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Responding to Climate Change at Provincial Level in Viet Nam

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Abstract: Responding to climate change at the local level plays an important role in building resilience and supporting the implementation of the National Climate Change Plan. Due to its geopolitical characteristics, Vietnamese provinces developed their own climate change action plans, taking the climate change impacts on that province, its financial capacity, and the homogeneity of the provincial plan with the national action plan into consideration. Currently, in the world, there are very few studies on assessing the implementation of climate policies at the local level as well as their effects on the national climate policies. From that perspective, this paper aims to fulfill that existing gap by assessing Viet Nam's city/provincial efforts on climate change response and their contribution to the national goals. The assessment applied both top–down and bottom–up approaches which is a combination of the review of legal documents and results of the implementation of 63 cities/provincial climate change action plans (PAPCs) and their relevance to the national goals. The study uses information from the PAPCs of 63 provinces/cities in Viet Nam to analyze their goals, content, and results to achieve the goals as set out in the National Strategy on Climate Change. On that basis, it was shown that in the coming time, it is necessary to further strengthen the coherence during the development process of central, ministerial, and local action plans in order to achieve the national goals to respond to climate change, contributing to the implementation of the Paris Agreement on climate change.

Keywords: Provincial action plans to respond to climate change; Impacts of climate change.

1. Introduction

The central aim of the Paris Agreement is to keep global temperature rise this century well below 2 °C above pre–industrial levels and to pursue efforts to limit the temperature increase even further, to 1.5 °C. Furthermore, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change. On that basis, countries need to develop action plans to cope with climate change in order to achieve national commitments on adaptation and mitigation [1–2].

Cities and provinces are crucial actors in climate change response efforts [3–4]. However, how and why cities engage in climate policy is a matter of current debate [5–7] and the effect of national or international policies on the local level is not well understood [8]. Cities and provinces can play a key role in developing and implementing climate change programs because they are the main focus of local actions as well as national and international climate change commitments [9].

For years, the global community has focused on efforts responding to climate change at a national level, which has been mostly unsuccessful in terms of realizing comprehensive

international agreements or taking action. Cities and provinces, by contrast, are preparing risk assessments, setting greenhouse–gas emission reduction targets, and pledging to act. Cities are crucial actors of climate change mitigation and adaptation efforts [3–4, 7]. Urban areas account for between 71% and 76% of CO_2 emissions from global final energy use and between 67 – 76% of global energy use [10]. At the same time, cities, nearly all being built on coasts or riverbanks, are particularly vulnerable to climate change effects [4]. Globally, efforts are underway to reduce anthropogenic greenhouse gas emissions and to adapt to climate change impacts at the local level. However, there is a poor understanding of the interlinked relationship between city strategies on climate change mitigation and adaptation and the relevant policies at the national level [8–9]. The mere existence of international or indeed national climate policies is no guarantee for local plans and action [9].

The capacity of cities is being increasingly recognized by international institutions and has been pointed out as crucial in the multi–level government scenario of the European Union (EU) [6]. Recognizing this important role, local governments have taken further efforts to mitigate and adapt to climate change. However, and despite the risks and cost of taking no action, many cities are struggling to introduce climate issues in their policy agenda on a sustained basis [6].

A "bottom–up" approach means that regional or local authorities are encouraged or allowed to go beyond national requirements or incentives to independently act to address climate change, either with the present national policies or not. In this model, learning and experience acquired through successful local programs diffuse to inform and steer policymaking at regional or national levels. Inevitably both directions of influence–top–down and bottom–up–co–exist to shape actions and policies across levels of decision making. Experience from the City of Portland and the State of Oregon in the US demonstrate this type of example [11]. There are a number of other examples of note in the US as well as in Spain, both of which have a decentralized approach to governance. In turn, this allows experimentation and room for innovation for those states and cities with the resources to do so. The State of California is notable for example. Also, at the local level, New York City has become a leader on the issue of adaptation and mitigation. This is due in part to a strong network of academic and government practitioners, working together to advance understanding and support decision making [4].

The study [9] reports the findings of studying the climate change strategies or plans from 200 European cities from Austria, Belgium, Estonia, Finland, France, Germany, Ireland, Italy, Netherlands, Spain, and the United Kingdom. The study highlights the shared responsibility of global, European, national, regional, and city policies [9]. It was found that there's no archetypical way of designing for global climate change and multiple interests and motivations are inevitable. The research warranted the need for a multi–scale approach to climate policy in the future, mainly ensuring sufficient capacity and resources to enable local authorities to plan and respond to their specific climate change agenda for maximizing the management potentials for translating environmental challenges into opportunities. The analysis shows that a lot of cities tackle the causes (65 %) and consequence (28 %) of global climate change [9].

In France, the responsibility for climate change is also divided between national, regional, and local levels, but the national level has a strong guiding and directing function for cities which is different from Austria, Belgium, Germany, Estonia, and Finland [9]. The analysis shows that many European cities are proactive on climate change. However, climate change mitigation and adaptation potentials may lie outside the administrative boundary of the city and clear guidance in which case collaboration across city boundaries is needed. Cities search for national guidance and if this is often not available align themselves to international guidance and networks [9].

In Spain, the central Government has to rely on the involvement of regional governments and municipalities in order to fulfill its international commitments. This fact is even more evident as regions and cities have jurisdiction over housing, mobility, urban planning, and spatial planning, etc [6].

[12] examined 40 recently adopted local climate change action plans in the US and analyzes how well they recognize the concepts of climate change and prepare for climate change mitigation and adaptation. The results indicate that an action plan to respond to climate change at the local level has a high level of "awareness", moderate "analysis capabilities" for climate change, and relatively limited "action approaches" for climate change mitigation [12].

Viet Nam has issued its National Strategy on Climate Change. The strategy indicated that Viet Nam's climate change response must: i) be associated with sustainable development; ii) lead towards a low–carbon economy, iii) take advantage of opportunities to innovate development thinking and enhance national competitiveness, and iv) conduct adaptation and mitigation activities at the same time to effectively deal with climate change. This strategy is the basis for central and local authorities to identify and implement adaptation and mitigation activities as well as integrate climate change contents into their strategies, planning, and development plans. The strategy points out that each province needs to develop its own plan to respond to climate change [13].

After the National Assembly passed the Paris agreement, the Government issued document No. 2053/QD–TTg dated 28th October 2016. According to this decision, the Government identifies key objectives and tasks for implementing the Paris agreement. Besides ministries, localities and provinces are supported to develop their own action plans to respond to climate change [14]. Annually, provinces report the status of implementation of PAPCs to the Ministry of Natural resources and Environment. The report includes facts and figures about the ongoing adaptation tasks and projects, limitations, and problems faced in order to implement the PAPCs [14].

In 2014, which is the year with the latest GHG inventory results since Viet Nam ratified the Paris Agreement. The sources/sink of GHG emissions is identified for the energy, agriculture, LULUCF, waste, and IP sectors. The total GHG emissions in the base year 2014 were 284.0 million tons of CO_2eq. Viet Nam now has reviewed and updated the nationally determined contribution (NDC) [15]. After submitting the NDC to the United Nations Framework Convention on Climate Change (UNFCCC), the Government will develop the National action plan on responding to climate change. So, the Provincial action plans to respond to climate change (PAPCs) will play an important role in developing the National action plan.

Currently, 63/63 provinces and cities in Viet Nam have approved their Action Plans to Respond to Climate Change [16]. And perhaps, Viet Nam is the only country where all provinces have their own action plans based on climate change vulnerability and socio–economic development. Local action plans to respond to climate change mainly focus on assessing the impacts of climate change on sectors and local areas especially sensitive and vulnerable ones [17]. These plans also identify solutions and develop a list of priority projects to cope with climate change in their provinces. These action plans are an important basis for local authorities to effectively implement projects and call for domestic and foreign supports in order to respond to climate change. Funding sources for the implementation of local plans include central and local funding mobilized from development partners and international organizations and also the private sector [18].

In this study, the existing (PAPCs) of the 63 provinces and cities in Viet Nam will be reviewed [19]. The study addresses two principal research questions:

What are the impacts of implementing PAPCs on socio–economic development and on achieving the national climate change response goals?

What are the relative influences of local, national or international policies on the development of PAPCs?

The study will be conducted based on the evaluation and analysis of PAPCs in Viet Nam. The research method focuses on analyzing the following issues: (1) the process of developing action plans; (2) the objectives, scopes and contents of the action plans; (3) the contribution of the PAPCs to the national climate change response goals, and (4) the limitations and shortcomings of the PAPCs implementation.

2. Materials and Methods

2.1. Analysis of planning processes

a. Analyzing the level of response of PAPCs based on following criteria:

– The involvement of stakeholders, especially local communities;

– The conformity with short–term, medium–term and long–term national and local strategies, plans and socio–economic development programs;

– Identify priority solutions, activities and areas for each province in order to response to climate change;

– Integrate solutions to cope with climate change into ministerial and provincial strategies and programs;

– Ensure the feasibility in terms of timeline, resources, effectivity and outputs;

– Ensure the ability to examine, monitor and evaluate the implementation process as well as the final results.

b. In order to integrate climate change elements, the review of local development strategies, programs, planning and plans is crucial. Therefore, this study will also analyze this aspect by focusing on the following processes:

– The selection of measures to response to climate change to integrate into other strategies, programs etc... (identify and list all adaptation and mitigation measures related to the content of strategies, programs, planning and development plans);

– The integration of climate change goals and issues into strategic objectives, programs, planning and development plans;

– The comparison and considering of the priority levels of climate change issues that are integrated into development strategies, programs, planning and plans.

2.2. Analysis of Objectives, scopes and contents of the PAPCs

The objectives of the PAPCs are based on assessments of the impacts of climate change on each province as well as existing gaps in adaptation and mitigation. Research methodology will assess the extent to which these issues are addressed in order to set out goals of the PAPCs. In addition, the study will also assess the conformity of the scope and content of PAPCs, specifically:

– Whether the scopes of the PAPCs cover the main fields that contribute to the local socio–economic development including: natural resources and environment, natural disaster prevention, agriculture and rural development, public security, poverty reduction, public health, energy, transportation, tourism, industry and commerce and other fields.

– Whether the action plans include specific activities for each sector in order to adapt to climate change and reduce local greenhouse gas emissions.

2.3. Analysis of contribution of the PAPCs to the national goals

The study conducts an analysis of the objectives of the national action plan on climate change and on the results of the PAPCs. On that basis, an analysis of the effectiveness of the

implementation of the action plan for the province/city for each specific national goal is set. The evaluation criteria were determined based on the set goals of the PAPC.

2.4 Research data

The study uses information from the PAPCs of 63 provinces/cities in Viet Nam to analyze their goals, content, and results to achieve the goals set out in the National Strategy on Climate Change [13,19]. The study also uses collected data from annual reports that provinces send to the National Committee on Climate Change. The Government issued Decision No. 2053/QD–TTg on the Plan for the Implementation of the Paris Agreement [14]. Accordingly, provinces and cities formulate their PAPCs to set out tasks to respond to climate change and annually report the results, status of implementation of ongoing projects to the Ministry of Natural Resources and Environment. With an integrated approach, the paper analyzes efforts to assess the local contribution to the implementation of national climate change goals. The collected data includes facts and figures about the ongoing adaptation tasks and projects; limitations and problems that provinces face in order to implement the PAPCs.

Survey and survey data were collected to further assess the impact of climate change on specific areas to analyze the suitability of action plans for local socio–economic development. Survey data is also used to assess the process of developing action plans of provinces/cities. The collected data includes local reports on assessing the impact of climate change; damages caused by natural disasters and climate change of annual reports of localities; results of climate change adaptation projects.

3. Results and Discussion

3.1. Analyze the appropriateness of the objectives of the PAPCs and national action plans

The National Climate Change Action Plan that was issued in 2012 set out 10 goals as following: (1) Strengthening climate monitoring and natural disasters warning capacity; (2) Ensuring food and water security; (3) Actively responding to natural disasters and flood for big cities; consolidating river and sea dykes; (4) Mitigating greenhouse gas emissions, heading toward a low carbon economy; (5) Strengthening management capacity, improving climate change–related mechanisms and policies; (6) Mobilizing the participation of all economic sectors, scientific, socio–political–professional organizations and non–governmental organizations in responding to climate change; building communities in order to effectively adapt to climate change; (7) Raising awareness, developing human resources; (8) Developing science and technology to assist policies formulation, impact assessment, identification of climate change adaptation and mitigation measures; (9) Enhancing international cooperation and Viet Nam's role in international activities on climate change; (10) Mobilizing financial resources to cope with climate change [20].

From the collected data, the authors have found that the overall goals of the PAPCs are elaborated based on the National Action Plan's objectives. In addition, the proposed targets in the PAPCs are also based on the results of local and sectoral climate change impacts assessments.

Specific targets identified in the PAPCs are as followed [19]:

1) Assess climate change vulnerability in various fields such as services, agriculture, natural resources, environment, energy exploitation and usage, transportation, telecommunications, security and national defense activities, and healthcare;

2) Assess climate change vulnerability in sensitive areas such as coastal, rural, or mountainous areas;

3) Assess the vulnerability for vulnerable groups such as poor households, migrant workers, elderlies and children;

4) Apply modern and advanced management models, approaches, technical methods in order to minimize losses and/or improve the climate change responding capacity of vulnerable sectors, areas, and groups;

5) Improve provinces and cities' legal framework to strengthen the coordination between agencies, businesses, organizations, and individuals in responding to climate change;

6) Integrate climate change contents and activities into provincial socio–economic development plans to increase long–term sustainability;

7) Strengthen cooperation with domestic and international climate change organizations to exchange experience and cooperate in climate change response activities.

The goals mostly aim to solve short–term issues and do not focus on long–term orientations of the province in order to cope with climate change in the future. The list of implementation tasks is not clearly planned. Most of the PAPCs lack monitoring and evaluation solutions to achieve their goals. The tasks proposed in the PAPCs are mostly implemented in the whole provinces/cities. Some specific projects focus on regions that are vulnerable to natural disasters and climate change.

For example, the PAPC of Quang Nam province focuses on assessing the impacts of climate change, sea–level rise and propose solutions to address areas such as biodiversity; coastline stability; drought; socio–economic development planning; agriculture; flood and storm prevention; health; tourism; general topographic; geological conditions, etc. of the province in the context of climate change.

The PAPCs of Ben Tre province focus on assessing the impacts of climate change, sea–level rise on coastal communities, biodiversity, tourism and proposes solutions. The PAPCs are mostly divided into 5–years periods of 2011–2015 and 2016–2020 (that are similar to the timeline of the local socio–economic development plans). This can create favorable conditions for the integration of climate change elements into local socio–economic development plans. The PAPCs focus on certain specific priority areas such as environmental resources, natural disaster prevention, agriculture and rural development, employment; social security; hunger eradication; poverty reduction; health; energy; construction; transportation; tourism; industry, and commerce.

3.2. Analyses of the PAPCs's contents

The PAPCs mainly focus on assessing the impact of climate change on areas and sectors; developing climate change and sea–level rise scenarios for localities; proposing actions to cope with climate change and sea–level rise. This is mainly a document for authorities to base on when integrating climate change into the provincial socio–economic development plans and mostly focus on key and vulnerable sectors such as agriculture, environmental resources, and natural disaster prevention [19]. The contents of PAPCs have partly met the set goals. However, the lists of tasks and projects are still fragmented and lack coherence and coordination among activities, sectors to achieve the desired results. Very few PAPCs are integrated into local long–term development plans (e.g. the Action Plan of Ho Chi Minh City) [19].

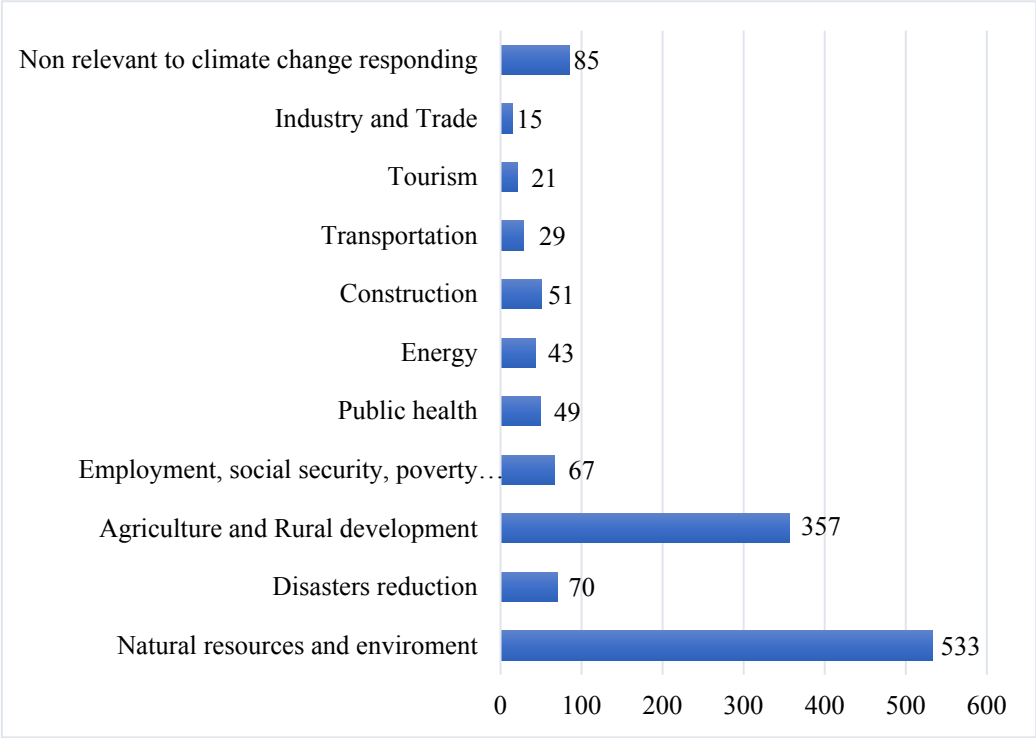

Figure 1. Total number of actions/projects by sectors in the PAPCs [19].

In Figure 1, it is clear that the PAPCs focus on sectors such as natural resources and environment (surveys, impact assessment, improving the capacity of climate change forecasting, planning climate change responses etc.) and agriculture and rural development (cultivation, livestock, natural disaster prevention, forestry etc.). The figures show that the natural resources and environment sector is prioritized to allocate the most funding in PAPCs and account for 35% of the total proposed funding (equivalent to VND 9927.67 billion). It is followed by agriculture and rural development sector for activities such as conservation and development of watershed forests, mangrove forests, development of animal husbandry and aquaculture adaptable to climate change and other infrastructures (Table 1, Figure 2).

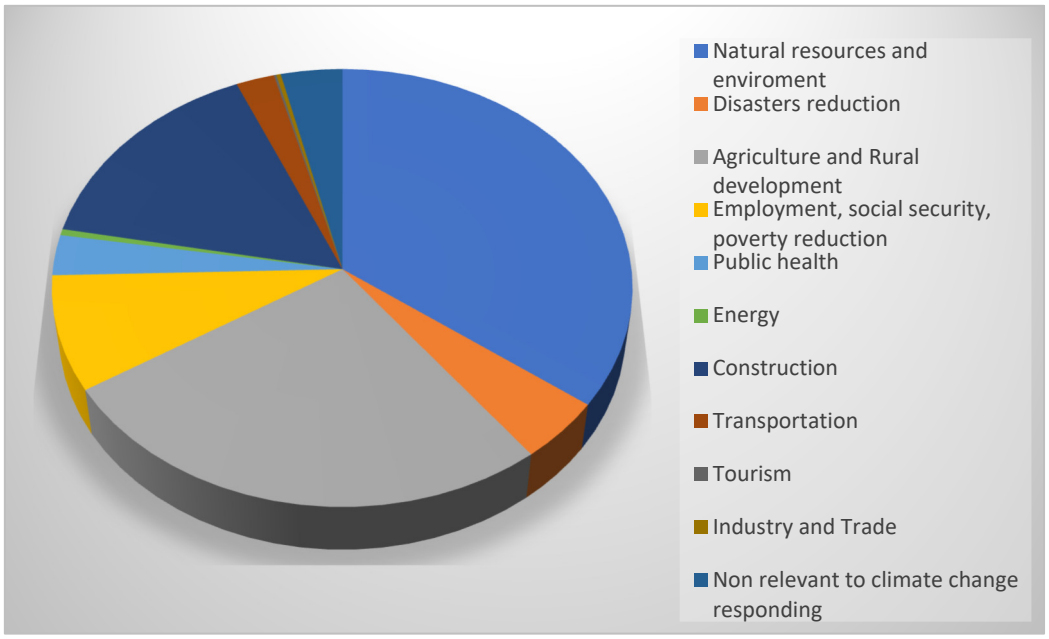

Figure 2. Total proposed funding for prioritizedsectorsin the PAPCs [19].

Table 1. Total proposed funding for prioritized areasin the PAPCs [19].

Sector	Total proposed funding for prioritized sectors in the PAPCs (billions of VND)
Natural resources and Environment	9927,67
Natural disaster prevention	1275,75
Agriculture and Rural development	7500,79
Employment, Society welfare, Poverty reduction	2392,87
Health	846,09
Energy	128,5
Infrastructures	4400,2
Transport	657
Tourism	41,3
Industry and Commerce	75,4
Others	1052,54

3.2.1 Prioritized sectors in the PAPCs

By analyzing the PAPCs, it can be seen that the two most focused sectors are environmental resources and agriculture and rural development [19]. These two sectors are deemed to be vulnerable to the impacts of climate change and natural disasters [21]. In the agriculture and rural development sector, cultivation is prioritized with many tasks/projects proposed. Rice is a common crop in coastal/delta provinces. Rice loss accounts for the majority of the total national annual losses due to climate change and natural disasters (66.1% in the period of 2011–2016 [22]. Drought and saltwater intrusion in 2016 damaged 527.7 thousand hectares of rice, of which 44% was completely damaged (damage level > 70%), 13.7% suffered serious damage (50–70%), 17.0% suffer moderate damage (30–50%) and minor damage (< 30%) [23]. Other crops are also affected: in most affected areas, crop yields are reduced by more than 50%. Therefore, provinces prioritize adaptation solutions in cultivation. The Red River Delta, the North Central Coast, the South–Central Coast, and the Mekong River Delta are the regions with the highest number of proposed tasks for cultivation. Particularly in the Mekong Delta, cultivation tasks/projects account for 65% of the total tasks in the agriculture and rural development sector (63 out of 97 tasks). The Mekong Delta region is one of the areas where cultivation is heavily affected by extreme weather events such as floods and saline intrusion. Thus, provinces in the area have strong needs to increase the efficiency and competitiveness of the agriculture sector and to adapt to climate change.

Provinces also prioritize the natural resources and environment sector, especially the water management area. According to the 2018 report of the Central Steering Committee for natural disaster prevention and control, the situation of drought and saltwater intrusion in recent years has increased both in terms of scope and intensity. A severe drought occurred from the second half of 2014 to the middle of 2016 on a large scale of 18 provinces and cities in the South–Central Coast, Central Highlands, and especially the Mekong Delta. This drought had great impacts on the socio–economical, environmental, and ecological of the region, especially in agricultural production. Drought may be increasingly severe for the Central region in the period of 2011–2050. Therefore, solutions to prevent drought and saltwater intrusion are prioritized in the action plans of the provinces in this region. In the North Central region, ensuring water supply for daily life and irrigation account for 32% of the total proposed tasks [23]. In addition, the PAPCs also focus on strengthening climate monitoring capacity, disaster warning, and ensuring food security, water security [19].

3.2.2 Differences between regions

The Red River Delta, North Central Coast, Central Coast and Mekong River Delta are areas with large population and are economic centers of the country. Thus, the PAPCs in these regions focused on reducing exposures, natural disaster prevention (floods, landslides prevention, the construction of national highways and railways etc.), urban planning to cope with climate change, encouraging the usage of clean and low–carbon fuel. These are regions with medium sensitivity and have better abilities to cope with climate change, so their solutions focus on sustainable development and the reduction of natural disasters' impacts [19]. On the other hand, the Northern provinces and the Central Highlands are the areas with lower exposure levels (they are not affected by sea level rise) but also have less adaptive capacity compare to delta and coastal areas due to the sparse population and complex landscapes. Solutions proposed in these areas focus on natural disaster prevention (such as flash floods and landslides) for each sector; improving safety conditions for poor households and other emergency measures in case of landslides etc [19, 23].

3.2.3 Gender issues in the PAPCs

Except for the Red River Delta and the Mekong River Delta, other areas have developed gender–focused solutions in their PAPCs such as: developing policies to support the development of vulnerable groups, especially woman from ethnic minority, in order to effectively respond to climate change and raise awareness in vulnerable areas; implement and expand community–based models etc [19].

3.2.4 Climate change issues integration into socio–economic development plans

Most provinces/cities have focused on integrating climate change issues into their socio–economic development plans, especially for major cities. The PAPCs are mostly established for a 5–years period which is the same period with the local socio–economic development plans [19]. For example, in the process of developing its PAPC, Da Nang City has paid high attention to its current master plan on socio–economic development vision to 2020. Da Nang City also identified the city's development plans that should be prioritized for integration, including: the development plan of making Da Nang into a driving force in the central part of Viet Nam; the proposal of the environmental city by 2020; the sectoral development plans such as transport, tourism, energy, agriculture and water management [19]. In addition, the integration of climate change issues in sectoral plans and strategies are also addressed. Some provinces and cities set out specific sectoral solutions, activities to suit with their climate change conditions. Integrating climate change into development plans is based on results of assessing impacts of climate change to the development of the respective province/city. Solutions and activities response to climate change proposed by the climate change agency will be considered and approved by the People's Committee of the province/city and will be the basis for implementation of integrating processes [19].

3.3 Results of of the PAPCs implementation process assessment

3.3.1. Results obtained in the PAPCs implementation process

Statistics show that all provinces pay high attention to the climate change response activities and provincial climate budgets have increased faster than the growth rate of the total provincial budget. For example, the climate budgets of three provinces of An Giang, Bac Ninh, and Quang Nam all have annual growth rates higher than the growth of the total provincial budget. An Giang is a province with the highest climate budget growth rate [19].

Provinces are more concerned about adaptation activities than mitigation ones. For example, Quang Nam province has funded a number of mitigation actions according to its PAPC with prioritizations for energy conservation measures in the transport, industry, and energy sectors. The summary shows that An Giang, Bac Ninh, and Quang Nam all spend a large part of the total budget to respond to climate change although the provinces still have other priorities. Climate budgets account for approximately 5% of the total budgets of the three provinces. Bac Ninh's climate budget accounts for about 4% of the total budget, mainly for river dykes and irrigation systems. Quang Nam's climate budget also accounts for about 4% of the total budget, mainly allocated to irrigation systems, forest development activities, waste management. About 1% of An Giang's total budget in the period 2010–2013 was allocated to climate change programs (mainly for dyke systems, river embankments, irrigation, and transport systems). In addition, the comparison between the funding from MARD to response to climate change with local funding confirms the fact that the provinces are directly sponsoring most of the climate change activities. The implementation of the local action plans achieved the following results [19].

1) Assessing climate change impacts on vulnerable areas and initially developed plans to cope with climate change and extreme weather;

2) Strengthening capacity to monitor climate change; forecast and warning of natural disasters, floods, droughts, saltwater intrusion in the context of climate change. Upgrading the warning system, hydro–meteorological forecasting, establishing a network to monitor climate change and sea–level rise;

3) Raising public awareness about the impact of climate change; building capacity for full–time officials and people responsible for climate change issues in provinces;

4) Planting and rehabilitating coastal mangroves to create dykes to prevent waves, enhance CO_2 absorption and create sustainable livelihoods for people; increase water retention, combat erosion, improve coverage, reduce damage caused by floods, flash floods, landslides, protect downstream facilities, regulate climate, maintain and sustain livelihood development;

5) Building irrigation structures such as lakes, dams to contain freshwater, guaranteeing the water supply for production in the dry season and regulating floods in the rainy season;

6) Upgrading and building sections of the sea and river dikes, preventing flooding and saltwater intrusion in areas that can greatly and directly affect production and livelihood;

7) Applying climate change adaptation models for cultivation, livestock, aquaculture, industry and commerce, restructuring and promoting local economic development taking into consideration climate change adaptation;

8) Applying adaptive models to improve health conditions, social security;

9) Utilizing resources from the central government, domestic and international social organizations to implement the Action Plan.

3.3.2. The effect of the PAPCs on the national goals of climate change

In general, the PAPCs closely follow the main objectives of the National Action Plan to respond to climate change. Therefore, they also contributed to the achievement of national climate change goals. The specific effects of the implementation of local action plan to the goals and tasks of the national action plan on climate change can be analyzed as follows [19]:

a. Strengthening of climate monitoring capacity, warning of natural disasters

Some provinces have taken the initiative in developing regional climate maps in order to forecast and inform the localities about different types of natural disasters. For example, Vinh Phuc Province has the task of "Building, zoning and mapping the risked areas of floods, flash floods under the impact of climate change in the province and establishing measures to prevent and mitigate damages". Besides that, the provinces have also identified the

importance of building climate and environmental quality monitoring systems. The provinces have conducted researches and assessments of the impacts of climate change. The Da Nang City has elaborated on a climate change action plan which assesses the impact of climate change for each region and vulnerable areas. Sea level rise and climate change scenarios for each locality (updated in 2016) also contribute to improving the socio–economic development planning of provinces and cities. The tasks are developed and implemented in accordance with the Climate Change Action Plan to gradually improve the capacity of local climate change monitoring, forecasting, and warning; the management of climate change, natural disaster forecasting have also been gradually improved.

b. Ensuring food and water security

Agriculture and rural development have been given special attention by the provinces and cities in their PAPCs. There have been 357 tasks (accounting for 35.8% of the total) with a total proposed budget of VND 7,500 billion that focus on food security solutions by provinces and cities. The tasks proposed by the provinces included: researching a new types of rice; applying some agricultural production techniques to adapt to climate change; structural change, plant, and animal breeds, crop adjustment, etc.

Up until now, a number of rice varieties adapted to floods, salinity, alum... have been developed and cultivated. Measures to adapt to climate change have also been studied and implemented. In particular, a number of provinces in the Mekong Delta have changed the mode of agricultural production from "rice–aquaculture–fruits" to "aquaculture–fruit–rice", etc. The tasks in the field of water resources management mainly focus on building the monitoring system, planning water resources for agricultural production, and daily life.

c. Responding to natural disasters; flood control for big cities; consolidating river dikes, sea dikes, and reservoir safety

Disaster prevention is a special concern for localities and funding for these activities also accounts for a large proportion of the total local budget since they contribute to protecting livelihood in the area. The tasks of proactive response to natural disasters mainly focus on improving the safety of natural disaster prevention structures (river dykes, sea dykes, embankments, reservoir safety, etc...), strengthening rescuing actions, avoiding and mitigating natural disasters. These tasks especially focused on coastal areas, high mountains, and vulnerable areas to natural disasters.

According to statistics, damage caused by natural disasters has decreased compared to the previous period; human loss in the period 2008–2017 was 303 people/year, a decrease by 39% compared to the period 1998–2007 (497 people/year). In terms of property damage, the absolute value has not decreased significantly, but the damage ratio compared to the national GDP has decreased due to economic development in recent years. Some localities such as Hanoi, Ho Chi Minh City, Can Tho build and deploy many anti–flood tasks, projects, and structures. However, in general, the implementation of these tasks is still slow.

d. Reducing greenhouse gas emissions, developing a low carbon economy

There are not many solutions to mitigate greenhouse gas emissions in the PAPCs. Some related actions include measures to combat deforestation, forest degradation, forest protection, and development. The tasks concerning transforming the growth model and promoting a low–carbon economy were initially built and implemented by big provinces and central cities such as Ha Noi, Ho Chi Minh City, Da Nang, Can Tho ... The green economy model in the river basin concerning fisheries and coping with rising sea levels has been developed and implemented by provinces in the Mekong Delta. Currently, provinces have been developing action plans for green growth for the 2016–2020 periods with many types

of models being implemented like green industry, green urban areas, and green transportation models in Ho Chi Minh City, Quang Ninh, Da Nang, Hai Phong, and Phu Yen. Some provinces have developed green agricultural and forestry models such as Gia Lai, Hau Giang, Tra Vinh, and Binh Thuan, etc.

e. Strengthening the management capacity, establishing mechanisms and policies on climate change

Many provinces and cities set up raising awareness and capacity building tasks concerning climate change for authorities due to the shortage of specialized climate change officials at a local level. The goal of completing climate change mechanisms and policies has not been clearly reflected in the PAPCs due to the difficulties faced during the development and implementation process. The integration of climate change into local socio–economic development plans has not been paid much attention by localities.

f. Mobilizing the participation of all economic sectors, scientific organizations, socio–political–professional organizations, and non–governmental organizations in responding to climate change

There are not many tasks in the PAPCs concerning this issue. This shows the problems faced by provinces and cities in mobilizing the participation of all economic sectors and social organizations in responding to climate change. In addition, this also reflects the fact that the importance of communities, economic sectors, social organizations in the response to climate change in Viet Nam is currently underestimated.

g. Raising awareness, developing human resource, promoting scientific research

These tasks focus on raising awareness for vulnerable groups such as women, students, etc... Scientific development activities that identify climate change adaptation and mitigation measures are also prioritized. Scientific and technological tasks mainly focused on studying the impact of climate change on socio–economic and promoting research on technologies to adapt to climate change and reduce greenhouse gas emissions.

h. International cooperation

Most localities are interested in strengthening international cooperation in order to take advantage of international funding sources including financing, new technology transfer, and participation in regional and global cooperation activities on climate change. Central cities propose many tasks in expanding cooperation with international organizations in developing climate change strategies.

i. Mobilizing financial resources

In the list of tasks and projects proposed by the PAPCs, most provinces and cities use the state budget to implement the tasks. This proves the difficulty in mobilizing financial resources from other economic sectors and international funding sources. In addition to some provinces and cities such as Quang Nam, Ben Tre, Da Nang, and Ha Tinh propose the use of foreign funding supported by non–governmental organizations and development partners. This also demonstrates the problem that provinces are facing in section 6 concerning the lack of participation of communities, economic sectors, and social organizations.

3.3.3. Analyze the limitations and shortcomings of the PAPCs implementation

1) Shortcomings and limitations in the process of developing the PAPCs: (i) The targets set out in the PAPCs are still sporadic and not systematic; (ii) Climate change adaptation

targets in the action plans have not really been integrated into the local socio–economic development plans; (iii) The plans still lack specific targets for specific periods. If this can be shown, it will be the basis for the provincial People's Committee to ask the relevant departments on focusing on prioritized targets, projects, and solutions; (iv) The roadmap to implement the prioritized projects and tasks has not been determined. Some provinces and cities also list the general objectives without specifying resources for each project and each stage. This will undoubtedly reduce the feasibility of the PAPCs.

2) Shortcomings and limitations in the implementation of the PAPCs: (i) The implementation is somehow passive due to the increased intensity of climate change; (ii) Lack of public awareness in climate change; (iii) Due to the limited budget, many tasks set out in the action plans cannot be implemented yet; (iv) The coordination among relevant authorities is not synchronized, lack of information sharing.

3) Shortcomings and limitations in terms of regulations: The legal framework for integrating climate change issues into national socio–economic development plans is limited. The coordination between relevant authorities is still ineffective. There is also a lack of methods to encourage and attract domestic and foreign investment, to mobilize businesses in order to participate in climate change adaptation activities. The national climate change database is insufficient and does not meet the requirements. The climate change legal system is not synchronized and has not been reviewed, adjusted in line with new domestic and international situations.

4) Shortcomings and limitations in terms of capacity: Most of the officials in charge of climate change response have not received proper training. There is a shortage of in–depth experts and technical staff in some areas especially concerning climate change assessment and adaptation activities. The public awareness is still low and communication capacities are still limited and thus, have not yet met the demand of the current state. There are still limitations in replicating suitable climate change adaptation models at the community level and in allocating resources to implement prioritized climate change adaptation activities.

5) Shortcomings and limitations in mobilizing resources: Although there have been policies, plans, and programs to adapt to climate change and the state resources can meet only 30% of the demand. Meanwhile, the demand for construction and upgrading structures concerning climate change adaptation is still high, the existing works only meet a part of the country’s need.

6) Shortcomings and limitations in science and technologies: There is a shortage of advanced technology in hydro–meteorological monitoring and forecasting, warning of natural disasters, hazards, and climate change.

7) Shortcomings and limitations in evaluating and monitoring: Lack of monitoring, reporting, and evaluation system for local adaptation activities to improve their effectiveness.

4. Conclusion

The analysis of the PAPCs of 63 provinces/cities of Viet Nam shown that these plans have contents related to climate change adaptation and GHG mitigation. However, PAPCs do not propose many solutions to reduce GHG emissions. The solutions mainly focus on deforestation, forest degradation, development, and protection of forests.

The objectives of the PAPCs are determined based on the assessment of provincial climate change impact to propose specific solutions in order to respond to climate change and natural disasters and ensure social security and socio–economic development [24]. However, the list of tasks and projects is still fragmented, lacking coherence and coordination among activities and sectors to achieve the desired results. Very few local Action Plans are integrated into local long–term development plans.

Although the PAPCs have contributed effectively in achieving the objectives of the national action plan to cope with climate change, it is still necessary to further strengthen the

cohesion in developing action plans from the central level to ministries, and provinces in order to achieve the overall climate change adaptation goals of the nation.

The study proves that all provinces that paid high attention to the climate change response activities have gained noticeable rises in socio–economic development. The implementation of the local action plans helped the local authorities in assessing climate change impacts on vulnerable areas; strengthening capacity to monitor climate change and raising public awareness concerning the impact of climate change.

The development of PAPCs is also impacted by international and national policies on climate change. Especially, the NDC and NAP process define priority targets and adaptation activities for vulnerable areas that localities should integrate in their PAPCs.

Currently, localities are developing action plans for the next stage. In order to be more effective, adjustments needed to be made compared to the previous period, including (1) selecting specialized authorities in developing these PAPCs; (2) including several concerned sectors with priorities to Natural Resources and Environment and Agriculture and Rural Development; (3) promoting the application of science and technology; (4) monitoring and evaluating on the implementation; (5) integrating climate change issues with local long–term development plans.

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