacts, it can be challenging to

manage it in the context of rapidly transforming cities of developing countries. It is because of competing priorities of economic growth and rapid urbanization in cities, and limitation of resources to address emerging and uncertain issues like climate change.

With the introduction of ACCCRN project in Quy Nhon, the overall awareness among leaders, government officers, and residents has enhanced. As a result, the Master Plan of 2015 has covered detailed climate change information. It has projections on sea level rise, flooding, and typhoon which will be accelerated by climate change. The Master Plan of 2015 also has assessments of future impacts of climate change. For individual disasters, it covers adaptation actions. But those actions are not for every sector. For example, there is a height requirement for residential areas that are developed in the flood-prone areas. But there are no adaptation recommendations on how other infrastructures such as power lines, drinking water distribution system, drainage system, waste management systems, and road network will adapt to flooding. There is also confusion and gap in skills and tools among government offices in the city regarding operationalization of some of the adaptation recommendation in Master Plan and Climate Action Plan of the city. They mentioned that they needed some type of clear standards on the adaptation to climate change. In order to establish coordinated actions among different sectors to deal with climate change impacts, continuous support and incentives on capacity building (government offices, planning consultants and, provincial and local leaders) on climate change adaptation are necessary.

The use of AAA framework for the evaluation of climate change adaptation should be extended to other cities. Further understanding of climate change adaptation and mitigation initiatives through empirical studies will help to conclude how cities get motivated to address challenges of climate change in the course of land use planning in the context of rapidly transforming cities of Asia and beyond.

References

- Anguelovski I, Shi L, Chu E, Gallagher D, Goh K, Lamb Z, Teicher H (2016) Equity Impacts of Urban Land Use Planning for Climate Adaptation. *J Plann Educ Res* 36(3):333–348. <https://doi.org/10.1177/0739456X16645166>
- Baer WC (1997) General plan evaluation criteria. *J Am Plann Assoc* 63(3):329. Retrieved from <http://eres.library.manoa.hawaii.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=9708082272&site=ehost-live>
- Bahadur A, Tanner T (2014) Transformational resilience thinking: putting people, power and politics at the heart of urban climate resilience. *Environ Urban* 26(1):200–214. <https://doi.org/10.1177/0956247814522154>
- Baynham M, Stevens M (2014) Are we planning effectively for climate change? An evaluation of official community plans in British Columbia. *J Environ Planning Manage* 57(4):557–587
- Berke P, Godschalk D (2009) Searching for the good plan: A meta-analysis of plan quality studies. *CPL Bibliogr* 23(3):227–240

- Berke P, Newman G, Lee J, Combs T, Kolosna C, Salvesen D (2015) Evaluation of networks of plans and vulnerability to hazards and climate change: a resilience scorecard. *J Am Plann Assoc* 81(4):287–302
- Berke P, Stevens M (2016) Land use planning for climate adaptation. *J Plann Educ Res* 36(3):283–289. <https://doi.org/10.1177/0739456X16660714>
- Berke PR, Conroy MM (2000) Are We Planning for Sustainable Development? *J Am Plann Assoc* 66(1):21–33. Retrieved from <http://eres.library.manoa.hawaii.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=2989497&site=ehost-live>
- Binh Dinh Statistical Office (2016) Binh Dinh statistical yearbook. Retrieved from Binh Dinh, Vietnam
- Burby RJ (1998) Natural hazards and land use: an introduction. In: Burby RJ (ed) *Cooperating with nature: confronting natural hazards with land-use planning for sustainable communities*. Joseph Henry Press, Washington DC, pp 1–26
- Burby RJ, Dalton LC (1994) Plans can matter! The role of land use plans and state planning mandates in limiting the development of Hazardous Areas. *Public Adm Rev* 54(3):229–238. Retrieved from <http://www.jstor.org/stable/976725>
- Burby RJ, Deyle RE, Godschalk DR, Olshansky RB (2000) Creating hazard resilient communities through land-use planning. *Nat Hazards Rev* 1(2):99–106. Retrieved from <http://link.aip.org/link/?QNH/1/99/1>, [http://dx.doi.org/10.1061/\(ASCE\)1527-6988\(2000\)1:2\(99\)](http://dx.doi.org/10.1061/(ASCE)1527-6988(2000)1:2(99))
- Challenge to Change, Binh Dinh People’s Committee, Quy Nhon People’s Committee, DONRE, Quy Nhon City Red Cross, Quy Nhon City mass organisations Peoples Committees, Binh Ward and Nhon Ly Commune (2009) *Hazard, Capacity and Vulnerability Assessment in Quy Nhon*. Retrieved from Quy Nhon, Vietnam
- Chi VK, Hang NTT (2017) Coastal urban development in Quy Nhon, the context of climate change. In: Archer D, Colenbrander S, Dodman D (eds) *Responding to climate change in Asian cities: governance for a more resilient urban future*. Routledge, London and New York, pp 75–88
- Chi VK, Hang NTT, Hoa DTB, Van LT, Xuan NH, Ha TT, Trang NTT (2015) Coastal urban climate resilience planning in Quy Nhon, Vietnam. Retrieved from London
- Davoudi S, Shaw K, Haider LJ, Quinlan AE, Peterson GD, Wilkinson C, Davoudi S (2012) Resilience: a bridging concept or a dead end? “Reframing” Resilience: challenges for planning theory and practice interacting traps: Resilience assessment of a pasture management system in Northern Afghanistan Urban resilience: what does it mean in planning practice? Resilience as a useful concept for climate change adaptation? The politics of resilience for planning: a cautionary note. *Plann Theory Pract* 13(2):299–333. <https://doi.org/10.1080/14649357.2012.677124>
- Dinh TV, Nhung NV, Van HC, DiGregorio DM (2010) Climate change resilience action plan, Quy Nhon City: Summary. Retrieved from Quy Nhon, Vietnam
- Eraydin A (2013) “Resilience Thinking” for Urban planning. In: Eraydin A, Taşan-Kok T (eds) *Resilience thinking in urban planning*. Springer, London, New York, Dordrecht, Heidelberg, pp 17–37
- Hamnett S, Forbes D (2011) Risks, resilience and planning in Asian cities. In: Hamnett S, Forbes D (eds) *Planning Asian cities: risks and resilience*. Routledge, Abington, UK, New York, USA, pp 1–39
- Holling CS (1996) Engineering resilience versus ecological resilience. *Engineering within Ecological Constraints* 31(1996):32
- Hosseini S, Barker K, Ramirez-Marquez JE (2016) A review of definitions and measures of system resilience. *Reliab Eng Syst Saf* 145:47–61. <https://doi.org/10.1016/j.ress.2015.08.006>
- Kuhlicke C (2013) Resilience: a capacity and a myth: findings from an in-depth case study in disaster management research. *Nat Hazards* 67(1):61–76
- Liao KH (2012) A theory on urban resilience to floods—A basis for alternative planning practices. *Ecology and society* 17(4) <https://doi.org/10.5751/es-05231-170448>
- Luers L, Moser SC (2006) Preparing for the impacts of climate change in California: opportunities and constraints for adaptation. Retrieved from Online

- Lyles LW, Berke P, Smith G (2014) Do planners matter? Examining factors driving incorporation of land use approaches into hazard mitigation plans. *J Environ Planning Manage* 57(5):792–811
- Malalgoda C, Amaratunga D, Haigh R (2013) Creating a disaster resilient built environment in urban cities: the role of local governments in Sri Lanka. *Int J Disaster Resil Built Environ* 4(1):72–94
- Moser SC, Luers AL (2008) Managing climate risks in California: the need to engage resource managers for successful adaptation to change. *Clim Change* 87(1):309–322. <https://doi.org/10.1007/s10584-007-9384-7>
- Nelson DR, Adger WN, Brown K (2007) Adaptation to environmental change: contributions of a resilience framework. *Annu Rev Environ Resour* 32(1):395
- Nguyen KV, James H (2013) Measuring household resilience to floods: a case study in the Vietnamese Mekong River Delta. *Ecol Soc* 18(3) <https://doi.org/10.5751/es-05427-180313>
- Ove Arup, Partners International Limited (2015) City resilience framework. Retrieved from London
- Quy Nhon Sub-office of Statistics (2013) Statistical yearbook of Quy Nhon city. Retrieved from Quy Nhon, Binh Dinh, Vietnam
- Rittel HWJ, Webber MM (1973) Dilemmas in a General Theory of Planning. *Policy Sci* 4(2):155–169. Retrieved from <http://www.jstor.org/stable/4531523>
- Shah F, Ranghieri F (2012) A workbook on planning for urban resilience in the face of disasters: adapting experiences from Vietnam's cities to other cities: World Bank Publications
- Sharifi A (2016) A critical review of selected tools for assessing community resilience. *Ecol Ind* 69:629–647. <https://doi.org/10.1016/j.ecolind.2016.05.023>
- Sharifi A, Yamagata Y (2014) Resilient Urban planning: major principles and criteria. *Energy Procedia* 61(Supplement C):1491–1495. <https://doi.org/10.1016/j.egypro.2014.12.154>
- Su YS (2015) Rebuild, retreat, or resilience: can Taipei plan for resilience?
- Tang Z, Brody SD (2009) Linking planning theories with factors influencing local environmental-plan quality. *Environ Plann B: Plann Des* 36(3):522–537
- Tang Z, Brody SD, Quinn C, Chang L, Wei T (2010) Moving from agenda to action: evaluating local climate change action plans. *J Environ Planning Manage* 53(1):41–62. <https://doi.org/10.1080/09640560903399772>
- Tang Z, Hussey CM, Wei T (2009) Assessing local land use planning's awareness, analysis, and actions for climate change. *Int J of Clim Change Strat Manage* 1(4):368–381
- Tang Z, Ting W, Quinn C, Zhao N (2012) Surveying local planning directors' actions for climate change. *Int J Clim Change Strat Manage* 4(1):81–103. <https://doi.org/10.1108/17568691211200236>
- Taylor S (2017) The role of climate change coordination offices in building resilience: lessons from ACCCRN. Retrieved from Hanoi
- The Asian Cities Climate Change Resilience Network (2014) ACCCRN city projects. Retrieved from Bangkok
- The Rockefeller Foundation, Verulam Associates Ltd (2014) Summative evaluation: the rockefeller foundation initiative asian cities climate change resilience network. Retrieved from New York
- The Socialist Republic of Vietnam (2009) The Law on Urban Planning. XIIth National Assembly of the Socialist Republic of Vietnam, Hanoi
- UKCIP (2003) Climate change and local communities—How prepared are you? An adaptation guide for local authorities in UK
- Weber RP (1990) Basic content analysis Sage university papers series. Quantitative applications in the social sciences Retrieved from WorldCat database Retrieved from <http://catdir.loc.gov/catdir/enhancements/fy0655/90061019-d.html>
- Wilkinson C, Porter L, Colding J (2010) Metropolitan planning and resilience thinking: a practitioner's perspective'. *Crit Plann* 17(17):2–20