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湄公河三角洲濕地保護區生態旅遊：氣候變遷調適的社會生態系取徑分析

Ecotourism in Mekong wetland protected areas: Rethinking the social-ecological system approach to climate change adaptation

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This doctoral thesis is finished by ***Phan Thi Loan*** (D06247003) at International Degree Program in Climate Change and Sustainable Development on ***2022 January 14th*** passed the oral examination by the following examination committees.

Oral Examination Committee：

(Advisor)

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中文摘要

保護區管理從社會生態系統 (SES) 的角度而言是一個新興的研究趨勢，經當前與 SES 有關的文獻回顧就發現缺乏與生態系統有關的外部實證研究，例如：氣候變化及當地適應。早期的 SES 法重視生態模式建構，較少考慮到社會系統的因素以及其對生態系的相互作用。雖然生態旅遊係當地經濟的選項，尤其係保護區在面臨全球環境及經濟變遷下的緩衝，但針對有關 SES 法的研究仍是少數。本論文透過實證法研究氣候變遷所造成的影響，並將生態旅遊作為保護區的主要適應性響應，提高 SES 在氣候變遷調適研究中的知識。

世界銀行 (2010) 指出，越南是對氣候變遷最脆弱的國家之一，並在全國內影響最嚴重的係湄公河三角洲 (以下縮寫為 VMD; MONRE, 2019)。目前，VMD 旅遊的政策以自然為本及永續發展為目標進行轉型，並使生態旅遊、農業旅遊以及社區旅遊成為重要的發展方向，尤其是保護區與其緩衝區。本研究針對 VMD 中的兩個藍薩濕地保護區，使用社會生態方法來進行比較分析，並探討生態旅遊與其在濕地保護區之生態及社會系統中的角色，並討論如何對應氣候變遷。

本研究以“生態旅遊如何助於 該地區的當地利益關係者適應氣候變遷？”為重要的問題，並採用多種研究方法來展現其複雜性。其中，使用定量方法包括 Mann-Kendall 秩檢驗、Theil-Sen 估計法和 Mann-Whitney-Pettit 法來分析 1978 年至 2019 年氣候參數的變化趨勢。同時，作為生態應對氣候變遷的指標，本研究以 2002-2020 年常態化差異植生指標 (NDVI) 來進行分析衛星圖，以及討論濕地植物群落之變動。另，進行專家詢問、在焦點小組討論（共有 8 組）中的深度訪談 (45 名受訪者) 和公眾參與地理資訊系統等定性方法，其目的為調查跨政府別及政府與當地社區之間在建設適應能力與行動中的互動。社區參與的方法特別適用於當

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地學生和當地人在全球系統動蕩的背景下自我評估他們的適應能力，例如在國外或偏遠地區的研究因 covid-19 流行導致禁止國際旅行而受阻。

研究結果顯示，隨者溫度以及極端事件增加，兩個國家公園的氣候在過去二十年中發生了顯著變化，然而常態化差異植生指標 (NDVI) 降低及低地植物群落擴大，改變了植物群落的時空分布。此外，透過使用社會生態系統方法，本研究發現氣候變遷從利害相關者的角度而說非視為植物群落變化的主要驅動力 (發現主要利害相關者並未將氣候變遷視為植物群落變化的主要驅動力)，而是濕地保護區多樣性退化的重要因素，導致適應不良的後果。根據定性分析結果，生態旅遊不僅對濕地保護區之經濟與保護面有重要的貢獻，而且提升兩地對氣候變遷的適應能力。生態旅遊發展以加強一體化管理、提高對生態的理解和認識來平衡社會與生態系統。適應行動的選擇在發展較好的旅遊更加多樣化以及會有更多科技支援，然旅遊與保護的共同利益在不同的國家公園有所不同，因此造成對永續發展負向影響。在此環境和政策變化的轉折點，本論文將研究結果提供給予越南湄公河三角洲的旅遊業與保護決策者參考。

最後，對社會生態系統的貢獻度上，本研究增加外部相關生態系統與適應的第二變數進入此框架，並從跨級別相互作用評估結果顯示，具有穩定功能的較高級別機構雖然透過規定文件提醒較低級別機構，但在製定適應管理和永續轉型的氣候適應政策方面仍然缺乏經驗。

關鍵字：生態旅遊、社會生態系、層級套疊系統、適應能力、社會參與研究、保護區管理、越南湄公河三角洲。

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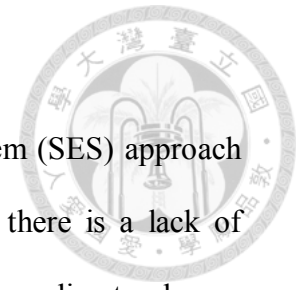

Abstract & Keywords

Protected areas (PAs) management from social-ecological system (SES) approach is an emerging research trend. Reviewing current literature on SES, there is a lack of empirical studies from the External Related Ecosystems (ECO) such as climate change and its induced local adaptation. The early studies of SES approach focus more on ecological system modeling and account less for factors of the social systems as well as their interactions with ecological systems. Ecotourism, which is promoted as an economic alternative for local communities, particularly in the buffer zones of PAs in facing global environmental and economic changes, has been seldom investigated in scholarly work of SES approach. This study empirically investigates the impact of climate change and examines ecotourism as the major adaptive response in PAs to advance the knowledge of SESs in the research theme of climate change adaptation.

The research was conducted in Vietnam, one of the top five most vulnerable countries impacted by climate change (World Bank, 2010). In the whole country, the Vietnamese Mekong Delta (VMD) is the most severely impacted region (Ministry of Natural Resource and Environment (MONRE), 2019). Currently, the VMD is undergoing several important policy transitions towards a nature-based and sustainable direction. Ecotourism, agritourism, and community-based tourism are three key orientations of tourism development in the VMD, especially in the PAs and their buffer zones. This study carries out a comparative analysis of two Ramsar-site PAs in VMD, which are representative PAs of wetland landscape in Vietnam. The study applies the SES approach to analyze ecotourism and its roles in the ecological and social systems of Wetland Protected Areas (WPA) to adapt to climate change.

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The study tries to answer the major research question (RQ) "to what extent is ecotourism contributing to climate change adaptation of local stakeholders in WPA in the VMD?" Multiple research methods are adopted to reveal the complexity of the above research question. The quantitative methods include the Mann-Kendall rank test, Theil-Sen estimate method, and the Mann-Whitney-Pettit method to analyze trends in climate parameters from 1978 to 2019. The wetland vegetation changes, as the index of ecological response to climate change, are detected by the analysis of Satellite images based on the Normalized Difference Vegetation Index (NDVI) from 2002 to 2020. The qualitative methods include experts' consultancy, in-depth interviews (with 45 respondents), and Public Participation Geographic Information Systems (PPGIS) in focus group discussions (FGDs) (with 8 FGDs) to investigate interactions at cross-government levels and between government and local communities in building adaptive capacity and forming adaptation actions. A community-engaged approach was applied particularly with the engagement of local students and local people in self-assessing their adaptive capacity in the context of global system turmoil such as the covid-19 epidemic when research abroad or in remote areas is hindered by the ban on international travel.

The results show that the climate in the two national parks (NPs) has changed significantly during the past two decades with an increase in both temperature and extreme events. However, a decrease in NDVI dynamics and an extension of lowland vegetation communities dominate the spatio-temporal change of vegetation. In addition, by using the SES approach, it is found that climate change is not the main driver of vegetation change but has been mentioned in recent local reports and provincial disaster prevention documents as the main culprit for biodiversity degradation of WPA, which

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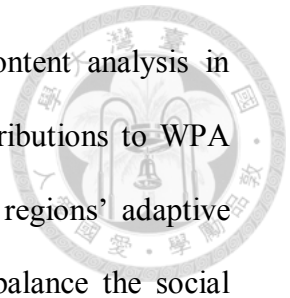

inherently results in maladaptive actions. Based on the results of content analysis in qualitative data, it is found that ecotourism has made significant contributions to WPA regions in both economy and conservation as well as enhanced both regions' adaptive capacity of climate change adaptation. Ecotourism development can balance the social system and ecological system by strengthening integrated management and improving ecological knowledge and understanding. The options for adaptation actions in the better-developed tourism site are more diverse and technology-supported. However, the co-benefits of tourism and conservation are inconsistent in different NPs and result in negative impacts on sustainable development. The study shall provide references for decision-makers in tourism and PAs in the VMD in this tipping point of environmental and policy changes.

Finally, on contribution to SES approach this research revises and adds some second-tier variables of external related ecosystems and adaptation for the SES framework. From the panarchy approach in assessing the cross-level interactions, the result of two case studies shows that the higher-level agencies with stabilization functions though "remember" the lower ones still lack experiences in shaping their climate adaptation policy for adaptive management and sustainable transition.

Keywords: Ecotourism, social-ecological systems; panarchy; adaptive capacity; community-engaged research; protected area management; Vietnamese Mekong Delta

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Abbreviations

A	Actors
AC	Adaptive capacity
ARC	Adaptive Renewal Cycles
ASEAN	The Association of Southeast Asian Nations
CC	Climate change
CPR	Common-pool resources
DMOs	Destination management organizations
ECO	External related ecosystem
ESP	Economic – social – political
FA	Focal Action Situations
FGD(s)	Focus group discussion(s)
GDP	Gross domestic product
GoV	Government
GS	Governance system
HCMC	Ho Chi Minh city
I	Interactions
ICEM	International Centre for Environmental Management
IHA	International Hydropower Association
IPCC	Intergovernmental Panel On Climate Change
IUCN	International Union for Conservation of Nature
IWPA	Inland water protected areas
MARD	The Ministry of Agriculture and Rural Development
MRD	Mekong river delta
MONRE	Ministry of Natural Resource and Environment
NDVI	Normalized difference vegetation index
NMR	Net Migration Rate
NQ-CP	Nghị quyết – chính phủ
NQ/TW	Nghị quyết/trung ương
NGO(s)	Non-profit organizations
NTP-RCC	National Target Programme to Respond to Climate Change
NP(s)	National park(s)
O	Outcomes
ODA	Official development assistance
PA(s)	Protected area(s)
PCI	Provincial Competitiveness Index
PES	Payment for ecosystem services
PPC	Province People's Committee
PPGIS	Public participation geographic information systems
QD-TTg	Quyết định- Thủ tướng
QnA	Quantitative analysis
RCP	Representative Concentration Pathway
RCW	Ramsar Convention on Wetlands
RIS	Ramsar Information Sheet
RS	Resource systems
RU	Resource units

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S	Socio-economic
SDGs	Sustainable Development Goals
SES(s)	Social ecological system(s)
SESF	Social ecological system framework
TCNP	Tram Chim National Park
TNDPC	Tam Nong District People's Committee
VCCI	Vietnam Chamber of Commerce and Industry
VINASAT	Vietnamese satellite
VMD	Vietnamese Mekong delta
VNFOREST	The Vietnam Administration of Forestry
VNAT	Vietnam National Administration of Tourism
VND	Vietnam Dong (currency)
VNEPA	Viet Nam Environment Protection Agency
U	Users
UMTNP	U Minh Thuong National Park
UN	United Nations
UNEP-WCMC	The United Nations Environment Programme World Conservation Monitoring Centre
UNESCO	The United Nations Educational, Scientific and Cultural Organization
USD	United States Dollar
WB	World Bank
WTO	World Tourism Organization
WWF	World Wildlife Fund
WPA	Wetland protected area

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Chapter 1. Introduction

1.1 Problem statement

1.1.1 Climate change and tourism

Global warming and climate change have become the greatest threats to this planet. Climate change impacts every country and can cause severe damage to communities and individuals. Developing countries are the most impacted by climate change because of a lack of infrastructure, technology, management, knowledge, etc. The pressure of economic development challenges climate change responses of those countries; however, there are still many proposed initiatives to achieve a balance in socio-economic development and environment, especially in sustainable response to climate change. More and more research is being developed in diverse fields such as agriculture, fishery, and industry. However, in all economic sectors, tourism is one of the least prepared for the impacts and opportunities of climate change (Scott, 2011). Although this is an industry that accounts for 10.4% of global GDP (in 2019) and is heavily influenced by climate change.

In the context of climate change, there are many debates that ask "Can sustainable tourism survive climate change?" (Weaver, 2011; Scott, 2012, Gossling et al., 2012). Those knowledge domains have been enriched by the pioneering research that analyzes the role of climate on tourism (Smith, 1990; Smith, 1993) and the research on climate change impacts on tourism (Agnew & Palutikof, 2006; Dubois et al., 2010; etc). There has been climate change mitigation research on a global and regional scale (Gossling & Hall, 2006; Gossling et al, 2008) and climate change adaptation in local ones (Gossling et al., 2008; Hall, 2006). Under this context, although climate change adaptation frameworks or strategies have

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accounted for a large and increasing number of literature in both government reports and academic references, the majority of studies on adaptation are either non-tourism specific or not planned for application at the regional or destination level (UNWTO, 2008). Some scholars such as Scott et al. (2006), Becken and Hay (2007), and Simpson et al. (2008) have proposed frameworks or models that are particularly for tourism adaptation. However, there is no evidence that their work has been evaluated or implemented in regional tourism sites. Meanwhile, climate change is known as a global issue but climate change adaptation is locally efficient. To avoid maladaptive solutions, it is necessary to have a local based adaptation framework.

1.1.2 Protected areas management approach changes

Protected areas are widely acknowledged as critical tools for sustainable development and climate change adaptation. In addition to conserving species and ecosystems, PAs provide various vital ecosystem services for humans such as provisioning services, regulating services, supporting services, and recreational services. Protected areas that are well-managed can enhance resilience against disastrous events as well as provide connections across landscapes that enable plants and animals to relocate. In the Anthropocene era, there are increasing challenges to PA management (e.g. land-use change, climate change, invasive alien species, overexploitation) caused by an increase of resource demands by urban societies and advances in transportation technologies and adopting non-ecosystem services in PAs, which loosen links/feedbacks between humans and nature (Cumming, 2016). Those challenges also act as driving forces for the transformation in conservation paradigms in protected areas from “nature for people” to “nature and people”

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(Mace, 2014) or an evolution of protected areas concept from island approach (ca.1872-1980s) to social-ecological approach (today) (Palomo et al., 2014).

It means protected areas concepts transform from focusing on only preserving the great values of nature from human transformation and a static statement of PA management type in order to reduce variability (island approach) to network approach which focuses on the protection of connections among PAs and the creation of conservation networks in the period from 1990s to mid-2000s. From the mid-2000s to today it has not only been important to be aware of management of the area within the boundary of PAs but also the surrounding areas for conservation objectives. The landscape approach was initiated with the idea of a buffer zone or zone of interaction between a PA and surrounding landscape (DeFries et al., 2010). In these two approaches, PA management is dynamic and allows some natural changes if necessary. However, the existing PA management is criticized for failing in integrating socioeconomic systems within ecological systems. For example, the primary goal of PA management is biodiversity conservation, while the interests of local people are not fully accounted for (Palomo et al., 2014), therefore PA management from a social-ecological system approach becomes an emerging and inevitable trend. Thereby, PA management is adaptive with natural and social changes being incorporated into management.

1.1.3 Social-ecological system approach in PA management

As mentioned above, under the context of increasing uncertainty and long term changes from diverse aspects including economy, society and environment, a new approach in PA management and adaptation is required. In the context of the shift in human and

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nature relations and many emerging challenges in protected areas management, the most common framework to understand complex interactions within different systems and scales and one which supports sustainable management of common-pool resources such as protected areas, is Social-Ecological Systems (SESs) (Plummer & Fennell, 2009). The fundamental understanding of SESs provided by two top-notch experts (Berkes & Folke, 1998), is that social-ecological systems are complex, integrated systems in which humans are a part of nature. The theory of SES has developed and been reinforced by the social-ecological system framework by Ostrom (2007; 2009). Three main parts of SES which support researchers or managers in analyzing the context and relations between humans and nature are social systems, ecological systems and their interactions. The SESs are systems that connect people and nature, with the natural and human interactions being a part of the core dynamics of the relevant system and a defining element of the research domain (Berkes et al., 2003; Cumming, 2014). Reviewing current literatures in SESs, Partelow (2018) and Salgueiro-Otero and Ojea (2020), there is a lack of empirical approaches in the External Related Ecosystems (ECO) such as climate change in studies of SESs and adaptation actions, and several second-tier variables in the social systems of SESs. Therefore, in our study with climate change as the main issue, we would like to contribute to this lack of knowledge in SESs and contribute to the capacity of SESs in adapting to climate change.

In the literature on SESs, few studies focus on the tourism sector which is increasing its role because of the increase in market needs and the middle class, especially in PAs in developing countries (Baral et al., 2014; Heslinga et al., 2020). Tourism is one emerging local livelihoods in many PAs and it can reflect adaptation of local people to

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global environmental changes such as climate change and global economic changes such as market changes. Therefore, analyzing tourism and its roles in the SES of WPAs can contribute to the lack of social systems in early SES models (Huong, 2020). Moreover, the multidisciplinary nature of tourism studies, as well as the complexity of tourism systems, when combined with diverse stakeholder engagement and interactions at various scales and levels (Becken and Job, 2014), can provide a systematic perspective of both social-ecological system interactions and climate change adaptation in PA management.

1.1.4 Ecotourism, protected areas management, climate change adaptation in Vietnam

Ecotourism is a small segment of nature-based tourism but it is defined by additional management, education, and conservational criteria (Buckley, 1994). Ecotourism is encouraged as an economic alternative for communities in the buffer zones of PAs (Kiper, 2013) because of its positive impacts on conservation, resilience and local community development especially in the context of increasing uncertainty and extreme changes compared to the past (Strickland-Munro et al., 2010).

The perception, implementation and management of ecotourism is context based (Weaver, 2001; Higham & Carr, 2010). In Vietnam, ecotourism is considered to be a tool to reduce poverty and improve the quality of life for people in the buffer zones of PAs (Law on Biodiversity of Vietnam, 2008). However, ecotourism is developed spontaneously without an approved masterplan. The lack of human resources and capable managers makes ecotourism one of the main threats of PAs to biodiversity conservation (MONRE, 2019). In addition, climate change is becoming more and more complicated with the increase in both quantity and intensity and because it is becoming more unpredictable, it threatens the

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conservation and management of PAs. Therefore, management of ecotourism in the context of climate change in PAs faces many challenges and requires a holistic and adaptive approach.

Because of the interdisciplinary nature of both ecotourism and climate change, in this study, we rely on social-ecological system framework (SESF) and community engagement research approach to investigate ecotourism contexts, and how a destination (local users and governments) responds to climate change impacts on ecotourism, and ultimately, we would like to examine to what extent ecotourism can contribute to climate change adaptation. Consequently, this research has the potential to contribute to the lack of a climate change adaptation framework in tourism at the destination scope.

The cross-level interactions have been insufficiently studied in the current community resilience literature, therefore this study contributes to clarifying the panarchy applications for wetland protected areas (WPA). Resilience at the community level is shaped by diverse influences in multi-level or nested relationships and has been more recently reinforced by actor agency, decision-making power, and social capital (Berkes & Ross, 2016). However, the early studies engaging with the SES approach are criticized for mainly focusing on ecological systems' modeling, but ignoring several social systems elements such as complex power relations and actor agency (Huong et al., 2020). Therefore, we used panarchy theory (Gunderson & Holling, 2002) to analyze the resilience of the two WPAs in Vietnam from a tourism perspective.

In terms of methodology, tourism and climate change research using qualitative methods makes up the majority (48.9%), while quantitative ones make up 32.8% and only

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18.3% of studies used mixed methods (Phan et al., 2021). After 2015, the number of quantitative studies surpassed qualitative research, albeit to a relatively insignificant degree. Climate change and tourism are complex problems that involve diverse determinants, both qualitative and quantitative, and require a mixed-method approach. Therefore, in this study, we take a mixed-method approach with pragmatisms and grounded theory. In addition, although the number of studies about climate change and tourism from developing countries has increased steadily over time, it is still slow in comparison and far from that of developed countries (Phan et al., 2021). Therefore, this study with the research site in Vietnam can also contribute to reducing the risk in policy transition in climate change adaptation and tourism in a developing country.

1.2 Research objectives and contributions and summary of the methodology

1.2.1 Research objectives, research questions and contributions of the thesis

The main research purpose is to analyze ecotourism and its roles in ecological and social systems of WPAs to adapt to climate change. Firstly, we aim to apply the SES approach in characterizing ecotourism development of WPAs. Then we analyze externally related ecosystems with climate change as major environmental factors of broader scales and its impact on local landscape and people's livelihoods, especially in ecotourism. This study contributes to the lack of current literature of SES with more analysis on climate change impacts (as ECO) in the framework of SESs. The third purpose is to contribute to the lack of current literature of SES with more analysis on interaction of WPA systems and externally related ecosystems in terms of climate change adaptation and adopt panarchy theory in analyzing cross-level interactions.

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Corresponding to those purposes, we seek answers to one main research question of "to what extent is ecotourism contributing to climate change adaptation of local stakeholders in Wetland Protected Areas (WPA) in the Vietnamese Mekong Delta (VMD)?" with three sub-questions: (RQ1) What are the main characteristics of ecotourism development of WPA in the VMD?; (RQ2) To what extent does climate change transform the landscapes of the WPA?; (RQ3) How do people (local government and residents) in WPA perceive and adapt to climate change from tourism perspectives?

In this study, in terms of theory, we would like to contribute to the lack of current literature of SES with more analysis on climate change (as ECO) in the framework of SESs (Ostrom, 2007; 2009) in adaptation actions studies. Therefore, this research has the potential to contribute to the lack of a climate change adaptation framework in tourism at the destination scope. Tourism is multidisciplinary with a great potential contribution in terms of social psychological aspects in adaptation research (Phan et al., 2021). Therefore, this study can be a contribution to both methodologies and knowledge for SESs' framework, especially at second-tier variables which still lack aspects from society and culture.

This study is based in the context of Vietnam, a developing country which is in the top five most vulnerable countries impacted by climate change (World Bank, 2010). After over 30 decades of system transition from central planning to a market-oriented economy, Vietnam has witnessed various massive changes in diverse aspects. Although both demography and economy are at a period of rapid development, the development gap increases between urban and rural, Vulnerable groups who used to live on the natural resources from national parks in remote areas currently suffer more challenges under climate change impacts (MONRE, 2019). Many solutions for economic development are proposed and implemented, in which ecotourism is believed to bring multiple benefits from

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economic, environmental, and social aspects (Hoang & Pulliat, 2019). However, to develop comprehensive and sustainable ecotourism in protected areas under the context of climate change challenges, all managers are needed from local to national levels. In the entire country, the Mekong Delta is selected as a research site with two national parks which are also Ramsar sites, namely Tram Chim National Park (Dong Thap province) and U Minh Thuong National Park (Kien Giang province) (see Figure 1.1). They are representative of wetland protected areas, two typical ecotourism destinations of the VMD and located in subregions which are heavily affected by climate change (The Ministry of Agriculture and Rural Development (MARD), 2016).

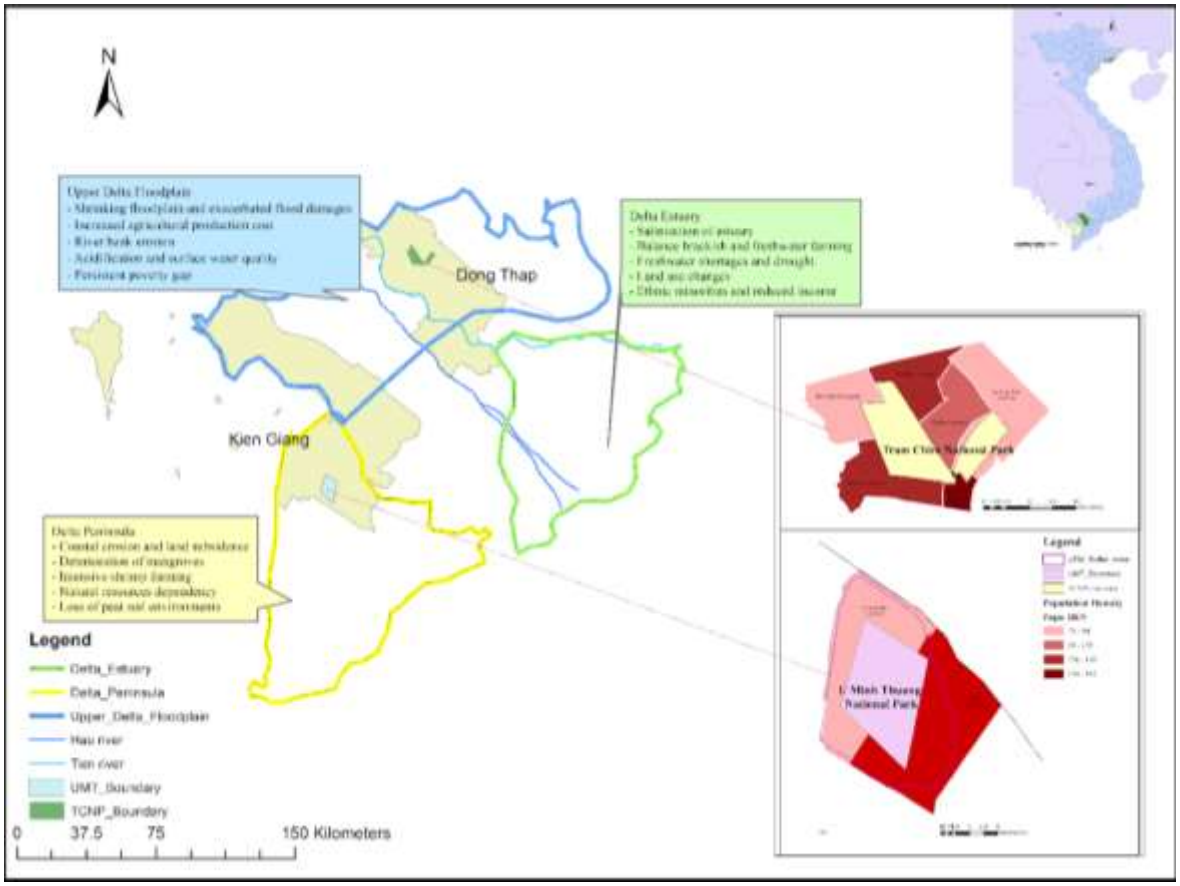

Figure 1.1 Location of two study sites and summary of trends and main challenges of subregions of the Vietnamese Mekong Delta (adapted from MARD, 2016)

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The Vietnamese Mekong Delta is one of the five deltas in the world that are most vulnerable to climate change (Governments of Vietnam and the Netherlands, 2013). Due to the high population density, socioeconomic exposure is very high, with approximately 11 million people in that region facing risks that are exacerbated by issues such as sea-level rise, land subsidence, and flooding (MONRE, 2019). The Mekong Delta Plan began officially in 2011 and was finalized in 2013 to develop a long-term strategic vision for adoption efforts in this region (Smajgl, 2018). The Prime Minister Resolution 120 was enacted in 2017 to implement the Mekong Delta Plan. This Resolution establishes a set of goals for 2050 with strategic "solutions" and a series of specific agency-related tasks. In other words, the Vietnamese Mekong Delta is at the tipping point of environmental changes as well as climate change and sustainable development change with Resolution 120 with an orientation to sustainable development with nature-based solutions and climate change adaptation economy.

However, this region is also one of the weakest regions in the whole country in terms of adaptive capacity, especially management capacity of governments as well as environmental policies implementation in both conservations, protected areas management, and so on (Governments of Vietnam and the Netherlands, 2013). That makes the orientation to respond to climate change and sustainable development in this region in the past inconsistent and ineffective. Therefore, our research aims to make a timely contribution to the management of one of the most sensitive and vulnerable areas in the Mekong Delta – wetland areas in a livelihood that is emerging and chosen by many national parks. – ecotourism. We will provide a comprehensive analytical picture and pay special attention to adaptive capacity and climate change adaptation in this region to

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contribute to decision-making in terms of protected areas management and climate change adaptation.

1.2.2 Summary of methodology

With the characteristics of research subjects including both ecological and social systems as well as climate change and adaptation, we used both quantitative and qualitative methods in data collection and analysis. In this study, quantitative methodology in this research is used for investigating climate change manifestation and temporal-spatial changes of ecological indicators to provide the general context of climate change and its impacts in two research areas. Meanwhile, for interactions cross-government levels and between government and local community in adaptive capacity and adaptation actions, as well as social-ecological-political contexts of research sites, which needs more in-depth and participatory observations with community engagement, qualitative methodology is suitable.

1.3. Structure of the thesis

The thesis includes 7 chapters. The first chapter is the Introduction with problem statement, research objectives, research questions, contributions and summary of methodology. Chapter II is Literature Review and Methodology with theoretical discussions of protected area management and social-ecological system approach from ecotourism and climate change adaptation. Based on that, we found research gaps and designed our research framework to partly fulfill research gaps in both the theoretical and empirical. At the end of this chapter we presented methodology and operationalization to collect and analyze data to answer research questions. Chapter III provides general pictures

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of PA management in Vietnam and the VMD. Based on that, we analyzed empirical issues and contributions of this thesis in PA management in Vietnam and the VMD from an ecotourism perspective and climate change adaptation. Chapter IV is the result of the first research question with characteristics of ecotourism development in wetland protected areas from a social-ecological system approach in the two selected WPAs. Chapter V answers the second RQ with an analysis of the nexus of climate change as an external ecosystem to WPA resources and ecotourism development from the social ecological system. Chapter VI is the result of the third RQ with an analysis of climate change adaptation for tourism destinations from social-ecological adaptive capacity and panarchy in cross-level interactions. Lastly, chapter VII is the discussion and conclusion which will answer look at the ways ecotourism can contribute to climate change adaptation in WPA, rethink ecotourism in Vietnam, make a proposal for a new SES framework for ecotourism in the VMD to adapt to climate change, and contributions of the study to SES framework from tourism and climate change perspectives.

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Chapter 2. Literature review and Methodology

2.1 Introduction

It is estimated that there are 202,467 protected areas which cover approximately 20 million square kilometers or 14.7% of all land in the world, excluding Antarctica (UNEP-WCMC & IUCN, 2016). Today, the world is confronted with serious issues such as climate change, food and water security, and protected areas play a critical role in conserving species and ecosystems that help us encounter these challenges. Therefore, it is essential that PAs are effectively managed if we want to thrive on this planet. There are several approaches to protected area management. One of the most common ones is Social-Ecological Systems (SESs) because of its comprehensive coverage and holistic approach. The development of the SES framework is promoted by a long history of a variety of research on the commons, collective actions, and institutions (Ostrom 1990; Agrawal 2001; Anderies et al., 2004; Poteete et al., 2010) as well as ecosystem services (Daily, 1997; Partelow & Winkler, 2016), resilience (Berkes & Folke, 1998), and environmental governance theories (Folke et al., 2005; Cox et al., 2016).

Reviewing the current literature, we found some research gaps relevant to protected areas (PA) and SESs. The first one is a lack of research relevant to recreational values which is one of four main ecosystem services of PA in literature using SES theory (Partelow, 2018). The second one is among current studies using SESF, only a very small percentage mentions external ecosystems (Partelow, 2018) especially in climate change adaptation and vulnerability (Salgueiro-Otero & Ojea, 2020). Therefore, in this chapter, with the literature review of studies on protected areas management, ecotourism

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development with social-ecological systems, and climate change adaptation, we would like to answer four main questions:

1/ What is the relation of humans and nature in protected areas, how does it change over time, and what are the main driving forces for its changes?

2/ What are social-ecological systems and how can SESs and protected areas management be involved and what are the research gaps in research protected areas management from the SESs framework in current literature?

3/ What are the main issues of protected areas management involved with climate change and ecotourism development from SESs?

4/ What are the main indicators of social and ecological systems for a destination-based adaptation framework in protected areas management from tourism development and climate change adaptation?

On that basis, this chapter includes 6 main sections. Section 2.2 will provide the answer for the first question with a basic understanding of protected areas (PA), governance in PA, and relation of human and nature in PA; challenges or driving forces for new conservation paradigm shifts in PA. Also in this section, we will answer the second question with the definition of social-ecological systems (SESs) and analyze the first and second tiers variables of SESs and the appropriation of applying SESs in PA management. At the end of this section, we pointed out two main research gaps in current literature in PA management from SESs. In section 2.3, we will review current studies of ecotourism and PA management in general and from the SES approach in particular. In section 2.4, we reviewed the main impacts of climate change on PA, particularly in WPA, and proposed

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indicators of SESs that can be used for the analysis of protected areas management from ecotourism development and climate change adaptation. Two main approaches of SESs which help analyze ecotourism as a climate change adaptation in PA are Adaptive Renewal Cycles (ARC) (Holling, 2001) and panarchy (Gunderson and Holling 2002). Based on these two approaches and SESs, in section 2.5, we proposed our research framework on analyzing ecotourism in WPA as climate change adaptation with three main phases from context settings analysis; climate change manifestation and impacts; adaptive capacity and interactions cross scales in tourism destinations. In section 2.6, we will provide details of methodology and operationalization in data collection and analysis which include study site selection, time frame, methodology, and operationalization of this thesis.

2.2 Protected areas management and social-ecological systems

2.2.1 Human and nature relation in protected areas

There are various definitions of protected areas, one of the most popular ones is guided by the International Union for Conservation of Nature (IUCN). Thereby, a protected area is defined as "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley, 2008: 8). According to the perspective of specialized applications, there are 5 types of protected areas: inland water protected areas, marine protected areas, forest protected areas, sacred natural sites, and geodiversity. In terms of governance perspective, IUCN categorizes four governance types. The first is the government's governance which is attributed to the federal or national government, local government, and government-delegated management. The second type is shared governance which comprises joint management, collaborative

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management, and transboundary management. The third is private governance including individual owners, nonprofit organizations and for-profit organizations. The fourth type of governance is run by indigenous people and local communities, such as indigenous people's conserved areas and territories as well as community conserved areas (Dudley, 2008). The aim of the establishment of PAs is for sustainable conservation due to their significance in regard to ecosystem services and cultural values.

Human beings have colonized nature to an irreversible degree (Maldonado, 2015). In the current uncertain and unpredictable contexts, natural and social systems are coupled (Liu et al., 2007), and the "delineation between social and natural systems is artificial and arbitrary" (Berkes & Folke, 1998:4). Human and protected areas have a two-way relationship in which PAs ensure the provision of goods and services for human demand, and vice versa. Humans manage PAs via their institutions (rituals, traditions, customs, and laws) and restrictions in hunting, harvesting or no-take zones (Berkes, 1999). This means that PAs are expected to not only gain the goal of biodiversity conservation, but also record and evaluate the diversity, quantities, and values of the services they provide on a local and regional scale.

Protected areas management in the Anthropocene has been facing many challenges. First, the relevance of protected areas and human societies becomes more complicated with cross-scale threats from local issues such as ecological disasters, widespread epidemics to regional and larger-scale level issues such as conflict and global climate change. Besides the obvious drivers of climate change and agricultural expansion, protected areas would also be subject to political pressure based on justice and equity issues (Bryant, 1992; Walker & Fortmann, 2003). This results in protected areas becoming cross-scales and

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multiple-level concerns (Becken & Job, 2014) and they therefore need the engagement of different stakeholders. Secondly, Pas management faces the mismatch between threats and management levels, for example, water management pressures in lower Mekong river delta wetland protected areas are due to dam construction in the upstream which are not local issues, but transboundary issues. Thirdly, balancing the benefits of stakeholders is not easy and needs to enhance the resilience of protected areas in changing contexts from local initiatives under science-based consultations (Cumming, 2016).

Therefore, selecting long-term management strategies which are tradeoffs or synergies (Bennett et al., 2009) is innovative, diverse, and context-dependent. Fifty to sixty years ago we were still familiar with the conservation paradigms of "nature for people," but currently we have shifted to "people and nature" (Mace, 2014). Under the pressure of overexploitation, therefore, they are expected to have tighter management of nature and human relations with intensive monitoring and rapid institutional responses; however, we have witnessed a loosening of links between human and nature in the context of an increased demand for resources due to population growth, urbanization, unsustainable production and climate change.

2.2.2 Protected areas management and Social-ecological systems

Social – ecological system: In the context of the shift in the relationship between humans and nature, and the many emerging challenges in protected areas management previously mentioned, the most common framework used is Social Ecological Systems (SESs). SEEs framework is used to understand complex interactions within different systems and scales and it supports sustainable management of common-pool resources such as protected areas.

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The first SES definition was by the Russian Microbiologist B. L. Cherkasskii in 1988, but was developed more thoroughly and was more widely known when Berkes and Folke (1998) did an analysis of the interactions between ecosystems and institutional structure to develop a conceptual framework for analyzing the resilience of local resource management systems. Accordingly, "Social-ecological systems are complex, integrated systems in which humans are part of nature" (Berkes & Folke, 1998). Berkes and Folke used the term social-ecological instead of socio-ecological, because “social-ecological emphasizes that the two subsystems are equally important” (Berkes 2017:3).

After that, Anderies et al. (2004) developed a more comprehensive definition of SES than the definition developed by Berkes and Folke (1998). The SES was defined as an ecological system that is coupled with and influenced by one or more social systems. Social systems can be assumed as interdependent systems of organisms. Thus, social and ecological systems consist of interdependent components, as well as subsystems that are interactive. Anderies et al. (2004) focused on the robustness of SESs to highlight key interactions within the SESs due to the special importance of both robustness and the resilience of systems after disturbances.

Later, the SES definition developed by Anderies et al. (2004) inspired Elinor Ostrom to establish "simple, predictive models of social-ecological systems (SESs) and deduce universal solutions, panaceas, to problems of overuse or destruction of resources” (Ostrom 2007:15181). Ostrom advocated for the SES framework to be refined and restructured to identify variables more easily than others, create favorable conditions for comparative studies; and build a common language, which is useful for communication and comprehensive understanding.

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Comparison of SES by different big names: The development of the SES framework (SESF) is strengthened by a variety of empirical studies from diverse fields such as commons, collective action, institutions, and resilience (Ostrom, 1990; Agrawal, 2001; Anderies et al., 2004; Folke, 2006; Wollenberg et al., 2007; Poteete et al., 2010). Two SESF proposed by Berkes and Folke and Ostrom have some common grounds such as including local contexts as drivers of change (Berkes & Folke, 1998) and social-economic – political settings and external ecosystems in SESF of Ostrom (2009). However, Berkes and Folke emphasize the link between social and ecological systems through knowledge and understanding of ecological dynamics. Therefore, Berkes and Folke's SESF based studies are towards resilience, social learning, and transformation in adaptation (Folke, 2006). Meanwhile, Ostrom developed her SESF through empirical research on common property concepts, self-organization, and linked SES interactions. The framework can be used to diagnose sustainability issues and theorize analytical relationships between SES components, interactions, and outcomes within and among case studies. Berkes and Folke (1998) characterized the SESF as a descriptive framework that focuses on the connections between institutions, management practices, and various environmental knowledge systems. Meanwhile, Ostrom and Anderies' SESF proposes a set of generalizable variables that has been used as a diagnostic guide to help manage challenges with environmental governance, generate new theories in SES (Cox et al., 2016), diagnose the sustainability of SES more broadly (Ostrom 2007; 2009), and for further modeling (Schlüter et al. 2012).

The main research purpose is to analyze ecotourism and its interaction with ecological and social systems of WPA and to adapt to climate change in a comparative study. Our study will refer mainly to SESF proposed by Ostrom (2009) due to its

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convenience and adequacy of SES variables in investigating components of SES and interactions, and outcomes within and across case studies. However, we also inherit concepts from Berkes and Folke's SESF, especially in the analysis of adaptation which has been developed by Berkes and Holling in later studies, especially the concept of panarchy, one of the two concepts relevant to the field of tourism.

The SESF of Ostrom (2009) consists of 4 main subsystems: 1) resource systems (RS); 2) resource units (RU); actors (A); and governance systems (GS) (see Figure 2.1). For example, lakes, forests, water systems, and parks can be resource systems and fish, grass, and timber can be resource units. Resource units are part of resource systems. Actors can be individuals, local communities, government agencies, and other stakeholders. Governance systems refer to the specific rules related to the use of the PAs, and how these rules are made. The first-tier components of the SES framework are the main subsystems which operate in and interact with a specific socioeconomic (S) and ecological setting (ECO). In focal action contexts, these components interact (I) with outcomes (O) following. Each SES has different activities and interactions based on each of these first-tier components or entities (Ostrom and Cox, 2010). Multiple resource systems, such as the river, forest and park systems can co-exist within a SES, and each resource system has its own set of first-tier components with multi-tier attributes.

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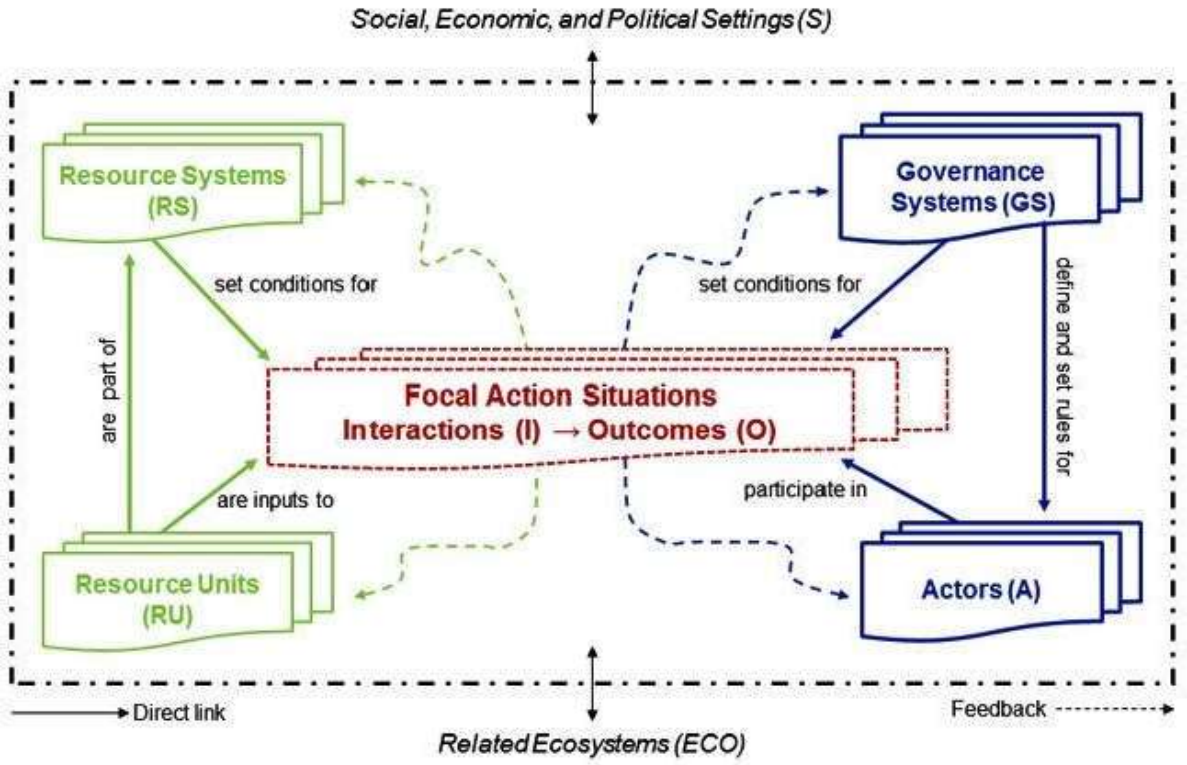

Figure 2.1 First-tier variables with their interactions and outcomes of the social-ecological systems framework from McGinnis and Ostrom (2014)

The attributes ascribed to certain first-tier entities are the second-tier variables of the SES framework (Table 2.1). These characteristics have been well confirmed empirically (Ostrom 1990; Agrawal 2001; Dietz et al., 2003) and constitute the first core of conceptual variables needed to appropriately diagnose the justification for sustainable or unsustainable outcomes in SES at a certain time and location in an area (Ostrom, 2007). The key, according to Ostrom (2007: 15183), is "assessing which variables at multiple tiers across the biophysical and social domains affect human behavior and social-ecological outcomes over time." Since the SES framework is multi-layered, each second-tier variable could be further subdivided into third, fourth, and... nth tiered variables. For example, property rights systems (GS4) could be classified into private and public (McGinnis, 2011). The

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mobility of resource units (RU1) might be divided into mobile and immobile ones (Ostrom, 2007). However, the methodology employed in each study and how to divide the second-tier variables are different and depend on empirical situations (Ostrom 2007; 2009; McGinnis, 2011; Ostrom & Cox, 2010; Anderies et al., 2004).

The focal action situation which is a key component of the SES framework describes the pattern of interaction between actors and specific resource systems and units, the governance system, and upon which actors' livelihoods rely. The socio-ecological components of the focal action situation can be subdivided into smaller components and located within a broader context (McGinnis, 2011).

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Table 2.1 Second-tier variables of a social ecological system. (Adapted from McGinnis & Ostrom 2014)

First-tier variable	Second-tier variables
Social, economic, and political settings (S)	S1 – Economic development
	S2 – Demographic trends
	S3 – Political stability
	S4 – Other governance systems
	S5 – Markets
	S6 – Media organizations
	S7 – Technology
Resource systems (RS)	RS1 – Sector (e.g., water, forests, pasture, fish)
	RS2 – Clarity of system boundaries
	RS3 – Size of resource system
	RS4 – Human-constructed facilities
	RS5 – Productivity of system
	RS6 – Equilibrium properties
	RS7 – Predictability of system dynamics
	RS8 – Storage characteristics
	RS9 – Location
Governance systems (GS)	GS1 – Government organizations
	GS2 – Nongovernment organizations
	GS3 – Network structure
	GS4 – Property-rights systems
	GS5 – Operational-choice rules
	GS6 – Collective-choice rules
	GS7 – Constitutional-choice rules
	GS8 – Monitoring and sanctioning rules
Resource units (RU)	RU1 – Resource unit mobility
	RU2 – Growth or replacement rate
	RU3 – Interaction among resource units
	RU4 – Economic value
	RU5 – Number of units
	RU6 – Distinctive characteristics
	RU7 – Spatial and temporal distribution
Actors (A)	A1 – Number of relevant actors
	A2 – Socioeconomic attributes
	A3 – History or past experiences
	A4 – Location
	A5 – Leadership/entrepreneurship
	A6 – Norms (trust-reciprocity)/social capital
	A7 – Knowledge of SES/mental models
	A8 – Importance of resource (dependence)
	A9 – Technologies available
Action situations: Interactions (I) → Outcomes (O)	I1 – Harvesting
	I2 – Information sharing
	I3 – Deliberation processes
	I4 – Conflicts
	I5 – Investment activities
	I6 – Lobbying activities
	I7 – Self-organizing activities
	I8 – Networking activities
	I9 – Monitoring activities
	I10 – Evaluative activities
	O1 – Social performance measures (e.g., efficiency, equity, accountability, sustainability)
	O2 – Ecological performance measures (e.g., overharvested, resilience, biodiversity, sustainability)
	O3 – Externalities to other SESs
Related ecosystems (ECO)	ECO1 – Climate patterns
	ECO2 – Pollution patterns
	ECO3 – Flows into and out of focal SES

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The SESs are extensively associated with diverse issues with the most common topics being resilience (Berkes & Folke, 1998), ecosystem services (Daily 1997; Partelow & Winkler, 2016), and governance theories of environment (Folke et al., 2005; Cox et al., 2016), such as adaptive co-management, multilevel governance, and polycentric governance. Therefore, SESs can bring a holistic approach to protected areas management. From the contemporary conservation perspective, PAs are increasingly being viewed as complex, adaptive systems that are both sustained and directed by the dynamics of their human and ecological elements, as well as the interactions between these elements. Conservation based on SESs means we depend on the natural system; we do not control nature but we are embedded in the natural system; humans cause conservation problems, in other words, rather than ecological factors, the conservation failures are mainly caused by social, economic, or political ones. (Cumming, 2011; 2014). New paradigms do not mean to displace all earlier ideas but bridge the gap between ecological and socioeconomic analysis.

Reviewing current literature in SESs, Partelow (2018), and Salgueiro-Otero and Ojea (2020) both agreed that in the first tiers and second tiers subsystems of SESs, Actors are the most widely investigated subsystem across frameworks. In contrast, the Related Ecosystems (ECO) are the least studied subsystem in all empirical studies. Interactions (I) and Outcomes (O) are also underrepresented, particularly in vulnerability assessments and adaptation action research. Actors and Resource Units (A-RU) and Actors and Governance Systems (A-GS) are the most common types of combinations researched in the literature; meanwhile, ecosystems and ecological dynamics such as interactions between climate

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patterns and resource units, changes of the spatial and temporal of resource systems had received little attention in previous research.

We argue that it is necessary to have empirical studies which can balance coverage between the set of second-tiers variables and Related Ecosystems such as climate patterns. Understanding the interactions between the ecological and social subsystems or the evaluation of outcomes after particular interventions is crucial for climate change adaptation and contributes to understanding the complex dynamics of an adaptive SES under adaptation processes and supporting sustainable management. Salgueiro-Otero and Ojea (2020) also supposed that the resource system subsystem must be widened beyond the human-utility concept to include ecological functions and ecosystem services. Therefore, in our study where climate change is the main issue, we would like to contribute to this lack of knowledge in SESs and contribute to the adaptive capacity of SESs to adapt to climate change.

In addition, literature in the SESs have shown that although the SESs are extensively researched in diverse fields (Partelow, 2018) SESs framework research remains largely focused on the “classic” common-pool resources (CPR) systems of fisheries, forestry, and irrigation systems. Meanwhile, ecosystem services which have more and more human intervention and increasing interactions between ecological and social systems have gotten a little attention from scholars. In four main ecosystem services in PAs, tourism service attracts the least scholarship, and tourism is regarded as one of the least prepared economic sectors for climate change's threats and chances (Scott, 2011).

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Meanwhile, tourism research with its multidisciplinary nature as well as the complexity of tourist systems when combined with various stakeholder participation and interactions cross-scales and cross-levels (Becken & Job, 2014) can provide a systematic perspective. Furthermore, tourism research based on SESs can strengthen the connection between tourism development, involving local and regional links, and sustainable development. Tourism can contribute to the development of socio-ecological approaches and climate change adaptation that have evolved from the resource-based and socio-psychological to attain equilibrium between ecological and social system components in tourism systems (Phan et al., 2021). The scale of adaptive capacity (AC) elements can be extended to incorporate ecological aspects, such as the AC of water, vegetation, and animals by applying resource-based and socio-psychological AC approaches. Tourism has the potential to contribute significantly to the achievement of the environmental, social, and economic SDGs by utilizing the social and human capital of local indigenous communities.

PA management and SES approach: Current PA practices have been criticized for failing to recognize that every socio-economic system is nested within an ecological system. Further, the main objective of PA management is biodiversity maintenance which does not fully incorporate the interests of local populations (Plummer & Fennell, 2009). Under the context of increasing uncertainty and long term changes from diverse aspects, including economy, society and environment, PA management from a social ecological system approach has become an emerging and inevitable trend. Thereby, natural resource management decisions are made in the context of environmental and ecological conditions and socio-economic and political factors, intervention choices, feasibility, and outcomes (Nuno et al., 2014).

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The results of the review of the literature in terms of PA management and SES show that the majority of studies in this field has been published since 2009, after Ostrom's publications on SES in the sustainability of common good management (Ostrom, 2007; 2009). In eight first level core subsystems of SES (Ostrom, 2009), the most studied subsystem is the governance system with discussion of several management approaches in PA such as adaptive co-management (Plummer & Fennell, 2009; Soliku & Schraml, 2020), integrated management (Wyborn, 2009, community based conservation institution (Baral et al., 2010), autonomous management systems or private PA management (Child et al., 2013), using Ostrom's principles to assess institutional dynamics of conservation (Tebet et al. 2018), socially-innovative governance (Castro-Arce et al., 2019), and adaptive governance (Akamani, 2020; Roux et al., 2021).

There are several studies focusing on the interaction between users such as the relation of local people and government in PA management (Hirschnitz-Garbers & Stoll-Kleemann, 2011), the role of leaders (Baral, 2013), benefit-sharing (He et al., 2020), and community-led green land acquisition (Castro-Arce & Vanclay, 2020). The participation of the local community is mentioned as a solution that would enhance the effectiveness of PA management from SES because it can provide a consensual management strategy (Palomo et al., 2011) and the local people's support for acceptable benefits and active engagement can help to improve knowledge acquisition and adaptive learning processes (Hirschnitz-Garbers & Stoll-Kleemann, 2011; Cebrián-Piqueras et al., 2020). There are several variables to enhance community participation in PA management, including stabilizing resource use rights, facilitating community participation in decision-making, ensuring

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development rights, innovating industrial modes, improving individual adaptability and reducing policy risks (He et al., 2021).

Interaction and outcomes is also one of topics discussed in many resilience related studies of PA (Baral, 2014; Berney et al., 2016). Another topic discussed often is ecological impacts from human activities (Baral, 2014; Burgoyne et al., 2016; Heslinga et al., 2018; Heslinga et al., 2020). The negative impacts of economic activities such as agriculture can degrade vegetation cover (Burgoyne et al. 2016). Some economic activities can improve the resilience of PAs such as ecotourism (Baral et al, 2014) and tourism (Heslinga et al., 2020). Notably, in the context of the Covid-19 pandemic, the study by Hentati-Sundberg et al. (2021) stated that human presence in PA can improve biodiversity.

SES approach also provides more lens for resilience studies of PAs with the concept of adaptive cycles. Thereby, when PA institutions experience one or a half form of the adaptive cycles, it will become more resilient because the system maintains its identity in institution memory and becomes more flexible (Baral et al., 2010). A case study in Nepal in ecotourism applied adaptive cycles in assessing the resilience of PAs which also claimed that ecotourism can enhance local capacity, facilitating self-organization and diversifying livelihoods, therefore it can strengthen the resilience, sustain stability and help deal with uncertainty (Baral, 2014). However, similar to previous literature using the SES approach, studies of PA management also lack studies focusing on climate change as ECO and adaptation actions. That can threaten the sustainable development of PA in the long term.

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2.3. Ecotourism and PA management and from SES approach

2.3.1 Ecotourism and PA management

Ecotourism plays an essential role in protected area management especially in developing countries where local and central budget for biodiversity conservation is limited. According to Kirkby et al. 2011, annual revenue flow of ecotourism in developing countries can be US$ 29 billion which provides a significant financial incentive to prevent habitat loss and exploitation. In addition, several studies proved the positive correlation between ecotourism participation, local income streams and perceptions, attitudes and participation towards the national protected area (Sirivongs & Tsuchiya, 2012; Brunnschweile, 2010). Therefore, ecotourism can be a driver for a shift in protected area management strategies toward integrated development (Goodwin, 1996) which help PA become more resilient to adapt to current uncertain contexts.

Engagement of multiple stakeholders in adaptive management or integrated management is an inevitable choice of many PAs (Holland et al. 2021). In which, the stakeholders for the engagement can be the local community, visitors, scientist community, etc. It is inevitable that protected areas and local communities will have a partnership toward successful conservation strategies (Andrade & Rhodes, 2012). Many case studies proved that ecotourism development with local community engagement in PA management can bring benefits for not only local residents in terms of income but also local support for biodiversity conservation (Brunnschweile, 2010; Baral et al., 2008). However, there are various factors restricting local people's engagement such as apathy, limited financial resources, lack of information, low levels of education, unfair benefit distribution, a command and control public administration, human-wildlife conflicts, lack of coordination

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and human resources (Bello et al., 2017). Therefore, to engage local communities, it is necessary for both greater advocacy of community participation and for incorporating specific community engagement strategies appropriate for developing country contexts (Bello et al., 2017) to achieve equitable access to and engagement in tourism and associated benefits. Consequently, tourism based livelihoods can help PAs become more resilient and better positioned in the equilibrium between economic benefits and the conservation of biodiversity (Holland et al., 2021).

In addition, external factors such as visitors also can have several impacts on PAs. On the one hand, visitors can bring financial support for biodiversity conservation (Wallace & Pierce, 1999) because they are willing to pay (Baral et al., 2008). On the other hand, they can be a disturbance to conservation such as affecting trails, recreation sites, wildlife, water, attraction features and other resources (Farrell & Marion, 2001), and issues requiring managerial responses. Tourists' environmental concerns and attitudes can have significant impacts to improve the natural environment and the environmental degradation of PAs. Therefore, environmental concerns and attitudes of visitors towards protected areas and national parks should be factored into management plans (Ghazvini et al., 2020).

There are more and more studies with proposal of application of technology such as GIS in tourism infrastructure planning (Boers & Cottrell, 2007; Papathimiu et al. 2022) and estimating visitor flows in natural areas (Orsi & Geneletti, 2013) or using social big data (Kim et al., 2019) in PA management and reinforcing existing field-based participatory approaches or social media based data (Arkema et al., 2021) in visitor marketing.

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There are various challenges of ecotourism development in PAs such as multi-stakeholder conflicts in benefit sharing, resources accessibility, lack of local community engagement, lack of reliable data for management, lack of conservation awareness and knowledge among stakeholders, and environmental changes. Challenges of ecotourism can be caused by both internal and external factors. In which, internal factors such as governance system, property system, benefit sharing mechanism, power which have decisive impacts on effectiveness of PA managements and need to be taken into account prior to the implementation of programs and the development of collaborative and adaptive management plans for the operationalization of tourism in and around PAs (Mach & Vahradian, 2021). When fundamental factors related to tourism development in PAs such as secure land rights, gauging tourist demand (Mach & Vahradian, 2021), environmental justice, and well-being (Morea, 2021) are not carefully considered, several issues such as multi-stakeholder conflicts, complexity and uncertainty (Plummer and Fennell, 2009) will threaten the sustainable development of PAs.

2.3.2 Ecotourism in PA from SES

Starting in 2009, studies of ecotourism in PA from the SES approach have started to develop. Analyzing ecotourism as an indicator of the interaction of human and ecological factors has become a popular study stream of ecotourism in PAs from the SES approach. Based on that, management of ecotourism from SES involves dealing with complexity, which necessitates setting explicit goals for ecosystem service delivery, including ecosystem service synergies and trade-offs (Palomo et al., 2014). Following this stream, current studies have focused on the application of technology in guiding and capacitating conservation management and policy from intellectual ecosystem service (Smit et al., 2017);

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or on estimating the monetary value of the ecosystem services of PAs (Castillo-Eguskitza et al., 2019). Previous studies stated that ecotourism contribution to conservation depends strongly on infrastructure, location, and the business models that the park adopts (De Vos et al., 2016). Furthermore, in the ecotourism development of PAs, visitation rates strongly depend on ecology, location, then biodiversity of mammal species, infrastructure and average accommodation charges (Baum, et al., 2017).

Although climate change has become an increasing threat to biodiversity conservation and PA management, there are few studies integrating ecotourism and climate change in PA management. In which, ecotourism is one of three selected livelihoods which satisfy the public's preferences for sustainable land use management in the context of climate change (Lee et al. 2019). Ecotourism is highly susceptible to a variety of climatic stressors including decreased precipitation, shifts in the rainy season, and increased drought frequency and intensity. These variations are making a huge impact on the environment, distorting tourism seasons, and disrupting the employment and income of local communities. To mitigate and adapt to these changes, it is necessary to have integrated management and a holistic understanding of the tourism system and climate change (Jamaliah & Powell, 2019).

2.4. Social-ecological systems in protected areas management from tourism and climate change adaptation

2.4.1 Protected areas and climate change

There are several types of protected areas, in this research, we selected wetland protected areas because they are the most damaged and endangered biomes and habitats

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due to human activity. Wetlands are known as inundated areas that are either “natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt” (Ramsar Convention Bureau, 2001). They are among the world's most productive natural habitats, providing significant socio-economic benefits to humans as well as habitats for a variety of species. Globally, wetlands cover over 12.1 million km2, with 54% permanently inundated and 46% seasonally inundated (Ramsar Convention on Wetlands (RCW), 2018). However, the amount of wetlands area is rapidly reducing around the world. Inland wetlands and marine/coastal wetlands both dropped by about 35% between 1970 and 2015, three times faster than the rate of forest loss (RCW 2018). According to Naiman et al. (2005), the wetland protected areas (WPAs) have high resilience with environmental changes and play a crucial role in transferring water in their systems via deep roots and the evaporation of vegetation systems.

Regarding climate change, WPAs also have an impact on climatic factors like temperature and precipitation and have many values with pollution, sediments, nutrient trapping, channel stability, flood control, ecosystem, habitat provision and corridors, economic values with a healthy ecosystem and recreational and aesthetic values. Change in wetland vegetation and its driving factors are the most critical challenges scientists are facing because of the environmental complexity. Various factors impact changes of vegetation in wetlands including human factors like land use (Nguyen et al., 2017), water diversion through dams, dykes, and canalization, infrastructure development or environmental related factors like climate patterns, topography, hydrological regimes, rodents, and pests (Zhang et al., 2021). Currently, the effects of climate change are increasing, with a growing number of studies assessing the impact of climate on the change

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of wetland vegetation. Wetlands can be affected by climate change through indirect impacts of increased temperatures (Yu & Gao, 2020; Reddy & Delaune, 2008), solar radiation, changes in rainfall intensity and frequency (Zhang et al., 2021). A warmer climate would accelerate the loss of water through evapotranspiration, which increases oxygenation of the exposed top layers due to water table drop (Lafleur et al., 2005). On the other hand, the areas with higher temperatures accompanied by more precipitation can promote photosynthesis, leading to primary production (Vitt et al., 2000; Backstrand et al., 2010; Bu et al., 2011).

In tropical and lowland regions, precipitation contributes directly and indirectly to water for wetlands. An increase of precipitation can enhance the Normalized Difference Vegetation Index (NDVI) especially in arid areas because it relieves water stress and increases soil moisture. However, once these effects reach a certain threshold, there is no longer a general linear relationship between precipitation and vegetation change (Zhang et al., 2021). Drought is the most damaging climate phenomenon, having a devastating impact on the wetland ecosystem, particularly peatlands. This could cause a shift of plant communities to the more drought-tolerant vascular plants. Meanwhile, the flood has more positive impacts on vegetation development because of raised water levels and higher light-saturated photosynthesis (Salimi et al., 2021). The manifestations of climate change and its effects on each wetland area are different. Therefore, to obtain more accurate and realistic results, we suppose that climate model data should be downscaled to the level of the study site. However, in many developing countries like Vietnam, climate change policies are state-centric in a top-down governance context. We argued that this can lead to maladaptive solutions.

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There are still various debates on how climate change contributes to wetland vegetation changes. However, wetlands lie at the intersection of multiple nexuses including physical nexus such as the interface of land and water or different water bodies (Adler, 2005), political nexus (i.e. multiple policies in wildlife, water quality, etc), and land use nexus (Downard et al., 2014). Therefore, the issues related to wetlands are dynamic and shift according to annual hydrological changes, policies, land-use, and population changes (Downard et al., 2014). Thus, wetlands are a complex social-ecological system (SES) and to understand climate change adaptation in wetlands we argue that it needs the linkages within SES. SES subsystems such as resource systems, resource units, actors, and governance systems are relatively independent, yet they interact to produce outcomes that subsequently affect these subsystems and their components and other larger or smaller SESs (Ostrom, 2009).

2.4.2 Climate change adaptation in tourism management

The first research of climate change and tourism started in the 1960s under the influences of climate revolution in technologies in climate recording, modeling, forecasting, and reporting climate data for the sake of using climate information in planning (Scott et al., 2012). The period during the 1980s witnessed the stagnation of research on tourism and climate change because of a lack of acknowledgment of climate change. Until the 1990s, when anthropogenic climate change was acknowledged, it led to a renewed interest in this field by scholars (Scott et al., 2012). This period had many studies focusing on analyzing both positive and negative impacts of climate change on winter tourism and coastal tourism and most research was distributed in developed countries. From the year 2000 and beyond, the publications on tourism and climate change went in two directions: the first one focused

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on analyzing the impact of climate change on tourism (Smith, 1990; Simpson et al., 2008; Dawson & Scott, 2010; Moen & Fredman, 2007). The second one considers tourism development as a tool for climate change adaptation (Weaver, 2011; Becken, 2005). After 2014, tourism for sustainable adaptation to climate change started to emerge.

There are various studies about the impact of climate change on tourism. Some studies show that climate change has a positive impact on revenue because of the extension of the tourism season and the diversity of tourism products within the Arctic and moderate climate countries (Combes, 2010). However, tourism destinations are found across the globe, including many in the humid tropical climate with a rich landscape of flora and fauna in Central and South Africa, the Caribbean and Latin America, Western Europe, South Asia, and Southeast Asia.

Climate change has had a devastating impact on the ecological systems and habitats of many fauna and flora, which are tourism resources. Many international destinations' ecosystems are potentially vulnerable to climate change. The most serious influences can be found in the impacts of sea-level rise on small island states. Other potential impacts of climate change on tourism include coral bleaching, fire outbreaks, altered animal and bird migration patterns, shorter skiing seasons, and the spread of vector-borne diseases. Climate change may cause a shift in the attractiveness of tourism destinations around the world if appropriate adaptation solutions are not implemented (Agnew, 2001).

The research of the relationship between tourism and climate change is at a rapidly developing phase (Fang et al., 2017). Currently, there are three main knowledge domains in the research on tourism and climate change, including climate change impacts and adaptation, mitigation, and policy analysis (Becken, 2013). Although climate change is

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predicted to change the tourism flow to Northward (longitude) and High ward (altitude), the facts have shown that tourism flows are witnessed to increase in the Global South (Hamilton, 2005). The reasons for this are because tourism is not influenced solely by climate conditions but also other factors like economic growth, advances in technologies, a rise in the middle class and improvement of living standards. All of which lead to an increase in tourism demands in markets like China and Southeast Asia. This increases the challenges of developing tourism sustainably under the impacts of climate change and requires an urgent need for sustainable tourism and climate change adaptation policies and actions, locally and globally.

Under this context, although climate change adaptation frameworks or strategies have accounted for significant and increasing literature in both government reports and academic references, the majority of studies on adaptation are either non-tourism specific or not implemented for regional application. Some studies by Scott et al. (2006), Becken and Hay (2007), and Simpson et al. (2008) proposed tourism adaptation frameworks or models. However, there is no evidence that their work has been evaluated or implemented in regional tourism destinations. Meanwhile, climate change is known as a global issue but climate change adaptation is locally efficient. To avoid maladaptive solutions, it is necessary to have a local based adaptation framework. This is a complicated task because of the interdisciplinary nature of both ecotourism and climate change. Therefore, in this study, we rely on the social-ecological system framework (SESF) and community engagement research approach to investigate tourism contexts, and how a destination (local users and governments) responds to climate change impacts on tourism. Ultimately, we would like to examine to what extent tourism can contribute to climate change adaptation in

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the settings of protected areas. Consequently, this research has the potential to contribute to the lack of a climate change adaptation framework in tourism within the destination scope.

2.4.3 Ecotourism development as a climate change adaptation strategy in protected areas

The context of protected areas is special due to its functions focusing on environmental functions - biodiversity conservation (Dudley, 2008). Many scholars have emphasized the importance of "ecosystem services" and their role in delivering advantages to humans such as fresh water, food, soil retention, nutrient recycling, medicines, and others (Daily, 1997). This concept was introduced by a conservationist who highlighted the PA's necessity to make revenue in order to ensure its long-term functioning. In addition to the benefits of tourism revenue for tour operators and local communities, payment for ecosystem services (PES) (Brockington, 2011) could be seen as an important prospect (Becken & Jop, 2014). Therefore, designation of the protected areas labels for those areas does not gain the approval of surrounding communities because their “food bank” would be bound after that. Illegally hunting, gathering, and harvesting plants, fish, and wild animals occur often as a way to sustain one’s livelihood and this is sometimes ignored by local authorities due to poverty (An et al., 2018). Tourism is considered a tool for pro-poor, climate change adaptation (Hornoiu, 2014; Jamaliah & Powell, 2017), conservation, and women empowerment (Weaver, 2011; Becken, 2005). Therefore, in many protected areas, tourism, especially ecotourism, is identified as a solution for balancing the' triple bottom line' discourse of sustainability.

Ecotourism is a small segment of nature-based tourism but defined by additional management, education, and conservational criteria (Buckley, 1994). The concept of

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"Ecotourism," as a specific type of tourism product, has emerged for a long time in tourism research and recently in advertising publications on tourism at different scales from national, local to corporate. Since the appearance of this concept in the 1970s, ecotourism has attracted the attention not only of researchers but also of tourism companies, tourism managers, and tourists. However, the concept of ecotourism is still inconsistent, many ecotourists suppose that ecotourism is simply the combination of two words "Tourism" and "Ecology" or it is nature-associated tourism that has appeared since the early 1800s (Ashton, 1991). With this concept, all tourism activities associated with nature such as sightseeing tours, sea bathing, and vacations are understood as ecotourism. The International Ecotourism Association has introduced the concept, whereby ecotourism is seen as a responsible way to travel to natural areas that preserve the environment and improve the welfare for local people. The above concept shows that ecotourism is not merely tourism associated with nature but ecotourism also creates opportunities for visitors to experience and learn about nature, especially about ecological values and biodiversity and literature. The Indigenous culture where tourists come to travel, thereby increasing the awareness and responsibility of visitors to preserve and develop the nature and local community is identified as a solution for balancing the 'triple bottom line' discourse of sustainability. Ecotourism, in particular, is believed to support the SDGs especially in goal 10 (reduced inequality), goal 17 (partnership for the goals), goal 8 (decent work and economic growth), and goal 9 (industry, innovation, and infrastructure) (WTO, 2017).

Since 2010, several studies of ecotourism have claimed that ecotourism is a social-ecological system (Joanne, 2010; Heslinga et al., 2017). Ecotourism is one of 4 main ecosystem services within wetland protected areas and ecotourism systems are nested,

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multilevel systems in which humans are part of nature (Berkes & Folke, 1998). Considering in the context that WPA is also a SES, the mingling of these two SES systems together to adapt to climate change impacts as ECO is an important interaction in PA management but has not yet been studied. Therefore, in this study, we will analyze ecotourism and its interaction with the ecological and social system of WPA to adapt to climate change, thereby providing policy suggestions and contributing to the current lack of adaptation studies of PA management from SES.

2.5. Research framework

In this study, we analyze ecotourism as one local livelihood and its interaction with the ecological and social system of WPA to adapt to climate change. In which, CC is one driver that impacts the landscape change of WPA and CC adaptation actions of Actors and Governance systems as the main subject to investigate the interaction of ecological and social systems to adapt to CC. Elba et al. (2016) highlighted the significance of the social, economic, and political contexts, as well as their implications for collective action. Therefore, in our research, contextualizing social – economic – political settings of two national parks is our first step in exploring the characteristics of tourism development of WPA (see Figure 2.2). In the first step (chapter IV) we identify internal actors of ecological systems such as resource systems and units and social systems including governance systems including relevant stakeholders: governmental regulatory framework for natural resources and actors who are local people who are working in tourism and not working in tourism.

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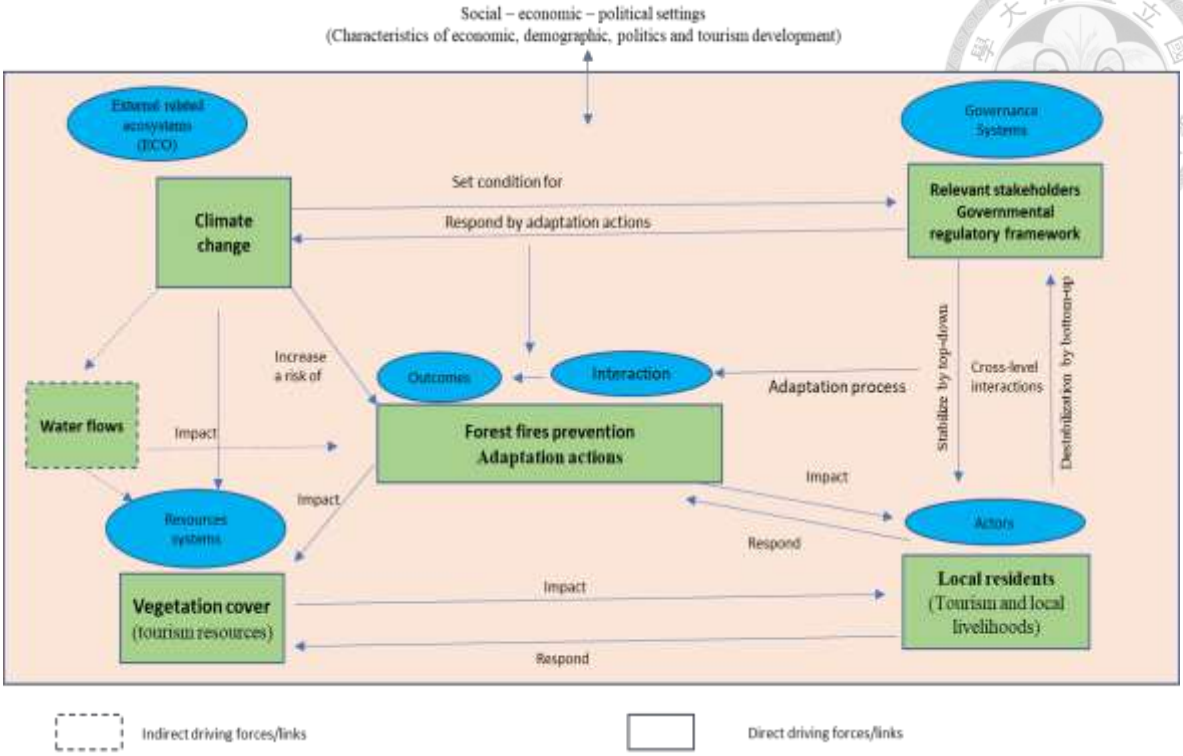

Figure 2.2 Research framework

Empirical indicators of SES and panarchy in this study

- **Social economic political setting:** Characteristics of economic, demographic, politics and tourism development
- **Resource system and Units:** Natural resources for tourism; Location, Zones, and boundaries of resources units; Changes of resources units; Customary and formal restrictions of using resources in tourism.
- **Government system:** Relevant stakeholders; Governmental regulatory framework for natural resources
- **Actors:** Local residents who have been living on resource systems of WPA
- **Outcomes:** Forest fires prevention (ecological performances); Adaptation process and actions
- **Cross level interactions:** Stabilization by top-down; Destabilization by bottom-up
- **External related ecosystems:** Climate change, Water flows

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Studies on climate change and adaptation are highly contextual. Therefore, the next step (chapter V) after describing the general socio-economic and political characteristics of the locality is to describe the context of the external related ecosystem (ECO) as climate change, its effects and interactions of 4 dimensions of SES including RS, GS, ECO and A. ***Climate change*** is selected as an external driving force because in the local scale it causes direct impacts to vegetation cover changes mainly through temperature and rainfall factors. The changes of temperature and rainfall by seasons and years as well as extreme weather are one of the major factors causing local disasters such as forest fires. ***Water flows*** are external driving forces and are supplied by rainfall (climate factor) and river flows which are indirectly impacted from hydrological systems of upper streams and dam construction, therefore it is a more regional and transboundary scale factor. Therefore, water flows in this study are not considered as main driving forces for vegetation change at the local scale but are still involved in climate change impacts in the analysis of changes of water level of the two WPAs. These changes impact the vegetation and forest fires and are managed by GS through construction such as sluice gates and canals. ***Vegetation cover*** is the main local resource systems as well as tourism resources of the two WPAs, therefore, detecting the Spatio-temporal changes of vegetation play a key role in assessing the interaction of resource system changes and the external driving factor of climate change and internal driving factors of the governance system and Actors.

Forest fires prevention is an integrated result of climate change impacts and governance system in water and vegetation management. Climate change is considered a risk causing forest fires, and when forest fire occurs it impacts vegetation cover change and GS deploys several adaptation actions to respond to forest fire which is also a way to respond to climate change. Therefore, analysis of forest fire outcomes can reflect

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interaction of GS and RS in the context of CC. Evaluation of changes in vegetation cover, water, and non-vegetation will support future development and management of ecotourism in wetland protected areas, especially in the construction of public facilities such as toilets and resting areas, and reduce the damages caused by climate change with nature-based solutions.

Actors in our framework are mainly local residents who have lived on the resource systems of WPAs for their livelihood. In chapter V, we will analyze how local residents perceive the impacts of climate change on the resource system by their participation in co-creating disaster maps and timelines of disasters to identify extreme events in both spatial and temporal scales of national parks. This is also a necessary step in several climate change adaptation frameworks to determine problems (Jopp et al., 2010 & 2015; Becken & Hay, 2007) but does not appear in the SES framework. Furthermore, we also investigate how vegetation changes impact local livelihood and how local residents respond to those changes. In chapter VI, from an ecotourism perspective, we will have more insight on how local residents who have been working in tourism respond to climate change and their adaptive capacity.

In SESs, ***adaptive capacity*** refers to "the capability of an agent or system to adapt to change, regardless of whether it is examined as an independent social or ecological entity, or as a coupled social–ecological system" (Cottrell et al. 2019:555). Adaptive capacity is related to resilience (Holling, 1973) and panarchy (Holling & Gunderson, 2002) which plays a vital role in analyzing ecological dynamics during change. Therefore, in our study we combine panarchy and SES in adaptation research with more focus on institution interactions. A tourist destination, a community or a wetland protected area is not an isolated system. The actions and interactions of individuals and groups within the

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community have a significant impact on community resilience (Berkes & Ross, 2016). Berkes and Ross (2013 & 2016) stated that resilience of a community or tourist destination is shaped by diverse influences in multi-level or nested relationships and has been more recently reinforced by actor agency, decision-making power, and social capital, which highlights possibilities for proactive adaptation of community-level resilience. However, the early studies engaging with the SES approach are criticized for mainly focusing on ecological systems modeling but ignoring several social systems elements such as complex power relations and actor agency (Huong et al., 2020). Meanwhile, panarchy theory (Gunderson & Holling, 2002) with adaptive cycle metaphors emphasizing on 4 phases to either grow, conserve, collapse or reorganize itself over time (Figure 2.3a for an image of an adaptive cycle) to respond to disturbance has important implications for community resilience. It shows that the adaptive cycle does not occur in isolation but instead the resilience of one system is influenced by the systems it is connected to. Therefore, the panarchy concept is important because it enables interactions across levels and thresholds through system feedback (Holling & Gunderson, 2002) which is not a focus of the SES framework by Ostrom (2009).

A panarchy has numerous interactions between its layers. Two of the most important are "revolt" and "remember" (Berkes & Ross, 2016), and the panarchy's higher and larger adaptive cycles have a stronger impact on smaller cycles and the overall system, and they spin more slowly, whilst the smaller-scale and lower cycles in the hierarchy spin faster (Figure 2.3b) (Berkes, Colding & Folke, 2003). According to Berkes and Ross (2016) actions at lower levels of organization (individuals, households) and changes originating at higher levels (national level policies, globalized market forces) have an impact on community resilience. These two types of linkages between panarchy levels are crucial for

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building and maintaining adaptive capability. Therefore, in our study, we combined Holling and Gunderson's (2002) idea of the panarchy framework with social-ecological systems theory for understanding the resilience of two WPAs in Vietnam from a tourism perspective.

In reviewed tourism adaptation frameworks, there are three approaches of AC (asset-based, psychological-social based and SES based). In this research, from the SES and community engagement approach, we argue that the adaptive capacity of the local community is the result of the interaction of adaptive capacity among multiple scales. Regarding scale, we assess the adaptive capacity of higher cycles (based on the policy and management mechanism) and lower cycles (based on local knowledge, conservation practices, and initiatives of the local community) in adapting to climate change. Thereby, interactions between scales and changes in the tourism system among adaptive renewal cycles occurring at multiple spatial scales are crucial in identifying the dynamics of the system at any given focal scale and its adaptive behaviors in the future.

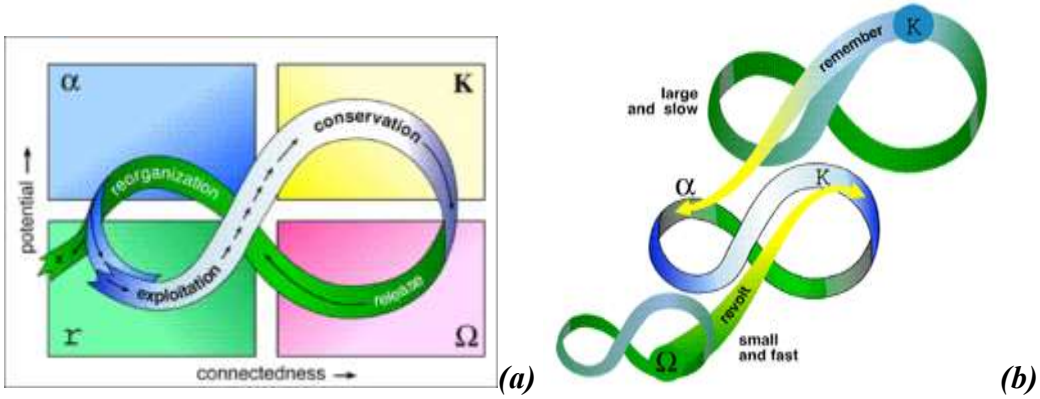

Figure 2.3 Adaptive Renewal Cycle (Holling 2001) & panarchy (Gunderson and Holling, 2002)

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Our operationalization of the cross-scale interactions among levels in a panarchy of the layered adaptive cycles is interpreted through the top-down "remember" decisions and policies by governing bodies as well as the bottom-up "revolt" innovations started by the core community. In this way, the complex power relations and mechanism of adaptation process between levels of panarchy can be revealed under the cross-scale interactions. The system analysis of resilience focuses on social-ecological systems at a community level, looking "upwards revolt" and "downwards remember" from the community's reference level. This study seeks to contribute to the understanding of panarchy applications for WPA since the interactions between levels have received little attention in the community resilience literature.

2.6. Methodology and operationalization

2.6.1 Site for study, selected requirement, timeframe

This research selects two national parks (NPs) which have developed tourism as one livelihood. In terms of resources and actors, Tram Chim National Park (TCNP) in Dong Thap province and U Minh Thuong National Park (UMTNP) in Kien Giang province are two of the first and most important Ramsar sites in the VMD. They are representatives for wetland areas (resources such as melaleuca, bird, fish, grass, etc.) and lifestyles (history of soil reclamation and transformation) of the VMD. In terms of the governance system, they are typical cases for 80% of national parks in Vietnam, which are under provincial government management and adaptive governance. They are also famous ecotourism destinations of Vietnam.

The location and wetland landscape face different challenges and different adaptation strategies (Figure 1.1). Two case studies also represent WPA in two sub-regions

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out of 3 regions in the VMD. Climate change and adaptation strategy of two sub-regions are different, so we selected two sites to investigate how tourism contributes to climate change adaptations and how people and government adapt to climate change and its impacts and which factors play the key for success and failure of this livelihood in WPA in the VMD. There are various similar variables of SES of two the NPs, however, they also have some typically different variables including location, management mechanism, community engagement, empowerment, and leadership, as well as climate change and its impacts (Table 2.2)

Table 2.2 Main differences between the two study sites

	TCNP	**UMTNP**
Tourism development	Abundant potential in tourism resources	
	More developed tourism (scale, strategy, income, tourism products, and services are diverse)	Less developed tourism (fewer people engage in tourism service, infrastructure and services are poor)
Community engagement	More communities engaged in tourism (about 150 people)	Less community engaged in tourism (about 30 people)
Management	Social enterprise and provincial department	NP management
Location (Figure 1.1)	Near Mekong river mainstream	Far from Mekong river systems
	Located in Upper Delta floodplain (directly impacted by Tien River and Hau River)	Located on the delta peninsula dominated by coastal influences and limited freshwater inputs

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This study examines the similarities and differences of two national parks through three sub-research questions and also the main thesis question. From social-economic-political settings and also elements of social and ecological system in tourism of the two selected sites. The study then examines the development of tourism, climate change impacts and the adaptation to climate change of tourism's stakeholders in the two settings. The success and failure of tourism development in climate change adaptation will be discussed at the end to find lessons in two cases and also for WPA in general

In April 2019, we conducted one scoping trip to the Mekong river delta, Vietnam to investigate and select study sites. There are 3 main requirements for site selections as follows:

- Wetland protected areas located in two subregions of the Vietnamese Mekong Delta (VMD)
- Tourism development as a livelihood
- Established for long enough (more than 10 years) to evaluate management and adaptive renewal cycles
- There are buffer zone's community engagement into tourism services

In this research, the general time frame is from the establishment year of the two national parks, TCNP in 1998 and UMTNP in 2002, to the present. The change of landscape is evaluated from 2002 to 2020. The changes in climate are from 1978 to 2019. The changes in tourism are evaluated starting when tourism services and revenues of tourism in the two WPAs began: TCNP (2003) and UMTNP (2005).

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2.6.2 Methodology and data collection

According to our review of 57 articles (Appendix 1) on the nexus of tourism and climate change adaptation, there are 21 research methods using qualitative methods, 18 using quantitative methods and only 8 using mixed methods. In which, 7 out of 8 studies used mixed methods with multiple stakeholders. In our research, the tourism stakeholders are also complicated with residents in the community who work in tourism service, national park managers, relevant government agencies, and NGOs. This study also used mixed methods to answer the problem statement and its sub-questions. The methods included: i) quantitative methods (Mann-Kendall rank test, Theil-Sen estimator method, and the Mann-Whitney-Pettit methods for assessing climate change manifestations; ArcGIS and Matlab for assessing landscape changes; public participation geographic information systems (PPGIS) to create the disaster and tourism maps for this study) ii) qualitative (expert interviews, in-depth interviews, policy and content analysis, and focus group discussion, participant observation (field trip)). Table 2.3 summarizes the main methods used in the study for data collection.

We used mixed methods because 3 topics including tourism, climate change, and wetland protected areas are complex issues, require system thinking and both quantitative and qualitative indicators to answer the question of **what extent is tourism contributing to climate change adaptation of local stakeholders in Wetland Protected Areas (WPA) in the Vietnamese Mekong Delta (VMD)?**

We suppose that adaptation actions are the outcome of users and governance adaptive capacity, perception, and interaction between users and governance. Thus, we

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need to combine scientific data to identify the manifestations and effects of climate change on people and tourism resources. Then, we need to approach people working in the tourism industry and related departments of resources and tourism to do in-depth interviews and observe how they perceive the problem, how they respond, what they have and what they lack, and how they interact with the government. From there, we assess in which direction tourism develops, and how it contributes to the adaptation process.

Table 2.3 Data collection for the study

	Data collection method	**Tram Chim National Park**		**U Minh Thuong National Park**	
		Phu Tho	***Tram Chim Town***	***An Minh Bac***	***Minh Thuan***
Quantitative: - Climate change manifestation and trend - Landscape changes by time and season - Local disaster and tourism maps	**Climate parameter data and modeling**	Using Mann-Kendall rank test, Theil-Sen estimator method, and the Mann-Whitney-Pettit methods • Climate parameter data from 1978-2019 of two weather stations nearby National Parks: Cao Lanh station (near Tram Chim National Park); Ca Mau station (near U Minh Thuong National Park)			
	ArcGIS and Matlab analysis	Using Landsat 7 & 8 in detecting changes of NDVI (vegetation and water change by time) • Dry season: 2002-2020 • Wet season: 2011-2018			
	PPGIS	**- PPGIS** (disaster map and tourism map) with the participants of 5 commune officers and 18 local people in each national park			
Qualitative: - Adaptive capacity - Adaptation options	**In-depth interviews (Appendix 3, 4, 5, 6)**	• 2 commune officers • 3 national park managers • 6 districts and provincial officers • 13 local people (8 people working in tourism service; 5 people not working in tourism)		• 2 commune officers • 1 national park manager • 5 district and provincial officers • 7 local people (4 people working in tourism service; 3 people not working in tourism service)	

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		Expert interviews: - 3 NGOs officers (IUCN, WWF, World Bank (WB) - 2 researchers of Can Tho University and 2 researchers in tourism of Vietnam	
	Focus group discussions (Appendix 7)	**- Focus group discussions:** timeline of disasters, causes, challenges, responses, tourism development plan	
		1 FGD of local officer 03 FGDs of local people	01 FGDs of local officer 03 FGDs of local people
	Scoping trip	A visit on 3rd April 2019	A visit on 5th April 2019
	The research activities were conducted	• A visit on 3rd April 2019 • 03 visits by trained students of Dong Thap and Kien Giang University in December 2020, January 2021, and March 2021	• A visit on 5th April 2019 • 02 visits by trained students of Kien Giang University in Oct 2020 and December 2020

Quantitative method

Climate change manifestations

To assess the manifestation of climate change, we use the Mann-Kendall rank test, Theil-Sen estimator method, and the Mann-Whitney-Pettit method to analyze the change of temperature and rainfall data from 1978-2019 (Table 2.3). These are popular and reliable non-parametric tests for hydro-climatological time series that are widely used around the world. The result of this test will show if the change of climate parameters like temperature and rainfall is significant or not (p-value) and in which trend (slope) and the changing points – the year the change started. That will be the first step for assessing if there is a correlation between the change of climate to changes in vegetation and water cover.

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The surveyed climate parameters include hourly temperature and daily precipitation which are two basic parameters of climate having major impacts on wetland vegetation (Reddy and Delaune, 2008; Salimi et al, 2021). Regarding temperature, we calculated the annual average temperature, minimum, maximum, and average temperature by dry and rainy seasons. Regarding the precipitation, the study investigated the yearly total amount, the amount of rainfall in maximum and minimum months (October and February, respectively); and in rainy and dry seasons. After that, we conducted trend analysis on an annual basis.

For long-term trend analysis, we used the Mann-Kendall rank test to verify whether there is a significant trend change, Theil-Sen estimator method to evaluate the slope, the Mann-Whitney-Pettit method to find the change point (the specific year when climate change occurs).

Mann-Kendall rank test

The Mann-Kendall method is a non-parametric method used to identify trends in a time series of data. This method compares the relative amplitudes of the data rather than the values of the data themselves. This avoids the spurious bias caused by some local extremes as the usual least-squares linear trend calculation method. In addition, when considering the trend of the series by this method, it is not necessary to care which distribution of the sample set. Assume that there is only one data at a time. Each data value at each time point is compared with the values across the time series. The initial value of the Mann-Kendall statistic, S, is 0 (that means no trend). If a value at a later point in time is greater than the value of data at some earlier point in time, S is incremented by 1 and vice versa. If the

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series x1, x2…, xn represents n data points where xj is the data value at time j. Then the Mann-Kendall S statistic is calculated by:

$$S = \sum_{k=1}^{n-1} \sum_{j=k+1}^{n} sign(x_j - x_k)$$

n which:

$$sign(x_j - x_k) = 1, \quad x_j > x_k$$
$$sign(x_j - x_k) = 0, \quad x_j = x_k$$
$$sign(x_j - x_k) = -1, \quad x_j < x_k$$

A positive S value means an uptrend; a negative S value means a downtrend. However, it is necessary to calculate the probabilities associated with S and n to determine the significance level of the trend.

The variance of S is calculated according to the formula:

$$VAR(S) = \frac{1}{18}\left[n(n-1)(2n+5) - \sum_{p=1}^{g} t_p(t_p-1)(2t_p+5) \right]$$

In which, g is the number of groups with the same data values, tp is the number of data points in the group p. In cases where the sample size n > 10, the test statistic Z is calculated from:

$$Z = \frac{S-1}{[VAR(S)]^{1/2}}, \quad S > 0$$
$$Z = 0, \quad S = 0$$
$$Z = \frac{S+1}{[VAR(S)]^{1/2}}, \quad S < 0$$

Positive Z values imply upward tendencies, whereas negative Z values indicate downward trends. If |Z| is bigger than the standard normal deviation, the trend is regarded as significant (taken as 0.05 in this study).

Theil-Sen slope estimation method

This study used Theil-Sen slope estimation, which is a widely used method for quantifying significant linear trends in time series. Due to its relative insensitivity to

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extreme values and better performance for normally distributed data, this method is regarded as more reliable than the least-squares method. The slope of the data can be calculated using the following formula:

$$\beta = \text{median of series}\left(\frac{x_j - x_k}{j-k}\right), \quad j = 1, 2, \cdots, n \ ; \ k = 1, 2, \cdots, j-1$$

Where β is the trend slope of the two data points in the time series data; xj k and x are the data corresponding to j and k time points (j>k) in the time series data value.

After calculating the trend slope β, based on the original time series data, the slope estimation equation is as follows:

$$Y_t = \beta \times t + X_t$$

Where Yt is the estimated value calculated by the trend slope equation, and t is Time, Xt is the intercept of the equation.

Mann-Whitney-Pettit method

To detect the changing point of climate parameters, the study applied Mann-Whitney-Pettit method. With the time series of data (T), there is a trend change at time t. At the change point, the data can be divided into $\{X_1, X_2, \ldots, X_t\}$ and $\{X_{t+1}, X_{t+2}, \ldots\ldots, X_T\}$. The calculation method of Mann-Whitney Pettit change point is as follows:

$$U_t = \sum_{i=1}^{t} \sum_{j=i+1}^{T} sgn(x_i - x_j), \qquad sgn(x_i - x_j) = \begin{cases} +1 & x_i - x_j > 0 \\ 0 & x_i - x_j = 0 \\ -1 & x_i - x_j < 0 \end{cases}$$

When |Ut| reaches the maximum value, t is changing point:

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The probability that the change point reaches the maximum at |Ut| is

$$p = 1 - \exp\left[\frac{-6K_T^2}{T^3 + T^2}\right]$$

In practice, when there are multiple points of change, it can be assumed that when p is greater than the threshold (such as 0.9), the point can be regarded as a change point. In that case, we can also use û(t) = | U t | to calculate the annual P(t) value, compared with the preset probability threshold, accordingly, the changing point is calculated as:

$$P_{(t)} = 1 - \exp\left[\frac{-6\hat{u}(t)^2}{T^3 + T^2}\right]$$

Detection of Spatio-temporal changes of vegetation and water NDVI

Vegetation and water are two main natural resources of the two WPAs, therefore, detecting the Spatio-temporal changes of vegetation and water plays a key role in assessing the interaction of ecological system changes - climate change and adaptive management of government. Evaluation of changes in vegetation cover, water, and non-vegetation will support future development and management of ecotourism in wetland protected areas, especially in the construction of public facilities such as toilets and resting areas, and reduce the damages from climate change impacts with nature-based solutions.

Since wetlands are commonly located on the boundary between terrestrial and aquatic ecosystems with spatial heterogeneity and complex hydrological dynamics (Chen et al., 2020; Fuente et al., 2021), it is impossible to rely on single-phase remote sensing data to monitor and map wetland ecosystems with high precision using low spatial resolution remote sensing data (Chen et al., 2018; Zhang et al., 2020a, 2020b). The influence of climate and human factors has increased the heterogeneity of wetland landscapes, and

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vegetation patches have become severely fragmented (Cai et al., 2020b; Mao et al., 2018). As a result, high spatial and temporal resolution remote sensing images are definitely needed for wetland vegetation monitoring. Landsat-based detection can be applied for regional-scale mapping, which is usually capable of mapping vegetation at the community level or discriminating against some dominant species. The study used Landsat 7 and Landsat 8 with medium to coarse spatial resolution (15 m for panchromatic band, and 30 m for multispectral bands, and 60 m for thermal infrared band). Each scene measures 185 km x 185 km. The resolution period lasts 16 days.

Among various spectral vegetation indices of wetland greenness, NDVI was most responsive to field-based metrics of vegetation structure and composition and most used in inland woody wetlands because of its sensitivity to plant structure, composition (Taddeo et al., 2019), and a relatively consistent NDVI threshold which can be used to differentiate wetland (White et al., 2016). NDVI is the Normalized Difference Vegetation Index (NDVI) which is a plant health indicator based on how the plant reflects light of specific frequencies (some waves are absorbed and others are reflected).

NDVI is calculated by the formula:

$$NDVI = \frac{NIR - RED}{NIR + RED}$$

NIR – reflection in the near-infrared spectrum

RED – reflection in the red range of the spectrum

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According to this formula, the density of vegetation (NDVI) at a specific location in the image is equal to the difference in the intensities of reflected light in the red and infrared bands divided by the sum of these intensities.

This index ranges from -1.0 to 1.0, mainly depicting greens, with negative values representing clouds, water, and snow, and values near zero originating from rocks and bare soil. The NDVI function with very small values (0.1 or fewer) correlates to bare areas of rocks, sand, or snow. Shrubs and meadows are reflected by moderate values (0.2 to 0.3), while temperate and tropical forests are represented by big values (0.6 to 0.8).

In general, there are six types of NDVI time series analysis algorithms: differencing, regression, segmentation, statistical boundary, trajectory classification, and threshold (Zhu, 2017). We downloaded Landsat images from the NASA Earth science website https://earthdata.nasa.gov/ which provides data that is available fully, openly, and without restrictions. We selected Landsat images in both dry and rainy seasons with cloud cover less than 10% and used Matlab to run the threshold of each map. In all, we have the following data sources (Table 2.4):

Table 2.4 Main characteristics of Landsat images for vegetation covers change analysis

	Dry season (from December to April)		**Wet season (From May to October)**
Sensor	**Date of images**		**Date of images**
Landsat 7	2002/March/17		2011/October
	2003/January/31		
	2008/March/09		
	2009/February/08		
Landsat 8	2014/ February/22		2014/September/22
	2015/ February/03		2018/October
	2020/ February/07		

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The result of Matlab automatically generates 4 thresholds that are different in each map. We based on the real data in 2016 to reclassify the image and found that class 1 is matched with water bodies (lakes, canals, ponds). However, from class 2 to class 4, the vegetation is mixed and also different by seasons (Table 2.5).

Table 2.5 Vegetation and water classification based on the real data in 2016

NDVI classification	**Tram Chim National Park**		**U Minh Thuong National Park**	
	Dry season	**Wet season**	**Dry season**	**Wet season**
Class 1 (<0)	Open water body (canals, ponds, lakes, open swamps without aquatic plants)			
Class 2 (Low_NDVI vegetation) (0 to 0.2)	- *Dry season*: major part of melaleuca forest, Oryza rufipogon (wild rice), grass (Panicum repens), E. atropurpurea, Eleocharis dulcis, Xyris indica L	- *Wet season*: Major part of melaleuca; part of Eleocharis dulcis, Xyris indica L	- *Dry season*: In melaleuca forest and swamps near water bodies.	- *Wet season*: in some areas of a swamp with scattered melaleuca
Class 3 (Medium_NDVI vegetation) (0.2 to 0.4)	- *Dry season*: Part of melaleuca cajuputi, Panicum repens, a minor part of Eleocharis dulcis, Major of Nelumbium nelumbo.	- *Wet season:* Major part of Oryza rufipogon, major part of Eleocharis dulcis	- *Dry season*: Grassland, dense regenerated melaleuca forest; Melaleuca forest with Phragmites; Swamp with aquatic plant and scattered/sparse regenerated melaleuca.	- *Wet season*: scattered areas of swamps and forest near water bodies.
Class 4 (High_NDVI vegetation) (>0.4)	- *Dry season*: Minor part of Melaleuca cajuputi, Polygonum hvdropiper L	- *Wet season*: Major of Nelumbium nelumbo; Polygonum hvdropiper L, Minor part of melaleuca	- *Dry season*: Melaleuca forest (replanted melaleuca)	- *Wet season*: All types of Melaleuca forest.

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Qualitative method

Community-engaged research in the context of Covid 19

In the context of COVID-19, when the researcher and community's partnership is broken by geographical distance (the policy of postponing commercial flights has started from Feb 2020 to present between Taiwan and Vietnam), that would ruin the whole plan for community-engaged research. In this situation, we proposed and implemented an alternative framework which is the so-called "community engagement triangle" (Figure 2.4). In which, the researcher will make direct partnerships with local students and through them, make indirect partnerships with the local community. After having a scoping trip to the local area, we recruited local students who have lived in the research areas to research teams. Their cultural proximity and insightful knowledge of the local language, values, and customs helped us to better understand the local context. Our students will have received our training for 2 months with knowledge and skills for doing community-engaged research. In the training time, the researcher would not be the one who gives a task imperatively to a student but will design the task together, implement it, adjust it, and complete it to suit the context. The students would receive homework to understand their locals including a timeline of disasters, reasons and consequences, and explore ecotourism resources and tours. After training and completing the tasks, the students will need to do free-testing with survey questions to pass the "qualification exam" before they can go to the field sites to do data collection.

After each training class, students will receive their task, they perceive it, give some questions, then receive the task, discuss together before completing it and submitting it; then the researcher receives and discusses it with students before giving feedback to each

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student and completing the task together. After this process, we both learn, reflect, and improve the task by ourselves. The real context will be the ideal lab for testing tasks. We have some tasks that failed from the first steps like some interviewees refused to answer or not record (due to lack of trust) and 4 focus group discussions failed because students have no experience (they were too nervous to be a moderator, did not know how to run discussion properly, did not record the videos and the discussions). We then redo and improve (Figure 2.4). For example, from the initial lists of in-depth interview questions and focus group discussions to the official lists, we have a lot of adjustments that cannot do without the discussion and localization with local students and communities. The way we approach and engage people in our data collection needs a lot of initiatives from students and also social networks of local universities especially when we want to build up the partnership (with the trust and willingness to provide information) with local communities and work with officers at provincial and district departments.

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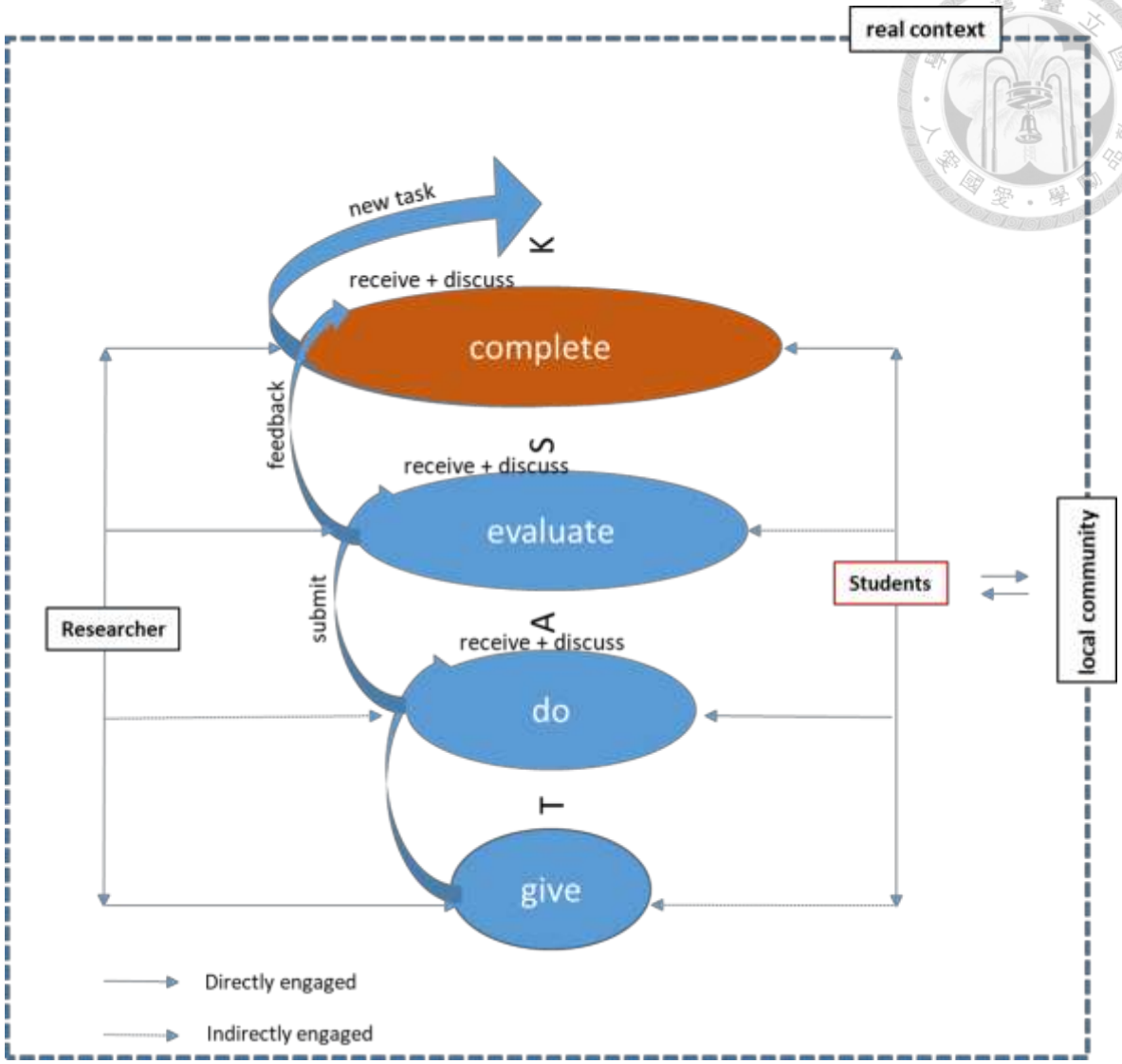

Figure 2.4 The process of a task completion in a community engagement triangle of researchers – local students – local community.

The community engagement approach is used in assessing adaptive capacity which is proposed from higher scale (decision making bodies) like water management policy, forest monitoring system, tourism masterplan to the lower scale (derived from the internal community). We argue that how communities react to implemented policy and self-assess their adaptive capacity is still lacking in many communist countries. This can create a

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communication channel that crosses scales in adaptation and can enhance the efficiency of adaptation in the twin interaction between high but slow cycles and small but fast cycles in SES. We conducted a comparative study with two selected areas which have a different history of reclamation and different ways of tourism management. Therefore, we suppose they can tell different stories in tourism development of wetland protected areas in the VMD

Desk review for contextualizing the research sites including protected areas context (Ramsar information sheets; socio-economic context to understand livelihood structures and the role of tourism in socio-economic structure). Understanding context is also the basis for building data collection questions and design data collection progress when working with the community. For example, UMTNP, in two communes in buffer zones, after a desk reviewing and scoping trip (in April 2019), we found tourism mostly develops in An Minh Bac commune. Therefore, we will organize a local workshop with focus group discussions in An Minh Bac. In TCNP, tourism mostly develops in Phu Tho commune and Tram Chim Town, so we will organize a local workshop in Phu Tho commune.

In-depth interviews: we select respondents from diverse categories and levels of tourism systems. However, because two of our PAs are also national parks under the management at the provincial level, our key informants are mainly from provincial, district to commune levels and residents who participate in tourism services. Our sample selection is quite random. From the beginning we planned to find a local facilitator who is a local person and working in a commune office and has a good reputation to invite key informants in communities (refer to Loc et al., 2018). We have some criteria for local key informants like residents must be from 20-75 years old with normal cognitive ability. They must have

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been living in the community for more than 5 years and working in the tourism service for more than 3 years. For officers, they need to have worked in one of the listed departments for at least 3 years. However, when students went to the communities to meet the invited residents, we found that although the local facilitator invited the right person, the one who attended the interview was not the invited person. The reason is because residents who work in tourism are very busy with their business and they did not understand the meaning of the project through the explanation of the local facilitators. So when our students went to the local area, they spent 4 days investigating and understanding communities, using tourism services (accommodation, food, transportation) and based on the criteria of key informants to select random interviewees, sent them an invitation letter and booked the interview appointment. The same way was applied for recruiting participants for focus group discussions, so we have a list of key informants for our survey (Appendix 2). In each method, we selected different actors with a different number of participants.

The purposes of an in-depth interview are to answer the second and third questions of the study: how do people perceive climate change manifestation and its impact and how do they respond to it in general and especially in tourism. According to the panarchy of the tourism system in two national parks, we can observe two main bodies related to policy. In which policy-making bodies include: People's Committee of the province; People's Committee of district and People's Committees of communes with the highest level being provincial People's committee. Regarding questions for policy-making bodies, we focus on leadership, policy planning and community engagement in livelihoods (particularly in tourism) and climate change adaptation (Appendix 3).

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The study involved policy agencies, which included the National Park Management Board, the Ecotourism and environmental education center, the Department of Agriculture and Rural Development, the Department of Culture, Sports and Tourism Trade, the Center for Investment and Tourism promotion, and Forest Rangers. Our questions not only focus on leadership, policy planning and community engagement in livelihoods (particularly in tourism) and climate change adaptation, but also on challenges in implementing policy from higher levels and how they react to new initiatives or revolution from communities in tourism operations or climate change adaptation (Appendix 4)

For communities, who are directly impacted by policy but have no power in policy-making, we will investigate community learning, empowerment, perception and adaptability to policy (Appendix 4). We also interviewed an active actor in policy consultancy – NGOs with the three most popular NGOs in National Parks (IUCN; WWF and WB) (Appendix 6).

Our timeline is built based on referring to secondary documents, however, on local documents, there is a lack of data from before 30 years ago. Several small and local disaster events are missed, especially on a small scale like a commune. Therefore, we explore local knowledge by interviewing local residents and local leaders to know the timeline of local disasters. So far, we have a timeline of two research areas (Appendix 3, 4, 5- based on local students' investigation). In the in-depth interview, we will include questions regarding local disasters to recall people's memories and investigate how they adapt.

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Local workshop and the focus group discussion

Due to the characteristics of the people living in rural and remote areas, approaching and building a partnership with the local community is a long process. Simultaneously with the strict management of the local authority in a communist country, we need government permission to approach and have interactions with both the local government and the community. Therefore, with collaboration with local universities through training, we started with a top-down approach such as contact with provincial departments such as Provincial Departments of Culture, Sports and Tourism, Provincial Departments of Natural Resources and Environment, as well as utilize the relationship of local universities to approach two national parks management directors and commune leaders in buffer zones. This process took us 6 months from the initial contacting of local universities to the first day we went to local communities. After successfully approaching local authorities, we were introduced to local facilitators who are people working in commune offices or national park departments. Those facilitators as gatekeepers helped us to organize local workshops to approach and build partnerships with local communities and also the local government.

Based on my experience in working with Vietnamese rural communities, I found that organizing a local workshop is the most effective way to approach and understand local contexts and build up partnerships with local communities. In the local workshop, we can find key informants for in-depth interviews and also observe interactions between local people and the government. In the local workshop, we started by introducing our teams and the objectives of the study, as well as letting people introduce themselves. After that, to make local people believe that our purpose was to support them in improving their

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knowledge of critical issues of climate change and livelihoods and nurture their desire to know more, we invited experts to share about climate change and its impacts. In the third part, we organized focus group discussions to gain local knowledge about tourism and responses to climate change. In this discussion, we wanted to build a different context, where local people would be directly involved in the context assessment (particularly climate-related extreme events and impacts, and tourism resources and tour design). Moreover, the most distinctive feature of the focus group discussions typically emphasizes the interaction between participants and reflects the power relations in decision making and empowerment which only can observe and assess properly by community meeting channels. After discussions, each group has a chance to speak out about their results and also their expectations to the government to help them adapt to climate change and improve livelihoods. That provided local authorities opportunities to listen to their communities in decision-making. We also gave people opportunities to self-evaluate their discussion results and encouraged them with small prizes. After local workshops, we recognized people are more open to sharing with us and they even invited the research team to visit their homes to share their startup stories in tourism and how they adapt to changes in both the environment and institutions.

In each national park, we organized 4 discussion groups with 3 groups of residents and 1 leader group. Participants would complete 3 tasks: (1) timeline of disasters; (2) disasters mapping and response; (3) the map of tourism resources, tours, and products (Appendix 7). Based on the real context of each national park, the number of groups and members of a group can be flexible, as long as it can reflect as much as possible the real interactions in the social setting of the community.

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2.6.3 Operationalization and data analysis

The necessary indicators were chosen based on the theory, context, and methodology to analyze the data and address the problem statement and its sub-questions. The indicators that dealt with the three sub-questions are identified in the following paragraphs.

Indicator I: the main characteristics of tourism development of WPA case studies in the VMD

Since our research was done with the SES approach, to describe the main characteristics of tourism development we apply SES to contextualize the social-economic, and political setting of tourism development. At the same time, characteristics of tourism are analyzed based on SES with four main subsystems: Resource system (RS), Resource unit (RU), Governance system (GS), and Actors (A). The indicators I will answer for the research question I. The majority of indicators will be collected through the reports of the People's Committee of communes in buffer zones, districts, and provinces. Local reports from 2015 to the present are collected and reports of resources management and disaster prevention are collected since 2010 (based on available data). After collection, information and data of reports are coded under the support of NVIVO to classify information into themes and subthemes (Table 2.6) for further analysis.

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Table 2.6 Indicators I

Theme I. Research context (QA[1])

Subtheme I.1. Social settings
- Code 1. Demographic trend
- Code 2. Culture and history contexts

Subtheme I.2. Economic settings
- Code 1. Main livelihoods
- Code 2. Income & poverty
- Code 3. Economic transformation

Subtheme I.3. Political settings
- Code 1. Political stability
- Code 2. Government policy in livelihood diversity
- Code 3. Government disaster prevention and post-disaster support

Theme II. Resources system and units in tourism (QA & A3, A4, A5)

Subtheme II.1. Main sectors of resources system, location, boundaries, and sizes
- Code 1. Main sectors of resources system (vegetation, water, animals, birds)
- Code 2. Location of resources
- Code 3. Size
- Code 4. Predicity of resources dynamics
- Code 5. Customary and formal restrictions of using resources in tourism

Subtheme II.2. Resource units in tourism
- Code 1. Mobile and immobile resource unites
- Code 2. Economic values of resource units
- Code 3. Interaction of resource units
- Code 4. Customary and formal restrictions of collecting resource units in national parks

Theme III. WPA resource governance in tourism (QA & A3, A4, A5, A6)

Subtheme III.1. Relevant stakeholders
- Code 1. Government organizations
- Code 2. Non-governmental organizations (NGOs) (appendix A6)
- Code 3. Network structure
- Code 4. Network structure
- Code 5. Customary institutions
- Code 6. Local leaders/patriarch
- Code 7. Role of the community

Subtheme III.2 Governmental regulatory frameworks for natural resources
- Code 1. Biodiversity conservation
- Code 2. Property-rights systems
- Code 3. Operational rules
- Code 4. Constitutional rules
- Code 5. Sanctioning processes

[1] QA: Qualitative analysis with desk review secondary documents (local reports and Ramsar information sheet of two NPs)

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Code 6. Monitoring processes
Subtheme III.3. Climate change adaptation policy
Code 1. Climate change manifestations and impacts[2]
Code 2. Policy in disaster prevention in national parks
Code 2. Water management
Code 3. Forest Fire management

Theme IV. Actors of SES in tourism sectors (A3. A4. A5)[3]

Subtheme IV.1 General Characteristics
Code 1. Number of people working in tourism
Code 2. Socioeconomic attributes and livelihood strategies of users
Code 3. History of use
Code 4. Location

Subtheme IV.2. Socio-cultural capital and leadership
Code 1. Knowledge of SES/mental models
Code 2. Leadership/entrepreneurship
Code 3. Norms/social capital
Code 4. Cultural capital

Subtheme IV.3. Dependence and technology
Code 1. Dependence on resource
Code 2. Technology used

Theme V. Tourism development (A3, A4, A5)

Subtheme V.1. Role of tourism in WPAs in livelihood and biodiversity conservation
Code 1. Income
Code 2. Basic services
Code 3. Biodiversity conservation supports

Subtheme V.2 Tourism facilities
Code 1. Traffic
Code 2. Accommodation
Code 3. Public facilities
Code 4. Technology

Subtheme V.3 Tourism operation
Code 1. Tourism policy and incentives
Code 2. Tourism using zones
Code 3. Legal provisions on rights and obligations in tourism exploitation in National park
Code 4. Legal provisions on rights and obligations in tourism exploitation in buffer zones

Subtheme V.4. Tourism products and masterplan (A7. T3, T4)
Code 1. Tourism routes and time for exploitation
Code 2. Tourism services inside a national park and in buffer zones
Code 3. Plan and promotion strategies

[2] The information of this code is synthesized based on local reports and previous research. In the second research question, we will provide more detail of climate change and impacts based on our primary data.

[3] Major information of theme IV cannot be found in local reports, therefore, we based on information of in-depth interviews from 44 informants to synthesize and analyze

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***Note*:** *QA means qualitative analysis*
A3, A4, A5, A6 mean Appendix 3, 4, 5, 6 respectively
A7.T3, T4 means Appendix 7 task 3 and task 4

Indicator II: To what extent does climate change transform the landscapes of WPA in the VMD?

Due to the manifestations of climate change and the fact that its effects on each wetland area are different, to obtain more accurate and valid results, the climate model data must be evaluated to the scale of the study area. However, assessing CC and its impact on each WPA is a complicated and expensive task. Therefore, in many areas, climate change adaptation policies are very general or applied equally in a large area, not regionally, which can lead to maladaptive strategies. Therefore, in two study sites, in indicators II, the study addresses two main tasks. First, we describe the trend of climate change, and second, we detect the wetland resources change. The nexus of climate change and wetland resources and tourism also are analyzed. Table 2.7 presents indicators we used to answer research question 2:

Table 2.7 Indicators II

I. Climate change manifestations (from 1980-2019) (QnA)
(*Trend (S>0: increase; S<0: decrease; S=0: no change)*
Changing point (t means the year the change starts to occur)
Significant change (|Z|<0.05 *means significant change))*
I.1. Temperature (Local weather station data)
Annual temperature
Maximum temperature
Minimum temperature
Temperature range
I.2. Precipitation (Local weather station data)
Annual total precipitation
Amount of rainy season (May to October)
Amount of dry season (November to April)

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I.3. Extreme events (A7)[4] Timeline of disasters (A7. T1) Disaster maps (PPGIS)[5] (A7.T2) II. Vegetation and water cover changes (QnA) Vegetation cover map (2016) NDVI transition maps by season (dry – wet season NDVI transition maps by years (dry season (2002-2020); wet season (2011-2018) IV. Climate change and impacts on vegetation and water covers Timeline of climate patterns and extreme events with NDVI changes Impacts of climate change adaptation to vegetation and water V. Climate change impacts on tourism development Impacts of climate change on tourism activities and services (A3, A4, A5 & QA) Impacts of climate change adaptation to tourism development
Note: *QnA means quantitative analysis*

Indicator III. How do people (local government and residents) in WPA perceive and adapt to climate change from tourism perspectives?

To answer this question, we analyze adaptive capacity and cross-scale interaction between local communities and governments in adaptation. The data is mainly collected from in-depth interviews and focus group discussions. The data is analyzed qualitatively by thematic analysis with the support of NVIVO 12. After collecting 45 interviews including 27 (TCNP) and 15 (UMT), and 3 (NGO) I transcribed verbatim. To reduce bias and improve the reliability of qualitative analysis the transcripts were inter-coded by two people (which is known as rater or inter-coder). We use the percentage agreement to test interrater reliability. After having 45 transcripts, I read through all to remove substandard passages such as digressions, too many suggestions from the interviewer and to get the general sense of data and reflect the overall meaning. Finally, we eliminated 1 transcript and were left with a total of 44 transcripts for analysis.

[4] The data of extreme events are collected from both local reports, in-depth interviews and focus group discussions

[5] In FGDs, we have tasks with local residents and the government to make a map of the disasters. We used paper-maps and use ArcGIS to create the disaster maps from results of FGDs (Appendix 7)

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Based on that and the theoretical framework, I formed the first version of Codebook which still can be revised during the whole coding process. The detailed step is as the following:

Step 1: Form codebook (first draft based on the theoretical and practical framework)

Step 2: Co-coding 1 transcript with intercoders and revising codebook

Step 3: 2 raters independently code 3 transcripts

Step 4: Calculate and discuss between raters to gain at least 80% of percentage agreement

Step 5: Revise and complete the official codebook (Appendix 9)

Step 6: One rater work on the remaining transcripts

Step 7: The second rater will randomly recode 2 transcripts

Step 8: Recalculate percentage agreement (>80%)

Interrater and interrater reliability have been measured by using a variety of statistics. Depending on the characteristics of the data and the number of raters, there are some examples: Percent agreement and Cohen's kappa are used for two raters; Fleiss kappa is used for three or more raters; and the contingency coefficient, Pearson r, and the Spearman Rho, the intraclass correlation coefficient, the concordance correlation coefficient, and Krippendorff's alpha are helpful for multiple raters. This study considers one of the most widely used measures which is percent agreement. I developed a matrix in which the columns indicated the different raters and the rows represented the percent agreement (Table 2.8). When the percent agreement reaches 80%, it means the data coding is reliable.

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Table 2.8 Calculation of percent agreement

Variables	Raters		Difference
	Loan	Betty	
1			
2			
3			
4			
…….			
n			
Number of Zeros			
Number of Items			
Percent Agreement			

Indicators III includes two main themes: Adaptive capacity and interaction cross time and cross-scale (Table 2.9). We will code and after the percent agreement is 80%, we will classify them into subthemes and themes.

Table 2.9 Indicators III

Theme I. Adaptive capacity
Subtheme 1. Perception of climate change and its impacts
- Code 1. Climate change manifestation (A8.B3.1/B3.2)
- Code 2. Causes of disasters (A8.B3.6)
- Code 3. Climate change impacts (A8.B3.2/B3.8/B8.13/14/15)

Subtheme 2. Perception of tourism resources and development
- Code 1. Tourism resources ((A8.B.7)
- Code 2. Tourism route ((A8.B.7)
- Code 3. Tourism service and products ((A8.B.8.8)
- Code 4. Tourism operation regulation

Subtheme 3. Leadership (A4.Q6)
- Code 1. Decision making in the community
- Code 2. Strategy and right

Subtheme 4. Adaptation action
- Code 1. Disaster damage reduction actions ((A8.B4.1)
- Code 2. Experiences ((A8.B4.2;4.3)
- Code 4. Innovations in adaptation ((A8.B.6)

Subtheme 5. Social capital
- Code 1. Networks (A8.B.8.2/B.8.3/B.8.4)
- Code 2. Supports post-disasters (A8.B.5.2/B.8.5)

Subtheme 6. Technology (A8.B.8.10)

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Theme II. Interactions

Subtheme 1. Top-down management

- Code 1. Regulation/Policy of climate change adaptation (A3, A4. Q3)
- Code 2. Regulation/Policy in tourism adaptation (A3, A4. Q4)
- Code 3. Benefit-sharing (A8.B.8.1)
- Code 4. Policy/regulation evaluation (((A8.B.8.7/B.8.9)

Subtheme 2. Bottom-up management

- Code 1. Empowerment ((A8/B.8.8)
- Code 2. The reaction of the government to local innovations (((A8/B.8.12)
- Code 3. Role of NGOs (A6)

Note:

A4.Q6 means Appendix A4 question 6

Because we used semi-structured in-depth interviews, the order of numbers in a questionnaire is just to support the interviewers. Besides, because the interviewers are local students, we need to design the interview very clearly with many sub-questions to support them during the interview. Therefore, the official questionnaire (A8) has many sub-questions like B3.1, B4.1, and different by different stakeholders.

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Chapter 3. Protected areas in Vietnam and the Vietnamese Mekong Delta

3.1 Vietnam and the Vietnamese Mekong Delta

Vietnam (officially the Socialist Republic of Vietnam) is a Southeast Asian country, along the Pacific Ocean. The mainland is shaped like an S on the map, running 1,650 kilometers from north to south and located between latitude 23o23' north to 8o27' north, the widest part on the mainland is about 500 km; the narrowest place is nearly 50 km. According to the 2020 census results, Vietnam's population is estimated at 97.58 million, of which the male population is 48.59 million, accounting for 49.8%; the female population is 48.99 million, accounting for 50.2%.

Regarding natural conditions, Vietnam has a humid tropical monsoon climate, the average temperature in Vietnam ranges from 21oC to 27oC and gradually increases from North to South. The North has four distinct seasons: spring, summer, autumn, and winter, while the South has a hot climate all year round with two distinct seasons: dry and rainy. Vietnam's topography is diverse with hills, plains, coasts, and continental shelves reflecting the long history of geological development and topography in the monsoon environment which is hot and humid and has been strongly weathered. Hills and mountains account for three-quarters of the territory, but mostly low-lying hills. There are two large and fertile plains: The Northern Delta (Red River basin, 16,700 km2 wide) and the Southern Delta (Mekong River basin, 40,000 km2). Lying between these two large deltas is a chain of narrow plains, distributed along the central coast, from the delta in the Ma river basin (Thanh Hoa) to Phan Thiet with a total area of 15,000 km2. Vietnam has a dense network of rivers (2,360 rivers over 10 km long) with the two largest rivers, the Red River and the

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Mekong River, forming two large and fertile deltas. The system of rivers and streams is added to 310 billion m3 of water every year. Vietnam's soil is diverse and fertile, making it ideal for agricultural and forestry growth. The flora of Vietnam is diverse and abundant (about 14,600 species of plants). The vegetation is mainly tropical jungle, including plants that need plenty of sunlight, high temperatures, and high humidity. The fauna in Vietnam is rich and diverse, and there are many rare and precious species recorded in the IUCN Red List of Threatened Species. Currently, 275 species of mammals, 800 species of birds, 180 species of reptiles, 80 species of amphibians, 2,400 species of fish, and 5,000 species of insects have been listed. Vietnam has preserved its rare biodiversity with about 30 national parks. These national parks are places for Vietnamese and world biologists to do scientific research, as well as attract eco-tourism. In addition, UNESCO has recognized 8 biosphere reserves in Vietnam as world biosphere reserves and 9 Ramsar sites with international importance.

Regarding socio-economics, the development of Vietnam over the past 30 years has had many achievements. Since 1986, economic and political reforms have accelerated economic development, transforming Vietnam from one of the world's poorest countries to a lower-middle-income country. GDP per capita increased 2.7 times between 2002 and 2018, reaching over USD 2,700 in 2019, with more than 45 million people escaping poverty. The poverty rate dropped sharply from more than 70% to less than 6% ($3.2/day at purchasing power parity). Vietnam's population and social structure are rapidly changing. Vietnam's population has increased to 96.5 million people in 2019 (from around 60 million in 1986) and is anticipated to reach 120 million by 2050. According to the results of the 2019 Vietnam Census, with 55.5% of the population under the age of 35 and an average life

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expectancy of nearly 76 years, the country outperforms other countries in the region with similar revenues. However, the population is aging rapidly. There is a growing middle class which is currently at 13% of the population and it is expected to grow to 26% by 2026. Health has also made great progress as living standards continue to improve. Over the past 30 years, the provision of basic services has seen many positive changes. People's ability to access infrastructure has been significantly improved. As of 2016, 99% of the population has electricity for lighting, compared with 14% in 1993. Access to clean water in rural areas has also increased, rising from 17% in 1993 to 70% in 2016, whilst in urban areas this rate is over 95 percent. However, Vietnam's infrastructure investment as a percentage of GDP has been among the lowest in the ASEAN area in recent years. This hinders the development of modern infrastructure services required for the next stage of development)[6]

The fast growth and industrialization of Vietnam has had numerous detrimental consequences for the environment and natural resources. In the last ten years, total electricity use has tripled, outpacing electricity generation. The energy sector accounts for about two-thirds of the country's total greenhouse gas emissions, owing to an increasing reliance on fossil fuels. The clean energy transition must be accelerated as soon as possible. Vietnam has emerged as the world's fastest-growing per capita greenhouse gas emitter over the last two decades – with an increase of around 5% per year. Water demand is increasing day by day, while water productivity is still low, reaching only 12% of the world standard. Unsustainable use of natural resources like sand, fisheries, and timber can have a severe impact on long-term growth prospects. In addition, the vast majority of people and the Vietnamese economy are vulnerable to the impacts of climate change. Urbanization,

[6] Data source: Compiled from General Statistics Office website https://www.gso.gov.vn/

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economic growth, and rapid population growth are posing increasing challenges in waste management and pollution treatment. Vietnam's waste volume is expected to double within the next 15 years. In addition, there is the problem of ocean plastic waste. It is estimated that 90% of global ocean plastic waste is discharged from 10 rivers, including the Mekong River. Vietnam has been one of the ten countries with the worst air pollution in the world. Water contamination has a significant impact on the productivity of key sectors as well as people's health.

Vietnam has been undergoing a system transition from central planning to a market-oriented economy for the past three decades and the country has witnessed massive changes in a variety of social, political and economic aspects, including protected areas. Consequently, the responsibility for economic development has shifted from the national government to the municipal level as a result of the decentralization of governance. Especially, after being recognized as a middle-income country (MIC) [7] in 2011, international funding such as official development assistance (ODA) flows have decreased and become less concessional. Despite this lack in budget, functions of protected areas in biodiversity conservation still need to be maintained, standards of living need to be raised, and increases in opportunities for poor households in buffer zones to make a decent living are needed. Therefore, national parks under local government management are expected to create revenue by becoming more entrepreneurial, either on their own or through private-sector collaborations. In the context of serious climate change threats in Vietnam in general and VMD in particular, the protected area is considered the most vulnerable and unable to adapt for tourism resources (Huynh & Piracha, 2019). Ecotourism has been developed

[7] https://www.worldbank.org/en/results/2013/04/12/vietnam-achieving-success-as-a-middle-income-country

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spontaneously, segmented and at the primitive stage, although this issue has been discussed in many domestic forums and workshops. In the increasing trend of green and responsible tourism demand in Vietnam, my research intends to provide the necessary recommendations for policymakers in tourism as well as protected area management in the context of climate change in Vietnam and the Mekong Delta. Theoretically, local initiatives for developing ecotourism in NPs from a country like Vietnam which has several system transitions and cross-scale challenges of climate change, can enrich the relationship between tourism and conservation at the local level which is still controversial (e.g. Becken and Jop, 2014; Pickering & Hill, 2007).

The Vietnamese Mekong Delta is the largest delta in Vietnam with a total area of 40,547.2 km², including 1 city of Can Tho (under the central government) and 12 provinces. The population of the whole VMD is 17,318,500 people in 2020 (accounting for 13% of the country's area). The Mekong River Delta has a sub-equatorial climate, so it is favorable for the development of agriculture, especially the development of wet rice and food crops.

In terms of natural conditions, VMD is a flat delta region with an average topographical elevation of about 2 meters, with a dense system of rivers and canals. The Mekong River from Phnom Penh (Cambodia) divides into two branches flowing into the VMD through Tien and Hau rivers. These two rivers divide VMD into three parts: one part located in the south of the Hau river is the Ca Mau peninsula; one part located in the middle of Tien and Hau rivers are fertile and flat plains, canals as dense as spider webs; and one part located in the northern part of the Tien River is divided with Dong Thap Muoi in the west and the Dong Nai plain in the east. VMD, which is located at the heart of the tropical monsoon region of Asia, is affected by the southwest monsoon coming from the sea from

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May to the end of September. It is wet and rainy from May to October and is the rainy season. From November to April next year, it is affected by the northeast monsoon coming from the mainland, arid with little rain, which is the dry season. The Mekong River plays a very important role during the formation of the delta. The average annual water volume of this river flowing into the VMD provides about 4,000 billion m^3 of water and about 100 million tons of alluvial material accreting to the fertile plain. Besides the Mekong river system, VMD is also affected by other river systems such as the Vam Co river system, the Cai Lon - Cai Be river system, the Giang Thanh river system, and the dense canal system which has mainly been dug within the past 100 years and has the function of transporting water from the main river to the inland field for irrigation and agricultural production. According to data from the forestry sector, VMD has a high biodiversity with 98 species of mangroves; in addition, in wetland ecosystems, there are 36 species of mammals, 182 species of birds, 34 species of reptiles, and 6 species of amphibians. Coastal areas have up to 260 species of fish and aquatic products. In addition, this area also has 10 land areas belonging to the wetland conservation areas that have been established.

In terms of economy, although the area of agricultural and fishery cultivation is less than 30% of the country's total, VMD contributes more than 50% of the rice area, 71% of the aquaculture area, 30% of the agricultural production value, and 54% of the aquaculture production in the whole country. The industry sector is very underdeveloped and consists mainly of the food processing industry. The service sector of the Mekong Delta includes three main industries: import and export, water transport, and tourism. Rice exports account for 80% of the country. Water transport plays the most important role. Ecotourism started to flourish through tourist activities on rivers, in gardens, and exploring islands. Sustainable

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tourism was initially formed with the success of the Mekong Lodge sustainable resort in Tien Giang and many other localities such as Ben Tre, Vinh Long, Ca Mau, and Dong Thap. However, the quality and competitiveness of tourist areas are uneven and limited.

This chapter aims to provide a general picture of the protected areas (specifically national parks) in Vietnam and specifically in the Vietnamese Mekong Delta. Section 3.2 will introduce the history of the formation and development of PAs in Vietnam as well as the governing system, community engagement, development of ecotourism, climate change and other challenges in the management of PAs in Vietnam. In section 3.3, we analyze characteristics of PA management in VMD with governance, community engagement, tourism and other economic activities, climate change and other challenges as well as current studies of PA in the VMD. Consequently, our study can open the potential for practical contributions to decision making in the context of tourism development in response to climate change and the management of the sustainable development PAs in Vietnam and the VMD.

3.2 Protected areas in Vietnam

3.2.1 History of development and category of Protected areas in Vietnam

The categories with current protected areas share some similar categories designated by the IUCN. For example, Nature reserves are classified as Category I (strictly protected areas); National Parks are classified as Category II; Landscape reserves/Landscape Conservation Areas are classified as Category IV/V (Table 3.1).

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Table 3.1 Subcategories approximate to IUCN PA management categories in Vietnam

SUF sub-categories approximate to IUCN PA management categories as follows.

SUF Category	Equivalent IUCN PA category
National Park	II
Nature Reserve	I
Species/Habitat Conservation Area	IV
Landscape Conservation Areas	III & IV

(Source: ICEM, 2003***)***

Vietnam has a long history of developing PAs. The first Vietnamese NP (Cuc Phuong NP) was established in 1962. As of 2018, there are 172 PA in VN with a total area of 2,493,843.67 hectares; National Parks have 30 (1,077,236 ha), Nature Reserves have 65 (1,150 million ha), Species and habitat conservation have 18 (100,639.78 ha), landscape protected areas have 56 (95,182 ha) (MONRE, 2019). Besides the PAs' systems, many PAs and areas that highly value biodiversity are recognized by international or regional organizations for international importance with the following titles: 06 globally important ecoregions recognized by WWF; 08 Ramsar sites; 09 UN – Recognized Biosphere Reserves; 01 World Heritage Site and World Cultural Heritage with biodiversity criteria recognized by UNESCO; 06 ASEAN Heritage Parks; 63 important bird areas accounting for 5% of the total land area of the country; 104 key biodiversity area, etc. The main objective of this strategy is that by 2020, the area of the system of special-use forest, marine protected areas, and inland water conservation areas shall be raised to 9% of the land area and 0.24% of the sea area of Vietnam. The national parks in Vietnam are protected areas and are created to protect natural resources and biodiversity. The first Vietnamese NP (Cuc Phuong NP) was established in 1962. Since then, the number of NPs has increased from 16

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(476,621 ha) in 2002 (Rambaldi et al. 2001) to 30 National Parks in 2017 (Figure 3.1) (1,077,236 ha, reaching ca. 3% of the total land area) IUCN and UNEP-WCMC (2017).

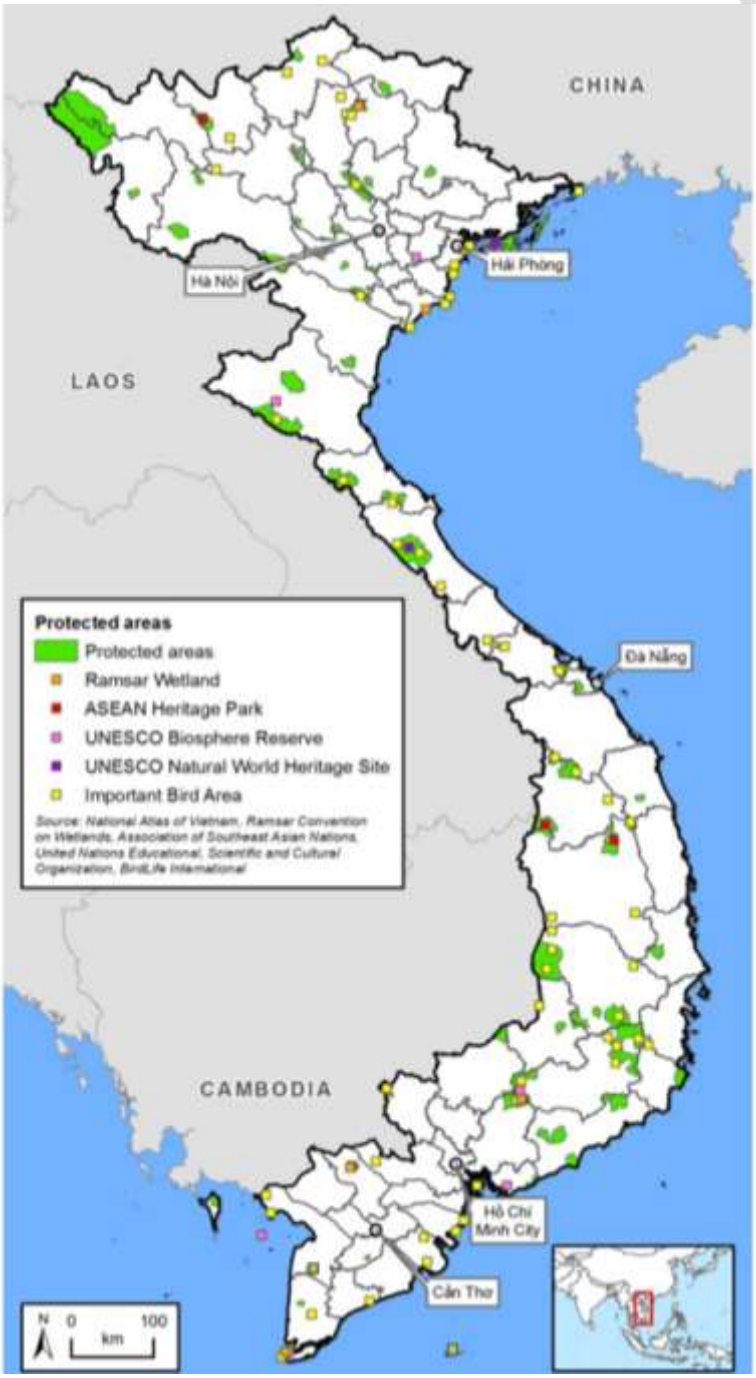

Figure 3.1 Distribution of protected areas in Vietnam. (***Source:*** Adapted to IUCN and UNEP-WCMC (2017))

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3.2.2 Governance in PAs in Vietnam

The management system and budgets: In general, many ministries and agencies are engaged in the management of protected areas (Figure 3.2). The Ministry of Natural Resources and Environment (MONRE) is in charge of managing protected areas' biodiversity throughout the country at the state level (GoV 2008, 2014). The Ministry of Culture, Sport, and Tourism, in collaboration with MARD, guides and examines the Provincial People Committees (PPCs) in managing ecotourism activities and promoting NPs as tourism destinations. The management and administration of protected areas, including NPs, however, is fragmented, and the division of responsibility among administrative levels is dubious (Dung et al. 2012, VNFOREST 2014).

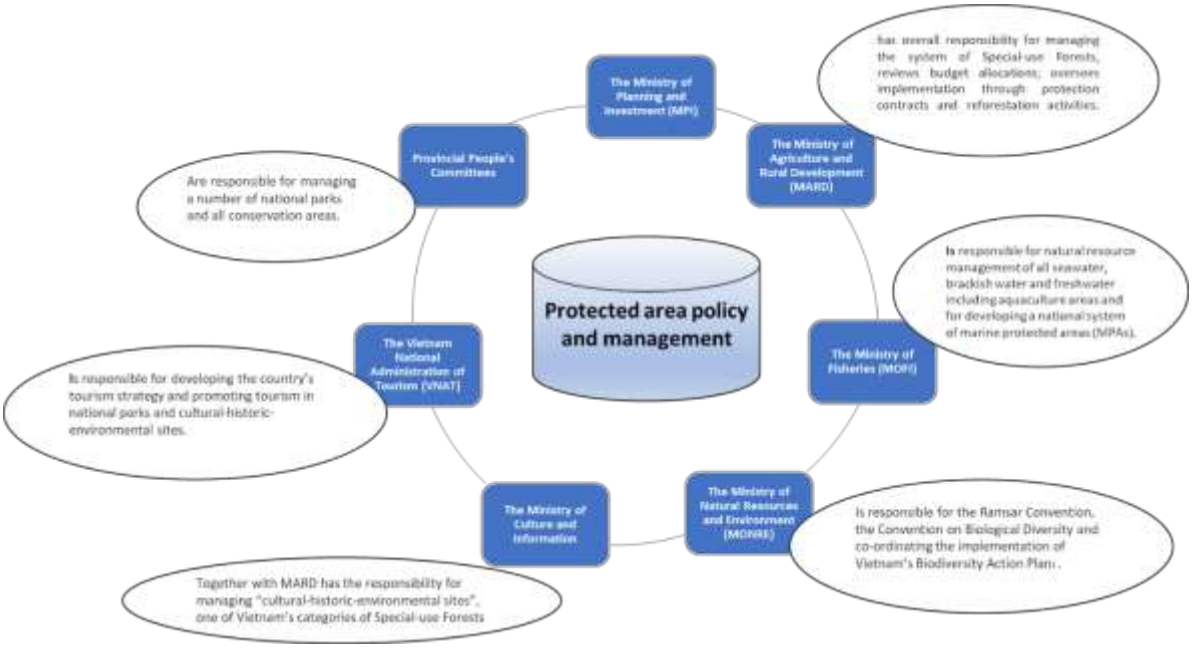

Figure 3.2 The key government agencies for protected area policy and management (ICEM, 2003:16)

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In Vietnam, currently, all protected areas are managed by the state, either centrally or provincially. In reality, the maintenance of protected areas is mostly reliant on the state budget which is still limited and poorly distributed. The Government of Vietnam is committed to allocating state budgets for biodiversity conservation and sustainable development, according to the Law on Biodiversity (2008). The finances for the state budget will come from the following sources: a) state budget; b) local and foreign organizations' and individuals' investments and contributions; c) revenues from the payments received from environmental services related to biodiversity and other sources by law.

Of the 30 NPs, most of them are under the management of the Provincial People's Committees, and only 6 are under the central government. Regarding the NPs governed by the PPCs and their agencies, each PPC is in charge of forming and staffing the NPs' management boards, as well as distributing capital and budget. The funding budget is unstable because it comes from the state budget and is channeled through central and provincial budgets, and international donors, and is generated from ecosystem services (ICEM 2003, VNFOREST 2014). The fund allocation also has fundamental differences between provincial NPs and central NPs, in which national parks under the management of ministries have a higher proportion of funds from the central budget (75.95%), meanwhile, NPs under the management of PPC receive almost 80% of their budget from their province. The decentralization of the management of most NPs in Vietnam limits the budget for conservation, but also encourages economic activities and livelihood diversification, which are proposed and developed by the local authorities (An et al, 2018).

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According to an OECD analysis (2015), 91% of biodiversity-related ODA funding has gone to fields like agriculture, environment protection, forestry, water sanitation, trade policies and regulations. Environmental protection accounted for 65 percent of total biodiversity-related ODA, funding from NGOs and civil organizations to support biodiversity conservation and environmental protection activities. These civil organizations and NGOs include The Vietnam Conservation Fund (VCF), which is non-refundable aid from the World Bank; financial and technical support from the Global Environment Facility and the Dutch Government towards projects which aim to enhance the management of special-use forests in Vietnam; and Trust Funds (TFF). The Vietnam Conservation Fund (VCF) was formed with ODA funding to support the implementation of the Vietnam Forestry Development Strategy 2006-2020, and it was later integrated into the Vietnam Forest Protection and Development Fund (VNFF). The Vietnam Fund for Aquatic Resources Reproduction (VIFARR) was founded in 2007 to promote biodiversity conservation programs in the fisheries industry, but there has been no success in raising resources to keep it operational. The Community Development Fund (CDF) was established by FAO, IFAD, ADB, and JICA to fund community development programs. Its purpose is to assist local people in alleviating poverty, protecting the environment, and increasing capacity. National parks such as Cat Ba, Xuan Thuy, Ba Be, Bidoup-Nui Ba, and Na Hang have all undertaken projects (MONRE, 2019).

Zoning scheme in national park land use: Vietnam has used the zoning scheme in using and protecting different areas in National Park. In Vietnam, the government is enforcing the allocation of long-term and stable land use rights to individuals, households, and organizations (known as red or green books). For agricultural lands, the certificates are

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valid for up to 20 years, and for forest lands, they are valid for up to 50 years. The process of allocating land use has been slow, particularly for forest lands. For management purposes, the Forest Protection and Development Law (1991) divides forest land into three categories: production, protection, and special use. The majority of land classified as production forest is managed by State-Forest Enterprises. In 1997, the government ceased logging operations in the majority of State-Forest Enterprises, shifting the emphasis from production to protection forestry.

***Regulation and law system**:* Because of the overlap in management by the different authorities, the regulations of PAs are based on resources. In Vietnam, the Law on Forestry (2017) regulates forestry protection, the economic values generated from the forests, and the protected areas system. The Law on Fisheries (2017) regulates the protection and development of aquatic resources, protected marine areas, and protected aquatic resource areas. Law on Environment protection (2014) regulates environment protection with the investigation, evaluation, and planning of natural resources and biodiversity. The Law on Planning (2017) controls spatial configurations in order to make the best use of the country's resources. The "Strategy for the Management of Special-use Forests system, Marine Protected Areas and Inland Water Reserves of Vietnam 2020 and a vision toward 2030" was approved in 2014. The goal of this policy is by 2020 the area of PA increase to 9% of Vietnam's land area and 0.24 % of its sea area; and to transform the management practices of PA to new practices such as co-management and benefit sharing (MONRE, 2019).

Cost and benefit-sharing mechanism: Vietnam has fee charges and the entrance fees are regulated by the laws of the state. There are also social enterprises participating in

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the organization of tourism activities and the collection of fees. In many national parks there are clear benefit-sharing mechanisms such as U Minh Thuong National Park which spends 25% of the profits from tourism on conservation activities.

3.2.3 Local livelihood and community engagement

There are other critical concerns in regard to protected areas and development in Vietnam, including local community development; water resources management; energy development; agriculture; fisheries; tourism; industrial development; and biodiversity conservation. For example, the concern about protected areas and community development has a strong correlation with the locations of the protected areas and the level of poverty that exists there. Poverty is higher in and around Vietnam's protected areas because these areas are in mountainous, remote and isolated areas with limited access to markets and minimal arable land. Protected areas provide many important benefits that help mitigate the impacts of poverty. They serve as "food banks" in times of food shortages and provide clean water to surrounding communities and help to control flooding. Some protected areas also help conserve ethnic minority culture by protecting religiously important "spirit" or "sacred" forests. However, local communities usually suffer losses after a protected area is established because of certain restrictions that follow.

Local livelihood in PA in Vietnam: in fact, eighty percent of the country's protected areas have people residing within them (PARC, 2006). In some cases, these activities predate the establishment of the PA and previous studies have shown that the majority of households living near PA in Vietnam have their livelihoods strongly dependent on PA resources such as forest-based livelihoods (McElwee, 2010), or farming and aquaculture activities which strongly depend on natural resources from PA such as fish,

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soil, water, grass, etc. (MONRE, 2019). Households in local communities and associations may secure use rights over protected forests. CPCs mainly grant the rights. It considers households that are eligible for bank loans. However, since PA managers consider biodiversity conservation as a priority goal, they pay more attention to the livelihoods of households living near a state-designated PA, these households can receive subsistence and cash incomes through forestry-related livelihoods or the collection of forest or wetland produce under the control of PA rangers. However, households that live in the buffer zones and depend on natural resources as well but are not close to the boundary of PA are usually "invisible" or receive little attention from PA managers (McElwee, 2010). Therefore, besides the subsistence provided to the local people who live near the boundary of PA, it is more essential to encourage the sustainable development of existing livelihoods (MONRE, 2019), invest in new sources of wage labor, or apply payments for ecosystem services such as environmental forest services and ecotourism for the local community in the surrounding buffer zones (McElwee, 2010; Do & NaRanong, 2019; Pham, 2020).

The Government has developed and promulgated a number of legal documents on sustainable fishery, agriculture and forestry since 2008. Accordingly, the Prime Minister and MARD cooperate with NGOs (WWF, IUCN, WB, etc) in preparing and implementing action plans/programs for sustainable development in agriculture such as price subsidies, exemption of irrigation fee, providing seeds and livestock breeds, credit mechanisms, payment by area, insurance, income support, extension services, etc. In forestry, in 2008, plans/programs for sustainable development included payments for environmental forest services which were implemented in many PAs in Vietnam; cooperation with WB in implementing REDD+ in deforestation in various PAs in Vietnam; and efforts in forest

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protection such as forest allocations. In terms of aquaculture and fishery, policies in aquatic biodiversity conservation, and sustainable exploitation and use of fishery resources have been implemented in both terrestrial and marine PAs.

It is very popular that local communities have no formal voice in PA management. There is still a gap between policy and reality in the management of protected areas and buffer zones. Further, how to ensure that communities of protected areas and buffer zones receive adequate benefits for PA is still a challenge for most NPs. In the future, NPs must boost their effort to find suitable mechanisms for enhancing the engagement/co-management of local stakeholders in conservation and sustainable use of resources (ICEM, 2003).

Currently, with the efforts of the government, NGOs, and local authorities in PAs, there is an increase in both the number and form of community engagement in PAs in both conservation and economic activities. In Vietnam, there are many local models and initiatives in PAs. The first popular model is the community-based conservation model. For example, a co-management model was piloted in Tram Chim National Park motivating local communities to join in a plan for managing the use of natural resources. Additionally, other models were piloted, including: a model for travel agencies to participate in coral reef resource management and responsible use; a model of "Sustainable livelihoods and community-based conservation of wetland natural resources"; a model of integrated community-based management of coastal mangrove forest resources; and a model for the conservation of the Vietnamese Heritage Tree. Secondly, conservation management models can be mentioned, including the model of marine protected areas; the model for integrating ecosystem-based climate change adaptation measures were evaluated in some coastal areas;

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the mangrove and seagrass bed rehabilitation and management model. Thirdly, livelihood models for local communities like a model of co-management for sustainable extensive clam farming, and a model of ecotourism development associated with biodiversity conservation. The fourth is agro-forestry-fishery combined models. For example, a model of combined forestry – fishery in the estuary in the northern coast; a model of ecological shrimp farming or mangrove rehabilitation model; a model of mushroom growing in buffering communes, in Kien Giang Biosphere Reserve. These are livelihood models which generate alternative income for local communities in wetland areas, especially for poor women and ethnic minorities.

Stakeholders engagement of scientists in management:

In the late twentieth century, some initiatives evaluating ecosystem services were established in order to assess the economic value of natural resources (environmental assets). In recent years, additional studies and economic valuation methodologies for natural ecosystems in Vietnam, such as forests, mangroves, coral reefs, and seagrass beds, have been conducted and implemented. Ecosystem services have contributed greatly to economic development, livelihood, and human life, according to research findings.

Measuring the economic value of biodiversity and ecosystem services assists decision-makers and managers in identifying the priorities of conservation and form a base for balancing conservation and development goals. However, the economic valuation of ecosystems is only a research topic in Vietnam. Although research findings have been shared with local and central management for consideration in operating economic

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activities, Vietnam's national accounting system has not yet included economic values derived from ecosystem services.

3.2.4 Ecotourism in PAs

Ecotourism definition in Vietnam: We find that the term "ecotourism" is defined and understood in a very general and incomplete way for both managers and tourists. During a field trip in 2019 to select a research area at VMD, I googled the phrase "ecotourism destinations in Mekong river delta, Vietnam." The results were that My Khanh ecotourism village (Can Tho) was displayed the most. However, during the field trip to this destination, I discovered that it was actually a human made village based on an artificial canal and it had privately operated orchard tourism. There is no principle of ecotourism met in My Khanh ecotourism village. Therefore, we can say the term "ecotourism" in Vietnam is abused as a marketing ploy to attract tourists who do not really understand this phrase.

In Vietnam, the development of ecotourism in national parks and nature reserves is governed by a variety of legal documents, issued by different levels/agencies. Basically, ecotourism activities in national parks and nature reserves are interdisciplinary and are governed by relevant specialized laws (such as the Law on Forestry, the Law on Biodiversity and the Law on Biodiversity, Tourism Law...), sub-law documents (Decrees, Decisions, Circulars...) by the Government and Ministries (MONRE, Ministry of Culture, Sports and Tourism, MARD, Ministry of Finance…) promulgated.

The main regulations on ecotourism are related to the Law on Forestry (2018) such as the need to develop an ecotourism, resort and entertainment project in accordance with the approved sustainable forest management plan. The form of ecotourism business after

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the project is approved is self-organization; cooperation between enterprises and NPs; leasing the forest environment; etc. Leasing the forest environment in which the rental price of the forest environment is mutually agreed upon by the parties,

but is not less than 1% of the total revenue realized in the year of the lessee within the scope of the leased forest environment (ie TCNP). The management of the construction of works which serve eco-tourism, convalescence and entertainment in the system of national parks and conservation areas must be approved. However, in the two cases that we observed, TCNP has not had an ecotourism project and that is something that happens in many national parks and protected areas in Vietnam. According to the inspection report on ecotourism activities of the General Department of Forestry 56/61, national parks and nature reserves have organized ecotourism activities but no ecotourism projects have been approved according to regulations.

Law on Biodiversity Article 5 states the regulations on conservation and sustainable development of biodiversity. The rules include promoting eco-tourism in conjunction with hunger eradication and poverty reduction; ensuring the stable life of households and individuals who are legally living in the conservation area; and sustainable development of the buffer zone of the reserve. According to the 2017 Tourism Law, Article 5, "ecotourism is a type of tourism based on nature, associated with local cultural identity, with the participation of the local community, combined with education on environmental protection." In regard to the fundamental principles of ecotourism, the definition of ecotourism in Vietnam in most laws mentioned 3 out of 5 principles of ecotourism according to Cobbinah (2015). They are nature-based and environmental conservation through education; community participation; and cultural preservation. However, there is

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no mention of economic benefits with benefit sharing or tourist satisfaction and empowerment.

Ecotourism situation in PA in Vietnam: The legal framework for protected area tourism is firstly mentioned in Article 16 of Decision 08/2001/QD-TTg. Accordingly, protected area management boards can organize, lease out or contract the provision of ecotourism services and facilitate organizations, households and individuals in investing, managing, protecting and developing the protected area (ICEM, 2003). Based on its natural resources and socio-economic contexts, each PA can apply/combine its management tools. According to An et al.'s (2018) study which surveyed 23 national parks, there are 7 main management tools: multiple-use forest management plan; forest monitoring program; regulations for scientific research activities; sustainable tourism development plan; environmental impact assessment; community-based forest management; and forest valuation. Most national parks combine those tools with national parks under PPCs that have more diverse economic activities than the ones under VNFOREST'S[8].

In developing countries with attractive wildlife species and adequate tourism infrastructure, ecotourism in PAs has a large potential profit. Nevertheless, in Vietnam, there is no institutional framework for tourism and ecotourism in PAs, although there is a legal foundation. It's questionable whether a PA's management board, Vietnam's National Administration of Tourism, or a district/provincial body should be in charge of tourist activities. The role of the business sector in PA tourism is likewise unclear. Therefore, to avoid negative consequences on local communities and to guarantee that

[8]https://www.academia.edu/5320267/COEXISTING_MANAGEMENT_MODEL_FOR_TOURISM_DEVELOPMENT_IN_VIETNAM_NATIONAL_PARK_ISSUES_AND_RESEARCH_PERSPECTIVES

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profits are shared equitably, private-sector tourism (especially tourism concession) needs to be managed by a regulatory framework. Tourism has a bad reputation for "leakage," which means that a large portion of the profits is not retained at the tourism site. Tourist operators generally recruit experienced staff from outside the area rather than training local residents. Outside operators usually provide transportation to and from the tourist attraction. As a result, in order to make tourism in PAs more sustainable and beneficial to local development, people in the surrounding communities must directly benefit from it. This can be accomplished by working in tourism, hosting homestays, selling handicrafts, providing tourist services, and so on. Local communities are unlikely to support the PA or tourism if they only see the costs and not the benefits.

A revised tourism master plan has been developed, which includes specific references to PA tourism: The Tourism Master Plan was revised in 2001 as part of a UNDP-funded project carried out by the World Tourism Organization and Vietnam's National Administration of Tourism to make it more sustainable. The updated master plan includes specific guidelines for national park tourism and ecotourism (VNAT 2001). The revised plan was scheduled to be approved in late 2002. The challenges are to ensure that local communities benefit from protected area tourism. Vietnam's wildlife tourism potential has been harmed by hunting, wildlife trade, and conversion of wildlife habitats to other purposes. As a result, PAs' ability to attract large numbers of high-paying international tourists has been hampered. Most national parks in Vietnam are far from current tourism centers so it also influences its accessibility to tourists.

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3.2.5 Climate change and other challenges

Climate change: Vietnam is one of the five countries anticipated to be among the most vulnerable to climate change (WB, 2010), due to its long coasts, high population density, and economic activity distributed in coastal areas, and because a large proportion of the economic structures depends on agriculture, natural resources, and forestry. The most impacted area under the context of climate change in Vietnam is the Mekong river delta (MONRE, 2016). Recently, the National Center for Hydro-Meteorological Forecasting reported that salt-water intrusion has almost reached the area of the Mekong river and in some provinces the salt-water has penetrated about 70 km with an intensity of 13-30‰. It is estimated that if the sea level rises one meter, about 10% of the population will be affected which will cause a loss of 10% GDP.

According to the climate change scenario that was officially approved by MONRE in 2016, the average annual and seasonal surface air temperatures (winter, spring, summer, autumn) in all regions of Vietnam have tended to increase compared to the baseline period (1986-2005); the increase depends on the RCP scenarios and the climate zone. According to the RCP4.5 scenario, the average annual temperature increase is usually from 1.3 to 1.7oC by the middle of the 21st century; and from 1.7 to 2.4oC by the end of the century. In general, the temperature in the North is higher than in the South. If the sea level rises by 1m, about 17.57% of the area of the Red River Delta, 1.47% of the area of the central coastal provinces from Thanh Hoa to Binh Thuan, 17.84% of the area of Ho Chi Minh City and 4.79% of Ba Ria - the Vung Tau area is at risk of being flooded. The Mekong River Delta is an area with a high risk of flooding (39.40% of the area), of which Kien Giang province has the highest risk of flooding (75% of the area).

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In terms of climate change impacts in PA, according to the BirdLife International organization, under the impact of sea-level rise, from 1/4 to 1/3 of all key natural habitat areas in Vietnam may be affected. These areas include most of Vietnam's existing protected and conservation areas because they are often concentrated on islands and coastal areas. Even with only a relatively low (1m) sea-level rise will affect most of the major natural habitats. Vietnam's biodiversity system has been faced with a crisis when the sea level rises, even with most climate change scenarios being considered carefully. Along with the change in the climate regime, climate change will change the rule and increase the intensity of extreme events. The consequences of this impact diminish the value of ecotourism resources, thus affecting the quality of ecotourism products. Further, they greatly affect the infrastructure and technical infrastructure of tourism in general and ecotourism in particular, and the organization of ecotourism (tours) built by travel companies.

The development of ecotourism in the context of climate change is a two-way relationship. On the one hand, the development of ecotourism is influenced by climate change impacts, necessitating adaptation strategies. On the other hand, ecotourism is a sustainable development strategy that helps to "mitigate" the effects of climate change (Ni & Tuan, 2015). After the National Target Programme to Respond to Climate Change (NTP-RCC) of Vietnam was developed and approved by the Prime Minister on the 12th of December in 2008, research on climate change and tourism has increased with diverse themes from climate change impacts (Fröde and Le, 2011; Le & Huong, 2018), climate change adaptation (Mai and Smith, 2018; Pham et al, 2018), and adaptation evaluation (Hoang, 2019; Huynh & Piracha, 2019). Interestingly, most of the research is on protected areas such as national parks, World Cultural Heritage sites, Biospheres, and coastal areas. It

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is understandable because protected areas are supposed to be most vulnerable to climate change threats.

However, it has been 11 years since the approval of NTP-RCC, and there is still no specific national program to respond to climate change in tourism. Reviewing previous studies in PA and ecotourism in the context of climate change, there are seven separate studies that have been conducted in the whole country. This is a very humble number with one synthesis research, three case studies in the North, two case studies in the Central area and only one study in the South. There are no projects in wetland protected areas, especially in VMD, which is the most vulnerable region in Vietnam (Vietnam Climate Change Scenario, MONRE, 2011; Huynh & Piracha, 2019). In Vietnam, most of the research of ecotourism focused on the economic aspect of tourism like ecotourism resources (Hong et al, 2002, Nhan & Thong, 2008) and ecotourism reality (Luong et al, 1999). However, there is still a lack of research that evaluates climate change and the ecotourism nexus in the Mekong river delta, Vietnam. Therefore, our study aims to fill that gap by using mixed methods to investigate two ecotourism sites: Tram Chim and U Minh Thuong National Parks and the Mekong River Delta. There will be an evaluation of the ecotourism activities and climate change adaptation solutions in ecotourism. Therefore, our research can be a reference for policymakers in tourism adaptation to climate change impacts in this urgent situation.

Other challenges: There are many causes of the limited management capacity of national parks, An et al. (2018) stated the following causes: lack of funding for the national park; overlapping and conflicting institutional mandates; and lack of enforcement authority for national park management boards. This overlapping in management has led to the

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cumbersome procedures and the rigidness in management mechanisms in PAs. In addition, in Vietnam, PAs were initially understood to be "prohibited forests" and later as Special-use Forests in accordance with the provisions of the 1991 Forest Protection and Development Law. Even when they do not include any forests, such as freshwater lakes, grasslands, marine areas, and cultural and historic sites, most PAs in Vietnam are still referred to as "Special-use Forests". All land is owned by the people and managed by the state. Each province develops land-use plans for the three types of forest land: protection, production, and special-use. Due to the fact that there is no integrated planning mechanism for PAs, land-use plans can propose activities in the boundaries of Special-use Forests that are either in conflict or uncoordinated with the PA's conservation management goals. Many PAs prioritize hard infrastructure over conservation activities; the pressure of population and resource use within and around PAs; limited human resources and institutional capacity of officials; and land use conflict/land grab. In which, notably speaking, the pressure of population and resource use within and around PAs and lack of funding for the PAs are two major causes in all PAs. Other threats to PAs' national resources include illegal logging and firewood collection; illegal hunting, trapping, poaching, and fishing; illegal collection of non-timber forest products; illegal wildlife trade; mineral exploitation and quarrying; hydroelectric dams/projects; pollution (water, soil, air, and noise pollution); land-use change; the development of dykes and canals; existing and planned routes (roads, motorways, and train tracks) crossing or located in surrounding areas of PAs; and tourism development (massive tourism and tourism infrastructure construction in the PA and its surrounding areas) (An et al., 2018). In Vietnam, PAs' management boards are responsible for administering Protection and Special-use Forests. These boards are typically staffed by

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officials appointed by the relevant provincial forest department (commonly the Forest Protection Departments) (ICEM, 2003). Representatives from other sectors or stakeholders are not currently represented on the management board. In most PAs of Vietnam, management boards lack sufficient staff and or resources.

3.3 Wetland protected areas management in VMD

3.3.1 PAs in VMD and governance

There are 14 PAs in the VMD and in total there are 172 PAs in Vietnam (MONRE, 2019). Of which, 5 out of 9 Ramsar sites in Vietnam are located in the VMD. The PAs in the VMD in Vietnam are typical and representative of PAs of wetland landscape in Vietnam (see Table 3.2). WPAs in VMD in Vietnam play essential roles in contributing to the development of agriculture and fishery in the VMD. In terms of ecological functions, WPA in the VMD are nursery grounds and sources of commercial species such as fish, shrimp, etc (Tran, et al., 2021). WPAs also contribute to wastewater treatment and nutrient removal and sediment replacement along with water flows in each flood season and they are sources of fibers and plant products for rice and other crops production. In terms of economic functions, WPAs provide free input into the growth and reproduction of commercially valuable species by supplying and maintaining suitable water quality and other conditions. They are also a source of commercially valuable raw materials (MONRE, 2019).

Table 3.2 List of Protected areas in the Vietnamese Mekong Delta in 2020

No.	Name	Type	Area (ha)	English designation	Type of designation	Status year	Governance type	Management Authority
1	Tram Chim	Terrestrial Protected Areas	7,588	National Park/ Ramsar site	National	1998	Government-delegated management	People's Committee of Dong Thap

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2	U Minh Thuong	Terrestrial Protected Areas	8,509	National Park/ Ramsar site	National	2002	Government-delegated management	People's Committee of Kien Giang
3	Mui Ca Mau	Marine Protected Areas	41,862	National Park/ Ramsar site	International	2013	Not reported	Not reported
4	Con Dao	Terrestrial Protected Areas	19,991	National Park/ Ramsar site	International	2013	Not reported	Not reported
5	Lang Sen Wetland Reserve	Terrestrial Protected Areas	4,802	Ramsar site	International	2015	Not reported	Not reported
6	Phu Quoc	Terrestrial Protected Areas	31,422	National Park	National	2001	Government-delegated management	People's Committee of Kien Giang
7	Thanh Phu	Marine Protected Areas	4,510	National Reserve	National	1998	Government-delegated management	People's Committee of Ben Tre
8	Nui Cam	Terrestrial Protected Areas	1,500	National Reserve	No data	1986	Not reported	Not reported
9	Bac Lieu Bird Sanctuary	Terrestrial Protected Areas	127	Nature Reserve	National	1997	Government-delegated management	People's Committee of Bac Lieu
10	Lung Ngoc Hoang	Terrestrial Protected Areas	2,806	Nature Reserve	National	2002	Government-delegated management	People's Committee of Hau Giang
11	Dat Mui - Bai Boi	Not reported	4,461	Habitat/Species Conservation Areas	No data	1992	Not reported	Not reported
12	Vo Doi	Not reported	3,394	Habitat/Species Conservation Areas	No data	1992	Not reported	Not reported
13	Hong Chong	Terrestrial Protected Areas	964	Cultural-Historical-Environmental Sites	National	1986	Government-delegated management	People's Committee of Kien Giang
14	U Minh Ha	Terrestrial Protected Areas	8,528	National Park	National	2006	Government-delegated management	People's Committee of Ca Mau

(***Source:*** https://www.protectedplanet.net/)

Governance system: According to four governance types[9] by IUCN, most of the reported PAs in the VMD apply Government-delegated management which belong to type A - Governance by government. In Vietnam, 100% of PAs are owned by the state and therefore the government assigns a management board to manage the area for conservation

[9] Type A: Governance by government (at various levels); Type B: Shared governance by diverse rights holders and stakeholders together; Type C: Governance by private entities (often land owners); Type D: Governance by indigenous peoples and/or local communities.

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purposes. In addition, in the VMD, the main government body that takes responsibility for management authority is the People's Committee of the Province, which has occupied 80% of PA management authority in Vietnam. This management authority has a direct influence on the budget allocation scheme of PAs. PAs are managed by the Provincial People's Committees (PPCs) and their departments. Each PPC is in charge of establishing and staffing the management boards of the PAs, and allocating capital and budget for them. The majority of funding comes from the state budget and is channeled through central and provincial expenditures, international donors, and other organizations, therefore, the funding budget is highly unstable (ICEM 2003; VNFOREST 2014). The fund allocation of PAs under the management of PPC has almost 80% budget from their province (An et al., 2018). That budget allocation scheme in most PAs in the VMD has a limited budget for conservation. Therefore, economic activities are encouraged and livelihood diversification is proposed and developed by the local authorities.

3.3.2 Community engagement

Protected area management with community participation: Like PAs across the country, PAs in the Mekong Delta are distributed mainly in remote, rural, and island areas; therefore, the economic conditions are limited and the poverty rate is high. People depend on the natural resources PAs provide. Thus, harmonizing biodiversity conservation and economic development is essential. Several international and national projects have been developed and initiated by Vietnamese experts in collaboration with foreign consultants to protect biodiversity for the VMD, particularly in buffer zones, there are various ecological rehabilitation zones, biosphere reserves, and development zones of PAs established in recent years. For example, a community-based conservation model was

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piloted in Tram Chim National Park with grants from a CARE International sub-project within the Mekong Wetlands Biodiversity Conservation and Sustainable Use Programme (2006) and a WWF-Coca Cola project (2008-2010). This encouraged local communities to engage in managing the use of natural resources under the guidance of the national park's management board, as well as to apply local knowledge flexibly. After this project, legal access to natural resources in Tram Chim National Park has been approved by the Provincial government and it provides an essential source of income for the poor and is a way to counter impoverishment when there are no other sources of income, especially during the flood season when it is impossible to cultivate agriculture. The model's effectiveness prompted the Management Board of NP to increase the co-management pilot site from 720 to 900 acres by 2010. According to a survey in 2010, 63% of the 120 respondents approved the model as a way of eliminating poverty and managing forest resources.

Livelihood based models: Another example is the "Sustainable Livelihoods and Community-Based Conservation of Wetlands Natural Resources" model which was deployed in the Lang Sen Wetland protected area and improved the livelihoods of people residing in the buffer zone. This model raised awareness about wetlands and experimented with the co-management mechanism. An Agro-Forestry-Fishery combined model was deployed in Kien Giang Biosphere Reserve with the support of the GIZ Kien Giang project. The model aimed to provide alternate sources of income for local residents in wetland areas, particularly poor women and ethnic minorities.

Stakeholders engagement of scientists in management: An important function of PAs is to conserve vital gene pools with the participation of scientists and national

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universities and institutions. The VMD is famous for its biodiversity of valid genes especially in rice and aquatic species, therefore it is essential to preserve agriculture crop genetic resources. One of the four organizations in Vietnam that have cold storage warehouses for seed preservation is in the VMD, specifically it is located at Can Tho University. This university facilitates the development of high-quality and organic agriculture with the advantage of native species. There are some famous organic rice products in the VMD, such as Tam Viet rice by Mr. Vo Van Tieng (Dong Thap province) and Hoa Sua rice by Vien Phu Organic & Healthy Food Company (Ca Mau province). Organic shrimp production has been developed in Ca Mau with 12 associated businesses in an area of 20,000 hectares, with 4,000 farming households and a total organic shrimp output of 8,000 to 9,000 tons/year. The VMD also has been developing and piloting coral reef recovery models similar to the ones in the Phu Quoc marine conservation zone. The managers also work with the Nha Trang Oceanographic Institute to establish two coral reef nurseries and to replenish dead coral reefs.

3.3.3 Local livelihoods and ecotourism in PAs in VMD

Local livelihoods in PA in the VMD: In the VMD, PAs are engaged with 4 main economic activities which are agriculture, forestry, fisheries, and tourism. These are different from many PAs in other regions of Vietnam which also develop energy by hydropower operation such as North and Central Vietnam (MONRE, 2019). In most PAs, such as National Park, the law clearly describes zoning schemes in land use. Thereby, within the National Park or Ramsar site, 100% of the park area is owned by the state. The government assigns the National Park Management Board to manage the area for conservation purposes and ecotourism as in the cases of TCNP (Dong Thap), UMTNP

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(Kien Giang), Mui Ca Mau National Park (Ca Mau), Lang Sen Wetland Reserve, etc. In the surrounding area, land tenure in the surrounding area is titled to individual farmers and land is mainly used for agricultural-forestry-fishery purposes. However, poverty and the local community's reliance on wetlands resources put severe pressure on the natural resources of PAs. As a result, in many PAs, the park authority allows local communities to harvest resources (invertebrates or non-timber forest products) under the control and supervision of park rangers.

Farmland in PAs' buffer zones and land in protected areas are good sites for in-situ conservation of valuable wild plant species because they provide some protection against land conversion that would eliminate wild species' native habitats. Villagers in the core zone of U Minh Thuong National Park in Kien Giang Province, for example, have developed an innovative method of using bats to facilitate their agricultural practices. They attract bats to shelter in large numbers adjacent on their fields by forming "bat houses" on the park's edge. From dusk to dawn, the bats feed on insects and pests in agricultural fields. Villagers collect bat guano and use it as fertilizer or sell it (MONRE, 2019).

Tourism in PAs is encouraged under the form of ecotourism, sustainable tourism or community based tourism which balance benefits in terms of conservation, economy and society. The VMD is famous on the Vietnam tourism map for orchard tourism combined with ecotourism. Costumes, cuisine, people's lifestyles, and natural landscapes are all attractive tourism products. PAs have become highlights in tourist routes and have attracted many tourists such as researchers, students, agencies, and localities during vacations. International tourists also come to explore the natural beauty of mangrove

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forests and ecological zones, enjoy the fresh air and quiet space, and explore the diverse and beautiful ecosystems.

In some PAs where ecotourism develops in the national park and has significant and increasing impacts on the surrounding areas, local communities living in the surrounding area can take advantage of the opportunity to develop infrastructure such as accommodation and food services. This can be an income resource but also a great threat to biodiversity conservation. Con Dao National Park is a typical example, in 2003, a new airport was built from an old helicopter landing strip to accommodate small planes and by the end of 2014, a new tourism ship harbor had been built. Over the last ten years, a large number of new resorts, guesthouses, and hotels have been constructed. The increased number of visitors and tourism facilities along with increasing pollution and disruption from tourism activities place more burden on local animal and plant communities[10].

Tourism in PAs in the VMD has been facing many challenges such as limited transportation systems and services (Mai, 2017). There is no connection with other travel services. Tourism is still fragmented, spontaneous, not promoted, and is still heavily dependent on travel agencies (Vu et al. 2021). Most tourism human resources have not received basic training; they are mainly part-time workers with a limited understanding of the culture, geography, and ecology of the area, and they cannot provide useful information for visitors[11]. There is a limited management capacity of the local government, a low level of community participation, and problems arising in the implementation process (Governments of Vietnam and the Netherlands, 2013). Further, local customs and people's way of life are in some cases commercialized by tourism activities. For example, tourism

[10] https://rsis.ramsar.org/

[11] http://daotao-vhttdl.vn/articledetail.aspx?sitepageid=628&articleid=452

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promotion activities in uncontrolled areas and accompanying issues such as prostitution, overconsumption of alcohol, local price increases, etc. lead to instability and cultural degradation and lifestyle in the area (Phuong, 2020[12]).

3.3.4 Challenges in PA management in the VMD

There are many challenges in PA management in the VMD, of which, the main challenges are related to aquaculture and agricultural intensification or unsustainable production; environmental pollution; changes in typical ecosystems; dam construction on the upper stream of the Mekong river; and climate change (Le et al, 2005; MONRE, 2019). Firstly, numerous deltas have experienced extensive agricultural intensification as a result of economic development and population growth. The majority of natural grasslands in the Mekong Delta, particularly in the Plain of Reeds and the Long Xuyen Quadrangle, have been transformed into rice-growing areas. This has narrowed down the ecological environment of several endangered species as well as wild genetic resources in Vietnam. For example, shrimp farming and high-density industrial production of other aquatic species in the Mekong Delta contribute significantly to organic pollution, which threatens ecosystems and aquatic communities.

Second, in the VMD, extensive agricultural intensification and the use of pesticides from a number of sources are becoming more popular and unmanageable, leading to the decline of bird and insect communities in suburbs and villages. Numerous beneficial bird species that eat pests have been harmed, resulting in disease outbreaks in the field. The discharge of untreated domestic and industrial wastewater into canals and rivers has a negative impact on the biodiversity of these ecosystems. The Biodiversity Intactness Index

[12] Phuong, H. (2020). Du lịch Đồng bằng Sông Cửu Long: Khó khăn "bủa vây. https://vov.vn/doi-song/du-lich/du-lich-dong-bang-song-cuu-long-kho-khan-bua-vay-763897.vov

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of the VMD ranks number 5 out of the 7 economic regions in Vietnam with data from 60-80% (MONRE, 2019).

Thirdly, changes to typical ecosystems caused by invasive alien species have been occurring in most national parks in the VMD. In particular, the Mimosa, which was initially found in Tram Chim National Park (Dong Thap province) in 1995, has spread throughout the country and has become a serious danger to numerous wetlands. Others include golden snails, freshwater lobsters and red-eared sliders which are known to harm biodiversity, human health, and economic sectors. Meanwhile, several domestic factories imported those invasive species from abroad such as Can Tho Seafood Import-Export Corporation imported 40 tons of red-eared sliders from the United States in 2010, or Phu Thanh Company Limited imported freshwater lobsters from the United States into Vinh Chau District (Soc Trang province). If these creatures are released into the wild, they could have disastrous effects.

Fourthly, the VMD has a variety of ecotourism resources, including dense river systems, productive orchards, and a diverse range of wetland environments. The uniqueness of wetland landscapes contributes an important component to the tourism industry of this region. However, the VMD is one of 3 regions which are projected to be the most severely affected by climate change. According to climate change and sea level rise scenarios modeled for Vietnam (MONRE, 2016), with 100 cm sea level rise, VMD is a high-risk area with 38.9% of the area being inundated (Figure 3.3). Previous studies stated that drought has been regarded as the most severe disaster impacting ecotourism in PAs in general and the VMD in particular (Ni & Tuan, 2015; Tran & Barzen, 2016) with its significant damage to biological systems and habitats of various species.

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Higher temperatures and erratic rainfall are predicted to lead to longer and more extensive dry periods and increasing forest fires. It also hastens the alum process and the fish death phenomenon. These phenomena reduce the availability of resources for ecotourism, such as fish and birds, and threaten the landscape of melaleuca forests and grasslands (Tran & Barzen, 2016). As a result, this challenges the sustainable development and conservation of biodiversity in national parks, natural resources, and local people's livelihoods. Climate change also aggravates the impact of natural disasters, followed by a threat to the biodiversity conservation of PAs. In addition, the VMD has very low Comprehensive Adaptability and suffers from a moderate to high vulnerability level (MONRE, 2019). Therefore, studying and implementing adaptive solutions based on the change of nature to take advantage and reduce damages of climate change have attracted the attention of both the government and the science community.

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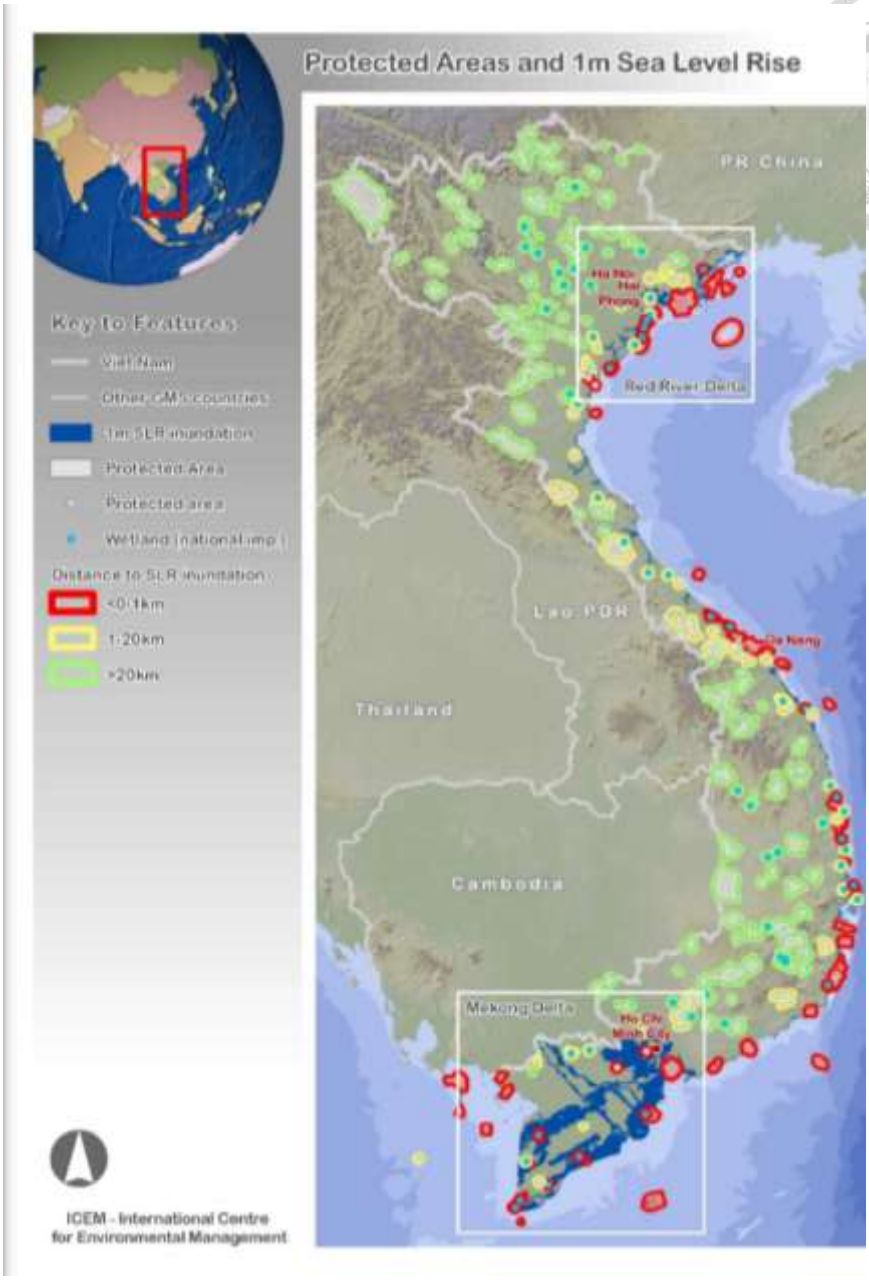

Figure 3.3 Vietnam – protected areas affected by one-meter sea-level rise (Carew-Reid, 2007)

Hydropower – climate change – protected area management: Many aspects of the impacts of hydropower to climate change especially in the 21st century when humankind is trying to reduce fossil fuel, hydropower is seen as a green and alternative energy solution (Berga 2016). However, the construction of hydroelectric power plants is controversial

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compared to other renewable energy which can be operated without harming the environment. Hydropower plants can cause massive impacts on the health of rivers which are our natural defense against global warming. They also destroy forests in dam construction and disrupt flows, degrade water quality, block the movement of river nutrients and aquatic species, and cause relocation of community near reservoir (Kurma et al, 2011). Further, they can even escalate tensions among the countries through that the river flows as in the case of Nile river, Mekong river, etc.

Many hydropower projects (HPPs) have significant impacts on ecosystems, including in some PAs. Conflicts between the objectives of protecting ecosystems and generating more hydropower have increased as the number of PAs and HPPs have grown. Hydropower has a negative effect on PAs. For PAs in the HPP build-up zone, the direct effects of HPP can include a permanent loss of area due to inundation or other land-use change, and an increased access to resources of PAs related to the construction of HPPs which causes temporary resource extraction and permanent impacts to the landscape and people's livelihoods. Along with damages to the river, HPPs cause loss of terrestrial connectivity with reservoirs and linear infrastructure (ie. roads, transmission lines, headrace and tailrace canals, and penstocks) which cause a loss of aquatic connectivity between the upstream area and the downstream area. The downstream area does not benefit from HPPs, but instead suffers a lot of impacts such as flow alteration and reduction of sediment, nutrients and aquatic species (International Hydropower Association (IHA), 2021).

Cambodia, Laos, Thailand, and Vietnam, the four countries of the Lower Mekong Basin (LMB), have created one of the world's largest protected area systems. Within the LMB, a system of 115 PAs covering 9,821,395 hectares has been established. Among other

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countries, Vietnam is the country with the lowest percentage of PAs covering national land (7%). PAs along the LMB are faced with serious impacts of climate change. In Vietnam, the VMD has problems of increased temperature, reduction of rainfall in the dry season, and increased rainfall in rainy season, all of which cause threats of drought, torrential rainfall, erosion, increase of salinity, forest fire, etc. (USAID Mekong Adaptation and Resilience to Climate Change (ICEM, 2014).

Currently, the number of hydropower dams along the Upper, Middle and Lower Mekong Rivers is increasing (Olson, 2018). Combined with climate change, it is putting pressure on water and food security and biodiversity conservation in the lower Mekong countries, including Vietnam. The VMD is the only region in Vietnam where it does not have hydropower and dams in its territory but still suffer the impacts of hydropower construction from upper and middle streams. Therefore, the management of PAs in the VMD with the problem of dam construction becomes a transboundary problem and therefore more complicated. Thus, this study will contribute to diversifying the picture of risks and responses of PAs in LMB in the context of climate change and also the rise of the Mekong River to investigate how authorities and people in PAs perceive these two issues and how they respond to environmental changes caused by these disturbances.

Some current solutions related to restoration of ecosystems in PAs in the VMD: In the context of increasing both human-made and natural challenges, a number of new threatened species management and monitoring programs have been launched in the VMD with financial and technical support from international organizations. Some mollusk species in national parks along Vietnam's southwest coasts, such as coral reefs and seagrass beds in Con Dao and Phu Quoc Islands, are also being monitored. However, due to a lack

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of resources, ongoing monitoring and reporting of threatened species have stopped. In 2018, Park and MONRE used the management effectiveness tracking tool (METT) to assess the management effectiveness of the six ASEAN Heritage Parks with 41 indicators from five groups.

In 2016, MONRE and a consultant agency did inventory updates of wetlands in Vietnam as part of the project "Conservation of Important Wetlands and Associated Habitats" and completed a full list and map of important wetlands. These data can be used to get up-to-date information on wetlands and distribution in Vietnam. On November 17, 2017, the Government Resolution No.120/NQ-CP dated by the Government, on Sustainable Development of the Mekong River Delta included an adaptation for climate change. This resolution included practical guidance toward nature-based solutions and is considered as a tipping point in environmental policy of the VMD in the climate change context.

3.3.5 Current discussions of PA management in Vietnam and the VMD

In terms of technical reports in PAs in Vietnam, we found the major reports from the Ministry of Resources and Environment (MONRE) with reports on the overview of biodiversity in Vietnam, reports preparing for the development of biodiversity law study in Vietnam (MONRE, 2008), as well as a report on implementation results and a national strategy on biodiversity in 2020, with a vision for 2030 (MONRE, 2011), report to the UN convention on biological diversity (MONRE, 2011; 2019), etc. In addition to MONRE, ministries and agencies related to the organization of conservation work include the Ministry of Finance, MARD, the Ministry of Planning and Investment, ministerial-level agencies, the Commission, People's Committees of provinces and centrally run cities,

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People's Committees of districts, the business community and socio-political organizations, social organizations, socio-professional organizations.

Vietnam is a member of many international treaties on biodiversity such as: The Convention on Wetlands of International Importance (especially, the waterfowl habitat (RAMSAR)), the United Nations Convention on Biological Diversity, the Convention on the Protection of World Cultural and Natural Heritage, the Convention on International Trade in Endangered Species of Flora and Fauna, the Protocol on Biosafet, and others. Many of the international commitments are gradually being domesticated. The world's NGOs are also involved in the field of biodiversity conservation in Vietnam with a large proportion of investment for biodiversity conservation such as multilaterally (UNDP, WB, ADB, EU, The GEF) and bilateral (Danida, JICA, SIDA, Dutch Embassy, GIZ, USAID) sources. The majority of donor assistance has gone toward assisting Vietnam in meeting its obligations under environmental agreements and contribute to the conservation of flora and fauna; sustainable development and consumption of natural resources from land, rivers, and seas; address the main causes of environmental degradation; increase the capacity to respond to climate change; increase public awareness about the conservation of the environment, etc (WWF, 2015, USAID, 2013). The contents of the reports affirm the biodiversity of Vietnam and its role in the region and the world, achievements after the 2008 biodiversity law, challenges and development strategies. The latest report is from MONRE (2019) which includes the achievements, challenges and strategies needed to achieve the Aichi Biodiversity Target with each specific target. Accordingly, Vietnam is gradually achieving certain achievements in terms of biodiversity conservation 12/20 Aichi Biodiversity Target such as expanding the area of protected ecosystems, conserving and

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developing genetic resources useful in selection and breeding, and discovering new species; however, Vietnam has been faced with various domestic and international challenges, especially climate change issues.

In the VMD, in terms of technical reports, the International Centre for Environmental Management (ICEM), IUCN, WWF, and USAID are some organizations which have significant contributions in researching PAs and related issues in the VMD. Reports mainly explore the biodiversity in PA as well as examine the nexus of biodiversity conservation, development, and climate change in the VMD throughout the Greater Mekong Subregion (ICEM, 2013) and LMB (ICEM, 2014). Water management and climate change are two of the most discussed topics with assessment of water changes, conflicts and opportunities for integrated management in the Mekong Delta (White, 2002), or assessment of climate change vulnerability and adaptation options (ICEM, 2013). However, there is still a lack of comprehensive assessment of climate change adaptation in PAs in the VMD. From 2021 to 2024, a project is being conducted by IUCN under the funding of USAID to conserve the Habitat of the Mekong Delta in partnership with Vietnamese government agencies, local authorities, businesses, management, development partners and communities to reduce environmental pollution threats to biodiversity and coastal fisheries resources, and to strengthen coastal resilience in the Mekong Delta.

With searching three keywords “Mekong”; “Vietnam”; “Protected area” in titles or abstracts or keywords, we found 11 publications in Scopus from 2006 to present. In which, most of the research discussed current challenges of PAs in the VMD and solutions. Main subject areas are agricultural and biological science (found in 9 publications) and environmental science (found in 9 publications), followed by social science (found in 3

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publications). Agricultural issues were discussed mainly in shrimp farming (Tran, et al, 2021; Gowing et al, 2006) or livelihoods on mangrove forest (Nguyen et al, 2017). In environmental science several studies focused on water management (Minh et al, 2019; Le et al, 2007); wetland management (Hoang, 2020); climate change adaptation (Nguyen et al, 2016); ecosystem services (Loc et al, 2021; Loc et al, 2018). In social science some studies discussed social and environmental impacts (Gowing et al, 2006; Nguyen & Parnell, 2019) or conservation and poverty alleviation (Triet, 2010).

Thus, the main research contents in previous studies focus mainly on livelihoods and the environment, in which agro-fishery livelihoods are the main ones. A handful of studies on livelihood initiatives in PA management such as analysis of a new protected area model with engagement of local community in harvesting and producing handicraft from natural resources (Triet, 2010). Regarding the factors affecting water flows of PAs, research by Le et al. (2017) also shows factors such as storm surges, sea level rise, future siltation of the Mekong Estuary resulting from the construction of damage in the upper and middle stream. At the same time, this study also warns about the effects of engineering structures in the delta which can increase bank erosion and flooding in the non-protected areas as well as the failure of the dyke in the PAs. Along the same trend, research by Minh et al, (2016) suggests that water management infrastructures are beneficial for controlling flood hazards but have negative impacts on water quality in PAs. After 2018, research trends on ecosystem services began to be noticed and studied (Loc et al. 2018; 2021). In that current trend, we find that there is a lack of studies of ecotourism, one of emerging livelihoods in most PAs in the VMD. We argue that WPA management in the context of uncertainty such as climate change in the pandemic requires an adaptive and holistic

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approach which is typical of the SES theory. Therefore, in this study we approach climate change as an external related ecosystem (ECO) and WPA as a social ecological system (SES) to observe ecotourism and its interaction with the ecological and social system of WPA to adapt to climate change.

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Chapter 4. Characteristics of ecotourism development in wetland protected areas from a social-ecological system approach

4.1 Introduction

In our research, we aim to revise the SES framework with a focus on the interaction of the governance system, actors (local communities), and resources system (mainly in tourism) responding to climate change and its impacts through their perception and adaptation action to climate change. Developing ecotourism in WPA is believed to be a sustainable livelihood option in the context of climate change (CC) because of its positive impacts on all three aspects of the environment, society, and the economy as well as support for SDGs (WTO, 2018). This chapter aims to clarify the first research question (1) What are the main characteristics of ecotourism development of WPA case studies in the VMD? In the comparative correlation between the two research sites Tram Chim and U Minh Thuong, this chapter is structured as follows:

Section 4.2 will describe the economic – social - political context for the development of tourism as well as the situation of tourism development in two NPs. In section 4.3, we will analyze the resources system and units of two NPs from the tourism perspective. In section 4.4, WPA resource governance in tourism with relevant stakeholders and governance regulations and users with mainly local communities in the buffer zone of two NPs will be examined.

In this chapter, we focus on describing a detailed picture of the characteristics of tourism development in the two NPs. The two surveyed national parks have distinct characteristics typical for two models of tourism development and management in Vietnam.

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In the case of U Minh Thuong National Park (UMTNP), a slow-growing tourism model with a priority on biodiversity conservation and tourism development is an integral part of the control of the National park management board. Meanwhile, in Tram Chim National Park (TCNP) tourism develops at a higher rate with a methodical promotion strategy and process, especially the intervention of external agents with the separation of tourism management from the management board of the national park. The two NPs have common and well distinguished points in terms of socio-economic and political contexts at the meso level (local community). These two tourism development models illustrate two options for tourism management strategies in national parks in Vietnam and based on those we will analyze the effects of climate change impacts on these two tourism models (chapter 5) as well as a comparison of climate change adaptation (chapter 6).

4.2 Economic - social - political context for the development of ecotourism in WPA

4.2.1 Similarities in economic – social – political for ecotourism development of Tram Chim National Park and U Minh Thuong National Park

Referring to economic – social – political (ESP) settings (Ostrom, 2009; Delgado-Serrano & Ramos, 2015) and data availability in the real contexts of two selected sites, we describe the ESP setting with the following variables: Economic settings (main livelihoods; income & poverty; economic transformation) and social settings (demographic trend; culture and history context); political settings (political stability; government policy in livelihood diversity; government disaster prevention and post-disaster support); then we analyze how those variables impact local tourism development.

The buffer zone of the 2 NPs is located in many communes, TCNP has five communes and one town and UMTNP has two communes. However, in the scope of the

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study, we only selected communes with tourism service facilities and those which were directly involved in providing and trading tourism services in the National Park (Figure 4.1). Thus, we conducted the scoping trip and combined it with the desk review of local reports. In TCNP, we selected Phu Tho commune and Tram Chim Town; In the UMTNP, we selected Minh Thuan communes and An Minh Bac communes for the investigation of tourism activities.

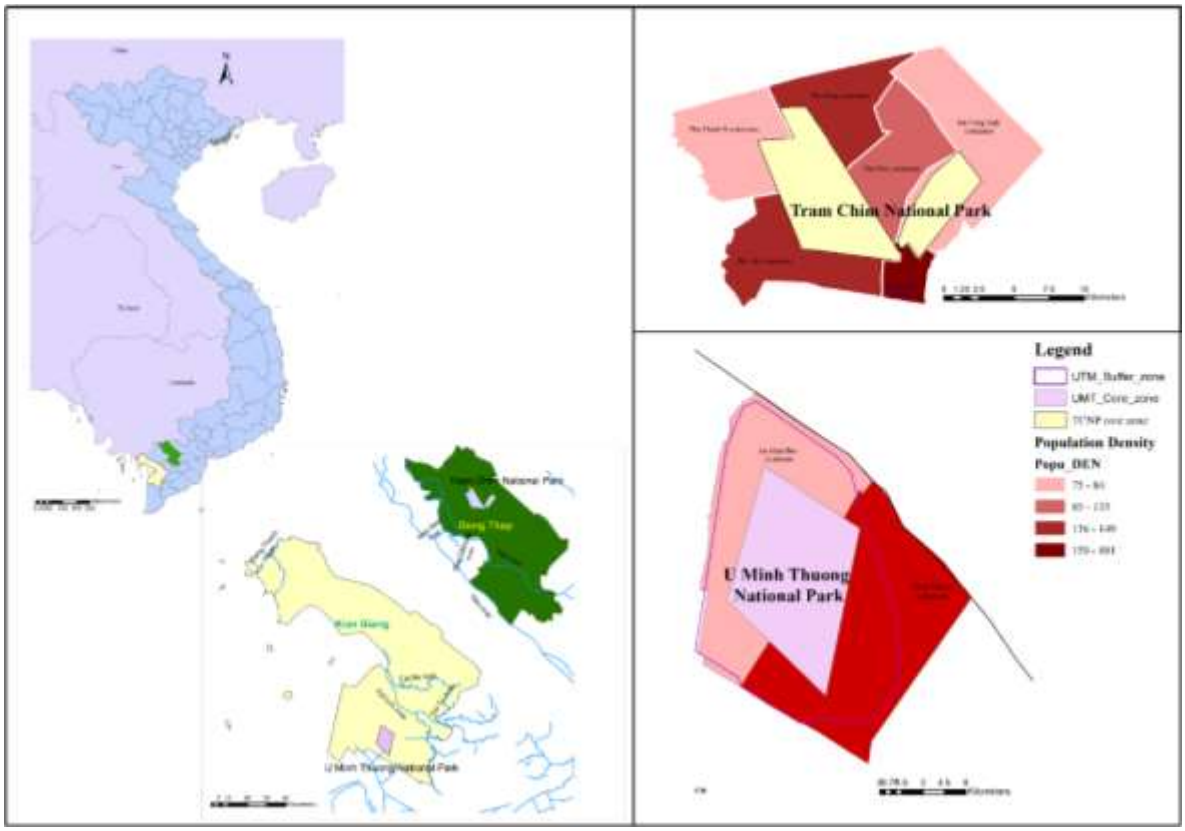

Figure 4.1 Two surveyed national parks and communes in the buffer zones

4.2.1.1 Economic settings

Economically, the two national parks both have 80% of household incomes from the primary sector including farming, forestry, aquaculture, etc. In the buffer zones, farmlands or forestry land occupies around 80% of land use proportion (Table 4.1). This

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situation is typical of the economic structure of national parks in Vietnam and laborers in these areas are mainly unskilled and come from farming families.

Table 4.1 Land use proportion in buffer zones communes of TCNP and UMTNP

Parameters	**TCNP**		**UMTNP**	
	Phu Tho commune	Tram Chim town	Minh Thuan	An Minh Bac
Land Use Pattern				
Natural Land (ha)	6,110	1,229	15,271	13,376
Agricultural Land (ha)	3,271	840	11,224	6,975
• Rice (ha)		1,318 (2019) (3 crops)	*	*
• Grains	7,630	1,476	*	*
• Upland crops (ha)		44.5	*	*
Aquaculture (ha)	318	60	*	*
Forestry (ha)	2,122	33	3,569.55	6,041.82
Residential land (ha)	58	57	125.5	52
Specialized land (ha)	250	221	346.16	246.6
Income (per capita/year)	50 million VND	55 million VND	54 million VND	52 million VND
Poverty rate[13] (%) 2017	17.55	16.74	*	11.5

(***Source***: Statistical data from Tam Nong District (2021); U Minh Thuong (2015 &2020) and local reports*)*

****Note:*** *not available data record*)

[13] According to the standard of Decision 59/QD-TTg date 19th November 2015 on multidimensional poverty for 2016-2020. Poor household = monthly income of 1,000,000 VND per capita (around 44$/month/person).

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Two of the NPs are located in the two poorest districts in the provinces. Therefore, people living there depend strongly on natural resources such as water, soil, climate patterns, etc. This makes their lives precarious and vulnerable to changes in the environment and climate. Disputes over resources, land, and water are also highly latent, and there are potential risks of social inequality. The rate of poverty in communes in the buffer zone of rural development is quite high compared to the national average (6%) and the Mekong Delta (5%) and Dong Thap (6%). The number of households under the poverty line in 2017 was 17.55% in Phu Tho commune; and 16.74% in Tram Chim Town; in UMTNP, the poverty rate of An Minh Bac in 2020 was 11.51%.

Economic structure and transformation have occurred toward reducing primary sectors and increasing secondary and tertiary sectors, but at a slow speed. In An Minh Bac, the livelihood proportion of agriculture-forestry-fishery accounts for 80.3%; industry and construction accounted for 6.2%; and trade-service-tourism accounted for 13.5% in 2020.

4.2.1.2 Social setting

Regarding the demographic trend and labor force, over 70% of people are in the working age of two research sites, but the education level of laborers is still low. In TCNP only 12% of laborers are trained, meanwhile in UMTNP, education level is low with an illiteracy rate of 86% among those under the poverty line. Along with the characteristics of agricultural production, a lot of idle time and slow economic transformation has resulted in a tendency for people to migrate to big cities such as Ho Chi Minh City, Binh Duong province to make a living. Tam Nong district, Dong Thap province has a total population of 1.598.800 people (2019), in which more than 99,948 people (6.25%) live around TCNP. Table 4.2 shows the population growth for the period of 2010-2020 of communes around

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the park, in which Tram Chim town has the largest number of households in 2020. From 2014-2015 to the present, the population around TCNP was intended to decrease in most communes and it is explained by the increase of emigration of local people. This is also the general trend in population change in the Mekong Delta with Net Migration Rate (NMR) <0 in this decade, in 2017 the NMR of VMD (-4%) with Dong Thap (-6.3%) and Kien Giang (-5.9%).

Table 4.2 Population from 2010-2020 and other population characteristics in TCNP

	Population from 2010-2020 (Unit: people)								Population density (people/km^2) 2020	Gender (people) 2017 (Male/female)
Year	2010	2015	2016	2017	2018	2019	2020			
Tam Nong district	**104429**	**101951**	**101462**	**100976**	**100493**	**99948**	**100019**		**211**	
Tram Chim Town	11238	10972	10919	10867	10814	10827	10835		881	50.2/49.8
Phu Tho commune	10583	10332	10283	10233	10184	10121	9217		145	49.6/50.4
Year	2011	2012	2013	2014	2016	2017	2018	2019	Population density (people/km^2) 2019	Gender (people) 2017 (Male/female)
U Minh Thuong district	**68655**	**69258**	**69739**	**71091**	**65221**	**64653**	**63351**	**63426**	**147**	**50.8/49.2**
Minh Thuan commune	18716	18880	19011	19378	19716	19549	19155	19178	126	51.4/49.6
An Minh Bac commune	10944	11041	11118	11343	11257	11161	10936	10949	82	51.1/48.9

***(Source**:* Statistical data from Tam Nong District (2021); U Minh Thuong (2015 &2020))

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The current migration trend is opposite to the past. Not only since 1975 but also from the feudal period, especially in the 17th and 18th centuries, the Mekong Delta has attracted many refugees from the North and the South. This history of demographic development affects the characters of the people here. In the book "A voyage to Cochinchina" by John White (1824), the author pointed out that the origin of characteristics of people in the Mekong river delta such as kindness and hospitality, derives from a strong sense of collective society and a survival need of the refugees (Tiếng Việt: Lưu dân; Chinese: 流民). In a new land because of the harshness of nature, they need to live together, support each other, and care for themselves. At the same time, due to the abundant resources, the people have a hobby of gathering, eating, and drinking as an opportunity to meet and relax. That is a typical culture of the people here. That forms hospitality, which is also the basis for the development of community-based tourism, one provincial officer at TCNP stated: *"People here are very friendly, when children see visitors, children greet them. Or when they pass a wedding or a feast, people also call them in for a cup of wine. Visitors experience that rural culture, like in buffer zones, it's great*" (TGP5[14], in person interview (IPI), December, 2020)

According to Son Nam's memoirs (Son Nam, 2008), the people here are from all parts of the world and live on rivers. Fear of wild nature has facilitated the development of religious superstitions such as spells. With a dense system of rivers and canals, the civilization of rivers and canals in the VMD develops and the blood relationship is not as tight as in the Red River Delta where there is a dyke civilization. Therefore, the human

[14] Interviewee ID: To ensure the anonymity of the interviewee, we assign IDs to the interviewees where IDs starting with T mean the interviewee in the case of TCNP. An ID starting with U means the person being interviewed in the case of the UMTNP. The next letter is the place of work according to the level of administrative units such as GP is provincial government; GD is the district government; GC is the commune government; N is the national park manager; LT is local residents working in tourism; LN stands for local residents not working in tourism. The last numbers in each ID are the order in which that person was interviewed (eg, TGP5 is the 5th officer interviewed working in the provincial government in the case of TCNP; UN2 is the 2nd officer interviewed working in the TCNP case. in the UMTNP). For 3 officers working in non-government organizations, we use the code NGO1; NGO2; NGO3.

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settlement of people here was formed according to the water flow because, in the migration history, people sought better places that have abundant resources like fish. Therefore, river-based lifestyles of people here can become a unique tourism product. However, people here are famous for their frankness, simplicity and even lacking the meticulous ingenuity of the northern or central people, so to develop tourism for the people here, training courses needed to be offered by local departments.

4.2.1.3 Political settings

Politically, the management of the two NPs in both public non-business units are owned by the state and are the two largest Ramsar sites in the VMD. Both Dong Thap and Kien Giang are poor localities compared to the whole country, and management capacity, especially at the commune and district level is still limited. Thus, tourism development or climate change response is under the guidance of the provincial level. Locally, economic development activities take precedence over environmental protection or climate change response issues which are typically at the orientation of extensive agricultural production such as three rice crops. Due to environmental problems being so complex and changing so rapidly, traditional state-centric, command and control manners cannot effectively monitor and implement appropriate regulations (O'Rourke, 2004). Therefore, local governments have very weak responses to pollution and climate change impacts. Enterprises are still not satisfied with the "dynamism and creativity" of some leaders of departments, branches, and People's Committees of districts and cities. For example, according to the survey of Dong Thap province in 2020, 75% of enterprises stated that the provincial leadership has the right policy but it is not well implemented in the departments and branches (Dong Thap Provincial People's Committee, Department of Planning and Investment, 2020).

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The fact has shown that although the provincial government is dynamic, the district and commune government is not active, leading to no synchronization in action. In our study, we found a mismatch in the mindset of tourism entrepreneurship between province officers and district and commune officers. Meanwhile, provincial officers intend to empower and promote livelihoods of local economic structures toward trading, services, and tourism, but the district and commune governments still hesitate. That mismatch derives from the lack of capacity of local officers and their mindset of economic development. One UMTNP officer shared that: "*From local leaders to districts and provinces, they have poor leadership and do not know how to exploit, [..] they talked a lot in theory, but did very little in practice"* (UN4, IPI, December 2020). In TCNP and UMTNP, people engaged in decision-making by voting and discussing with the local government about their livelihoods. However, they complained about complicated and cumbersome procedures, such as household tourism business establishment.

Considering other factors such as norm compliance (S3b), based on our interview, the most mentioned issue is the sharing of natural resources between NPs and people living in the buffer zone. In general, after 2006, the law on sharing the resources of the NP with the buffer zone, the NPs began to have clear regulations on resource exploitation, along with benefit sharing. For example, in 2008, a sharing of the benefits of fuelwoods towards wetland resource management was applied in Tram Chim. Accordingly, local people can harvest grass and wooden fuel at some time to reduce accumulated fire fuels, and it is also believed to reduce illegal penetration of people into core zones. The poor and policy beneficiaries have priority access to these resources through trading at preferential prices.

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One of the most important ***drivers of political change (S4b)*** in tourism development and climate change adaptation in the VMD in general and in the two selected research sites, is Resolution 120. This is due to the current production status of the Mekong Delta and the fact that it has reached a tipping point. In the past during flood season in the VMD, water overran on the rice fields and accumulated alluvium, but from 2000 to 2015, rice yield had been reduced and people had to use chemical fertilizers and construct dykes for 15 years. Rice production was no longer profitable and river water quality was also degraded. The main contents of Resolution 5 are to consider all water sources "Freshwater, brackish and saltwater" as resources; consider the VMD and the sea as two interconnected parts; shifting production from focusing on output to focusing on the economic profit, like quality and value of products; general planning, according to the planning law and integrated planning; and reorder the priority ranking of agriculture production from aquatic products and fruit trees to rice, which is based on the criteria of input costs and exploitation time as well as the change of market needs for high-quality agriculture products. In short, Resolution 120 was born in the context that the Mekong Delta has reached an environmental tipping point, so it is imperative to restructure. Currently, this resolution is only an orientation, and has not been implemented specifically, because it depends on the environmental conditions of each locality. The Ministry of Agriculture is currently running a program on restructuring the agricultural sector; The Ministry of Planning and Investment is developing an Integrated Master Plan for the Mekong Delta.

It can be seen that agriculture is still identified as the main economic sector of the Mekong Delta, and Decree 120 is an opportunity and also a pressure for all localities in the Mekong Delta in transforming the economic structure towards sustainable development and

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adaptive to climate change. For tourism, the development is based on the available advantages of agriculture, the local community also orients several directions for tourism in the Mekong Delta and is especially evident in 2 national parks, namely agricultural tourism and community-based tourism.

In 2017, the Law on Forestry in Vietnam had significant changes[15] with articles related to special use forest such as national parks, which also impacted the tourism master plan of two NPs. This was the case in UMTNP which had concerns of external investors and is identified as an important agent in the UMTNP tourism master plan, 2015. One provincial officer stated that: *"Currently, the Law on Forestry is issued in 2017, officially valid in 2019, the law is not circular or decree that can be changed, the law cannot be changed. According to the forestry law, you can't do anything to interfere with biodiversity, you can't breed and plant anything that's not native seedlings. The issue of inviting businesses to participate in tourism presents democracy and fairness. However, the land use purpose must not be changed. Because of fear of land capitalism problems, they come to invest in tourism gradually they will change the purpose of land use and occupy the land there, fence and people, as well as resources, will not keep the purpose of conservation"* (UGP2, IPI, December 2020)

Management in TCNP and UMTNP work under the head director and vice-director and they are the ones who directly contact a higher level of government. They make decisions and take general responsibility for all activities of the unit according to the functions, duties, and powers assigned, and at the same time take joint responsibility for the decisions of the deputy director to perform tasks and take personal responsibility before the

[15] https://thuvienphapluat.vn/van-ban/Linh-vuc-khac/Luat-lam-nghiep-367277.aspx

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Provincial Party Committee, the PPC, relevant ministries and branches for the activities of the unit. That is typical for traditional state-centric, command and control strategies which cannot effectively monitor and implement appropriate regulations in the context of environmental problems in general, and climate change adaptation is complex and changing so fast. Although management of national parks and surrounding communes is independent, it is highly related in terms of people's livelihoods and benefit-sharing. National parks are considered a common resource which benefits people at local, national and international scales (as recognized as Ramsar site).

In brief, two selected sites, in the economic – social – political settings, have many similar characteristics with different impacts on tourism development. Positively, people with openness and hospitality, and river-based lifestyle are favorable for the development of community-based tourism such as homestays. The remarkable development of agriculture with a variety of fruits and orchards at large scales, aquatic products, and people's entrepreneurship to market mechanisms also create a foundation for the development of agri-tourism. Further, nature-based tourism on protected areas such as 2 NPs, which are recognized as Ramsar sites, contributes to diversifying a colorful picture of tourism in the VMD. Secondly, the shift towards sustainable development from Resolution 120 also facilitates the development of eco-tourism and community-based tourism in NPs. However, there are many big challenges posed when developing tourism in these areas. Firstly, these people are familiar with the lifestyle and practices based on agriculture production and have a lack of professionalism in the service sector, and a shortage of trained workers to develop tourism. Therefore, it is necessary to have human resources training in service manners as well as foreign languages. Facilities and infrastructure also

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need to be synchronously invested. Secondly, despite the orientation of Resolution 120, the management capacity and coordination among levels from the province, district, and commune are still limited. The lack of initiative and entrepreneurship mindset of the subordinate units in innovating and receiving new directions will make investors in the tourism sector continue to be hesitant.

4.2.2 Remarkable differences in economic-social-political contexts of TCNP and UMTNP

In terms of economy and land use, in UMTNP, land used for afforestation accounted for a larger proportion than in TCNP (Table 4.1). In addition, with a sparser population density than TCNP, UMTNP households in the buffer zone receive a large area of land for production. On average, each household receives an average of 4.0 ha of production land under the combined Agriculture-Forestry-Aquaculture model. Near the UMTNP core zone are fruit orchards such as bananas, pineapples, ginger, and sugarcane. Many households living near the boundary of NP participate in guarding the forest by reporting if there is any illegal penetration, forest fires, etc. One UMTNP officer shared that: "*they can be mobilized for forest protection and fire prevention of Melaleuca forests very effectively*" (UN2, IPI, December 2020). Meanwhile, TCNP is located in a low-lying area, agricultural production is the main activity, especially rice cultivation with three crops/year, thus creating great pressure on resources such as water and land. Other crops are also limited due to alkaline soil; only scallion, lotus, and mango are scatteredly planted interspersed with rice land. The agricultural and forestry land area of TCNP is more limited than UMTNP (specifically, the average agricultural land/person in Phu Tho commune is 0.35ha/person, Tram Chim town is 0.08ha/person; while in UMTNP, Minh Thuan commune it is 0.58ha/person; An Minh Bac is 0.64ha/person). TCNP has a smaller

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agricultural land area with a simpler crop structure, so when the new tourism service started to emerge in 2012 (after being recognized as a Ramsar site), it attracted the participation of a small number of people around the National Park, with 100 employees engaged in tourism activities in Tram Chim town (report of the tourism situation of Tam Nong district in 2020). This number in UMTNP is less than 30 people (there is no record of how many people engage in tourism activities in UMTNP because tourism activities here are spontaneous). In TCNP, emigration is also more than in UMTNP because it is closer to big cities like HCMC, while in UMTNP, the population migrates less, due to their available natural resources such as large areas of agricultural land in the buffer zone areas.

Regarding political context, from the tourism sphere theory (Cochrane, 2010) to develop tourism, consistent leadership expressed through clear vision and good management is a key driver. It impacts the investment flows and economic strategies of the government. TCNP is located in Dong Thap where it has ranked top 5 out of 64 provinces in the whole country for Provincial Competitiveness Index (PCI)[16] (according to the results announced by the Vietnam Chamber of Commerce and Industry (VCCI) in 2013, 2014, and 2015) (Figure 4.2). Notably, Dong Thap indexes achieved high rankings such as market entry, time cost, dynamism, and legal institutions. This is also a condition to promote diversification of economic structures and expand tourism opportunities.

By contrast, Kien Giang ranked 62nd in the PCI index in the country and tends to decrease over time. Recently, at UMTNP, there was a case of violation of transparency in the construction of irrigation works, irrigation canals which cause a scandal in the

[16] There are a total of 10 sub-indexes (with a 100-point scale) to assess and rank provinces in terms of provincial governance quality in Vietnam. Those metrics are: Market entry; Land access and stability in land use; Transparency; Time cost; Unofficial expenses; Dynamic and pioneering of provincial leaders; Fair competition; Business support service; Labor training; Legal Institutions

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community[17]. One provincial officer stated that "*Mechanistic policies, the policymaking process is very one-way, no local investigation. Activities like voter and election interaction just to show off a fake democracy. [..] Public opinion polling, but opinion pollsters can be faked, not make them transparent"* (UGP2, IPI, December 2020)

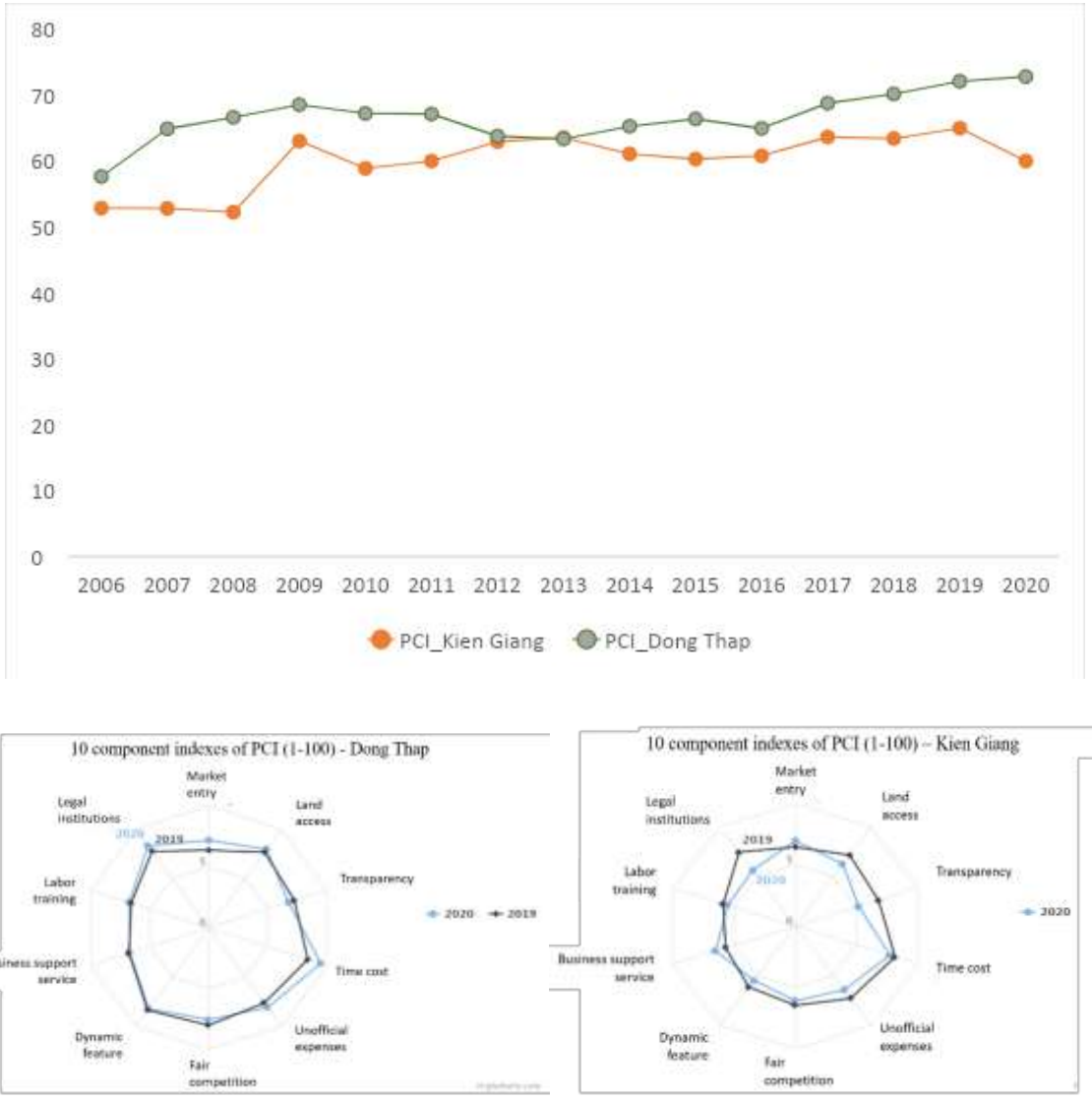

Figure 4.2 Provincial Competitiveness Index of Dong Thap and Kien Giang from 2006-2020 and 10 PCI indicators ***(Source:*** https://pcivietnam.vn/)

[17] https://tvphapluat.vn/video/sai-pham-o-vuon-quoc-gia-u-minh-thuong-nhieu-sai-pham-nghiem-trong-nhung-chi-rut-kinh-nghiem-46143/

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During a majority of the years that the PCI indicators of Dong Thap saw an increase, Kien Giang decreased, especially in indicators of transparency, access to land, and legal institutions. This makes businesses hesitant, especially private and foreign enterprises that want to invest in Kien Giang. Secondly, according to tourism strategy, Tram Chim is identified as one of three typical tourism values of the province and received a lot of support. One provincial officer shared: *"In Dong Thap, there is a set of important policies such as if a household opens a homestay with 5-20 rooms, they will be supported with 40 million to buy blankets and redecorate the house. On the scale of 20-30 rooms, they can get 50 million VND of support. [..] Secondly, if people build a restaurant to sell specialties, we will support him with 500.000VND/1m2. This includes restrooms and walkways. You build a house 200m2 and we support him with 100 million; 400m2 we will support him with 200 million; 1000m2 we will support him with 500 million. For the hotel building, based on the star rating, in the 3rd class star districts, they will get the support of 40 million/room. 4-5 stars we will support him with 50 million/room, and if they have a 4-star hotel with 80 rooms, they will get a billion*" (TGP5, IPI, December 2020). Therefore, local policies pay great attention to tourism development, especially in Tram Chim. There are many incentives for tourism development.

Meanwhile, in general, tourism in Kien Giang is very developed, but it is uneven and tends to be strongly polarized in terms of sea and island tourism. "The Mekong Delta province of Kien Giang is now home to more than 300 tourism projects with a combined registered capital of over 337.32 trillion VND (14.53 billion USD), mostly in the island district of Phu Quoc"[18]. Phu Quoc island is the most attractive tourist destination in the

[18] https://en.vietnamplus.vn/kien-giang-attracts-over-300-tourism-projects/164511.vnp

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Mekong Delta, while UMTNP tourism activities are very fragmented and mainly because tourism policy is "*too general*" just "*on paper*", even some respondents said "*unknown*" (UN3, IPI, December 2020), so it is not implemented in reality and people have not been motivated to do tourism. That leads to the disparity in tourism development in these two national parks. To explain the difference, one provincial officer shared: "*In Kien Giang, tourism is only available in Phu Quoc, while in UMTNP, tourism is only developed in the national park, but not in the buffer zone. The reason is that leaders, from local leaders to districts and provinces, have poor leadership and do not know how to exploit. In beautiful places in Kien Giang, people do tourism spontaneously, not planned*" (UGP2, IPI, December 2020).

In terms of management, while UMTNP has a transition zone that makes the boundaries of people in the buffer zone and core zone clear, land disputes are less serious than in TCNP. We argue that in UMTNP people have a large area of agricultural land, crop livelihoods are diverse, and this is a reason why people are not motivated to do tourism. One NGO officer explained: "*U Minh Thuong has more enclosed space, while in Tram Chim, all four sides are agricultural land owned by the people, so it is more difficult to contro*l." (NGO3, IPI, November 2020). However, in UMTNP due to a large area of peatland and the fire incident in 2002 that burned more than 3000 hectares of the primary forest causing great damage, the management policy of the national park places priority on conservation against forest fires. In addition, to ensure livelihoods for local people, the policy of forest contracting has been implemented and created jobs for people.

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4.2.3 Tourism situation

4.2.3.1 Number of tourists and revenue structures

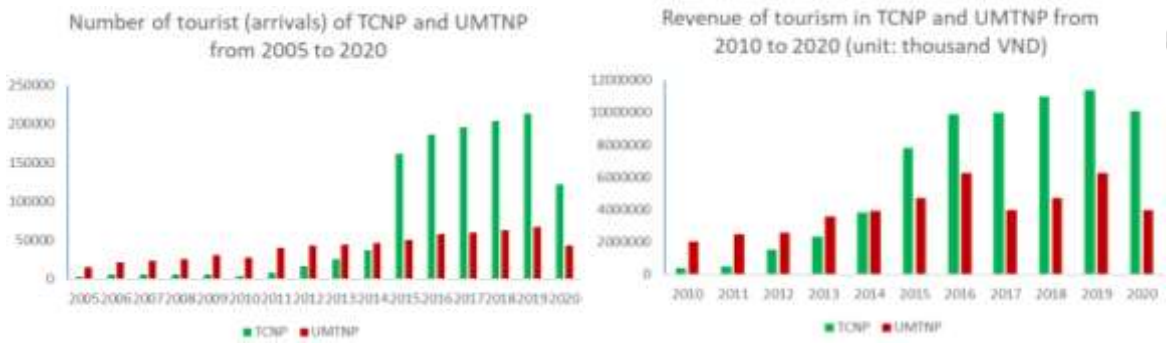

Figure 4.3 A comparison lens in the number of tourists (arrivals) and revenue of tourism in TCNP and UMTNP (***Source*:** TCNP & UMTNP database in 2021)

Tourism activities in both NPs have started since their establishment in the early 2000s since. In particular, the obvious difference in both national parks is that while TCNP has continuously progressed in its tourism, the tourism in UMTNP does not seem to have changed much after many years. Before 2014, UMTNP always had a larger number of visitors and revenue than TCNP, but after 2014 this balance had a spectacular reversal with the number of visitors and revenue of TCNP exceeding UMTNP 3 times in the number of visitors and 2 times in revenue (Figure 4.3). This difference can be explained by two reasons. Firstly, because TCNP was officially recognized as the 2000th Ramsar site in the world and the first Ramsar site of the VMD in 2012 and this created a boost for TCNP tourism. Meanwhile, UMTNP was recognized as the 2228th Ramsar site in 2016 which is 4 years later than TCNP. However, I suppose that is not the main reason why UMTNP has a slower pace in tourism development compared to TCNP. The main reason is that the tourism development strategy in TCNP was more clearly planned. Especially in 2014, the tourism management of TCNP had a big change when the Tourism center changed from an

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affiliated part of the national park to become an affiliated part of The provincial tourism center of investment, trading, and tourism. With plans of promotion and to attract investment and tourists, the number of visitors and revenue increased sharply in the period of 2014-2019. By comparison, UMTNP's revenue fluctuated after being recognized as a Ramsar site and even decreased in 2017-2018. Particularly in 2020 due to the impact of the Covid-19 epidemic, the number of visitors and revenue of both national parks decreased markedly. Specifically, the number of tourists in TCNPs decreased by 42.8%, and the revenue decreased by 11.4%; while in UMT the number of visitors decreased by 35.6% and revenue decreased by 36.6%.

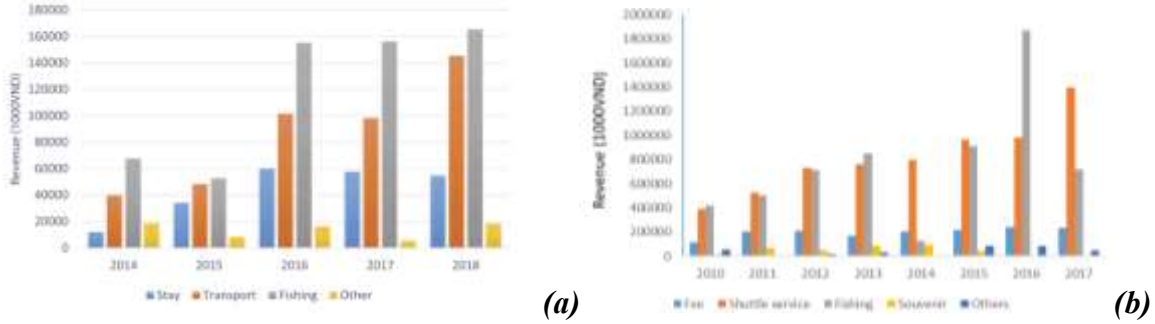

Figure 4.4 Tourism revenue structure in TCNP (a) and UMTNP (b) during 2014–2018 *(**Source**:* TCNP & UMTNP database, 2019*)*

Figure 4.4 shows that in the structure of tourism revenue in both national parks, services related to transportation and fishing account for a large proportion. However, neither fishing nor transport are authentic ecotourism products, especially for most visitors who fish for commercial rather than recreational purposes (Nhan & Thong, 2014). In the period of 2014-2018, fishing services accounted for the largest proportion (45.5%), followed by transportation services (33.0%), accommodation services (16.5%), and other

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services (5.0%). In UMTNP, from 2010-2017, shuttle service accounted for the largest proportion (38.3%), followed by fishing services (35.7%), fee (9.3%), food (6.3%), souvenirs (2.0%), and other (1.8%). The obvious difference is that TCNP has a stay service, which is also the reason why TCNP has a larger revenue than UMTNP because when tourists stay they spend more money on tourism services.

4.2.3.2 Tourism products

The tourism of the 2 NPs is mostly natural-based tourism with tourism products based on natural resources, typically fish and honey from the Melaleuca forest that has created the brand (Figure 4.5). The lifestyle of living on rivers is also reflected in tourism products such as dried fish and fish sauce which are traditional products. The people here process fish in this way because during the flood season there is an abundance of fish they need to reserve for the dry season. In the two NPs the two most common tourism products are fish (28) and honey (16). TCNP also has its specialties: “rice” (27) such as “wild rice” or “ghost rice”; "dragon blood rice"; “lotus” (22); and “scallion” (27). While UMTNP has some specialties such as "bananas" which are grown in large quantities in the buffer zone and is then processed to make dried banana.

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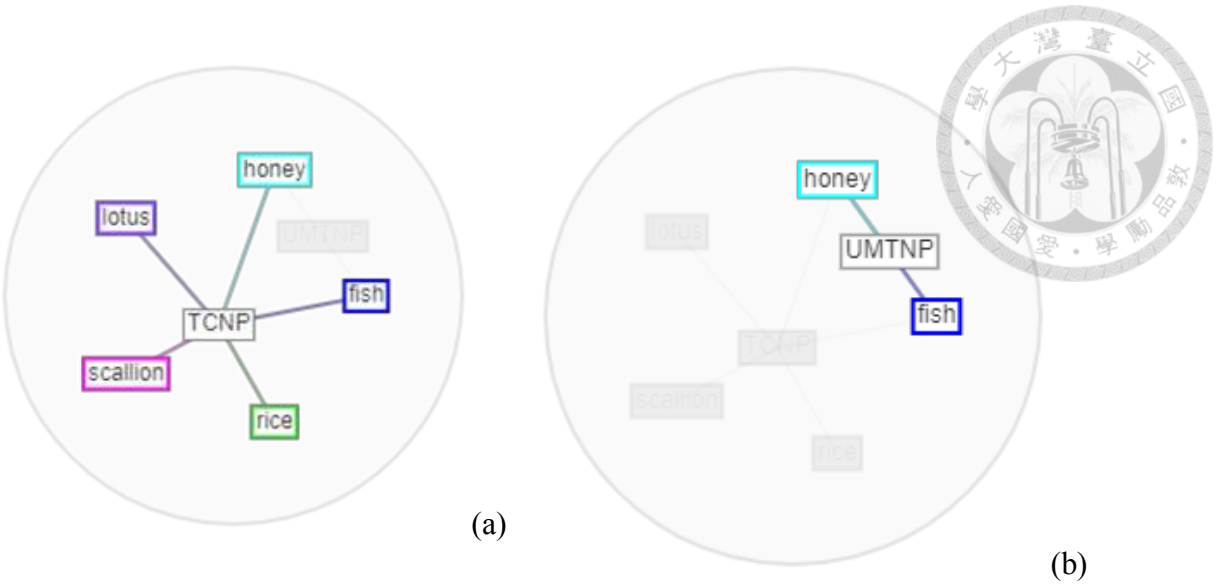

(a)

(b)

Figure 4.5 Mandala network present distinguished tourism products of TCNP (a) and UMTNP (b)

4.3 Resources systems and units in tourism

In the four main subsystems of an SES, resource systems could be forests, water systems, protected parks, and so on; and resource units could be timber, animal, and so on (Ostrom, 2009). In this section, the study analyzes resources systems and units in tourism.

4.3.1 Resources systems and units

4.3.1.1 Tram Chim National Park

From the social-ecological system approach in tourism, the protected area is a resource system that includes resource units like vegetation, water, birds, fish, etc. and these may be exploited for tourism purposes. TCNP was established in 1998 and designated the 2000th Wetland of International Importance by the Ramsar Convention on Wetlands in 2012 and the first Ramsar site in the Vietnamese Mekong Delta (VMD). Tram Chim is the one of largest remnant areas of natural inland wetland habitats remaining in the Mekong

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Delta. With an area of 7,313 ha, the resource system of TCNP comprises forests, water systems and resource units include vegetation, birds, and fish. With a warm climate and abundant rainfall, the vegetation of TCNP grows green for the whole year. There are six main biomes in TCNP including Melaleuca cajuputi (2435.7603 ha), Panicum repens (617.1078 ha), Eleocharis dulcis (820.8972 ha), Oryza rufipogon (Wild rice) (38.154 ha), Polygonum tomentosum (30.509 ha), and Nelumbium nelumbo (Lotus) (327.29 ha) (in 2016) (Figure 4.6). This abundant vegetation cover is a natural resource for sightseeing activities. This site is also famous for the population of Sarus Crane Grus (vulnerable species) and regularly supports more than 20,000 water birds in the dry season. Birds are resources for bird-watching services. Water flow is to support transportation services and also for daily use and forest fire prevention. In addition, in Tram Chim National Park there are 62 species of fish, typically: snake-head fish, carp, perch, and catfish. These are classified into three groups of fish: white fish with 39 species recorded (those that prefer deep rivers and only moves to shallow water areas or paddy fields in breeding season like members of Cyprinidae or Notopteridae families); blackfish with 8 species (those that prefer shallow water areas or paddy fields like members of Channidae or Anabantidae families); and 15 other species. The diversity of plants and animals is an important basis for the National Park to build ecotourism products for tourism activities such as sightseeing, research, and entertainment (Figure 4.7). These resources are essential for planning and organizing tourism services in TCNP in recent years.

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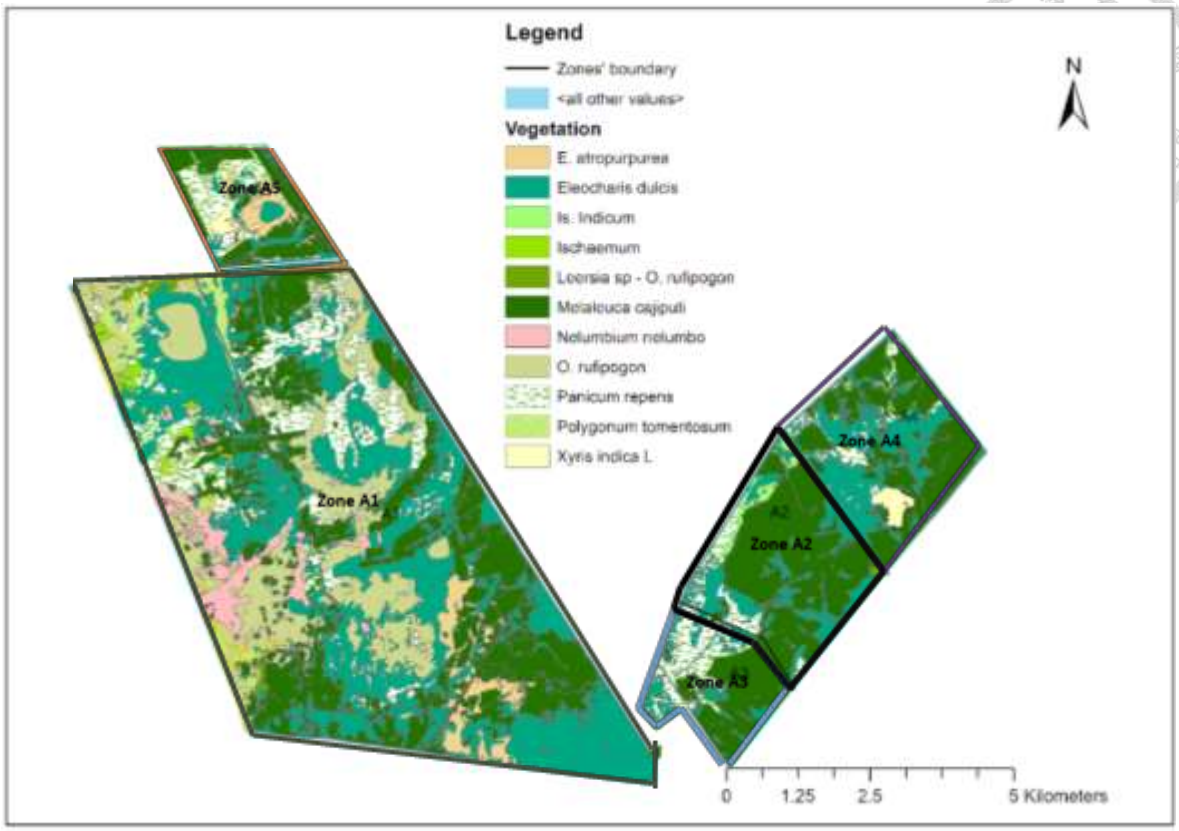

Figure 4.6 Location and vegetation cover map of TCNP

*(**Source**: Tram Chim National Park database April 2016)*

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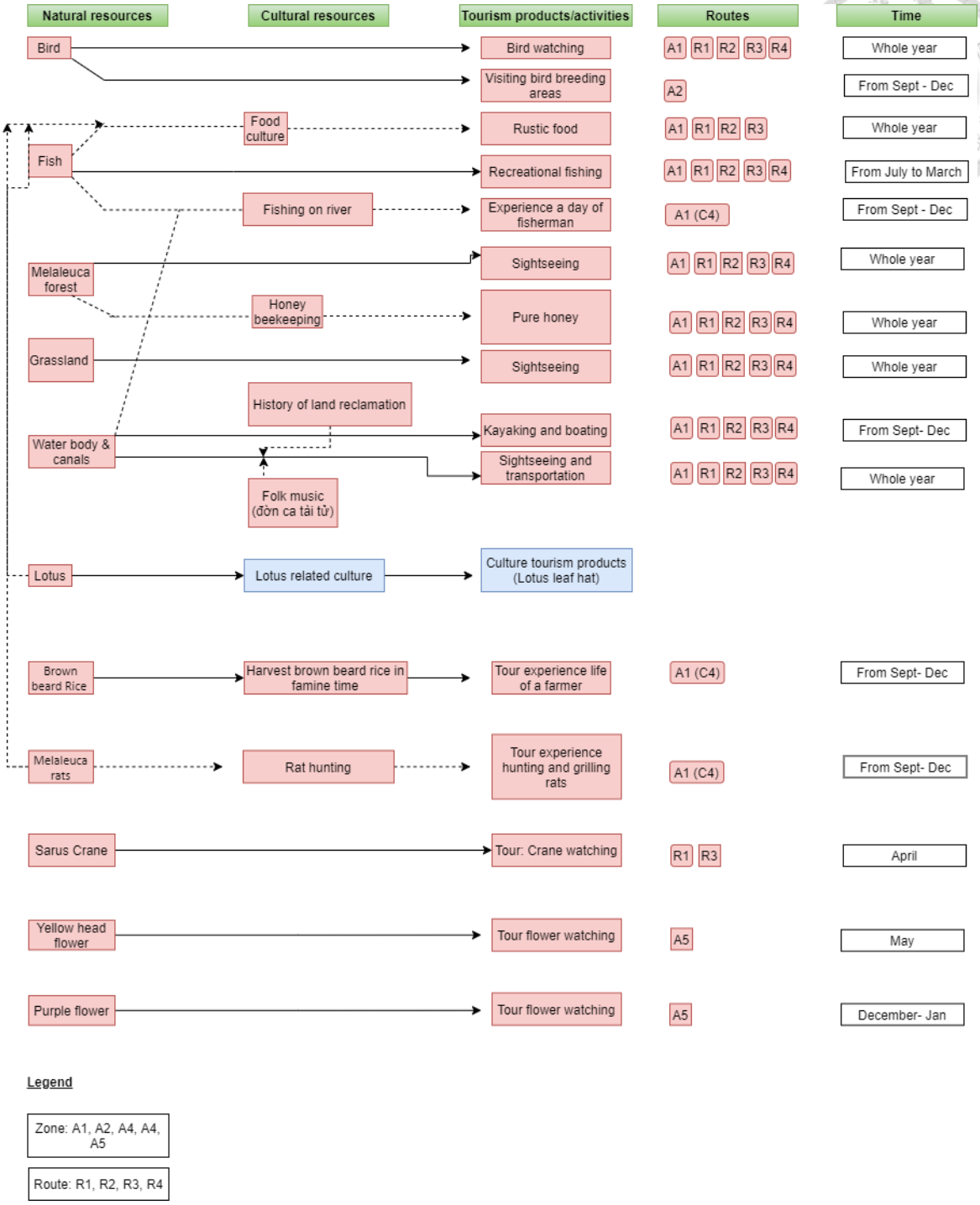

Figure 4.7 Tourism resources and activities in TCNP in 2020

(**Note:** the diagram is based on my hands-on experience in the scoping trip and the information of tourism services on the TCNP website https://dulich.dongthap.gov.vn/en/tramchimdongthap and Facebook fan page https://www.facebook.com/dulichtramchim)

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4.3.1.2 UMTNP

U Minh Thuong National Park which is one of the two most important peatland areas in Vietnam is the home of 32 species of mammals, 184 species of birds, 49 species of reptiles and amphibians, 64 species of fish, and 202 species of insects. Animals such as boars, otters, snakes, and turtles are popular and have large populations. The mammals which are rare in this region include pangolin (Manis javanica), small-clawed otter (Aonyx cinerea), nose-haired otter (Lutra sumatrana), civet (Viverra zibetha), large-spotted civet (Viverra megaspila), civet (Viverricula indica), wild cat (Prionailurus bengalensis), fish cat (Prionailurus viverinus), and big horse bat (Pteropus vampirus). U Minh Thuong National Park has the largest bird sanctuary in the Mekong Delta with an area of 65.4 ha. Waterbirds sleep at night and breed at bird sanctuaries, which are plentiful and diverse, including 26 species, in the breeding season there are over 1 million water birds, of which 3 rare and precious birds are recorded. There are reproduction activities in bird sanctuaries (White Pelican, Mycteria leucocephala, Anhingidae). Out of 184 species of birds, 8 species have populations of 1% or more of the total number of individuals worldwide. Freshwater fish are an important and abundant fishery resource in the U Minh Thuong Melaleuca forest. The most abundant fish species are snakehead fish, catfish, fish reef, gold catfish and field carp. The amount of fish in U Minh Thuong National Park is quite large, the total fish production in the canals is estimated at 297.9 tons. Production of fish species for exploitation reached 108.26 tons/year (Kien Giang people's committee, UMTNP, 2017). Based on the results of the interpretation of VINASAT satellite images (April 2016) and the field verification survey, the flora ecosystem of U Minh Thuong National Park has been classified into 4 classes: Melaleuca forest with 5,007.59ha (62.7%), seasonally inundated grassland with 1,699.4ha (21.27%), aquatic flora swamp with 1,184.1% (14.8%),

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and canals with 96.1 ha (1.2%) (Figure 4.8). All are resources for tourism activities such as sightseeing, recreational fishing, and bird watching (Figure 4.9).

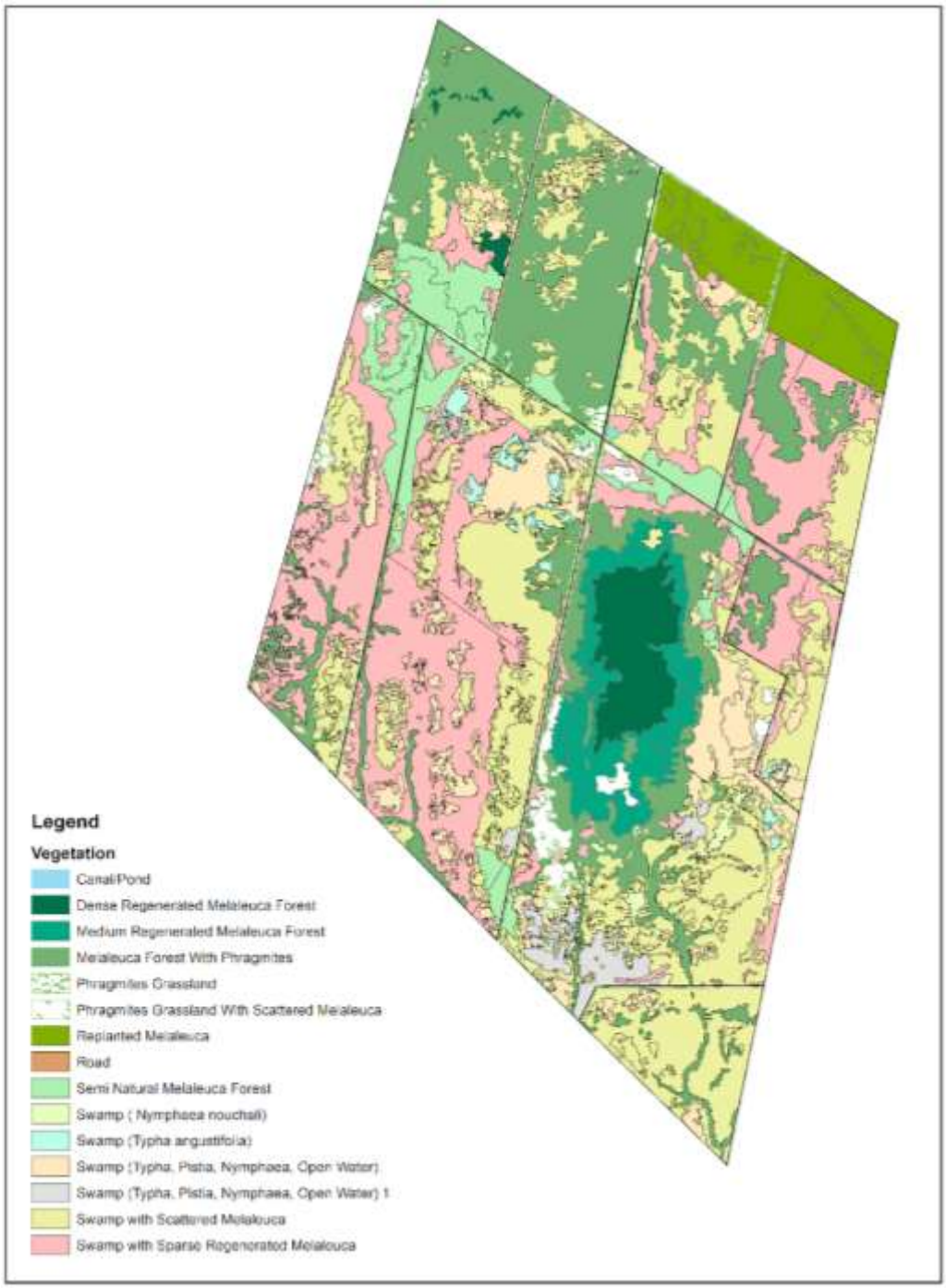

Figure 4.8 Vegetation cover map in UMTNP in 2016

*(**Source**:* U Minh Thuong National Park database, 2016*)*

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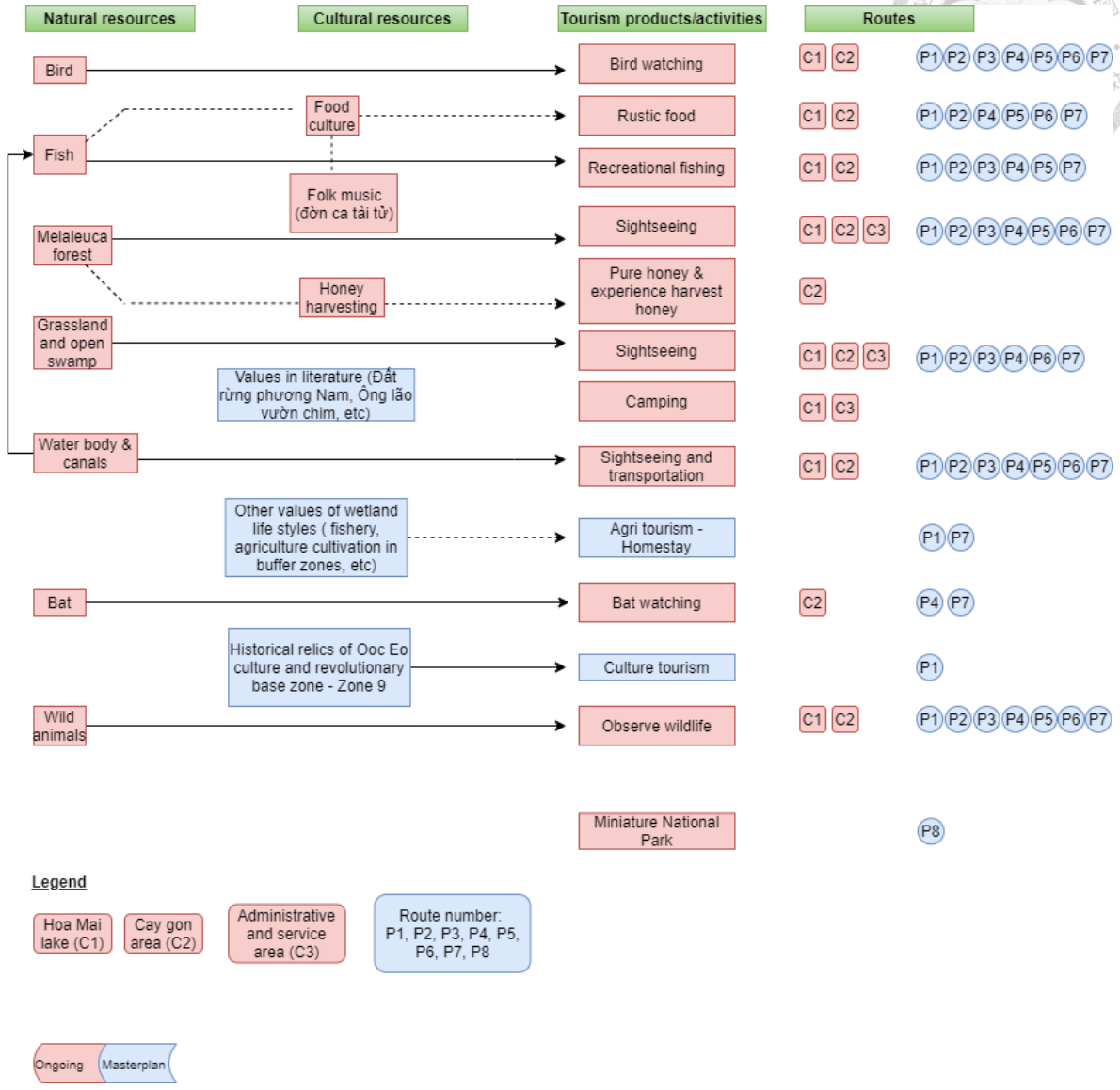

Figure 4.9 Tourism resources and activities of UMTNP in 2020

(**Note:** The diagram is based on my hands-on experience in the scoping trip and tourism master plan (UMTNP, 2015)

Based on the analysis of resource systems for tourism in two NPs, the study finds that tourism activities are taking place in the direction of relying on natural resources such as fish, birds, and wetland landscapes. However, according to the master plan of both NPs,

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besides natural resources, human and cultural resources will begin to be exploited to diversify tourism products and engage the buffer zone community in the future in tourism activities not only about labor forces but also lifestyles and cultural aspects.

4.3.2 Location, Zones, and boundaries of resources units

4.3.2.1 TCNP

The characteristics of resource units in NPs include: small size, well-defined boundary, low level of mobility, and predictable changes (Agrawal (2001, 2003). I found those characteristics in both of the NPs. Currently, the core zone of TCNP is divided into five separate management zones: A1, A2, A3, A4, A5. Each is surrounded by canals with a total of 60 km in length. Each zone has different functions and strict management levels. Zone A1 is 4,939.8 hectares and is strictly controlled and exploited for ecotourism for the whole year. Zone A2 is 1,120.8 hectares and prioritizes fisheries management; it is open for tourism activities in the flooding season under strict control. Zone A3 is 41.8 hectares and is strictly controlled with no outsiders being able to penetrate. Zone A4 is 730.5 hectares and is strictly controlled with no outsiders being able to penetrate; it prioritizes Eleocharis Dulcis recovery. Zone A5 is 434.1 hectares and prioritizes Eleocharis Dulcis recovery and Xyris indica L conservation for tourism activities (Figure 4.10).

Along the dike and water canals in TCNP recreational fishing services take place; and tourist activities such as bird watching and experience tours take place mainly in the Administrative and Tourist zone (in zone A1) and a part of zone A2 in the breeding season. From 2018 onwards, flower-watching activities take place at A5.

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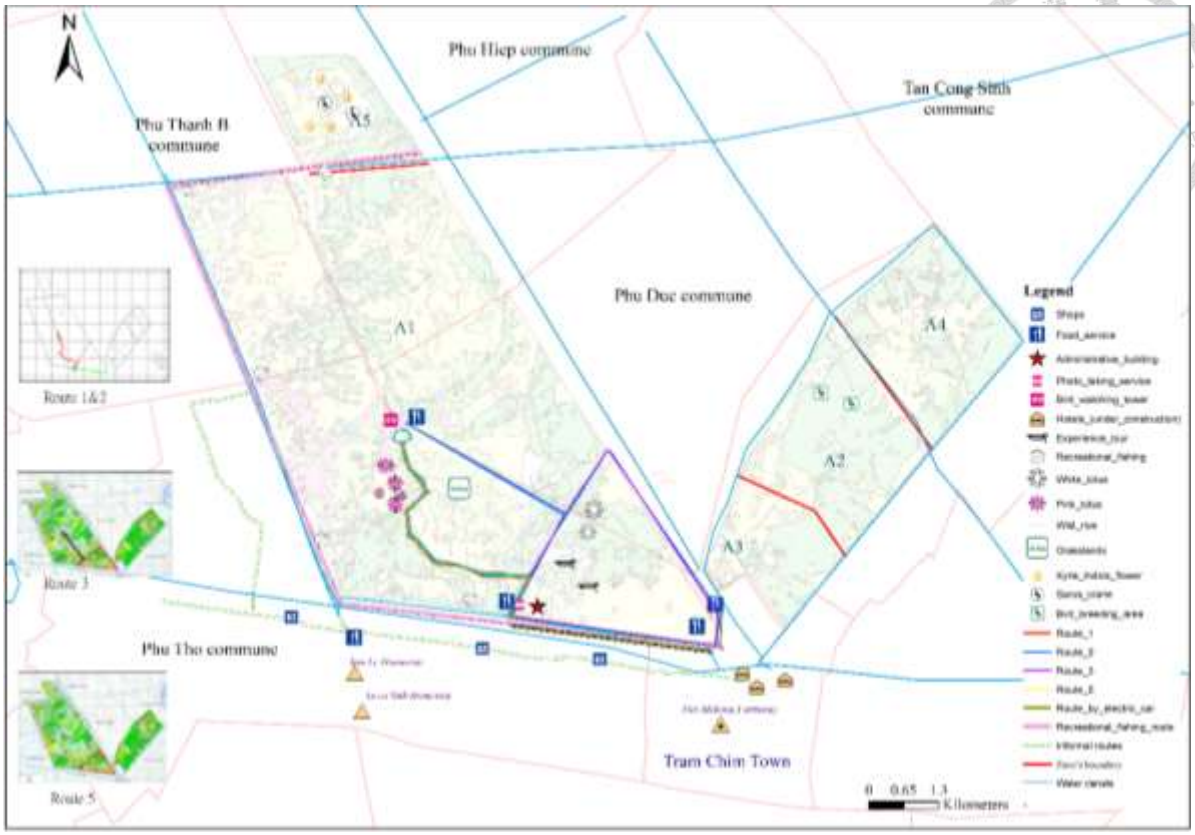

Figure 4.10 Location of tourism resources and routes in TCNP (results of public participation geographic information system (PPGIS) with the local community)

However, the tourism zone in TCNP is not fixable and depends on the regulation and direction of the PPC. One local resident working on tourism shared: "*We have been submitting the proposal to the provincial committee to consider opening the triangle area to make an ecological restoration area, the purpose is to serve tourism*" (TLT5, IPI, January 2021). One farm stay owner also shared: "*Because the national park is owned by the state, we rent space and develop the ecotourism model; Regulations on ecotourism exploitation are only like that, control exploiting of each route, cannot exceed*" (TLT1, IPI, December 2020)

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To expand the tourism space, at present, the Department of Culture and Tourism of Dong Thap province is implementing policies to promote tourism development in the buffer zone with the creation of favorable policies and capital for households that provide accommodation service. Sharing about this policy, one provincial officer stated that: "*In the context of urban and economic development, we cannot fence national parks by net, but it has a buffer zone. [..] agricultural tourism newly developed as a buffer zone for its satellites. [..] Therefore, developing rural agricultural tourism can expand the tourism space, no longer bound by the main destination points. The main points are the nucleus and the buffer zones are satellites around it, which will expand the space*" (TGP5, IPI, December 2020).

However, in TCNP, the boundary of the transitional zone is not clear, not specified even in the Ramsar Information Sheet (RIS) documents, so the problem of land dispute is still persistent and is the frustration of the people in the buffer zone with the core zone after the NP was established from 1994[19] onwards. This leads to benefit conflicts in exploiting and managing land, fish, and water resources. The land adjacent to the National Park is a rice-growing land that is producing 3 crops, so there is a high risk of polluting water sources in the NP. One provincial officer shared: "*In the past, mainly researched in area A1, because there is a lot of biodiversity in Tram Chim, then it was expanded to area A2, then we saw cranes coming back to feed in zone A3. In 1992, the new area increased to A4 and A5. That is the historical process. In the past, we needed to wade in the field to*

[19] TCNP has a long history since after 1960-1970s a large network of canals was excavated across the Plain of Reeds to lower wetland water tables and also impacted to average flooding in the depressions decreased from 12 months to 4-6 months (Hanhart and Ni, 1993). From 1990-1996, under pressure of population increase and rice production, a large reclamation on the Plain of Reeds required digging canals and drainage to remove acidity from soils. However, it caused several environmental issues like soil acidification and loss of functioning wetland ecosystems (Ni et al, 2006; Ni and Tuan, 2015, Ni, 2003). In 1994, Tram Chim Wetland Protected Area was established and then was upgraded to Tram Chim National Park in 1998 with the initial purpose to protect Sarus Crane.

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measure each area, the area expansion was about 10,000 hectares, not like now. Due to more and more agricultural development policies, some land becomes agricultural land" (TGP1, IPI, December 2020).

4.3.2.2 UMTNP

The park is surrounded by a 60km-long embankment system and covers 21,122ha of land in U Minh Thuong district, including 8,053ha of the core zone and 13,069ha of the buffer zone. A core zone's contiguous area (365 ha from the park boundary to canal 120) signed a contract with 76 local households for forest protection. Tourism occurs mainly along canal routes, such as recreational fishing, bird watching, and sightseeing. In the buffer zone, although it has not been officially implemented in reality, the government of two communes in Minh Thuan and An Minh Bac encourage people to plan fruit orchards such as dragon fruits, jackfruits, pineapple, oranges, mango, etc. for future tourism development (Figure 4.11).

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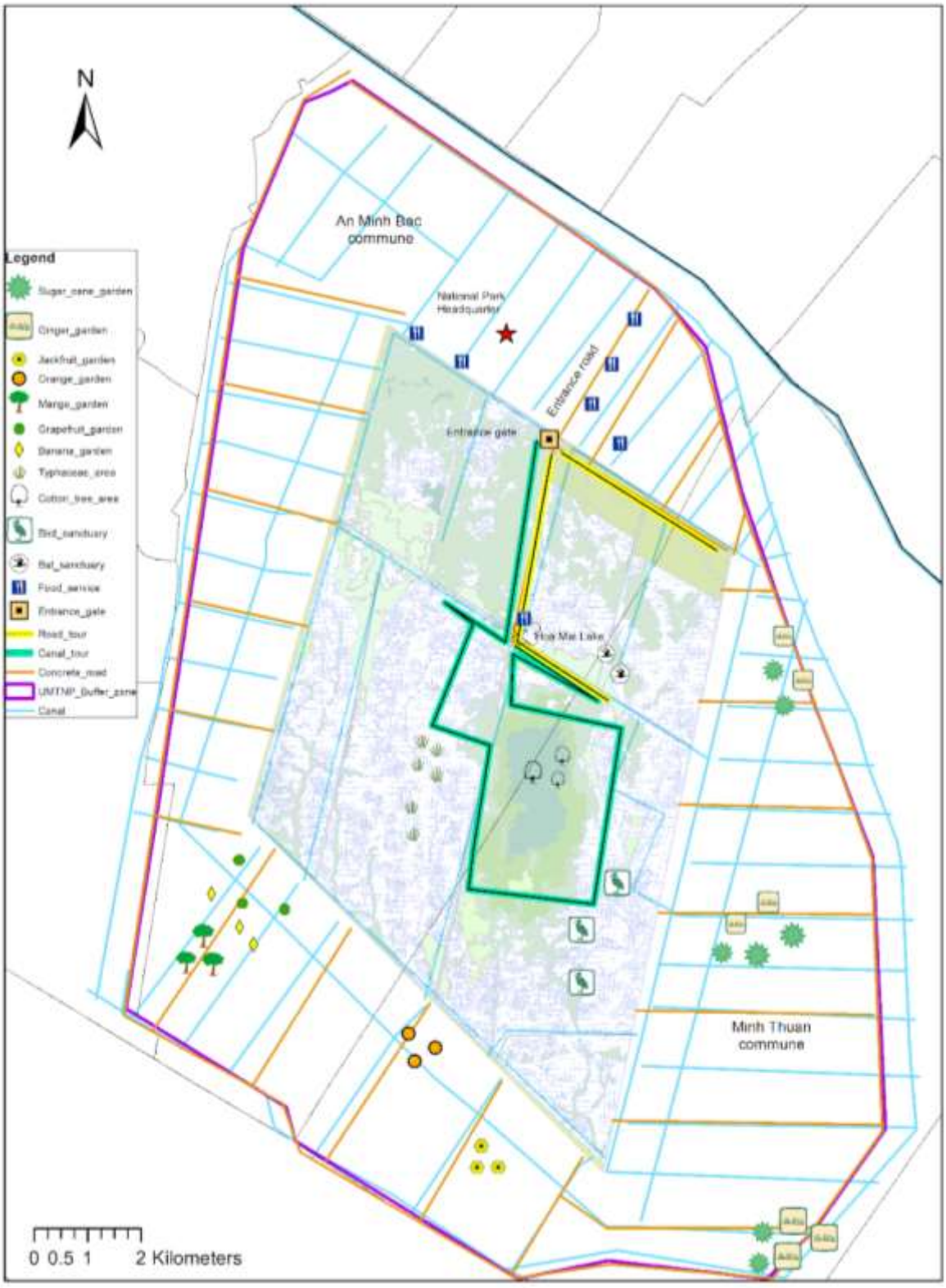

Figure 4.11 Location of tourism resources and routes in UMTNP (using PPGIS)

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Zoning of tourism resources and services in UMTNP also has similar strategies as TCNP in extending tourism space within the national park at the core and developing agritourism in the buffer zone in the form of satellite tourism points.

4.3.3 Changes of resources units

4.3.3.1 TCNP

Over time, some vegetation communities of TCNP have changed, with a decrease of upland communities such as Eleocharis; and an increase of lowland communities such as Panicum, Nelumbium nelumbo. The regeneration of Melaleuca and results of forest fire prevention in this decade have led to a significant increase of Melaleuca (Table 4.3).

Table 4.3 Changes of main plant communities in TCNP from 2009-2016

		Area of plant communities by years			The trend of change from 2009 to 2016 (+ increase; - decrease)
No.	Plant communities	2009	2013	2016	
1	Melaleuca	1901	2211	2435.7603	+534.7603
2	Panicum	451	269	617.1078	+166.1078
3	Eleocharis	1109	651	820.8972	-288.1028
4	Ischeamum	26	6	Polygonum tomentosum (30.509 ha)	
5	Nelumbium nelumbo	221	85	327.29	+106.29
6	O. rufipogon	27	37	38.154	+11.154
7	Mix-up	3853	4329	3073.8	-779.2

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The reduction in the area of Eleocharis partly explains the decrease in the number of Sarus cranes (Ni & Tuan, 2015) (Figure 4.12), an iconic bird of TCNP and a tourist attraction of this region. Those have impacts on tourism activities such as bird watching as well as the reputation of TCNP.

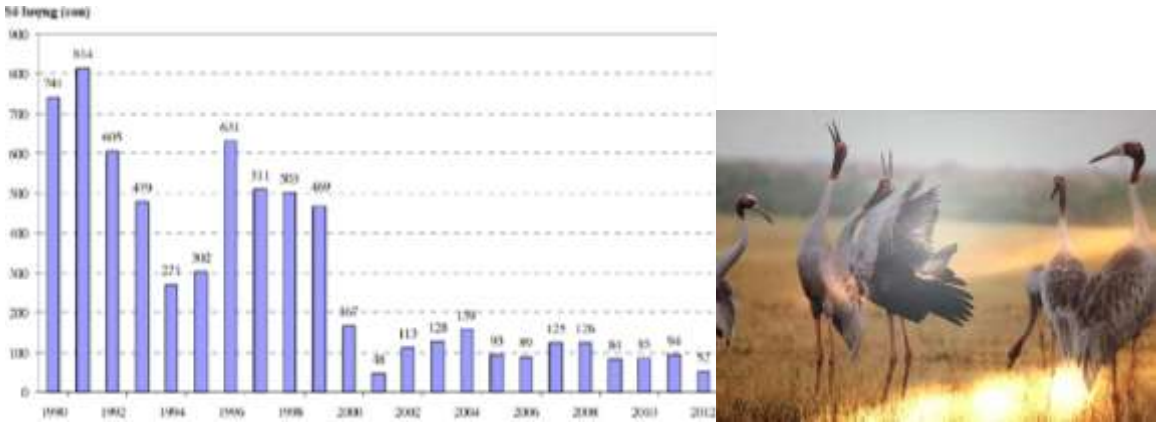

Figure 4.12 Variation of Sarus Crane number at TCNP from 1990 to 2010 (N i& Tuan, 2015) and Sarus crane in TCNP (photo by Nguyen Van Hung).

4.3.3.2 UMTNP

In 2002, UMTNP had a serious forest fire that destroyed a large area of the Melaleuca forests, and seasonally inundated grasslands were severely damaged and turned into open water bodies (in the map of 2003). In the satellite image, there is a remarkable change of vegetation from the period after 2003 to 2006/2008, after U Minh Thuong National Park implemented the hydrological regulation to promote natural regeneration of burned Melaleuca forest. Melaleuca forest has recovered 2,312.64 ha, reaching 72% of the burnt area in 2002. The areas where peat was burned out and meadow burned in 2002, are incapable of regenerating Melaleuca. In the seasonally inundated grasslands, there are mostly reed, Eleocharis, and Rockcap fern with an area of 1,828.11 ha. In inundated areas

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with an average of 40 cm of depth or more, after a long time, those areas transform to aquatic flora swamps of 1,126.74 ha with the dominant species being duckweed and water lily.

However, in 2009, a change was observed: a decrease in the area of the Melaleuca forest and seasonally inundated grassland, but an increase in the aquatic flora marsh (Table 4.4). In areas with a water depth of 40 cm or more on average for a long time, the root system of Melaleuca trees gradually dies out, the pneumatophores are unable to hold the Melaleuca trees, causing partial death of Melaleuca trees. In contrast, the process of water retention for a long time has increased the water surface area, creating conditions for aquatic plants to thrive.

From 2010 to 2020, after changing the water management plan in 2010, the water level in the U Minh Thuong National Park area is regulated to suit the existing topographical conditions and infrastructures. The Melaleuca forest has been changed and restored better. Areas of melaleuca forests on peatlands that have died from deep inundation have been regenerated. Seasonally inundated grassland was restored with an area of 1,838.73 ha. The area of swamp aquatic plants decreased by 1,828.04 ha. The vegetation cover of natural canals and ditches has no change in the area.

Table 4.4 Changes of main plant communities in UMTNP from 2006-2016

		Area of plant communities by years			The trend of change from 2006 to 2016
No.	Plant communities	2006	2009	2016	(+ increase; - decrease)
1	Melaleuca	4.936,24	4.437,88	5.007,59	+71.36
2	Grassland dominated by	376,94	182,6	153,23	-223.71

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	Eleocharis				
3	Grassland dominated by Phragmites vallatoria	1337,5	258,47	592,14	-745.36
4	Grassland dominated by Blechnum indicum, Stenochlaena palustris	113,67		403,81	+290.14
5	Swamp of aquatic plants	1.126,74	3.012,14	1.184,1	+57.36
6	Empty open water areas	348,86	353,48	22,35	-326.51
7	Water canals	96.21	96.21	96.21	0

(Source: People's Committee of Kien Giang Province, U Minh Thuong National Park (2016). Report on the status of biodiversity***)***

In brief, from 2002 to 2020, the vegetation covers of UMTNP experienced significant changes, from primary melaleuca forest to secondary melaleuca forest. Currently, the vegetation of UMTNP is still in a recovery period with an optimistic perspective after a serious forest fire in 2002, with 60% melaleuca forest still surviving. There are some open water bodies on swamps that are suitable for tourism activities like recreational fishing and sightseeing. The vegetation cover changes of UMTNP are strongly dependent on water management strategy. The strategy of deep and long-term inundation makes the area of melaleuca forests and grasslands decrease; water surface area, wetland aquatic plants increase, and vice versa.

In the wet season, after 2011 to 2020, the vegetation has a good recovery with major areas transforming from low and medium NDVI vegetation to high NDVI vegetation. Flood season is the season of green vegetation, abundant water, so tourism is very convenient. But the dry season from December to April is the season of migratory birds, so

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it is also suitable for bird watching activities. Therefore, in the whole year, diverse resources are impacting different tourism activities

4.3.4 Customary and formal restrictions for using resources in tourism

The law used in the management and development of TCNP today is still based on the forestry law enacted in 2001 and revised in 2006, according to Decision No. 186/2006/QD-TTg dated August 14, 2006, by the Prime Minister of Vietnam. Accordingly, the national park is a special-use forest that needs to be strictly protected and all management is controlled by the PPC under a strict law system from the central government with fragmented and overlapping participation and an unclear division of responsibility between administrative levels (Dung et al. 2012, VNFOREST 2014). Therefore, the tourism development of two NP is restricted with several legal provisions. Based on our surveys, there are three main formal restrictions of using tourism resources in two NPs: legal provisions on the rights and obligations in tourism exploitation in national parks, tourism services assignment (benefit sharing), and tourism using zones. The rate of response in comparison between TCNP and UMTNP shows that those restrictions mentioned by interviewees in TCNP significantly exceed that of UMTNP. Specifically, 19% of interviewees mentioned legal provisions on rights and obligations in tourism exploitation in the National park in TCNP, meanwhile that rate in UMTNP is only 11.1%; the rate of interviewees mentioning regulation of tourism services assignment in TCNP is 11.5% and in UMTNP is 22%. Strikingly, there is no one mentioning regulation of tourism using zones in UMTNP but 19% of respondents mentioned it in TCNP. We argue that the regulations in tourism operation in TCNP are more widely known than in UMTNP, which proves that the development of tourism in TCNP is more advanced than UMTNP.

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Accordingly, in terms of Legal provisions on rights and obligations in tourism exploitation in National parks, in TCNP the most mentioned regulations are related to forest environment renting, bidding, and food services. Meanwhile, wild animal hunting is forbidden. One local person working in tourism shared: *"I want to expand tourism but the national park is of the world, so how can I do it if the leaders do not allow it. The area of the national park is 7,300 ha and if there was an opening of an amusement area, entertainment services, and a fishing area, it will be very attractive to visitors, but this is not allowed*". (TLT3, IPI, December 2020). Another local person shared: "*In the past, for the long tours, people organized eating and drinking services inside, tourists also liked it. Now that it's forbidden to eat inside, visitors have also reduced"* (TLT2, IPI, December 2020)

By comparison, in UMTNP the most mentioned regulations related to recreational fishing restriction; construction restriction. One local person shared: *"NP bans multiple-rod fishing or netting. They stipulate for 1 person to bring a maximum of 3 fishing rods. For example, use a snakehead fishing rod, the other is a perch fishing rod. Now NP ban Channa lucius fishing in any form for fear of it being extinct. If they are discovered, visitors will be caught, fined and visitors have to release the fish. If they violate more than 3 times they will be photographed and be banned from entering. [..] This area is a national park, so they just developed eco-tourism to conserve nature. They do not allow us to build construction or anything new or build entertainment places. The state invested to construct the main road, and some paths for forest rangers to go around and on patrol*" (ULT2, IPI, December 2020)

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In terms of benefit sharing, the most mentioned issue is about tourism services assignment in both TCNP and UMTNP, interviewees mentioned assignments in tour guide services and transport services. One TCNP officer shared: "*NP safeguards will be in charge of taking visitors to canals or taking visitors to the flower field to visit. Sharing a portion of the tourism budget so that the safeguards can have more income"* (TN1, IPI, December 2020). Regarding transportation service in TCNP, one local person working in tourism shared: "*Each boat driver is given a number and assigned visitors. […] The receptionist welcomes visitors, issues tickets and arranges visitors by number, which are assigned to specific boat drivers"* (TLT1, IPI, December 2020).

In UMTNP, the Tourism services assignment is mentioned mainly in transport services. One boat driver claimed that sharing is very fair: *"In which, the state stands out to sell tickets, sell tours and do administrative work, arrange boat drivers, so there is no kind of a mess here. We have 7 boat drivers and we are assigned fairly. The income is shared fairly and if we have more tourists, we did a good job we can have a bonus"* (ULT1, IPI, December 2020). Benefit sharing also goes along with responsibility, another boat driver shared: "*I drive this boat by myself, this boat is mine, no one can help me to drive it except my children. People here cannot replace me. [..] In the past, I worked under a contract with the government, they paid me my monthly salary. Now, they have a socialization policy. There are 7 drivers here, they will assign us 7 numbers randomly.*" (ULT2, IPI, December 2020).

The tourism services assignment presents the benefit-sharing mechanism of NPs in tourism activities, the question that arose is who can join in. This reflects the customary use of resources in NPs in which people who have networks or relations with national park

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managers can take advantage. One NGO officer clarified: "*But for those who want to be involved in tourism activities such as driving boats or vehicles in the national park, they need to have relations with national park managers such as relatives, it's difficult for strangers, and this it is typical for Vietnamese people*" (NGO1, IPI, November 2020). This problem is also found in the benefit-sharing of other resources like in TCNP, there is a regulation in resources sharing of "fish – grass – wood" (Cá - cỏ - củi), however, our investigation shows that not all people who are under the poverty line can access those resources fairly.

4.4 Actors and governance systems

4.4.1 Actors

In SES, Actors are individuals using NPs in various ways for livelihood, recreation, or other commercial purposes. From an ecotourism perspective, actors can be people who are working in ecotourism and not directly working on ecotourism, but are impacted by the resources system and visitors. Based on our observations, in the two NPs, most people working in ecotourism are local people, so there is no risk of a "leakage" of resources in tourism development in the two NPs so far. Since Covid-19, during our field trip and scoping trip we did not have a chance to meet and investigate visitors. This is a limitation of our study. Therefore, in this study, we focus on local actors who are people making a living from the tourism industry in national parks and who also engage with some people who are not working in tourism but use NP resources. There is no local data recording exactly how many people are working in the tourism industry in the two NP. This is aprtly because tourism plays a modest role in economic revenues. In the case of TCNP, tourism contributes about 11% of GDP in 2019 and provides jobs for about 100 laborers who work

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regularly in this field (Tam Nong District People's Committee (TNDPC), 2020). Meanwhile, in UMTNP there is no official record of people who work in tourism. As our on-site investigation shows, 7 boat drivers are officially working in transport service for tourism, and there are about 10 food shops and inns along the main road, 1 canteen inside UMTNP with the number of estimated laborers being around 30 people. In our survey, 13 interviewees have been working in tourism participating in our in-depth interviews which accounted for 7-10% of employees working in tourism of each NP (TCNP – 150 labors); UMT (30-labors).

In TCNP, laborers work mainly in transport services (boat drivers in the national park and motor-taxi drivers (about 50 laborers) to transport tourists from the bus station to the main gate of TCNP) and tour guides. Currently, in the TCNP buffer zone there are five homestays; one showroom with displays of tourism products, one bus stop specializing in selling paintings and photos of Melaleuca bark for visitors, one Farmstay, five hotels, and 20 inns which attract 30 laborers.

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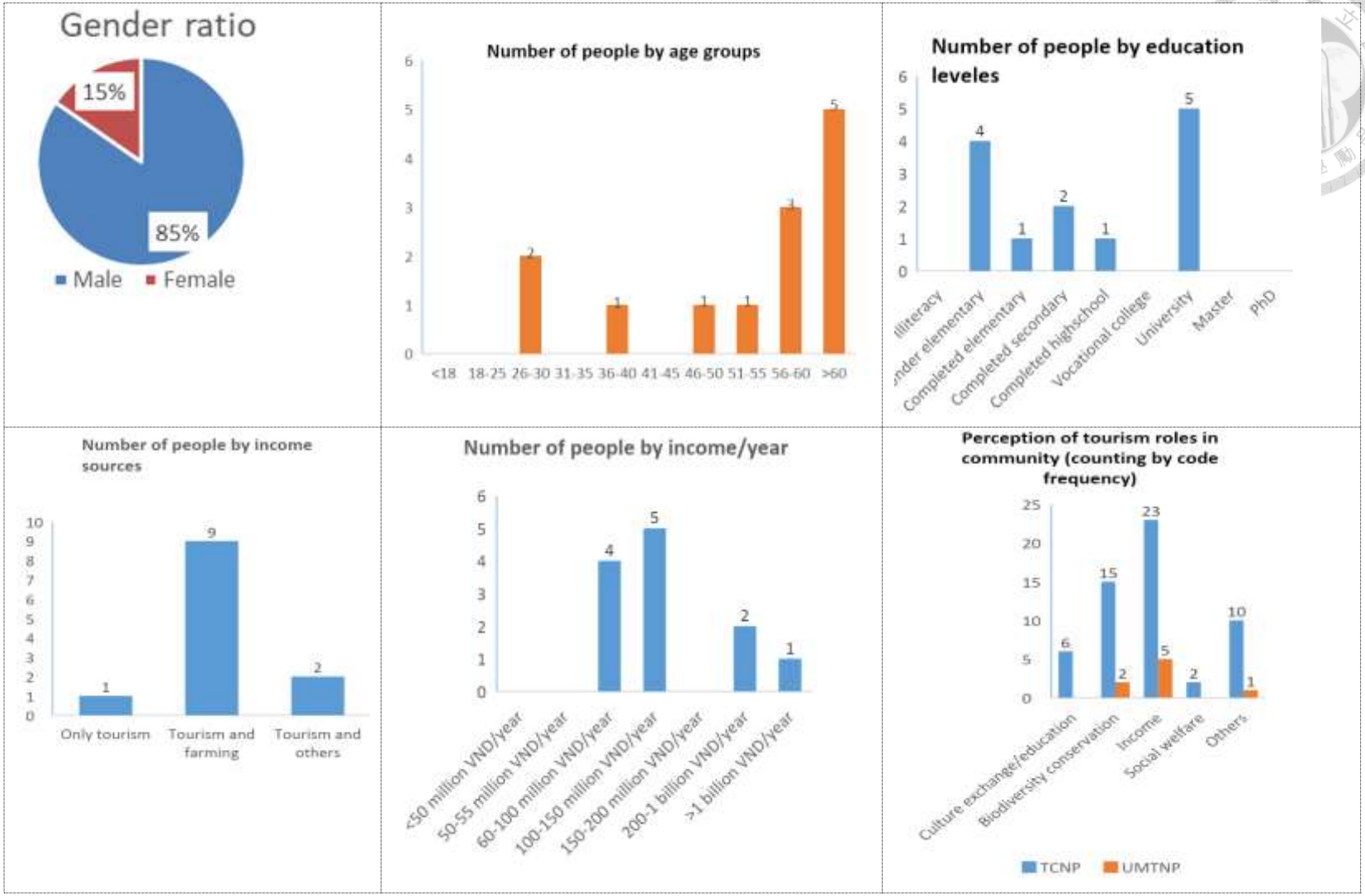

Figure 4.13 Basic statistics on gender structure, age, education level, average income, livelihood, and perception of the role of tourism of interviewees who are working in tourism in the two NPs

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According to our observations and interviews, male laborers dominate the tourism industry in the two NPs, especially in transportation services at a 100% (Figure 4.13). The age of participation is usually 40 years or older and educational backgrounds are very diverse, from primary school completion to university level. Over 90% of people working in the tourism industry have another livelihood, most of them doing tourism combined with farming. Tourism plays an important part in income generation for these families. Specifically, 100% of surveyed households have income higher than the average in the commune. There are 2 surveyed households with incomes that are 20 times higher than the average income. Analyzing the results of the in-depth interviews, we found that in the roles of tourism mentioned, income was mentioned with the highest frequency in both NPs, followed by biodiversity conservation, others, culture exchange, and social welfare.

According to the SES framework, users interact with the resources system by both self-organization and through government control. In two case studies, ecotourism activities of users were mainly under control by rules set by the governance system which define zones, times as well as regulations of monitoring and sanction progress, etc. In section 4.3.4 we analyzed part of this interaction of customary and formal restrictions of using resources in tourism with a benefit sharing mechanism. In the next part, we will explain this interaction by analyzing governance actors and how governance systems set and implement the rules in managing ecotourism resources and activities.

4.4.2 Relevant stakeholders in governance system

In SES, governance actors are individuals, local communities, government agencies, and other stakeholders. Further, governance systems refer to rules and violations, and other

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governance arrangements. In this section, the study focuses on analyzing government actors or relevant stakeholders in the tourism and government system presenting in the governmental regulatory framework for natural resources in tourism. For all resource management and also economic development in NP, it depends on the state through the Ministry and Provincial People's Committee. That is the reason why "people", "provincial" and "committee" appear at the highest frequency among the words.

There is direct and indirect involvement of many stakeholders in tourism activities. In which, the PPC is the leading agency. For tourism development of national parks, there will usually be indirect involvement of the Department of Natural Resources and Environment, the Department of Finance, and direct involvement from the Department of Cultural Tourism and Sports with the function of research, recommendation, and policy advisory to the PPC (Figure 4.14). In addition, a department that acts as a provincial department has a direct role in operating and managing tourism activities called the Center for Investment, Trade, and Tourism Promotion. In the case of TCNP, the Center for Ecotourism and Environmental Education which is responsible for tourism development in TCNP is the main agency directly under the Center for Investment, Trade and Tourism Promotion. Mentioning the role of the Center for Investment, Trade and Tourism Promotion, one provincial officer in Dong Thap shared: "*We have legal support and support administrative procedures, business licenses, licensing processes as well as vocational training. Then, when you open a farm stay and you do not know how to register for a business license or how to register for residence, the state will support you. Or if you work in tourism but you are not professionally trained, I will regularly organize training courses on skills as well as communication skills for free, then we have an annual budget which the center*

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proposes and approves. If we didn't organize classes that year, people wouldn't be trained, which means we can't spend money" (TGP4, IPI, December 2020). In addition, one provincial officer pointed out the good and bad sides of the engagement of the Center for Investment, Trade and Tourism Promotion in TCNP tourism after 2014: *"The good side is more professional services and more investment in tourism, […] accordingly, if TCNP does not operate tourism well, they can ask the Center for consultancy to support it somewhat. However, the bad side is that under the same NP, the tourism operators mainly make money from resources, and the TCNP management board mainly preserve it, so conflicts arise. [..] In the past, the TC tourism center had to listen to the NP management board because it was a subordinate unit. Now, instead of listening, the NP management board is coordinating. However, in Vietnam, successful coordination is difficult. […] In the NP, there must be an ecotourism department and it must be managed in NP; true ecotourism is under the management of the NP. On the tourism side, they want to explore everywhere and they don't like to follow a certain route.""* (TGP1, IPI, December 2020).

In terms of management at TCNP, it is important to note that park managers are responsible for conservation issues and ecotourism centers are responsible for ecotourism issues. Although both ecotourism and conservation parts are under the management of PPC, the interaction of benefit sharing between resource uses (in particular in ecotourism) and resource conservation is very loose and arguably the main concern of the conservation part. Many officers of the TCNP management board feel dissatisfied because they participate in conservation but the benefits are enjoyed by the tourism part. The percentage of 1% from tourism revenue of TCNP sharing for conservation is considered modest and does not support conservation much. Many

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TCNP officers want the tourism management mechanism to return to how it was before 2014, i.e. ecotourism is a subordinate unit of the NP management board, but this poses challenges to TCNP in particular and Dong Thap province in general in regard to tourism management capacity. Therefore, we suppose that for sustainable development in ecotourism and conservation in TCNP, PPC needs to consider the agreement and adjust the benefit-sharing between these two parts of ecotourism and conservation in a more reasonable way.

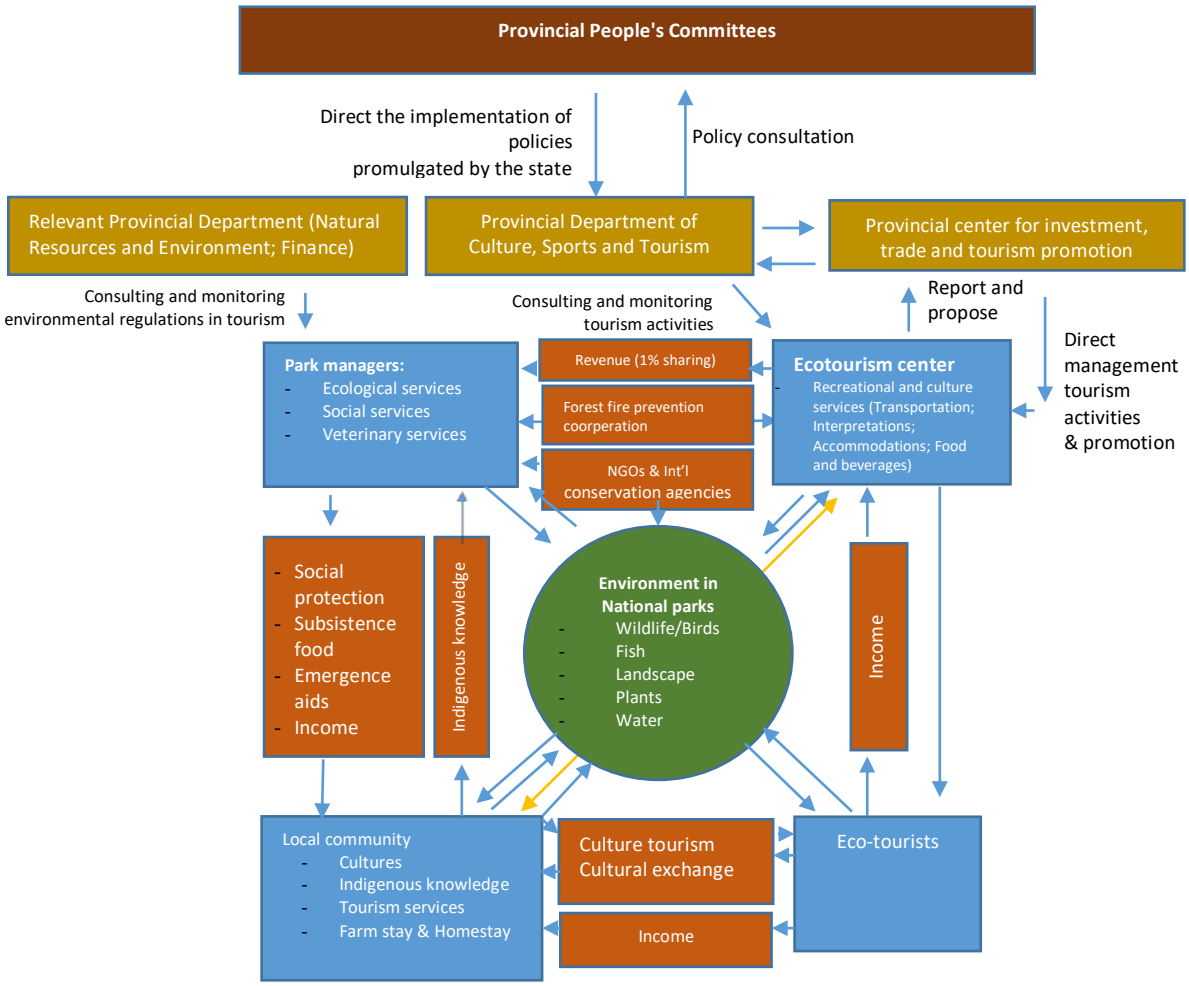

Figure 4.14 Tourism stakeholders and interactions in Tram Chim National Park

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Regarding tourism development and management of UMTNP, one communal officer stated that tourism in UMTNP has centralized management: "*Tourism development is a higher level, at the commune level, we are not able to do it. Like bidding or leasing, forest environments need the provincial government to lead*" (UGC1, IPI, December 2020). To develop tourism in a poor area like UMT, Kien Giang PPC, in consultation with agencies such as the Department of Finance and the Department of Tourism, determines the construction of infrastructure such as traffic is a priority to create the connection of tourist spots and routes of the province with UMTNP. Therefore, the interaction of the PPC and other provincial departments and the UMTNP is mainly presented through the construction of basic infrastructures and proposals in tourism activities. One local person shared that: "The *tourism department of the province invested in road construction. This road, in the past, was rugged, after they invested, it was raised up. That investment on the road is very good and people can travel conveniently"* (ULT2, IPI, December 2020).

The distinct difference in government actors and systems of tourism in the two NPs is presented at a meso level (national park). Specifically, the tourism development of the UMTNP has a repetition with the tourism development of the TCNP in the period before 2012, when tourism activities here still take place under the management of the national park. This means that all tourism decisions need to be approved by the national park management board before being proposed to the provincial level (Figure 4.15). Located on the peatland, the prior concern of the national park management board is forest fire and conservation issues, the negative impact of tourism on biodiversity, therefore, is that tourism activities still have not had a breakthrough.

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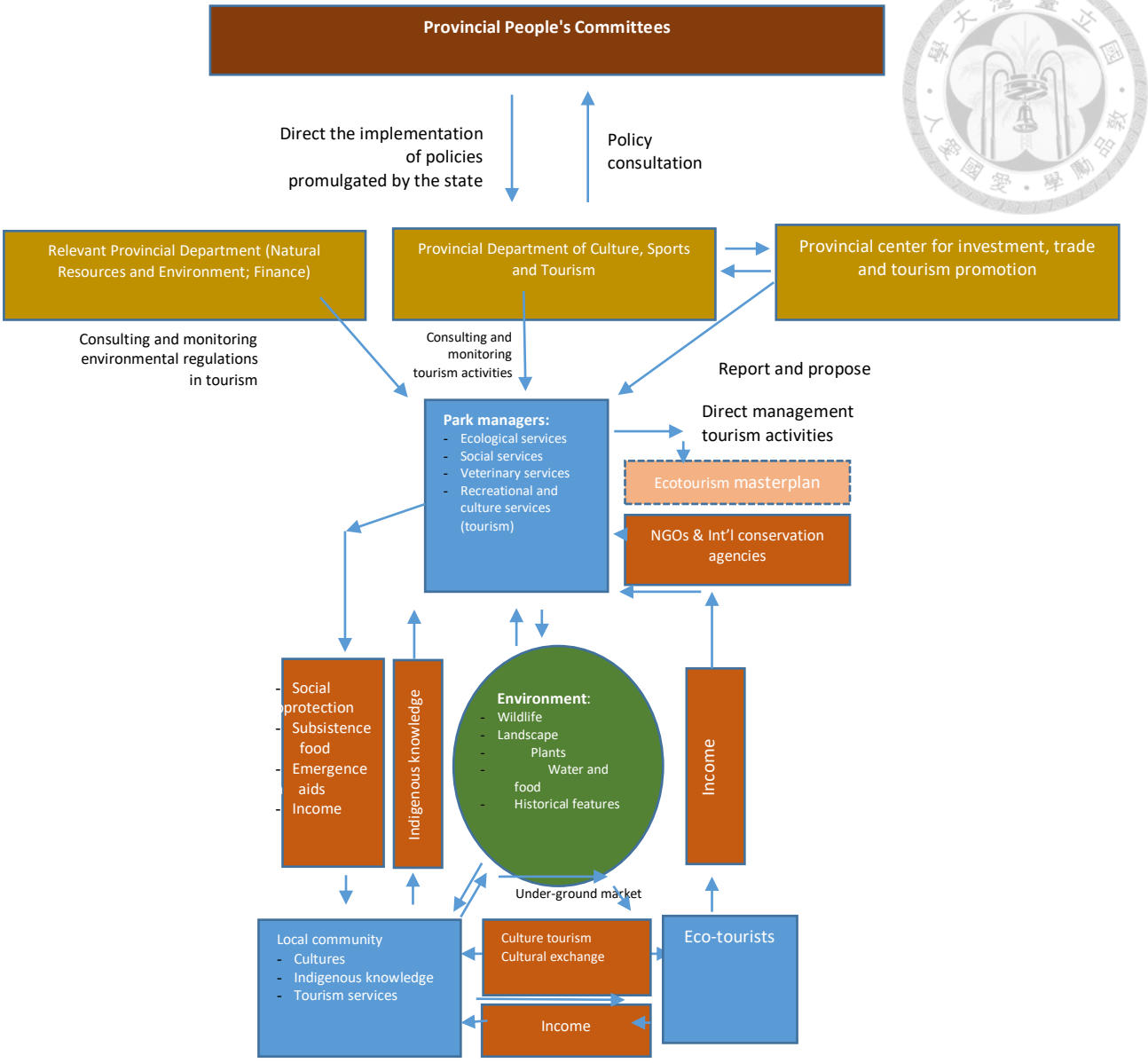

Figure 4.15 Stakeholders in tourism and interactions in UMTNP

Besides the road construction, the interactions of PPC and other provincial departments and UMTNP in ecotourism management are not clear and strong. That leads to tourism activities here being spontaneous and even some underground market activities in tourism products consumption such as wild animals. It can be explained by two reasons. One provincial officer

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explained that investors are not interested in ecotourism due to needs of visitors: "*In Kien Giang, there is a lot of investment in tourism, large corporations, and international corporations, but most of them invest in accommodation, and tourism products, especially eco-tourism, only have marine eco-tourism, ecotourism is only a small product, not the main product. There is no travel agency specializing in only exploiting ecotourism. It depends on the travel agency. They have to diversify products to suit the needs of visitors"* (UGP1, IPI, December 2020).

One UMTNP officer shared the second reason which was because the management capacity of the UMTNP Management Board is still limited and there are no people who have expertise in tourism, and most of them are mainly on the conservation side, without thinking about the tourism economy: *"In UMTNP, tourism is unmanaged, because there is no leader in tourism, the leaders do not know, no training in tourism development and also the government's lack of a mechanism for tourism development"* (UN4, IPI, December 2020).

Notably, there are many similarities of the current period UMTNP with TCNP in tourism exploitation before 2014. Therefore, we can not only make a comparison between the two NPs in how the efficiency of different strategies in tourism management can impact sustainable development and climate change adaptation but also observe the revolution of tourism development in national parks in Vietnam. UMTNP can choose the solution for improving their management capacity in tourism as the way TCNP has done since 2014, that is, tourism will separate and become a separate part of the NP, but learning from the lessons of TCNP, the UMTNP will need to pay attention to the benefit sharing between conservation and ecotourism, otherwise the UMTNP will choose a completely new direction. To find a good choice for tourism

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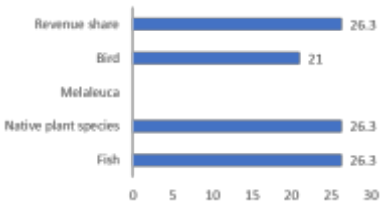
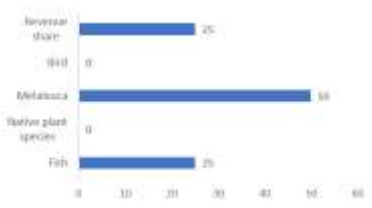
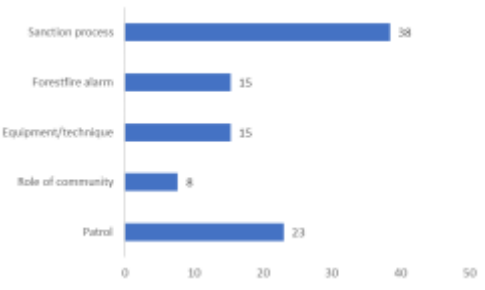
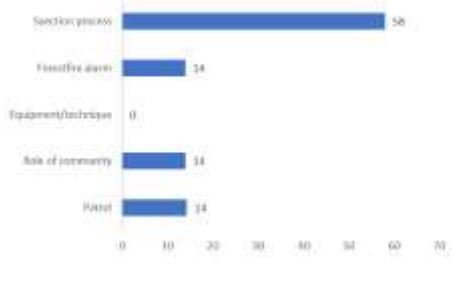
transformation of the two NPs, we will analyze elements of the government system through the governmental regulatory framework for natural resources in tourism development.

4.4.3 Governmental regulatory framework for natural resources

In this research I argue that there is a big gap between regulation and real implementation in Vietnam's national parks, therefore, besides reviewing regulations in documents, we also based on our text analysis of in-depth interviews to find which terms repeated can be coded into subthemes as concerned or important regulatory (Table 4.5)

Table 4.5 Responses of interviewees related to government regulatory framework from natural resources in tourism

	TCNP	**UMTNP**
a. Biodiversity conservation	Percentage of codes: 82.6%	17.4%
		
b. Monitoring processes/ Sanctioning processes	Percentage of code: 65%	35%
		

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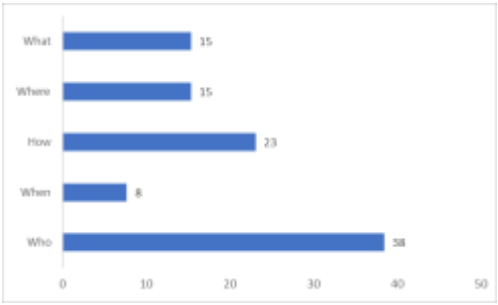
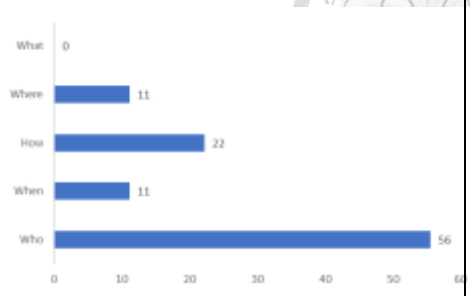
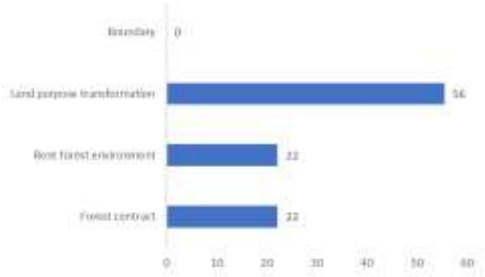
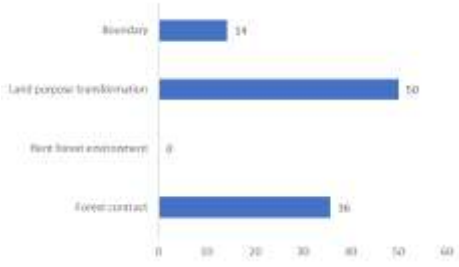
c. Operational rules	Percentage of code: 59% 	41% 
d. Property system	Percentage of code: 39% 	61% 

The results show that the number of codes of TCNP exceeds that of UMTNP in three elements, especially biodiversity conservation. Only the property system was discussed more in the UMTNP interview. In terms of biodiversity, the interviewees all mentioned revenue sharing between tourism and biodiversity conservation. However, in UMTNP, the sharing is subject to the law of 25% of tourism revenue for biodiversity conservation. Meanwhile, in TCNP, this ratio is only 1% of the budget, which shows the inconsistency of the policy implementation in tourism and biodiversity conservation benefit sharing in Vietnam's national parks. The separation of tourism management outside the general management of the NP makes the tourism activities of TCNP more attractive and have higher revenue but only 1% of the budget is paid for conservation that raises the question of sustainable development especially in the concerns of

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other biodiversity conservation issues such as the decline of native plant species, fish and birds (Table 4a). In UMTNP, on the contrary, the most concerning issue is in the forest, especially melaleuca (50%) and fish (25%). One TCNP officer shared more details of this benefit sharing: "*Now the rule is that we spend 1% of the total revenue. For example, if you collect 1 billion, you take 1% of the total revenue to pay for forest environmental services. [..] Certainly, I think it's not enough, but that's the rule, only 1% of revenue is deducted to pay for forest environmental services, and the issue of reinvesting in conservation is a matter of plans. Additionally, 1% of the forest environment is mandatory in the whole Dong Thap province, 1% of all tourism units, and 2% of all units related to water supply and hydropower*" (TN2, IPI, December 2020).

The NP monitoring and the sanctioning process is an important activity on the use and management of resources. In which, both NPs mentioned the most about the problem of sanction processing (fine or arrest unauthorized entry) with TCNP (38%) and UMTNP (58%). The forest fire alarm is also an important point in the monitoring process with the support of technique/equipment in TCNP (15%) and patrol (23%). One district officer of Tram Chim shared: *"In the national park, there are automatic remote water monitoring systems and there are remote control drones for early detection and paths for patrolling*" (TGD1, IPI, December 2020). Meanwhile in UMTNP, the role of the community in the buffer zone in the monitoring process plays an essential role and they also are the ones who can break the rule, so the patrol is also important (14%). One UMTNP officer shared: "*These 76 households will manage the forest together with the NP and if anyone breaks in illegally, they will report it to the NP*" (UN1, IPI, December 2020). In TCNP, there has been the application of technology to monitoring as well as patrol activities, while in UMTNP, the fact shows that the self-discipline of the community

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around the garden plays an important role. Poor households around the park often have unauthorized entry to the national park for catching fish or hunting, which also puts pressure on resource problems in both NPs.

With the question about operational rules which identify Local rules for defining Who, How, Where, When, and Why have access to local natural resources. Both NPs have quite similar regulations on who can access "tourists" and people working in tourism services can access natural resources with "how" methods such as "buying tickets" for tourists, "bidding," and "contracting" people working. Regulations on "when" such as fishing time are regulated in both areas based on the dry situation to stop tourist activities in the dry season from April to June every year and "where" like the area exploited for tourism. However, on the TCNP side, the content about "what" and which resources are allowed to be exploited is mentioned more specifically than UMTNP with main mentioned resources like "fish," “wood,” and "grass."

The most mentioned problem in the property system in tourism in both TCNP and UMTNP is land use purpose transformation. The NP is a common resource established with the main purpose of biodiversity conservation, however, before and after it was established, the land use purposes also differed. The issue of using buffer zone land for tourism purposes is an obstacle for residents as well as investors. Both areas are regions with a long history of immigration, mainly after 1975 the process of reclaiming wasteland and providing land for people in the National program of building New economic zones after Reunion. The people in the buffer zones of the NPs are provided with land for living and production. However, because of living on

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forestry land, so they were provided a green book[20], not the red book which is officially known as the Certificate of Land use right. The basic difference of the green book owners is that they are not entitled to mortgage, selling, or converting land use purposes. That significantly affects the economic development orientation of the two NPs, especially in tourism development. Explaining of land issues in two NPs, one NGO officer shared: "*The green book is rented land, which means that the state will not take away that part of their land and will not recognize that land as theirs, but only because they have lived in it since old times, so the government still allows them to stay and do the production. When they no longer stay or no longer need it, the state can withdraw it. Rent but don't pay. It is a form of recognition, but it is impossible to sell the land and must keep the status quo without changing or doing anything more, if you want to do anything on that land, you must get permission*" (NGO2, IPI, December 2020)

Therefore, the purchase and sale of land and the conversion of land use purposes are also implemented more strictly. This has an impact on the problem of converting forestry land into the tourism business. Many households conduct homestays or farm stays that do not affect the ground, and must not change the landscape. This supports sustainable development but causes anxiety for investors. Therefore, the number of households doing tourism is few and most of them are small-scale. From the sustainable livelihood approach (Scoones1998), in NPs, people were attracted here by the strengths of natural capital (land, water, fish resources from the wild) and political capital (policy to encourage new immigrants) to migrate to here; however, by the

[20] A green book is a certificate of land use rights issued by a forest enterprise for management, exploitation and afforestation with a term of usually 50 years. At the end of the time limit, if the land user wishes to continue using the land and in the process of using the land strictly abides by the law on land, the State shall allocate such land for continued use. Pursuant to Article 20 of the old Land Law, specifically 1993 and Article 6 of Decree No. 2/CP in 1994 of the Government

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time those capitals are changing and becoming obstacles to the development of the economy and the quality of life of the people, that explains for emigration trend in many PAs in Vietnam.

In addition, the boundary problem is repeatedly emphasized in a need for a clear boundary between the accessible land and the production land. However, in TCNP, this boundary is not clear, so the conflict about "who" has access to resources is also a concern. In addition, in the UMTNP, the activity of renting a forest environment has not been implemented in tourism, meanwhile the content of the forest contract has been discussed quite a lot and clearly.

4.5 Conclusion

In brief, tourism development of the two national parks contributes to income at household scale and economic development of national parks in the core zone and buffer zones. It also extends the economic value chain of agricultural products in the form of agritourism in the buffer zones and enlarges tourism space with the national park as a core and buffer zone as satellite tourism points. As a result, it diversifies tourism products and services around national parks.

Two national parks have different ways of conducting tourism management and development. In the case of UMTNP, tourism development has been at a slow-growing pace which derives from several reasons such as conservation concerns, especially the apprehension of melaleuca forest fires on peatlands, which can threaten biodiversity. Another reason is due to the lack of management capacity of officers at the meso level (NP and local) who have no expertise in tourism development, as well as lack of direction from the provincial level. Tourism in UMTNP develops sporadically, spontaneously, and only a very small part of the people benefit, while the land fund for agriculture and forestry is large, so people do not urgently participate in

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tourism. While in TCNP, tourism development orientation is clear and synchronous from the provincial, district, and NP levels. Partly due to the pressure on resources such as small areas of agricultural land, people also want to switch to tourism activities with higher income. Tourism is managed under a specialized tourism agency to facilitate investment, promotion, and development. However, the problem of sharing benefits between the tourism and conservation departments, especially the small sharing ratio, makes conflicts appear and intensify. With the above characteristics, in the next chapter, we will continue to analyze the impact of climate change on these two tourism models as well as the adaptation of these two models to the above change.

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Chapter 5. The nexus of climate change – wetland protected area resources – tourism development from social ecological system

5.1 Introduction

Climate change and wetland: Wetlands are an ideal area for SES approach because of its diverse and dynamic nexus to both ecological and social systems (Downard et al, 2014). In addition, climate change is a threat to wetlands because it alters patterns of water use and increases the threat of serious drought and flooding (Knapp et al. 2008; Erwin 2009). Further, it stresses vegetation and increases uncertainty about wetlands threats and the performance of various management options (Oki and Kanae 2006; Acreman et al. 2009). According to the Millennium Ecosystem Assessment, climate variability and change is a direct driver which unequivocally influences ecosystem processes (Nelson et al. 2006). However, literature in the SES approach detected an absence of several SES components in research of adaptation and vulnerability (Salgueiro-Otero & Ojea, 2020). This disparity is greater for interactions among social and ecological systems, and External Related Ecosystems. Therefore, in this study, we consider CC impacts and adaptation with the changing landscape of wetlands as the main subject and investigate the interaction of ecological and social elements. This can facilitate decision making and adaptive governance of wetlands in the context of uncertainty.

The two selected research sites are typical representations of Ramsar sites for the VMD. In which, TCNP is inland forested wetlands and UMTNP is inland peatlands. The major drivers of change in these two NPs are water, biota, drainages, conversion, sediment, nutrients, and burning (Ramsar, Global Wetland Outlook, 2018). Identifying the main drivers impacting landscape changes influences adaptation choices as well as trade-off and synthesis management

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strategies. Among the main drivers in the two NPs, based on available data, we selected water, burning, drainages and biota as the main subjects for analysis. In which, we argue that vegetation cover changes can become a significant indicator of Anthropocene in this area. Vegetation cover is an important element constituting the landscape and the attractiveness of tourism in the two national parks. Further, it has reflected interactions of ECO such as climate pattern, hydrological regime, and nutrient cycle, etc. Also from the SES framework (Ostrom, 2009), the growth of vegetation manifests the outcome of resource management in the ecological performance efficiency of biodiversity conservation which is analyzed by NDVI change and also water management and forest fires prevention.

Justifying forest fires prevention as an outcome: There are several drivers for forest fires like vegetation features, igniting agents, fire season length, and human activities such as fire management regulations and landscape fragmentation, all of which can have a significant impact on fire regimes (Flannigan et al., 2000). Changes in climate directly affect fire frequency and severity (Nitschke & Innes, 2007) such as changes of temperature, precipitation, wind, cloudiness, and extreme events. Under a warming climate, climate change is one of the main culprits of vegetation change (Dale et al., 2001; Overpeck & Rind, 1990; Williams et al., 2010). Working Group II of the Intergovernmental Panel on Climate Change (IPCC) predicts greater fire frequency and intensity in many parts of the world, particularly where climate models show more droughts (IPCC, 2007). In two NPs, we selected forest fires prevention as an indicator of social ecological interaction outcome because forest fires are one of the main drivers for the vegetation change in the two NPs (Ramsar, Global Wetland Outlook, 2018). Forest fires are considered a “visible” outcome mentioned in most of the local reports of wetlands’ PA

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management and climate change adaptation and therefore it is a major concern of PA managers in the two NPs.

The common trend of flood frequency in the VMD is a significant decrease over the past 20 years with various reasons such as dyke construction, bed river mining, dam construction in the upper Mekong river streams, and climate change (Park et al., 2020; Thanh et al., 2020). Distinguishing between 'good flooding' and 'bad flooding' in the VMD is still controversial and depends on the local perspective (Kuenzer et al., 2013a). However, various studies stated that a decrease of flooding in current years has caused a decrease of water flows, sediments, aquatic resources and has had a bad impact on local livelihoods (Vu et al., 2021; Manh et al., 2014). In our study, the interviewees mentioned the decrease of flood frequency and increase of drought as a risk for forest fires and therefore management of GS to forest fire prevention also considered those factors. Thus, we select forest fire prevention as an integrated outcome of risk management of GS rather than different separate extreme events.

Climate change and water flow: One special concern that PA managers of the VMD have noticed is the change in water flow from the Mekong river and that problem is becoming more and more serious with the increase in the number of hydropower dams in the upstream and downstream areas. The reduction in flow discharge, time of flood arrival, and amount of sediments and aquatic resources brought by the Mekong River in recent years have had a great influence on all aspects of life in the VMD region such as agricultural production, daily life activities, and biodiversity. That is also the reason that most of the research focuses on water management issues especially in the field of agriculture. However, the Mekong flow issue is considered to be a transboundary problem, and therefore it is difficult to solve this problem

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effectively without the cooperation of upstream countries such as China. Therefore, we suppose that in the current reality within the boundary of the VMD there are also several urgent problems that need to receive more attention. This is especially true for WPA which are areas that nurture aquatic and diverse natural resources for the VMD in agricultural development as well as other livelihoods such as ecotourism. Therefore, we choose climate change as the key external related ecosystem of WPA for analysis in this study.

Analytical framework: As a part developed from the research framework (see Figure 2.2), in the chapter V, we focus more on the ecological system of SES with the focus being the left side of the analytical framework which is inside the orange box (Figure 5.1). The remaining dimensions will still be analyzed with general interactions. In chapter VI, we will focus more on the social dimensions including GS and Actors in climate change adaptation.

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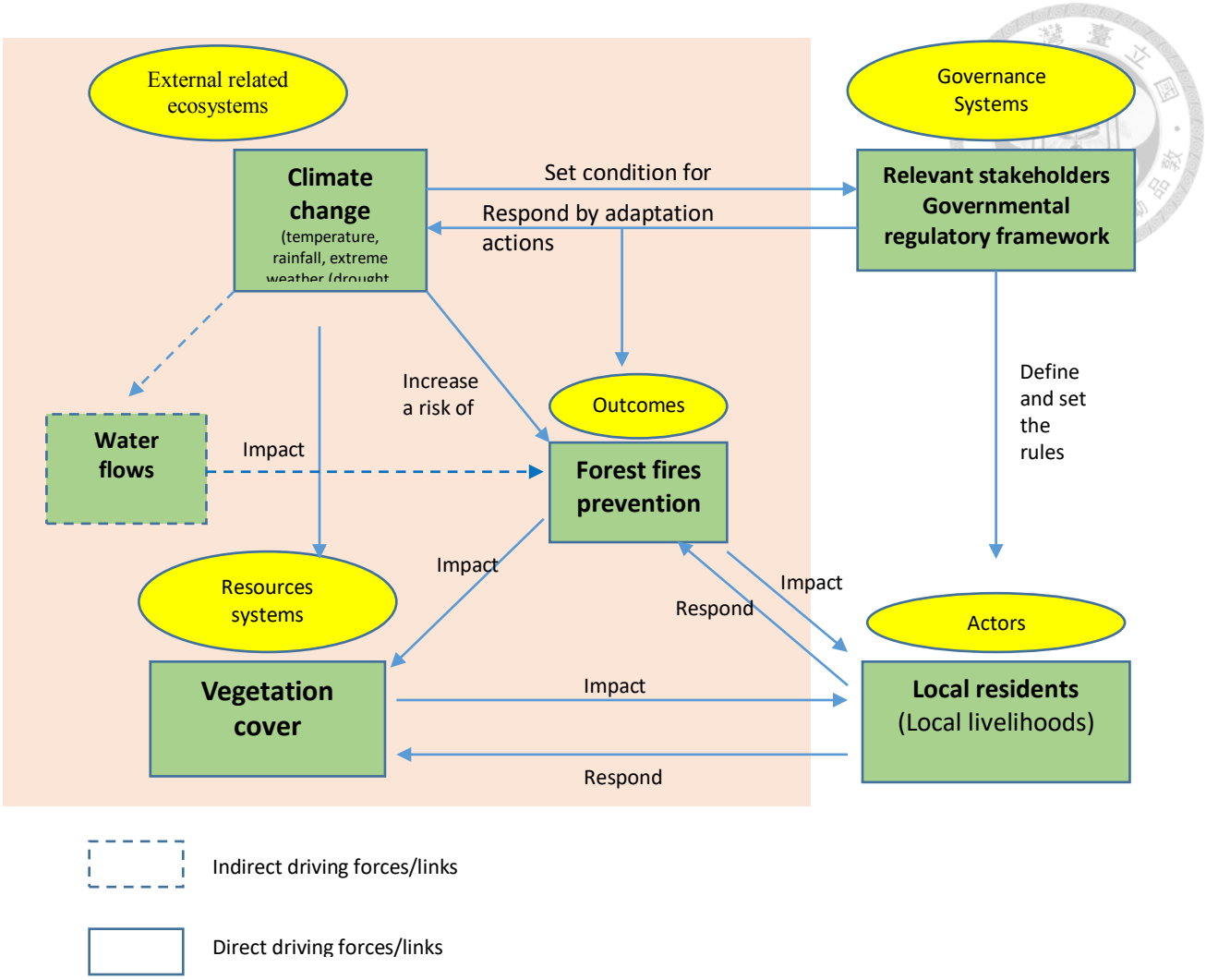

Figure 5.1 An analytical framework the interactions of 5 dimensions of SES including RS, GS, ECO, A and Outcome in two case studies.

Climate change is selected as an external driving force because in a local scale it causes a direct impact on vegetation cover changes mainly through temperature and rainfall factors. The changes of temperature and rainfall by seasons and years as well as extreme weathers such as flooding and droughts are one of major factors causing local disasters such as forest fires. ***Water flows*** are external driving forces and are supplied by rainfall (climate factor) and river flows which are indirectly impacted by hydrological systems of upper streams and dam construction,

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therefore it is a more regional and transboundary scale factor. Therefore, water flows in this study are not considered as main driving forces for vegetation change at a local scale but are instead still interwoven with climate change impacts in an analysis of the changes of water level in the two WPAs, which impacts the vegetation and forest fires, and is managed by GS through construction such as sluice gates and canals. ***Vegetation cover*** is a main local resource system as well as a tourism resource found in the two WPAs. Therefore, detecting the spatio - temporal changes of vegetation are key in assessing the interaction of resource system changes and the external driving factor, which is climate change, and the internal driving factors, which are the governance system and the actors.

Forest fires prevention is an integrated outcome of climate change impacts and governance system in water and vegetation management. Climate change is considered as a risk which causes forest fires, and when forest fires occur it impacts vegetation cover change and GS deploys several adaptation actions to respond to forest fires; this is also a way to respond to climate change. Therefore, analysis of forest fire prevention outcomes can reflect interaction of GS and RS in the context of CC. Evaluation of changes in vegetation cover, water, and non-vegetation will support future development and management of ecotourism in the wetlands protected areas, especially in the construction of public facilities such as toilets and resting places. Further, it will reduce the damages caused by climate change by implementing nature-based solutions.

Actors in our framework are mainly local residents who have lived on resource systems of WPA for their livelihood. In the remainder of chapter V, we will analyze how local residents perceive the impacts of climate change on the resource system by their participation in the co-

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creation of disaster maps and timelines of disasters to identify extreme events (drought, flood, forest fires, bank erosion) in both the spatial and temporal scales of national parks. This is also a necessary step in several climate change adaptation frameworks to determine problems, (Jopp et al., 2010 & 2015; Becken & Hay, 2007) but it does not appear in the SES framework. Furthermore, we also investigate how vegetation changes impact local livelihoods and how local residents respond to those changes. In chapter VI, from an ecotourism perspective, we will have more insight on how local residents who have been working in tourism respond to climate change and their adaptive capacity.

Governance systems with relevant stakeholders in this study are park managers and local governments at commune, district and provincial scales. Additionally, governmental regulatory framework for natural resources, which is enacted from state level and implemented by local governments, are also relevant stakeholders. Climate change and its impact on RS set conditions for GS and GS define and set the rule for actors in using RS and respond to CC and manage forest fires and vegetation changes to achieve outcomes which depend on context.

In this chapter, from the comparative analysis of the two NPs, we are going to answer the following research question: "**To what extent does climate change transform the landscapes of the WPA?**" The focus of this chapter is more about the ecological system than the social system (the focus of chapter VI). We aim to analyze how climate change impacts the resources system and interaction of ECO, GS, RS, A and Outcome as well as tourism development as a force for adaptation actions. Based on the comparative perspective of the two NPs, in section 5.2, we describe the trend of climate change; section 5.3, we analyze the nexus of climate change and vegetation and water-forest management. Section 5.4 is about the impacts of climate change on

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general livelihoods and particularly in tourism development. Section 5.5 is about the conclusion of similarity and differences in the interaction of five of those dimensions between the two NPs.

5.2 Climate change manifestations

5.2.1 Main characteristics of climate in two national parks

5.2.1.1 The monthly distribution of temperature

From 1978-2019, the climate of Cao Lanh station (Dong Thap), which represented TCNP, and Ca Mau station (Ca Mau), which represented UMTNP, was typical for the northern hemisphere sub-equatorial climate with a high annual average temperature of 27.3°C (TCNP) and 27.4°C (UMTNP) (Figure 5.2&5.3). There were small temperature ranges; the difference between the month with the highest temperature (April) and the month with the lowest temperature (January) is 3.3°C in TCNP and 2.9°C in UMTNP.

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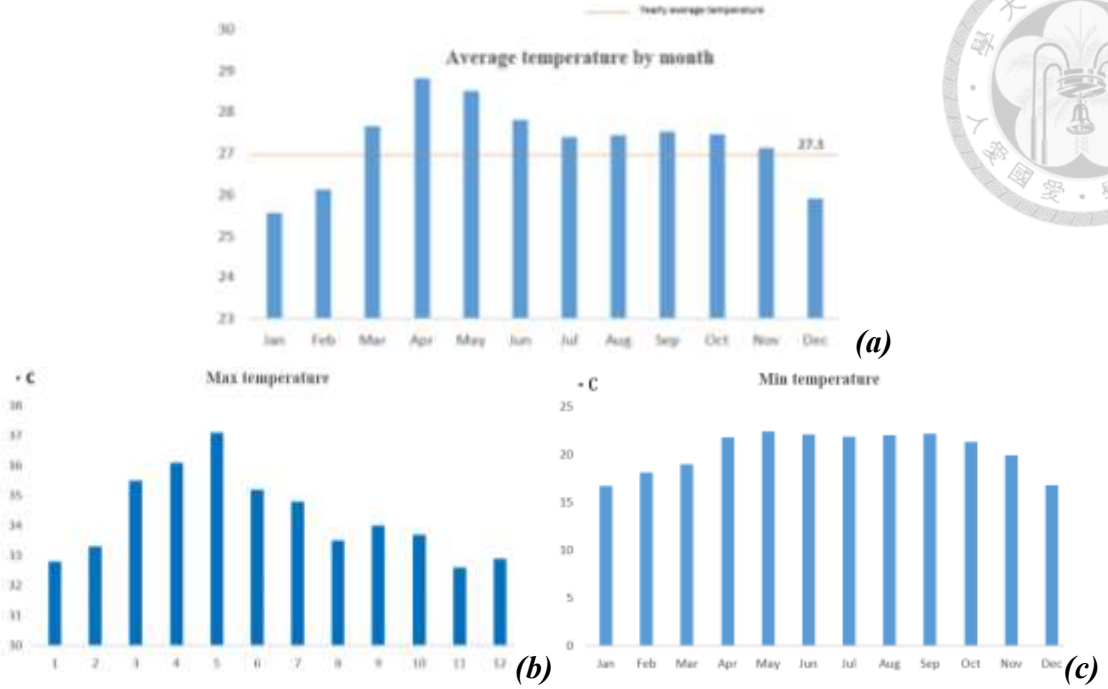

Figure 5.2 The monthly distribution of temperature at Cao Lanh station from 1978-2019 with annual average temperature (a), max temperature (b) and min temperature (c)

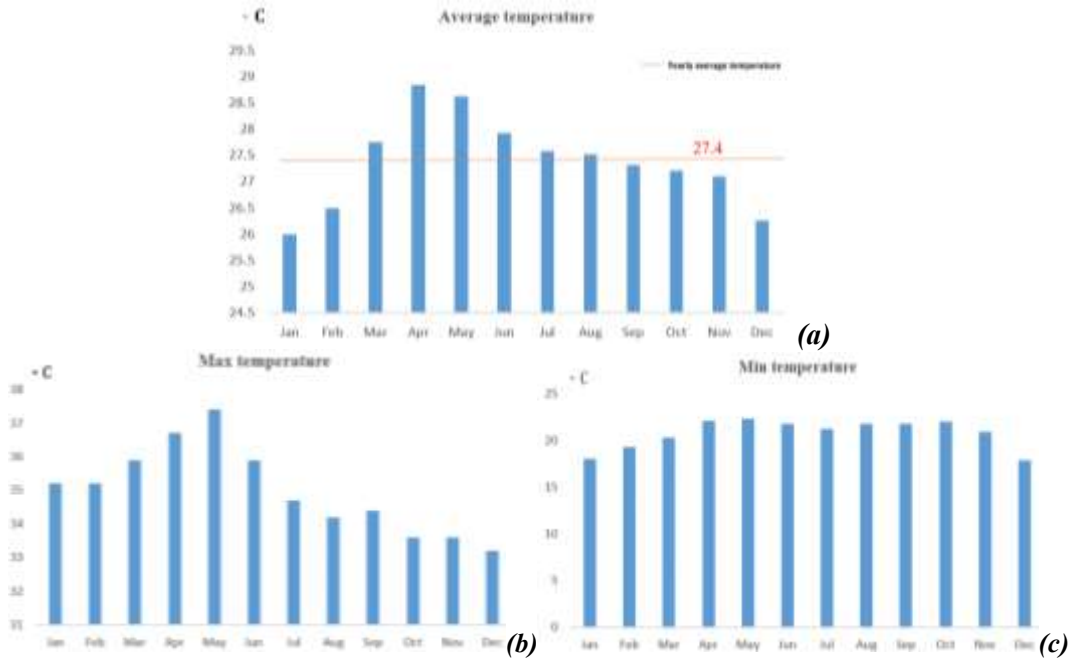

Figure 5.3 The monthly distribution of temperature at Ca Mau station from 1978-2019 with annual average temperature (a), max temperature (b) and min temperature (c)

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5.2.1.2 The monthly distribution of rainfall

Regarding the annual amount of rainfall, at TCNP (Cao Lanh station) it was 1471mm, meanwhile in the UMTNP (Ca Mau station) rainfall was higher than TCNP and had a rainfall amount of 2377mm. The rainy season in the two NPs starts from May, peaking in October, and ends in November (Figure 5.4a&5.4b). The amount of precipitation in the rainy season gains about 90% of the total rain amount with TCNP 1330.24 (90.4% annual amount) and UMTNP 2115.5mm accounting for 89% of the annual rainfall. The dry season starts from December, having the lowest amount in February, and ends in April (next year).

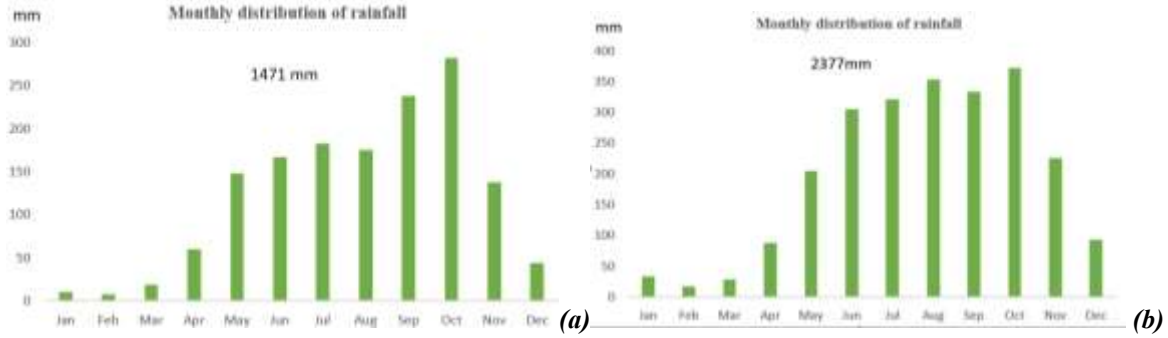

Figure 5.4 The monthly distribution of rainfall in TCNP (Cao Lanh station) (a) and UMTNP (Ca Mau station) (b) from 1978-2019

Some common natural disasters in the TCNP are floods, droughts, thunderstorms, lightning, and erosion. The flood season usually lasts from August to November with the peak in October. Drought usually occurs from February to April at the end of the dry season. While in UMTNP there are droughts, torrential rains, tropical cycles, thunderstorms, lightning, and erosion. Drought in UMTNP usually occurs from February to April at the end of the dry season, while salt intrusion is complicated and occurs mainly in the dry season from March to May. Normally,

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TCNP and UMTNP, are not or are rarely affected by storms, but they are affected by tropical cycles, thunderstorms, and lightning, causing damage to houses and people.

5.2.2 Changes in temperature

Both NPs witness the same change in temperature with a significant increase in average temperature (p value <0.05) and a significant increase in the hottest month temperature in January with p value <0.05 (Table 5.1). The changing points in TCNP are 23 (year), 24 (April) and 21 (January) which are quite similar to those in UMTNP: 20 (year), 23 (April) and 20 (January), respectively.

Table 5.1 Results calculated from Mann-Kendall method for temperature characteristics at Cao Lanh station (Dong Thap) from 1978-2019

TCNP												
	By year				**April (the hottest month)**				**Jan (the coldest month)**			
	S †	Z ‡	Yt §	P.T |	S †	Z ‡	Yt §	P.T |	S †	Z ‡	Yt §	P.T |
Tave	4.75	1.96E-06	0.021	23	1.38	0.16	0.009	24	9.32	1.16E-20	1	21
Tmax	3.69	0.0002	0.03	12	2.73	0.006	0.026	12	2.73	0.006	0.026	12
Tmin	-3.89	9.84E-05	-0.08	14	-2.02	0.04	-0.012	12	-2.81	0.0048	-0.072	14
UMTNP												
Tave	5.83	5.52e-09	0.04	20	4.46	7.97E-06	0.03	23	3.99	6.63E-05	0.04	20
Tmax	2.17	0.03	0.02	12	1.92	0.05	0.01	12	2.14	0.03	0.01	12
Tmin	-1.3	0.19	-0.01	11/12	2.43	0.01	0.04	24	0.7	0.48	0.01	34

Note:
†S - Mann-Kendall S - positive S value means an uptrend; a negative S value means a downtrend
‡ Z - standard normal deviate – p value
§ Yt - trend slope
| P.T – changing point

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Regarding maximum temperature, the two NPs had a significant increase in both years, in January and April (p value <0.05) and changing point all is 12 (Table 5.1). In terms of minimum temperature, TCNP has a significant decrease (p value <0.05) in both years, in January and April. Changing point of the minimum year is 14, in January is 14 and in April is 12 (Table 5.1). Meanwhile, in UMTNP, Tmin by year tends to decrease but not significantly, while monthly Tmin in April (the hottest month) increases significantly (p value is 0.01) and in January, Tmin also increases but the trend is not significant (Table 5.1). The changing point also varies, with Tmin by year two changing points being 11 and 12. In April the changing point is 24 and in January the changing point is 34 (Table 5.1).

In brief, in TCNP the average temperature has significantly increased, especially after 2001 (changing point); maximum temperature significantly increases, especially after 1990 and minimum temperature significantly decreases, especially after 1992. Consequently, the temperature ranges significantly increased after 1990 (Figure 5.5a). Meanwhile in UMTNP, although sharing the same trend of temperature change with TCNP, the changing point of temperature is different especially for the change in the maximum and minimum temperature in about 1 decade. Specifically, the average temperature has significantly increased, especially after 1998 (changing point); maximum temperature significantly increased, especially after 2001 and minimum temperature significantly decreased, especially after 1998. Consequently, the temperature ranges significantly increased after 2001 (Figure 5.5a).

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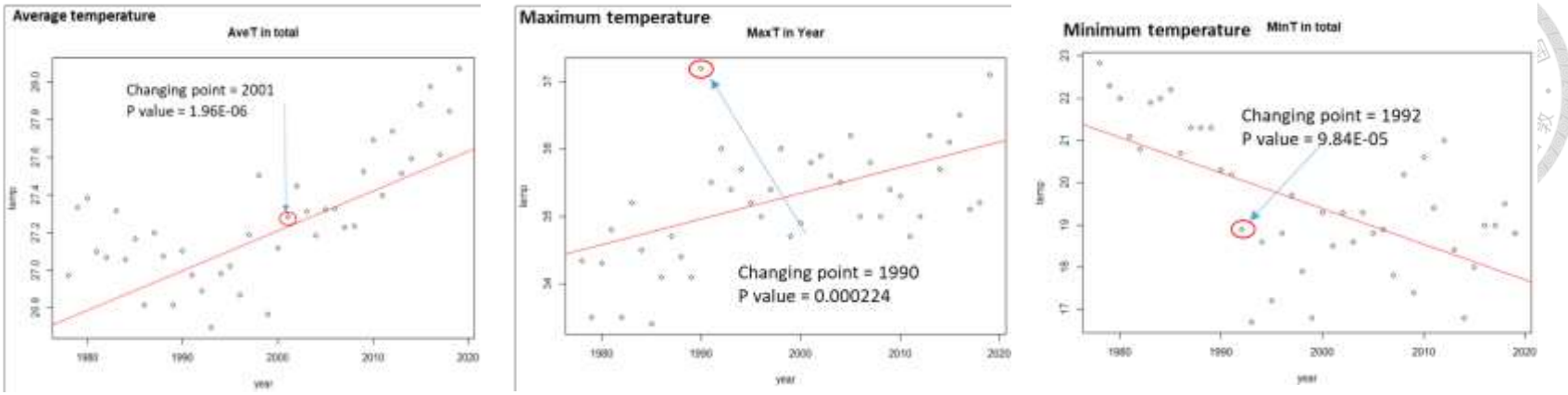
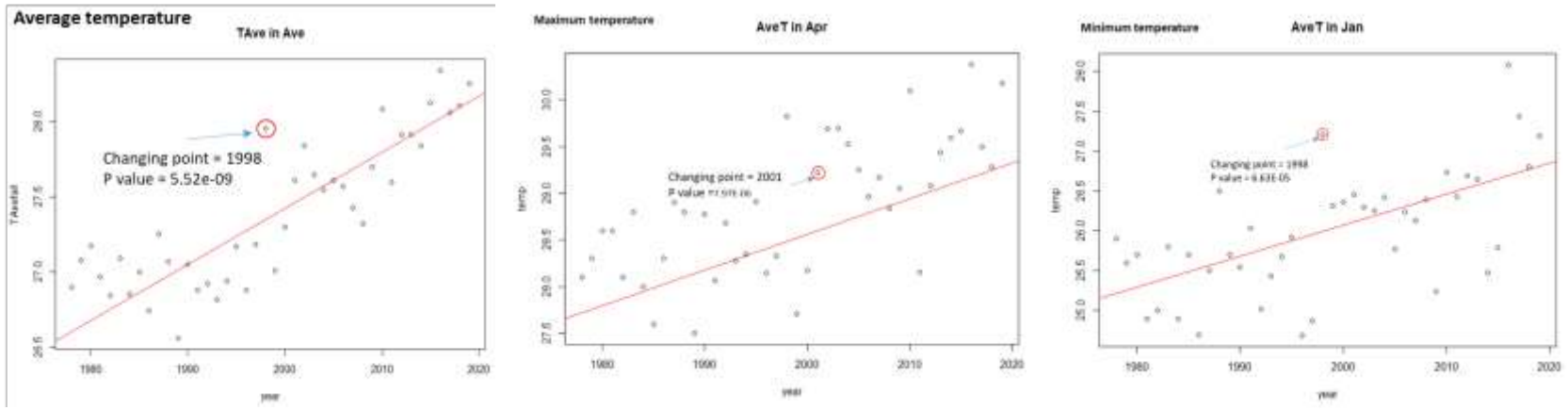


(a) TCNP



(b) UMTNP

Figure 5.5 Changes in average temperature, maximum temperature and minimum temperature of TCNP (a) and UMTNP (b) from 1978 to 2019

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5.2.3 Changes in rainfall

Regarding rainfall, in TCNP the rainfall slightly increases each year, in October, February and during the dry season (S>0), but not significantly (p value all >0.05). Only in the rainy season, the rainfall has a slight decrease trend (S<0) but it is not significant (p value = 0.9) (Table 5.2).

Table 5.2 Results calculated from Mann-Kendall method for precipitation characteristics at TCNP and UMTNP from 1978-2019

	TCNP				**UMTNP**			
	S	**Z**	**Yt**	**P.T**	**S**	**Z**	**Yt**	**P.T**
Annu	0.44	0.65	1.50	17	-1.75	0.08	-6.87	31
Max	1.34	0.17	2.53	17	2.41	0.01	2.83	18
Min	1.09	0.27	0	19	1.91	0.05	0.21	30
Rain	-0.10	0.91	-0.44	36	-2.3	0.02	-9.9	31
Dry	1.80	0.07	2.61	21	1.8	0.07	2.65	30

Unlike TCNP, rainfall has the opposite trend of changing in UMTNP. The annual amount slightly decreases (not significantly), but in the rainy season, the rainfall amount has a significant decrease (with a p-value of 0.02). Meanwhile, in October, the month that has the highest amount of rainfall, a significant increasing trend of rainfall was noticed (with a p-value of 0.01). In February and in the dry season, the amount of rainfall slightly increased but was not significant. The changing points in rainfall mostly found are 30 and 31 (Table 5.2). In brief, in TCNP rainfall does not show significant change. Meanwhile in UMTNP rainfall decreases significantly in the rainy season with the changing point in 2009.

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5.2.4 Forest fires and other extreme weather events in the last 20 years

With the change of temperature and rainfall parameters, and the influence of human activities, extreme weather events have been occurring with increasing frequency and intensity and complexity over time in both of the study areas. In TCNP, the change of climate is manifested in the increase of the mean annual temperature since 2001 and the annual temperature range since the early 1990s with the increase of maximum temperature and decline of minimum temperature (Figure 5.5a). Meanwhile, the precipitation shows an insignificant increase. That leads to the risk of a large increase in evapotranspiration and potentially reduced surface water, increasing the risk of hydrological drought and forest fires for the region. The facts have shown that natural disasters also change over time according to the change of climate parameters. In the period after its establishment from 1998 to 2001, flooding was considered a risk for this area. However, from 2003 to the present, droughts and forest fires in the dry season are considered to be major risks of the region (Figure 5.6a). In addition, drought years are usually accompanied by forest fires such as in 1998, 2010, 2016.

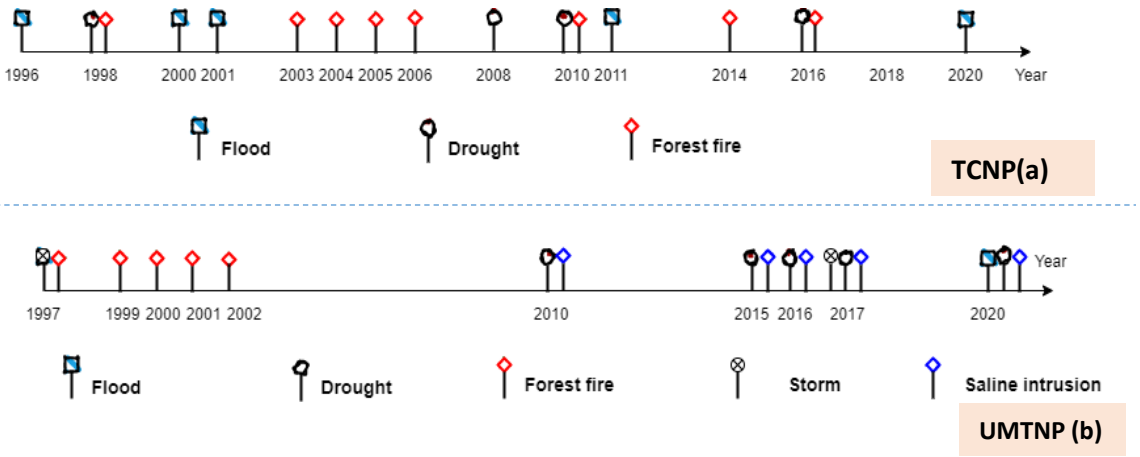

Figure 5.6 Timeline of disasters in TCNP (a) and UMTNP (b) (made by community and managers)

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In UMTNP, besides the 3 disasters similar to those in TCNP, there are also floods, droughts and forest fires; more diverse types of disasters include storm and saline intrusion. The reason is partly due to the geographical location near the sea of the UMTNP and the change of rainfall patterns with reduced rainfall but an increase in the occurrence of torrential rain causing local flooding in the rainy season (in 2020). Before 2002, forest fires occurred in UMTNP frequently and especially caused forest fires in 2002 which caused damage to more than 3000ha out of 8000ha of forest and reduced biodiversity significantly. After this forest fire, forest restoration work was carried out and even droughts are recorded to increase, there was almost no fire after 2002. However, the situation of drought and saltwater intrusion has increased, the drought in 2015 is supposed to be the main culprit of road erosion at that time. Abnormally increasing rainfall also caused a severe local inundation (local flooding) in 2020 (Figure 5.6b).

5.3 Climate change and other drivers impacting on vegetation and water-forest management

Change in wetland vegetation and its driving factors are the most critical challenges scientists are facing because of the environmental complexity. Various factors impact changes of vegetation in wetlands including human factors like land use (Nguyen et al. 2017), water diversion through dams, dykes and canalization, and infrastructure development; or environmental related factors like climate patterns, topography, hydrological regimes, rodents and pests (Zhang et al. 2021). Currently, the effects of climate change are increasing, with a growing number of studies assessing the impact of climate on the change of wetland vegetation. Wetlands can be impacted by climate change through both direct and indirect influences of rising temperatures (Yu & Gao 2020; Reddy

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& Delaune, 2008), solar radiation, and changes in rainfall intensity and frequency (Zhang et al., 2021). A warmer climate would accelerate the loss of water through evapotranspiration, which increases oxygenation of the exposed top layers due to water table drop (Lafleur et al., 2005). Conversely, the areas with higher temperatures accompanied by more precipitation can promote photosynthesis, leading to primary production (Vitt et al., 2000; Backstrand et al., 2010; Bu et al., 2011).

In the two selected cases, we examined the changes of vegetation covers in the dry season from 2002 to 2020 and the rainy season from 2011 to 2018 to explore the trend of change in vegetation covers and the correlation of vegetation change and climate change.

5.3.1 Climate change impacts on vegetation cover

The vegetation of the UMTNP based on satellite images also shows that the yellow and red colors dominate (Figure 5.7a, b, c, d) indicating that the NDVI value is also higher than that of TCNP. In other words, plants in UMTNP have better growth than TCNP. This may be due to the abundant rainfall in the UMTNP (Figure 5.4).

Changes of vegetation cover by seasons of climate in the two NPs: The humid tropical climate with two distinct wet and dry seasons in the VMD has a clear impact on the seasonal changes of vegetation. Specifically, the interactions of vegetation cover and climate change are analyzed by NDVI dynamics by seasons. First of all, the seasonal change of vegetation reflects the essential role of rainfall in the development and transformation of seasonal vegetation. The results of Landsat-based detection showed that NDVI has a difference between dry and rainy seasons. Specifically, during the rainy season, in all surveyed years, in TCNP we found that in the wet season the average NDVI (0. 152)

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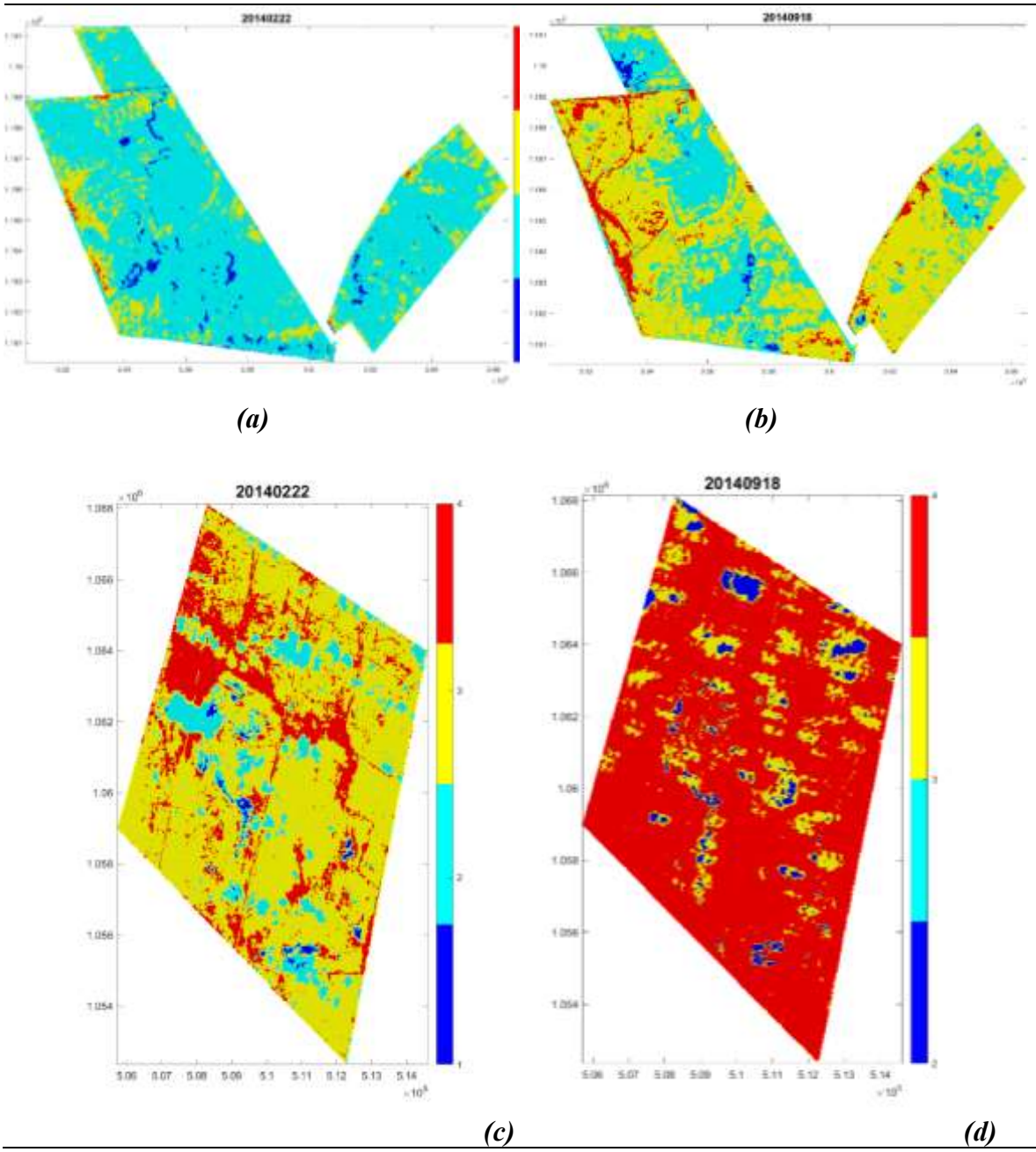
is higher than that of the dry season (0.14); in UMTNP NDVI is 0.605 for the wet season and 0.373 for the dry season. Thus, in the wet season, the landscape looks more diverse and vivid in all zones (Figure 5.7) since the major proportion of rainfall provides abundant water for vegetation to grow lush and healthy and even cover the water surface of canals, ponds, etc.



(a) *(b)*

(c) *(d)*

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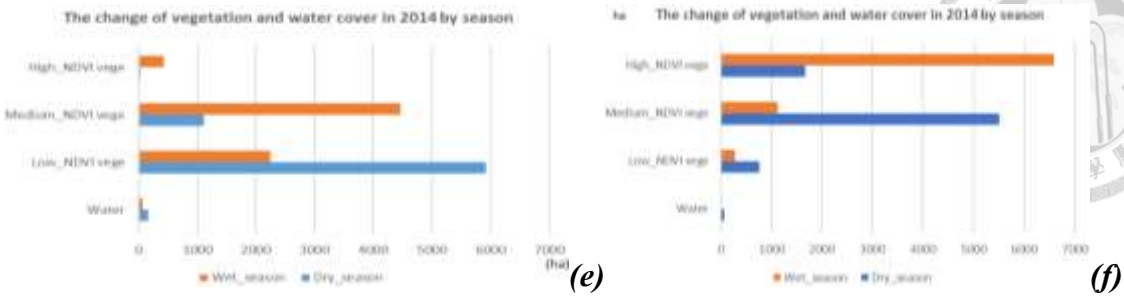

*<u>**Note**</u>:
Dark blue color: water
Light blue color: low NDVI vegetation
Yellow color: medium NDVI vegetation
Red color: High NDVI vegetation.
The higher NDVI the more developed vegetation.

Figure 5.7 The difference of vegetation and water cover in 2014 of TCNP in the dry season (a) and the rainy season (b) and the change of NDVI by season in 2014 (e); UMTNP in the dry season (c) and the rainy season (d) and the change of NDVI by season in 2014 (f)

Secondly, the rainy season is the recovery season for plants, especially in TCNP. In the rainy season, in TCNP there is a rising trend of medium NDVI vegetation meanwhile in the dry season, there is a decreasing trend in medium NDVI vegetation and an increasing trend in low NDVI vegetation (Figure 5.8a, b). Similarly, in UMTNP, in the dry season, the area of high NDVI vegetation has reduced significantly from 2002-2009 and started to increase after 2015 (Figure 5.8c, d). Thus, it can be seen that the trend of vegetation restoration of TCNP and UMTNP occurs mainly in the rainy season, meanwhile, in the dry season, the vegetation shows a degradation trend in both national parks. This is consistent with our analysis that the impact of increased temperature while an insignificant increase in rainfall in the dry season may be responsible for the increase in water evaporation and drought.

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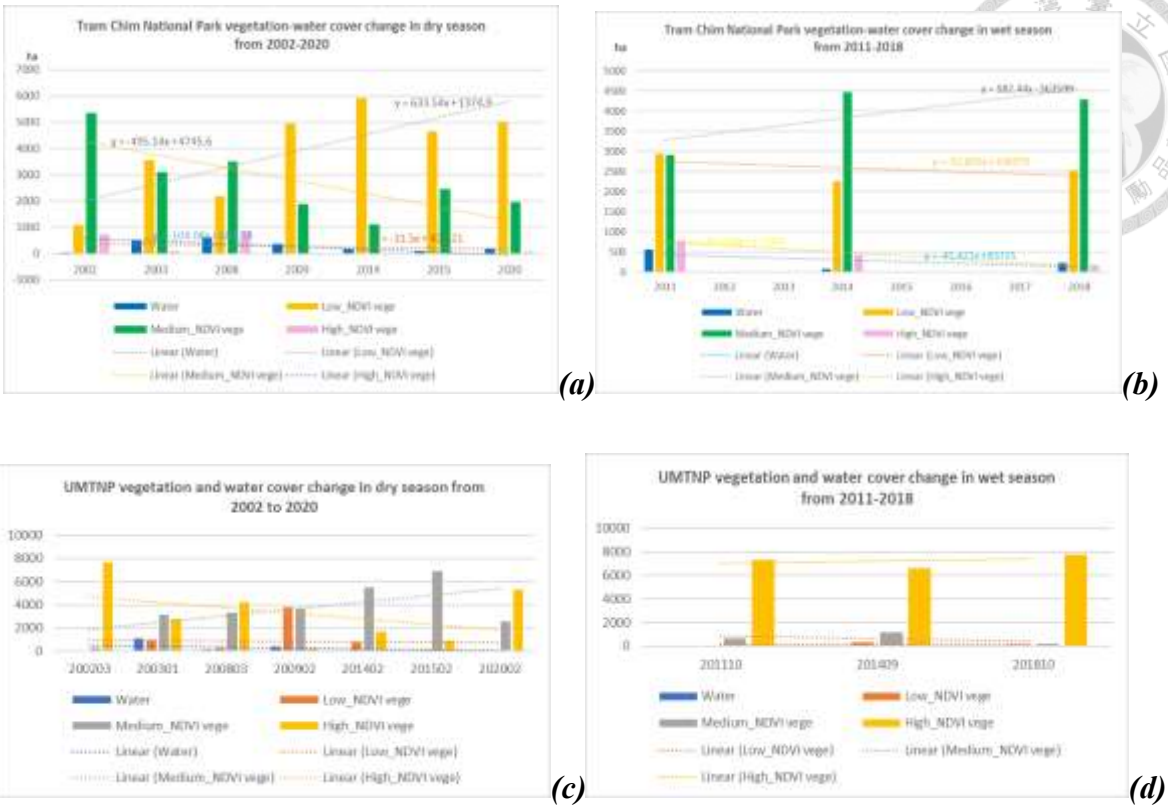

Figure 5.8 TCNP vegetation and water cover change in the dry season (a) from 2002 to 2020 and the rainy season (b) from 2011 to 2018; UMTNP vegetation and water cover change in the dry season (c) from 2002 to 2020 and the rainy season (d) from 2011 to 2018

Changes of vegetation cover by years: the development of vegetation, especially aquatic plants, in TCNP by years leads to most of the open water spaces in zone A5 and southwest of Zone A4 being transformed to medium NDVI vegetation (dark blue) and low NDVI vegetation (light purple) (Figure 5.9b). This is also a sign of the recovery of Xyris indica L and Eleocharis Dulcis in these areas. The waterbody shrunk significantly in 2014. However, water gradually increased in 2018 especially in the west of zone A1 which is also the area of aquatic plants like Nelumbium nelumbo and Polygonum hydropiper L. This creates favorable conditions for tourism development, especially in the floating season - a tourist specialty of this area.

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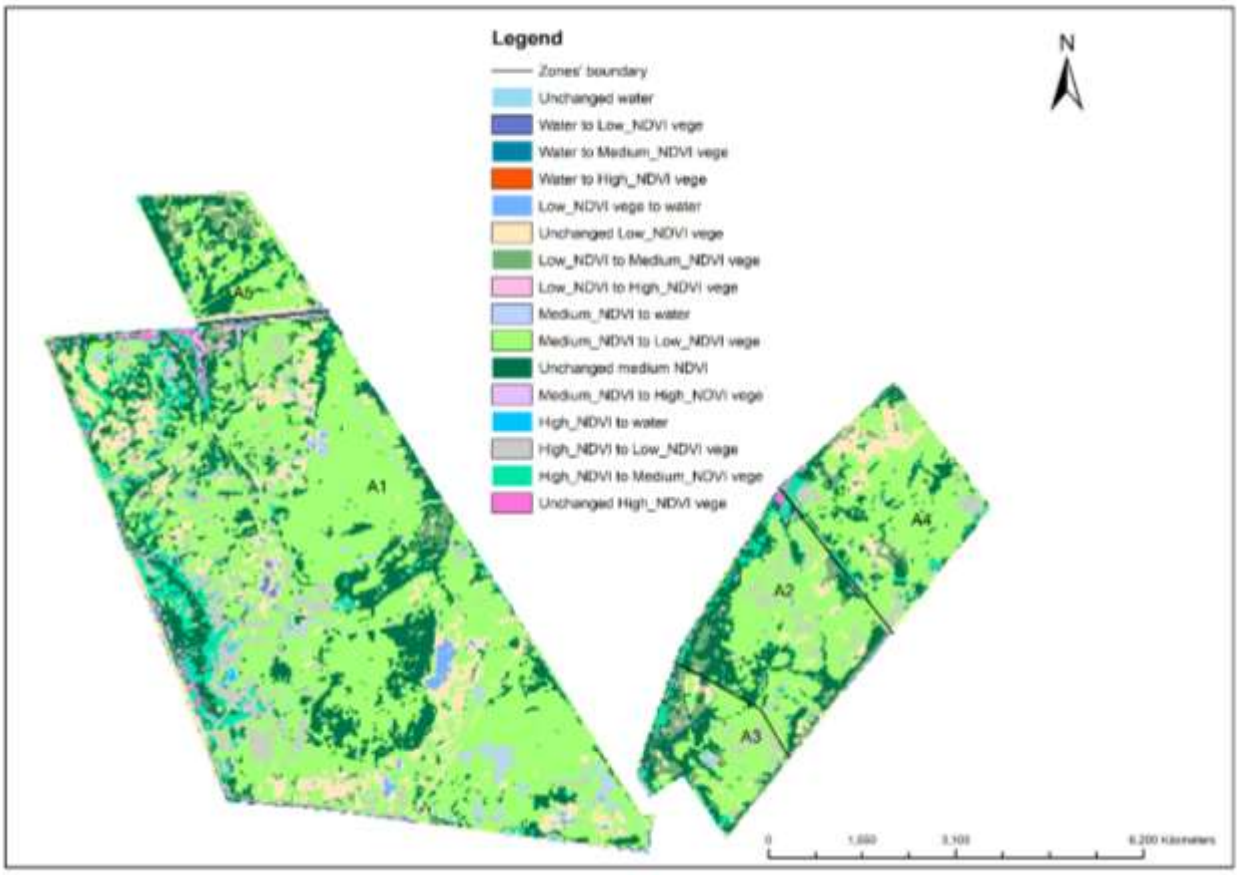
In the UMTNP, during the dry season from 2002 to 2020, a large area of high NDVI can be observed being converted to medium NDVI (Figure 5.9c). In the past those areas were Melaleuca forests, now those are swamp with scattered melaleuca or swamp with regenerated melaleuca or replanted melaleuca areas.



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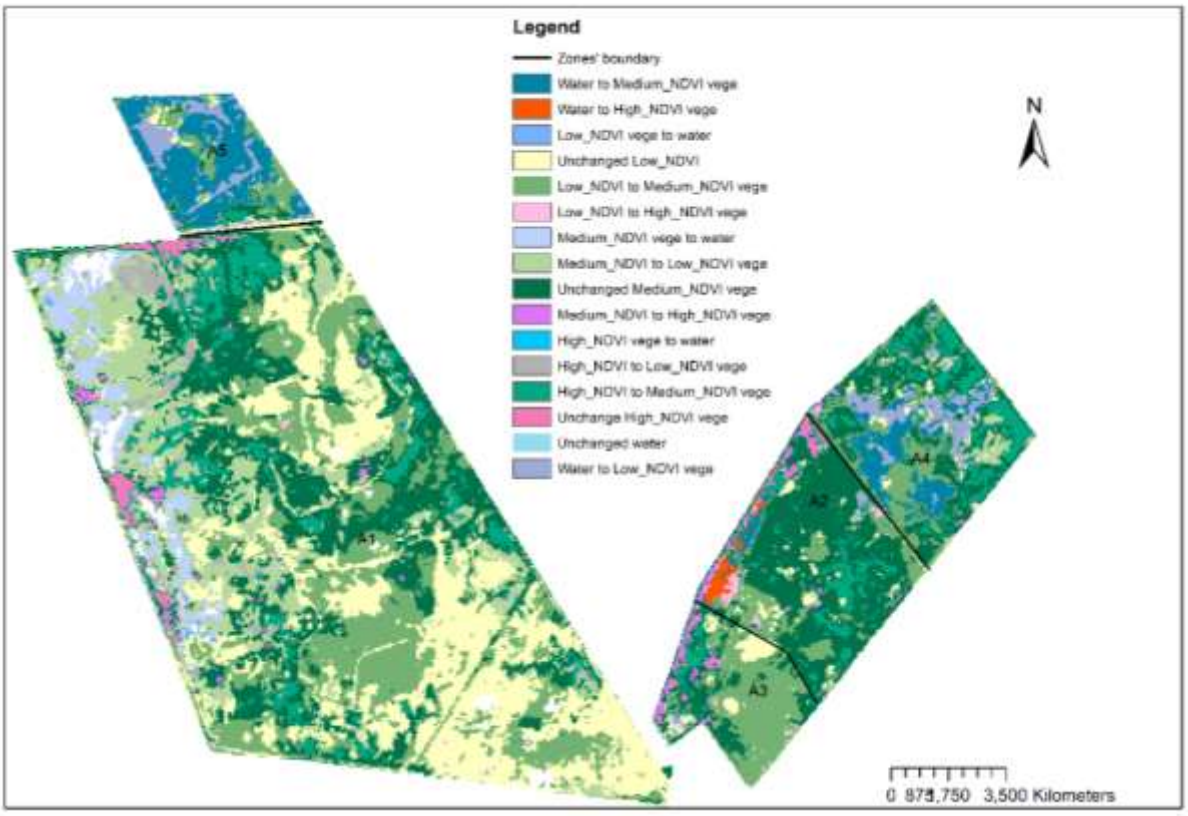

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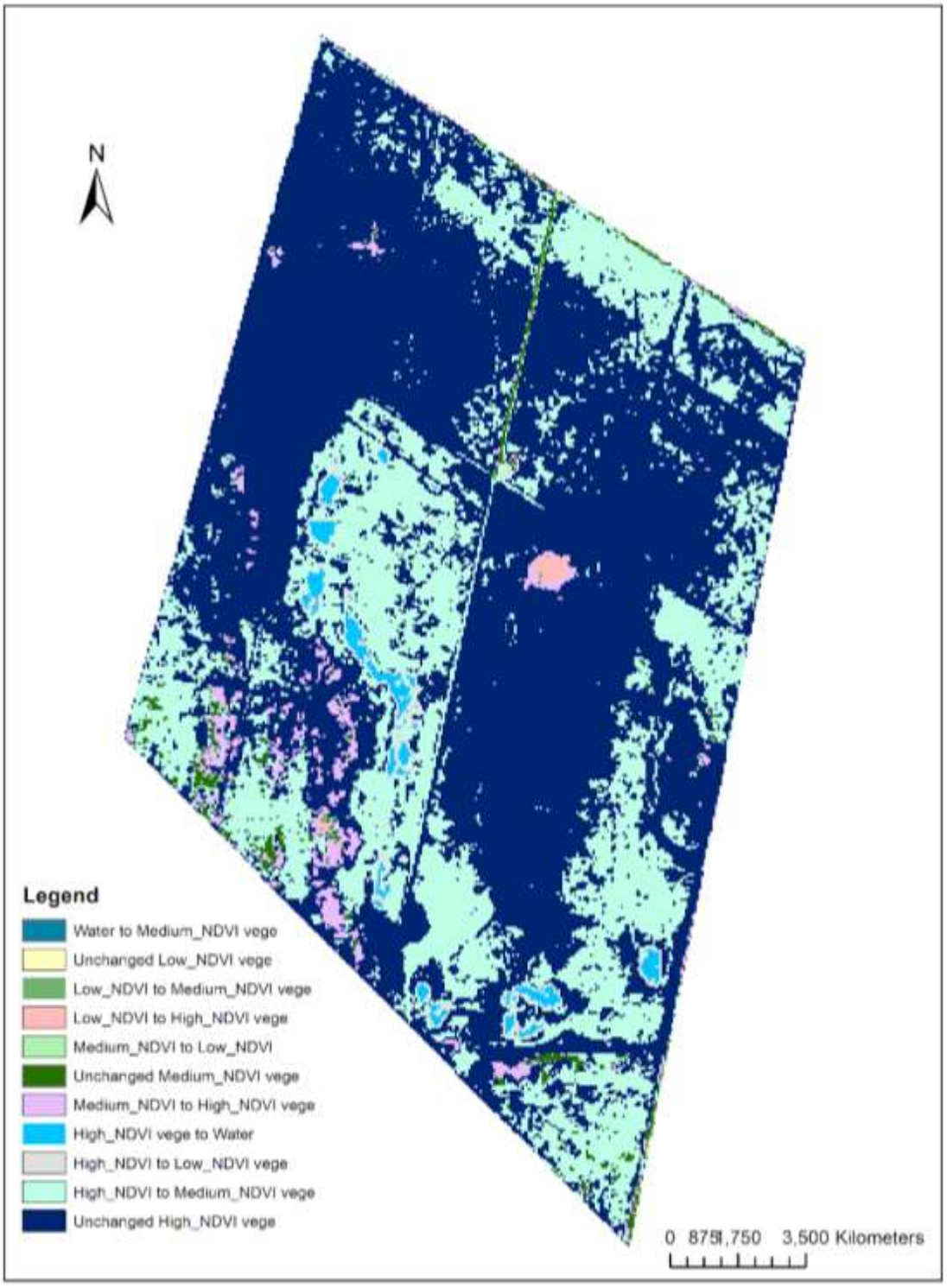

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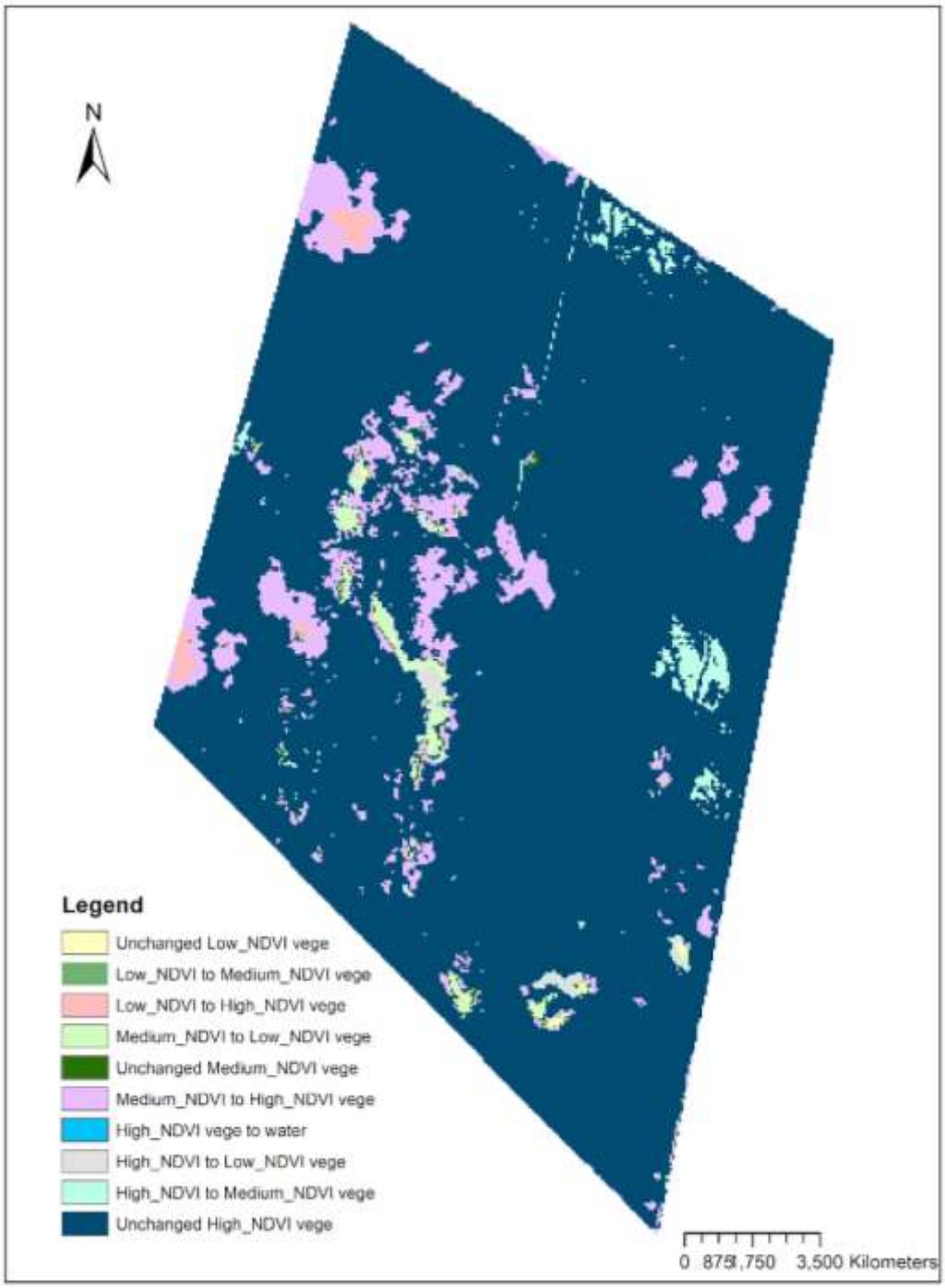

Figure 5.9 Transition map of landscape from 2002 to 2020 in dry season (a) and from 2011 to 2018 in wet season (b) in TCNP and UMTNP in dry season (c) and wet season (d)

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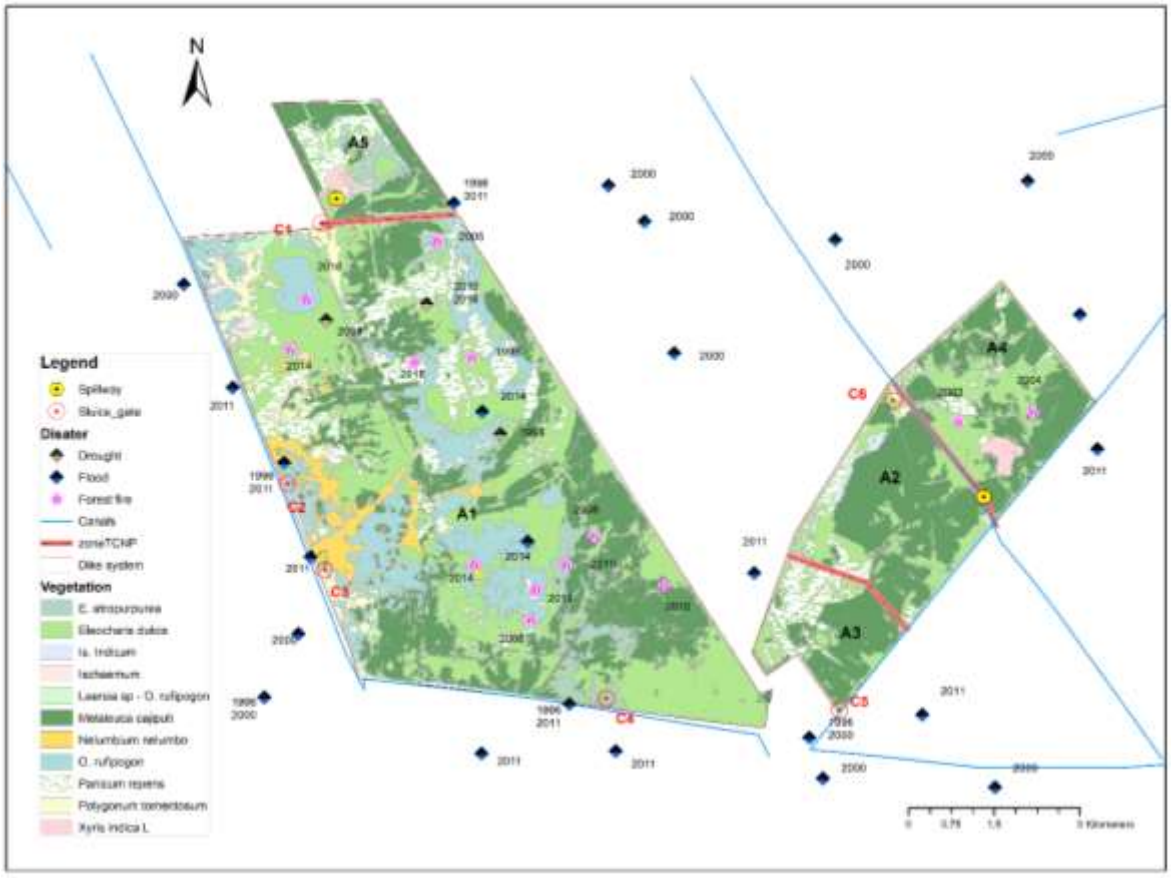
In addition, the increase of temperature in the whole year, especially in the dry season, could be the cause of extreme events like droughts and forest fires in recent years. In TCNP, based on the disaster map which is made by the local community and the park's officers (Figure 5.10a), zone A1 suffered the most natural disaster events such as floods in 1996, 2000, 2004, and 2011; forest fires in 1996, 2006, 2010, 2014, and 2016; and droughts in 2008, 2010, and 2016. This partly explains the drastic change of NDVI dynamics, especially in grassland areas such as Eleocharis dulcis and Ischaemum, which have significantly decreased.



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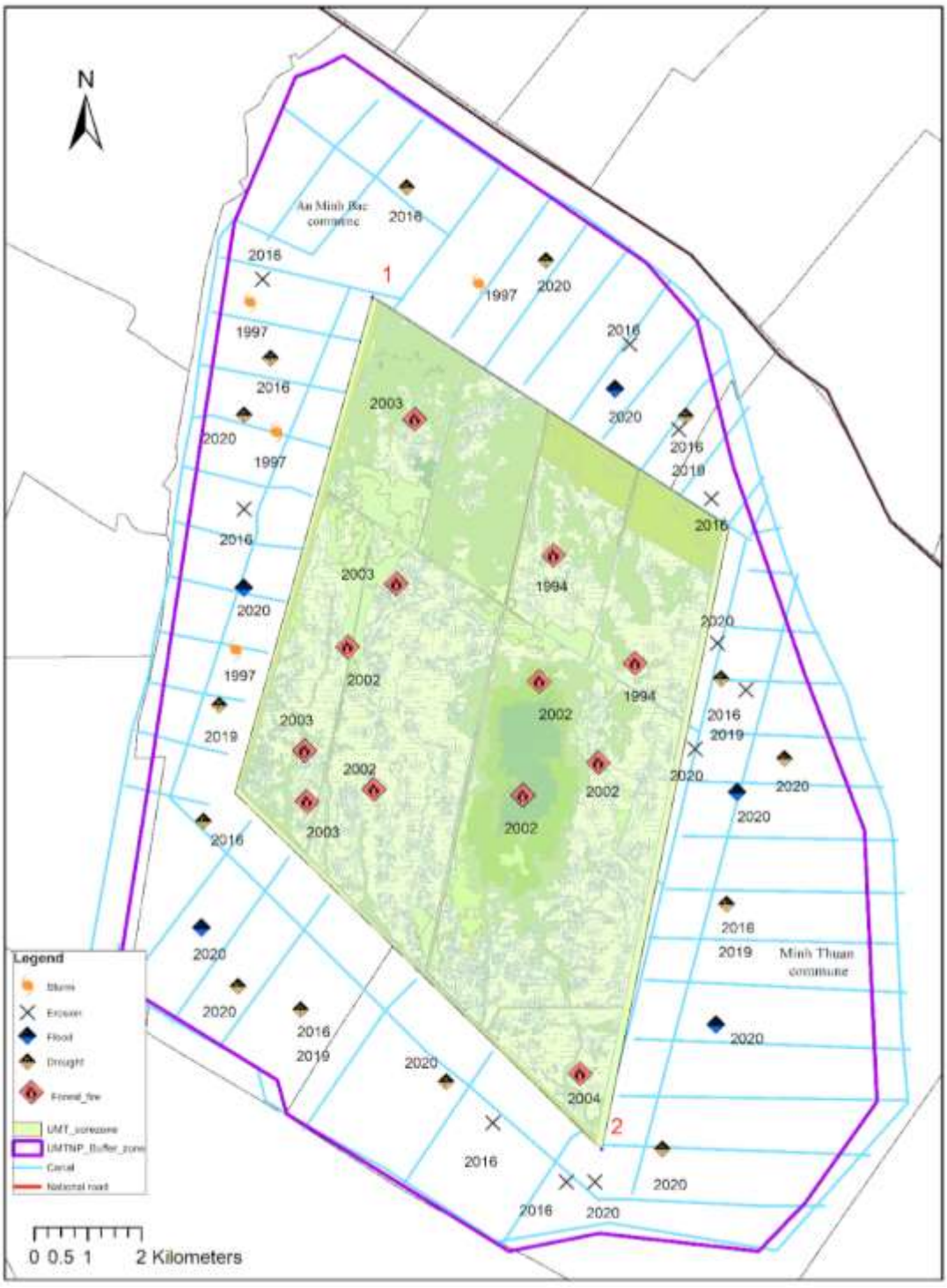

(b)

Figure 5.10 Disaster map of TCNP from 1996-2020 (a) and UMTNP (b) (made by local community and officers)

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Meanwhile, in UMTNP, forest fires occurred mainly from 2002-2004, those disasters destroyed a large area of Melaleuca forest and transformed the Melaleuca forest into a swamp. After 2004, no more forest fires were recorded (Figure 5.10b), which may be the reason why the vegetation of UMTNP after 2010 recovered quickly with many areas transforming from medium NDVI to high NDVI (Figure 5.9d).

A degradation trend dominates in vegetation cover in the dry season, especially after 2008, in both of the NPs. The change is more obvious with a decrease of medium NDVI vegetation including part of Melaleuca forest. Eleocharis dulcis in TCNP (Figure 5.8a) and after 2014, there is an increase of low NDVI vegetation in all zones A2, A3, A4, A5, the low_NDVI vegetation increase in the area with diverse vegetation like Melaleuca forest; Oryza rufipogon; Leersia sp - O. rufipogon; Panicum; E. Atropurpurea; Eleocharis dulcis; Is. Indicum; Ischeamum; Xyris indica L (figure 5.9a). Similarly, a transformation of high NDVI to medium NDVI vegetation in UMTNP (Figure 5.8c) was observed from 2003-2009; however, after 2014, an area of high NDVI vegetation of UMTNP was extended. In brief, through the large-scale decline of NDVI in TCNP, we argue that climate change has had an impact on a few areas by increasing the risk of forest fires. Meanwhile in UMTNP, although drought and saltwater intrusion was recorded to be increasing in frequency after 2010, there were no forest fires and vegetation that showed a rapid recovery after 2014. Therefore, I argue that besides climate change, other drivers that have a greater impact on the large-scale decline of vegetation in the TCNP and UMTNP in the dry season may stem from human management and other external ecosystems such as water level, the amount of sediment, etc.

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5.3.2 Water flows and Governance system impact to vegetation changes

Dams construction in the Mekong river: Regarding factors influencing landscape changes of the VMD, besides climate change, hydrological regime changes of the Mekong river, as well as intensive rice production, are mentioned as main factors (Nguyen et al. 2017; Le et al. 2007). The VMD is located in LMB, and of the three identified factors that impact LMB production, dam construction on the Mekong river is the most imminent threat (Cosslett & Cosslett, 2018). Since 1945, A series of hydroelectric dams have been built along the Mekong river system, mainly in China. Chinese hydropower dams would reduce alluvium volume in the Mekong River Delta by half, from 75 million tons to 42 million tons and sediment decrease would pose a serious risk of "Mekong Delta disintegration."

The construction of dams along the Mekong river is one cause for water flow reduction in the VMD. The hydrological regime of the Mekong River in general and its two tributaries in Southern Vietnam, Tien and Hau rivers, have two distinct dry seasons and flood seasons. The dry season usually lasts from December to May of the following year, and the flood season is usually from June to November. Research by Lu and Chua 2021 stated that the water flows from upstream Mekong river to the Vietnamese Mekong Delta had reduced significantly after 2010 since hydropower dams have significant impacts on increasing droughts not only in the dry season but also droughts in the wet season. Several previous studies also stated that as consequences of both El Nino effects and the operations of hydropower dams in the upstream, droughts and saltwater intrusion have occurred often in recent decades, as indicated by droughts in 1992–1993, 1998–1999, 2004–2005, 2010–2011, 2015–2016, and 2019–2020 (Guo et al., 2017; Cosslett & Cosslett, 2018). As a result,

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water flows in the Mekong River and its tributaries have been significantly reduced (Adamson & Bird, 2010; Kuenzer et al., 2013b; Hoang et al., 2019).

Climate change and dam construction have severe impacts on water flow reduction in the VMD, especially in the dry season. Our above analysis has shown that NDVI of TCNP has even declined by years and especially in the dry season. However, in many areas of TCNP, vegetation has transformed from water to aquatic plants, or from upland vegetation community to lowland vegetation community, which is opposite to the water flow trend. We suppose that can be the result of adaptive governance in water management. UMTNP is a closed area, the main source of water supply is rainwater (Thang, 2015) and also local rivers such as Cai Lon - Chac Bang river, Ong Doc -Trem river. The hydrological regime is regulated at all times of the year by a system of culverts, dams or dikes. I argue that the fluctuation in NDVI in UMTNP in the dry season and the decline of NDVI and the transition from upland vegetation community to lowland vegetation community in TCNP may be the result of human intervention in domestic water management.

Interactions between resource system, external ecosystem and governance system: Human intervention in the natural system surrounding the TCNP has a long history since after 1960-1970s an extensive network of canals was dug over the Plain of Reeds to reduce wetland water tables and also impacted the average flooding in the depressions which decreased from 12 months to 4-6 months (Hanhart & Ni. 1993). From 1990-1996, under pressure of population increase and rice production, a large reclamation on the Plain of Reeds required digging canals and drainage to remove acidity from soils. However, it caused several environmental issues like soil acidification and loss of functioning wetland ecosystems (Ni et al., 2006; Ni & Tuan. 2015; Ni 2003). In 1994, Tram Chim Wetland

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Protected Area was established and then was upgraded to Tram Chim National Park in 1998 with the initial purpose of protecting Sarus Crane. Since then to now, there have been several regulations and operations implemented, which modified the TCNP environment (Table 5.3).

Table 5.3 Timeline of remarked regulations/actions implemented and their impact zones in TCNP from 1994-present

Time	Actions/regulations implemented	Purpose	Impacted zones
1994-1996	Infrastructure development	Create the boundary for the national park	A1, A3, A2
	Water level regulation (through gates and boundary canals)	Regulate water level Forest fire control	
	Buffer zone socio-economic development and research	Reduce penetration of people into core zones	Buffer zone
1995–2004	Keeping high water levels inside Tram Chim	Prevent forest fires	A1, A2, A3, A4, A5
2000	Complete 60 km of dike around TCNP	Store water	A1, A2, A3, A4, A5
2001	Prescribed fire in some grass areas to decrease the risk of uncontrolled fire by reducing fuel loading	Forest fire control Recover Eleocharis Dulcis to attract Sarus crane	
	Water level has been regulated according to plan: dikes, water gates, protection stations, digging ponds, boundary poles, fire controls		

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2005-2008	A comprehensive fire and water management plan was developed and tested at Tram Chim by a team of international experts		A1, A2, A3, A4, A5
2008	A sharing benefits of fuelwoods towards wetland resource management has been applied in Tram Chim	Reduce illegal penetration of people into core zones Local people can harvest grass and wooden fuel at some time to reduce accumulated fire fuels	A1, A2, A3, A4, A5
2011 to present	The plan of fire and water management (proposed in 2005-2008) was approved by Vietnamese authorities to be applied permanently at Tram Chim		Buffer zone and core zones

(***Source***: Referred from Meynell et al. 2012; Torell et al. 2003)

The relationship of the related ecosystems (climate change) and resource systems (vegetation) and governance system (top-down law system and practical implementation) is clearly expressed through the process of achieving Ecological performance (a part of Outcome in SES) (Figure 2.2). In the case of TCNP, the Ecological performance is most evident in the three management goals of TCNP: preventing forest fires, increasing the area of the native species of Eleocharis Dulcis, and restoring the ecosystem to attract the iconic bird of TCNP (Sarus crane) (Ramsar Information Sheet (RIS), TCNP, 2012). Based on the synthesis of disaster prevention reports of Dong Thap province from 2010 to 2020 (PCDTP from 2010 to 2020) climate change is perceived as a risk which is often used to explain the

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failures in the water management of TCNP, especially after 2014, but the decrease of water flow from the Mekong river is perceived as the main driver for the shortage of water in NP in the dry season and also for the strategy of water retention. This identifies the management of water and forest fires as the key adaptation activity of governance systems (Table 5.3). Specifically, the disaster map showed that among all extreme events mentioned by local people and officers, the historical flood in 2000 was the most mentioned. That can be a focusing event (Birkland, 1998) for boosting the implementation of a dyke system around TCNP after 2000, which also plays a key role in vegetation transformation of TCNP. A dike system surrounding national parks with a length of up to 60km was constructed in 2000 to regulate water through a system of sluices and spillways located at the surrounding dike (Table 5.3). Since 2000 to present, to reduce the risk of fire in the dry season, the water level inside the national park has always been kept higher than the conditions in the past. In addition, to store water for firefighting, old ponds inside the park were dug and extended (Table 5.3). Thus, almost all areas are affected by human factors through water level adjustments, especially zone A1, A2, A3. That adjustment has narrowed the water tables in flood season and dry season (Figure 5.11) and zones of A1, A2, A3 have become too wet for many vegetation species compared to the optimum conditions (Ni et al. 2006). That explains the transformation of upland communities to lowland communities in these zones (Figure 5.11).

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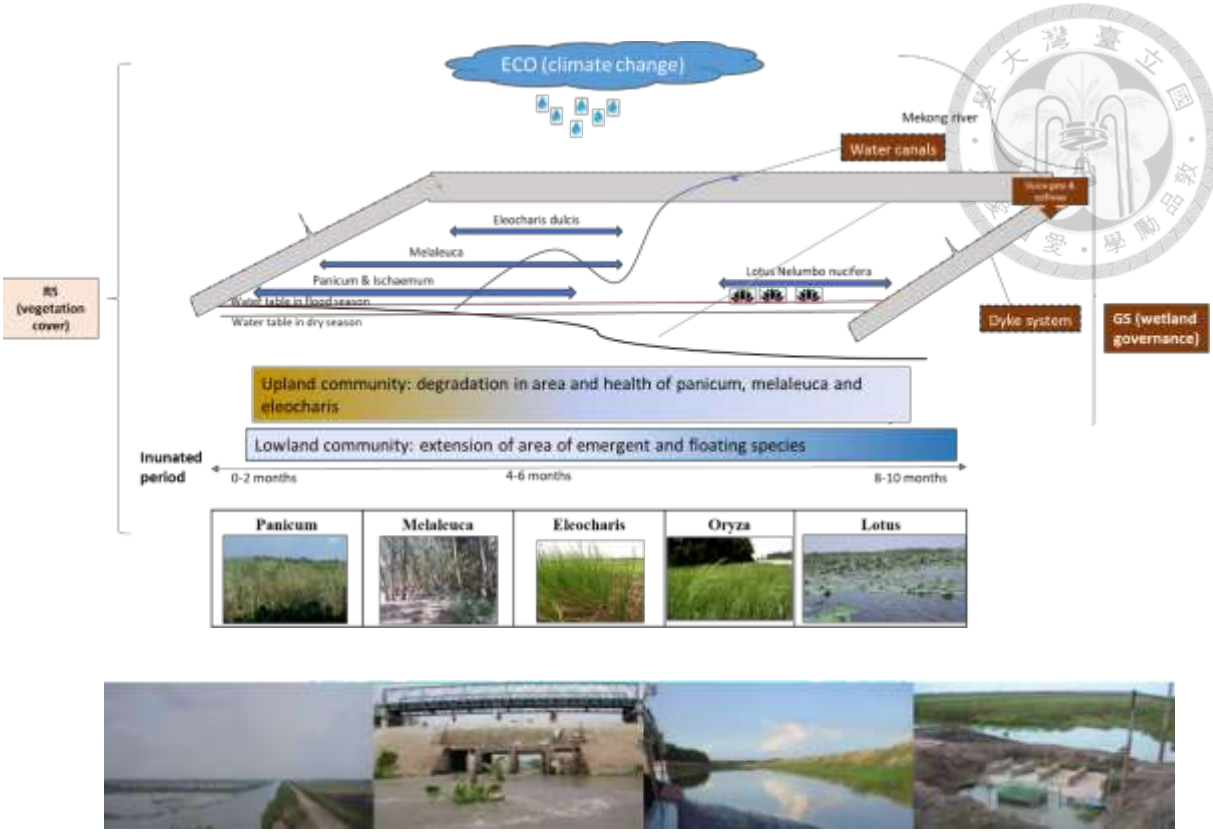

Figure 5.11 The relation of ECO – RS – GS in a schematic of wetland vegetation communities associated with changing hydrological regime under human intervention

However, the decline of NDVI in all zones (Figure 5.9 a, b) and native species in TCNP present a decrease in the health of the TCNP ecosystem and a failure of TCNP in ecological performance. Ecological succession with the expansion of lowland vegetation in contrast to the changing climate patterns reveals a significant intervention of human actors into natural laws. A tendency to cope rather than adapt to climate change and a human-based solution instead of a nature-based solution can be noticed in WPA management of the Vietnamese Mekong Delta.

Meanwhile, in UMTNP, the same strategy of water-forest management was implemented from 2006-2009 after the massive forest fire event in 2002. However, the

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investigation results showed that after this regulation, a large area of melaleuca, grassland decreased and by contrast, a large area of aquatic plant swamp extended (Table 5.4). Therefore, it seriously threatens the biodiversity of UMTNP, then after 2010, the new water – forest management strategy has been implemented with changing water level retention in different zones, then there is a quick recovery of melaleuca and grassland.

Table 5.4 Timeline of remarked regulations/actions water-forest management implemented and their impact zones in UMTNP from 1994-present

Time	Actions/regulations implemented	Impacted zones
1993	U Minh Thuong Melaleuca forest becomes a nature reserve U Minh Thuong natural forest with an area of melaleuca forest on protected peatland is 8,038 ha	
1/2002	U Minh Thuong Nature Reserve was reclassified into U Minh Thuong National Park	
2-4/2002	Massive forest fire	Destroyed over 3000 ha (40% areas) of UMTNP
2006-2009	Implementation of water retention submerged for a long time from 2006 to 2009	The Melaleuca forest decreased by 498.36 ha, seasonally flooded grassland decreased by 1,417.04 ha, aquatic plant swamp increased by 1,885.4 ha.
2010-present	After changing the water management plan for fire prevention and conservation of the Melaleuca forest in 2010	Areas of Melaleuca forest on peatland that died due to deep water flooding have regenerated. Seasonal wetland grassland was restored with an area of 1,838.73 ha, an increase of 1,397.66 ha compared to 2006. The area of aquatic plant swamps decreased by 1,828.04 ha.

The results of the investigation and data analysis show that the recovery and development of vegetation in the two national parks depend mainly on the water level regime under the regulation of humans. It is the awareness of managers about the problem of forest fires and the threat of climate change that leads to the adjustment of water

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management. Deep and long-term flooding reduces the area of melaleuca forests and grasslands and increases the area of water surface and wetlands with aquatic plants. Currently, the UMTNP has adjusted under the new regime, which makes the vegetation here recover again. While TCNP, the adjustment of water level is being considered and adjusted in the coming time. So we argue that not climate change impact but climate change perception and coping strategy in water-forest management play the key to vegetation cover changes.

Governance system and Actors interactions in the context of climate change: In TCNP, Under the pressure of the degradation of vegetation and decrease of woodfuel, after 2008, TCNP managers consulted the provincial government to allow local residents, especially the poor, to exploit grass-fish-fuelwood under the supervision of park rangers in order to reduce the accumulation of fuelwood which can be raw materials for forest fires and at the same time increase people's income. At UMTNP, NP managers determined that the cause of forest fires, besides dry weather, could be due to illegal intrusion of local people to catch bees and fish in the buffer zone. Thus, to reduce this intrusion, the 76 households residing in the area near the boundary of the NP are allowed to approach the national park resources (fish; grass; fuelwood) and receive financial support for livelihood development. Both NPs promote afforestation and agree that people living in the buffer zone are the main actors for fighting and preventing forest fires.

5.4 Climate change impacts on local livelihoods and tourism development

5.4.1 Climate change and local livelihoods

Climate change and accompanying natural disasters such as forest fires and degraded vegetation cause impacts on people's livelihoods in the 2 NPs. In TCNP**,** since

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2008, every year, the poor can harvest fish - fuelwood - grass under the supervision of NP managers. However, now, the regulation of water retention in TCNP has resulted in a large area of grass being flooded and rotten, such as Eleocharis Dulcis grass has significantly decreased by 288 ha from 2009 to 2016. This grass is used to cover scallions, so it has high economic value with local people, thus Eleocharis Dulcis degradation can affect the income of poor households. Forest fires by accidents can pollute air quality and water sources also affect the annual source of fuelwood that the National Park Management Board shares with the people.

Fish resources have decreased significantly with the reduction of water flows from upstream and the amount of water in the flood season. Although the flood season can cause inundation, it provides the main natural resources for the people. One provincial officer claimed that: "*In the past, people made their living from the flood season. In the flood season, they go to pick flowers, pick vegetables, and catch fish, but now it's not like that anymore."* (TGP5, IPI, December 2020). One district officer also shared "*This season, if there is no water, there will be no fish. Due to the decline of their fish resources and the development of the economy, companies and factories opened, so people also went to work and a part also went to Binh Duong to work*." (TGD1, IPI, December 2020). Thus, the depletion of resources in the TCNP under the impact of climate change and the reduction of water, fish, and sediments from the Mekong River causes great pressure on local livelihoods and creates a push for people to migrate to big cities to find work.

In the memory of the people of UMTNP, the forest fire in 2002 still leaves many impressions. The fire destroyed more than 3000 hectares of Melaleuca forest (40% of the total area of the national park). One local resident shared "*It burned about 1 meter 2.5 m of*

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depth. After that, the ground surface was sunk a few meters down" (ULT2, IPI, December 2020). Wildfires cause a serious decline in biodiversity of the UMTNP through the loss of a large area of primary forest and nearly 80% of endangered species. After 2002, forest fire has become a "taboo" or "trauma" for UMTNP managers, therefore, forest fire prevention has become the first priority of conservation and resource management.

Mechanism for active water retention has been implemented with dyke systems and pumpers to reserve water in the dry season and drain water in the rainy season so that the melaleuca trees could cling to it and revive. However, climate change has caused an increase in natural disasters such as droughts, local floods, landslides, and storms in the locality, which has caused conflicts between the managers of the national park and the people living in the buffer zone in terms of biodiversity conservation and economic development. After 2002, in the disaster maps of UMTNP and TCNP, it can be seen that in UMTNP buffer zones, there is an increase in a variety of natural disasters. After 2015, the buffer zone has more frequency of water-related disasters such as drought, local floods, and saltwater intrusion. One local resident complained "*in 2020, when inundation occurred in the buffer zone, it was also inundated in the national park, then they released the water from national park to the buffer zone, so it destroyed all of our fields […] the ginger is rotten, and the papaya buds are also rotten, so people could not stand anymore, they carried gears to break the sluice gates.*" (ULN1, IPI, December 2020). One NGO officer shared that "*People in the buffer zone have more arable land and diverse agricultural production in U Minh Thuong than in Tram Chim, therefore when disasters occur they suffer more loss than people in TCNP*" (NGO1, IPI, December 2020).

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5.4.2 Climate change impacts on tourism development

The results of the survey showed that the ratio of respondents mentioning climate change impacts on tourism in TCNP is 15/26 (57.7%) and in UMTNP is 8/15 (53.3%). In which, the response rate on the impact of climate change on tourism development was mostly negative with TCNP of 86.7% and UMTNP of 84.6%. Only a small percentage of 6-8% responded that climate change can have positive or no effects on tourism (Figure 5.12).

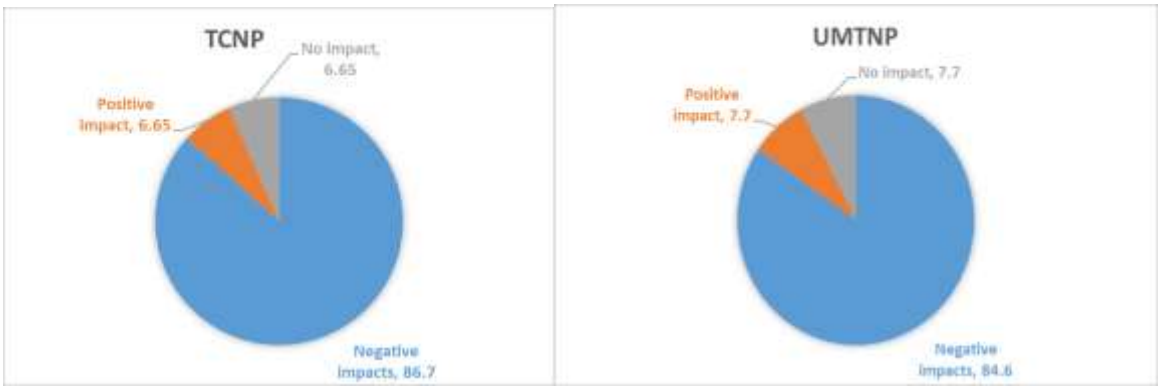

Figure 5.12 Response of local people in the impacts of climate change to tourism development

The responses on the negative impacts of climate change on tourism in the two NPs mainly revolved around common themes such as "water," but there are differences between the two NPs around this issue (Figure 5.13). In the case of TCNP, water-related issues are mentioned mainly as "flood" and "rain" with the problem of late arrival or no flood being highlighted as a major disadvantage of TCNP (Figure 5.13a). It affects flood-based tourism activities in the flood season which is a specialty of TCNP and followed by reducing tourism revenue. One homestay owner shared about the benefits of floods on tourism:

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"Especially in the flood season, visitors like to come to experience, they like to go by boat to the river delta or take a big boat to experience and enjoy local cuisine on a boat, but now there are no more floods" (TLT9, IPI, December 2020). Change of flood regime in TCNP has had bad impacts on tourism, one TCNP officer shared: "*These years there are no floods and it affects our income because we cannot develop a service to run boats in the flood season, and it impacts the birdwatching service in bird's breeding season. In the flood season, we cannot do the service of "experience fisherman life." So it impacts the services of tourism and revenue. We cannot operate those services and cannot have revenue in 2019 and 2020*" (TN1, IPI, December 2020). On the topic of torrential rain threats to the safety and hygiene of tourists on a boat trip, one TCNP officer shared: "*In case of small rain, boats still can go, but when the rain is quite heavy and accompanied by the wind, boats cannot go. Sometimes erratic and torrential rain causes hygiene problems, like mud soils, etc*" (TN2, IPI, December 2020).

Due to the restrictions on the conversion of land use purposes in the NPs as analyzed in chapter 4 (section 4.4), construction of permanent houses for tourism is taboo in the land adjacent to the national park. Therefore, most tourism accommodations are temporary, houses are made with bamboo, so they are easily blown away by whirlwinds and storms. One farm stay owner at TCNP buffer zone shared: "*My farm stay also has one house be unroofed and collapsed in this March, April at the beginning of this year by a whirlwind. [..] We just built this house so it had no wires. I lost about 200 million VND. Because that house costs 200 million*" (TLT10, IPI, December 2020).

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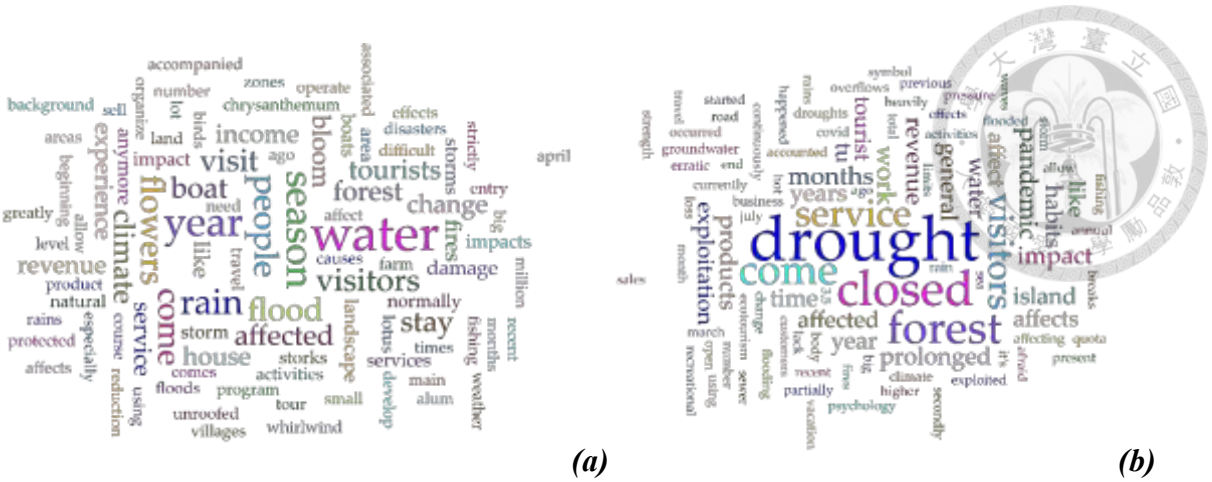

Figure 5.13 Word cloud of most frequent 95 words in response to the question "How climate change impacts tourism in your area?" in TCNP (a) and UMTNP (b)

In brief, extreme weather phenomena, climate change, and the response to climate change solutions through forest closure in the dry season, or water retention in the dry season in TCNP have both positive and negative impacts on tourism. Positively speaking, water retention can create favorable conditions for aquatic plants such as lotus to grow for the whole year or ease transportation by boat which is a unique service and also contribute a significant proportion in tourism revenue in the wetland of the VMD in general and TCNP in particular. However, water retention is reflected as having bad impacts on the growth of native species such as Eleocharis which is the food of Sarus Crane, and also reducing landing areas for birds, which have bad impacts on tourism resources as well as tourism activities and tourist experience (Figure 5.14).

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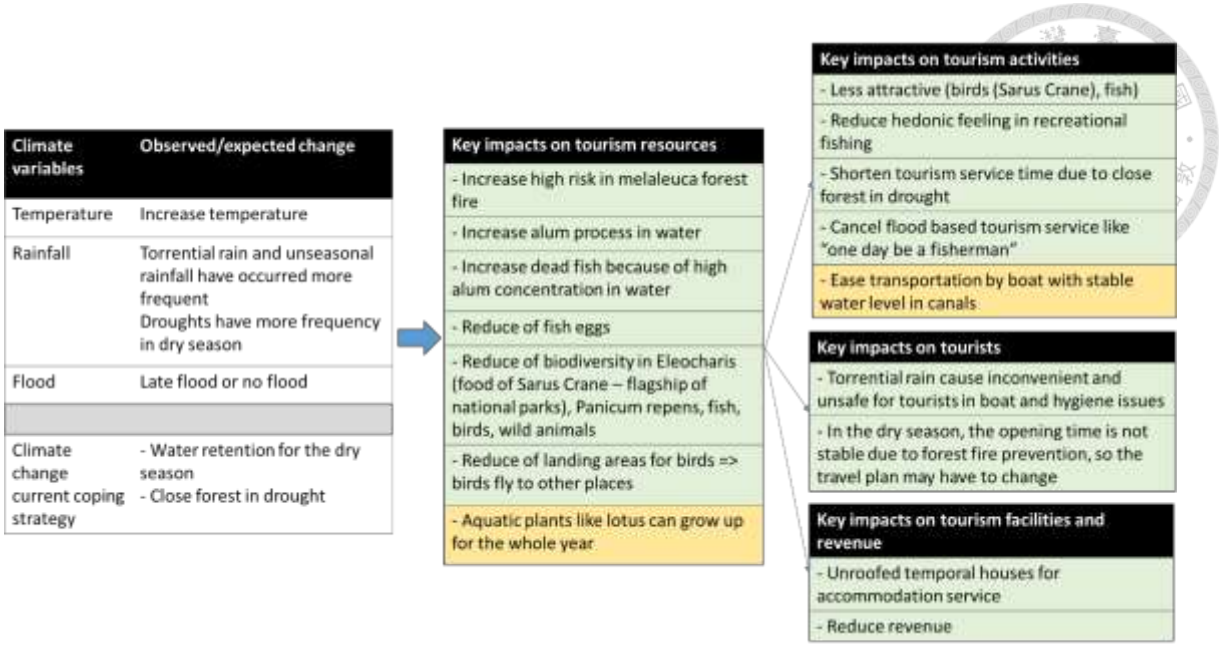

Figure 5.14 Impacts of climate change and climate change adaptation to tourism in TCNP **(Note: Positive impacts; Negative impacts)**

By comparison, in UMTNP, although tourism has just begun to form and has not yet developed as strongly as TCNP, some major impacts of climate change have been identified with the most mentioned issue being drought with fear of forest fire (Figure 5.13b). Drought can shorten the time of tourism operation, one district officer shared: "*A few years ago, due to the prolonged drought, NP was closed from about March to about July, because NP was afraid of forest fires, so they did not allow tourists to come in*" (UGD1, IPI, December 2020). As a result, revenue of tourism is reduced, one UMTNP officer claimed: "*Tourism is greatly affected by climate change, from 2010-2013, ecotourism revenue accounted for 15-20% of annual total revenue, the next year is higher than the previous year. But in recent years, due to the effects of prolonged drought and erratic rain, the forest has to be closed*" (UN3, IPI, December 2020)

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In UMTNP local people and officers also pointed out typical impacts of climate change on tourism activities, tourists, facilities, and revenues with both negative and positive effects (Figure 5.15). After the forest fire in 2002, the government's investment in building large roads and small paths to serve as tools for extinguishing forest fires has created a premise for tourism development when facilitating traffic connections to NP through vehicles such as motorbikes or cars. However, it also causes a lot of controversy about sustainability and the principles of ecotourism development in the UMTNP.

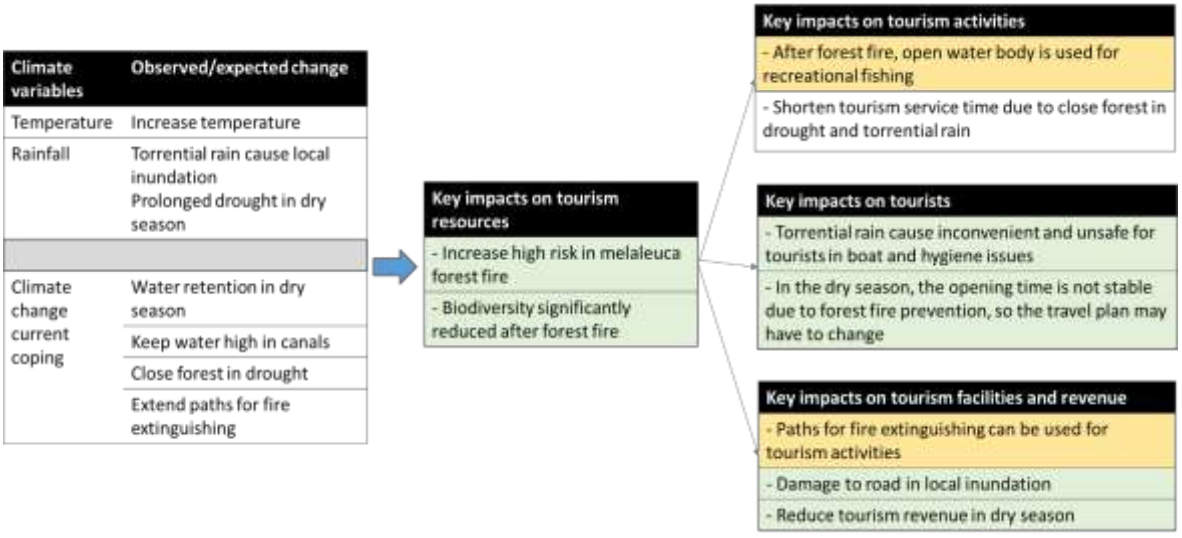

Figure 5.15 Impacts of climate change and climate change adaptation to tourism in UMTNP

(Note: Positive impacts; Negative impacts)

5.5 Conclusion

In brief, in this chapter, based on local data, policy analysis, focus group discussion and interviews, we have analyzed the interactions of 4 dimensions of ECO, RS, GS, Actors and the Outcome of management in forest fires and water management (Figure 5.16)

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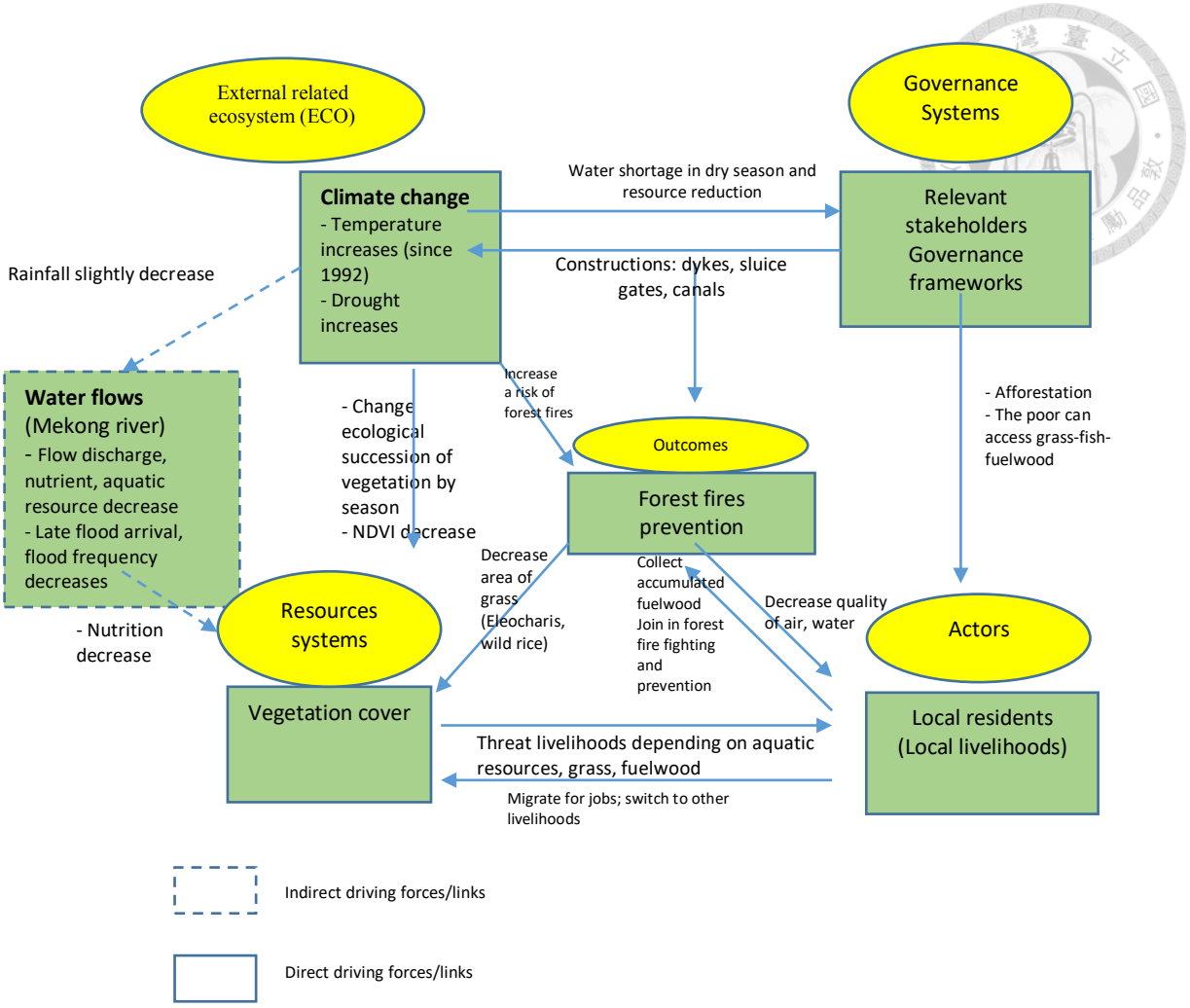

TCNP (a)

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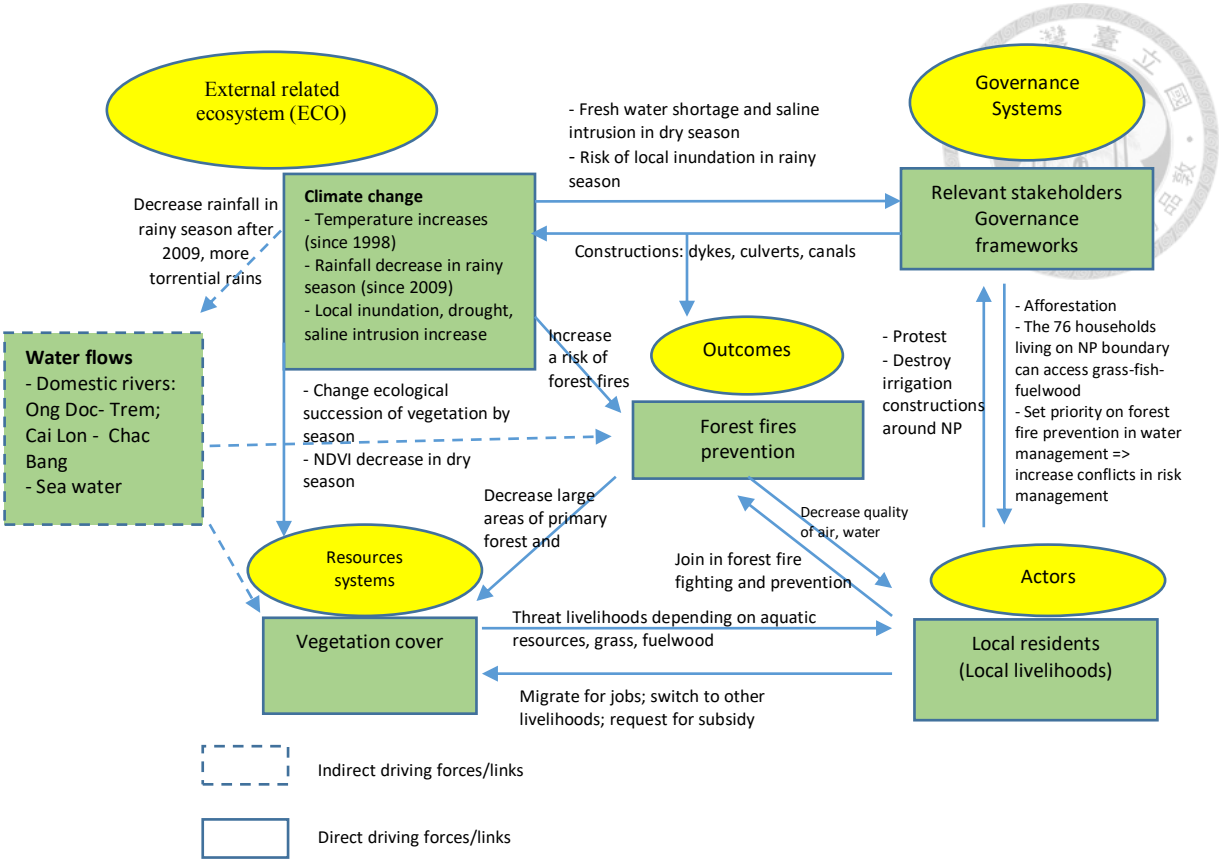

UMTNP (b)

Figure 5.16 The interactions of climate change (ECO), vegetation cover (Resource system); Governance systems, Actors and Outcome (Forest fires prevention) in TCNP (a) and UMTNP (b)

In terms of climate change, the two NPs have quite similar trends of changes in climatic factors. In TCNP, the temperature started to increase significantly (p value <0.05) from 1992, while rainfall did not change significantly. The increase of temperature causes increasing risks of drought and triggers forest fires and can cause the significant degradation of vegetation in TCNP, especially in the dry season. While in the UMTNP, the temperature started to increase significantly after 1998, the rainfall increased in the dry

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season and decreased in the rainy season. Vegetation NDVI showed a rapid decline from 2006-2009 and recovered after 2010 to the present.

After an evaluation of the nexus of climate change on vegetation cover changes, we found that climate change contributed to aggravating forest fires in the 2 NPs because the temperature increased, especially in the dry season, which increased the evaporation rate causing a fire risk. The increase of dam construction in the upper stream of the Mekong river contributes to aggravating the water shortage in the dry season and shortening the flood season. This results in a series of consequences in terms of reduced water flows, sediments and other biological resources. This transboundary factor further complicates the problem of PA management in the VMD. However, human intervention is supposed to have a stronger impact on the change of vegetation. Humans with interventions such as water retention in the dry season, have stopped wild forest fires in both of the national parks, but contributed to the degradation of vegetation. The vegetation in TCNP shows a marked degradation in the dry season after water retention solutions are implemented. Those solutions increase the area of aquatic plants and reduce the area of native species that prefer the original hydrological regime with a flooded season and a dry season such as Eleocharis and following consequences in biodiversity degradation. For example, the reduction of Eleocharis causes a decrease in the number of Sarus Crane (Ni & Tuan, 2015) (because Eleocharis is the main food of Sarus Crane).

UMTNP experienced a similar situation at the beginning when applying water retention (period 2006-2009), but after 2010, thanks to the adjustment of water and forest management not to keep water too moist and to keep water on a terraced level for each region, the ecosystem has been restored. Therefore, we suggest that TCNP can refer to that

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change in the management of national park resources in general and tourism resources in particular.

The change of vegetation in particular and the resources in general of the 2 NPs both cause difficulties in people's livelihoods. The management boards of 2 NPs both raise issues of afforestation and community-based forest protection and fire prevention, but the UMTNP's strategy shows an absolute priority for forest fire prevention and that also increases the risk of crisis in water management in the buffer zones. This is also an issue that has received little attention in WPA governance systems in Vietnam and the case of UMTNP shows that the impacts of climate change are not only presented by visible issues such as water shortage and forest fires, but also great pressures on the benefit conflicts of conservation and local livelihoods.

Considering the impact of climate change and the change of vegetation on tourism activities, both NPs show that the negative impacts are prevalent. With TCNP, the problem of late arrival or no flood is mentioned as the main problem of tourism because flood-based tourism cannot operate according to the plan of the province and tourism center. Thereby it causes visitors' dissatisfaction, reducing tourism revenue and affecting the long-term development of tourism in the locality. With UMTNP, forest fire-prevention is a top priority, so the drought situation shortens the travel time and the revenue is also modest and decreases over time.

Although tourism is a sensitive and vulnerable sector to climate change (Dogru et al., 2019), it is also a field with diverse adaptation options to cope with and adapt to climate change (Jopp et al., 2013). So what solutions will the people and government take to reduce the impacts of the change in the tourism environment as well as the climate change impacts?

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Does the interaction of macro government (provincial government) - meso level (NP & local community) affect adaptation as well as adaptive capacity in tourism in the context of climate change? We will answer those questions in the next chapter.

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Chapter 6. Climate change adaptation of tourism destinations from social-ecological adaptive capacity

6.1 Introduction

The analysis of community resilience to environmental change and the interaction of GS and Actors is not a new topic in studies using SES theory. The evolution of SES theory witnessed the division into different research directions with many contributions from big names such as Ostrom, Berkes, and Holling. Ostrom and her colleagues focus on institution arrangements that were most likely to enable Actors to collaborate and solve social problems in systems with common-pool resources (CPR) and public goods (Olson, 1965; Ostrom et al., 1994; Schlager, 2004). The SESF was proposed by Ostrom (2007; 2009) with a list of generalizable indicators that can be utilized as a diagnostic guide to assist in solving environmental problems and to diagnose the sustainability of SES more generally (Ostrom, 2009). Meanwhile studies by Berkes, Folke and Holling that focus more on resilience (Berkes & Folke, 1998; Berkes & Ross, 2013; 2016) and a variety of other environmental governance theories (Folke et al., 2005), including multilevel governance, panarchy (Holling, 2001; Holling & Gunderson, 2002) and adaptive co-management, etc.

In our research, with the approach from the evolution and effects of CC to WPA as an SES, we focus on comparing 2 cases representing the WPA community of Vietnam with two main focuses. Firstly, ecotourism is a field that requires an international market approach to capture economic values and promote indigenous values of landscape and culture, so we adopt the approach of Berkes and his colleagues on resilience. However, we focused our assessment of AC with special approaches from tourism and panarchy (Holling, 2001; Holling & Gundeson, 2002) in cross-scales interactions in adaptation actions (Figure

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6.1) to find out the impact of tourism development on AC and adaptation of two cases and identify the key factors that enhance resilience capacity.

Second, our research was conducted in a local context, but local context does not mean local scale. Interactions between GS and Local Actors in RS management are under the general influence of the Vietnamese and world context. The special feature we want to contribute in this study is the Vietnamese political context in the notion of RS in the SES framework. How does the transition of political regimes (particularly the transition of communist regimes) impact PA management (specially on land ownership and strategy of ecotourism development) and how does it change the approach to SES theory? Vietnam experienced a massive transition in political regime after the war and reform (in 1986 known as Doi Moi) under several driving forces such as globalization and market oriented economy. Berkes and Folke's studies focus on Aboriginal communities in which resources are considered community owned. Ostrom and her colleagues have a common goods approach. In our case in Vietnam, under a communist regime, RS management has made several adjustments because a major property right regime of RS is state owned. State ownership means the state has the right to determine use or access rules to the property.

The transition to a communist regime is a unique feature of the Vietnam context and it has wide impacts on every aspect of the socioeconomic conditions, such as on the tourism industry, resources system, governance, and actors. Transition to a communist regime as a condition of adaptive management in PA resources, especially land ownership. Among various resources of WPA, we select land ownership because it was a prior concern of a master plan of ecotourism, and also a concern of actors in investment decisions and adaptation choices.

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Analytical framework: Based on the general framework in chapter II (Figure 2.2), in this chapter we develop an analytical framework which analyzes the interaction of GS and Actors in the climate change adaptation process. There are some variables we already mentioned in chapter III and IV such as GS with relevant stakeholders and governmental regulatory framework and property right system. In this chapter, we focus on AC of actors and how cross-level interaction occurs in the adaptation process.

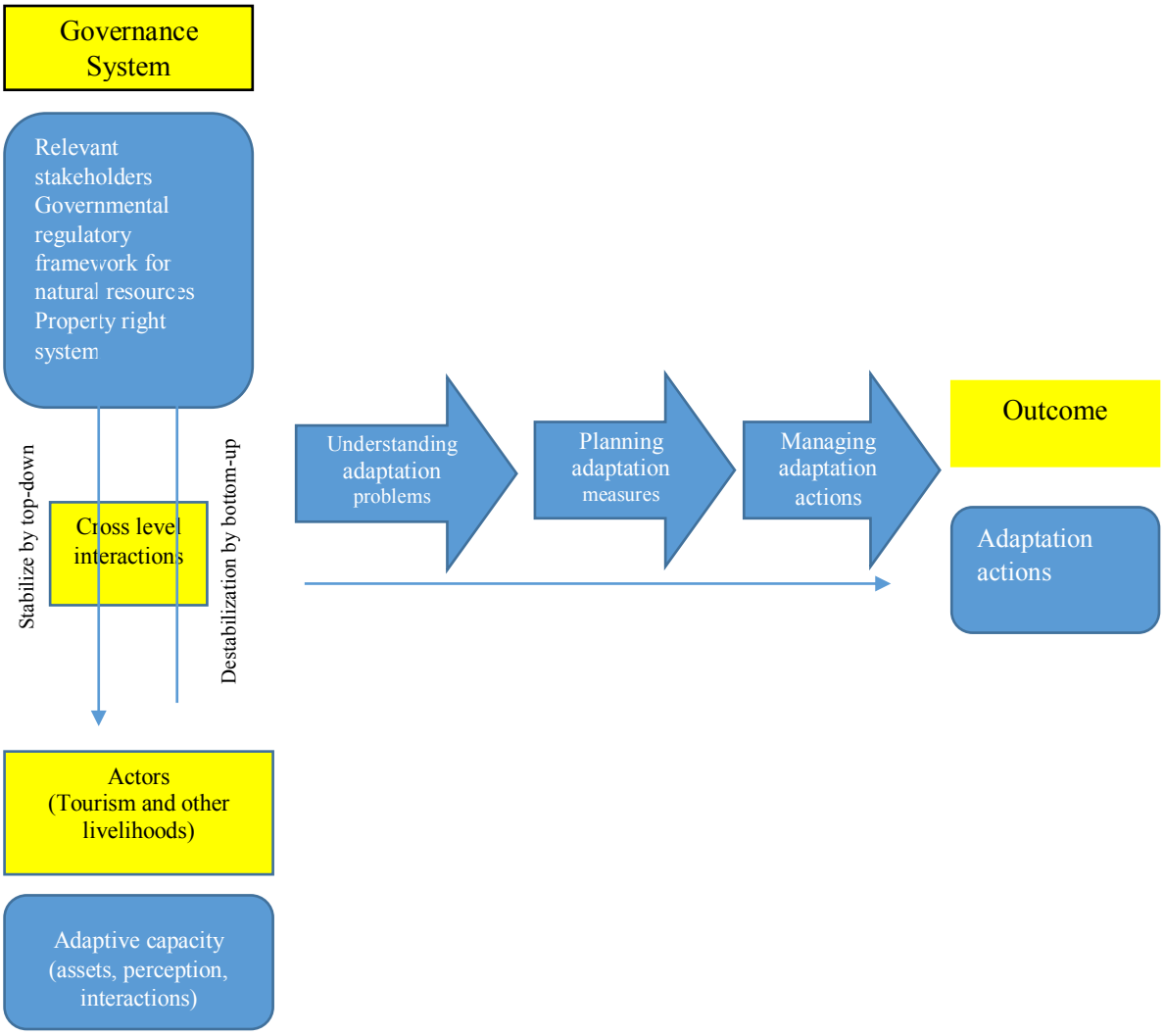

Figure 6.1 An analytical framework for the interaction of GS and Actors in the climate change adaptation process.

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From the SES approach, we argue that climate change adaptation and adaptive capacity of each tourism destination depend not only on the adaptive capacity (AC) of each stakeholder but also on the interaction of each stakeholder as a system. Tourism and WPA are two complex social-ecological systems with various elements and complicated interactions among them. The previous chapters described the context settings for the development of tourism as well as the situation of tourism development and resources system and the governance of the two national parks (Chapter 4) and how climate change impacts resources and general livelihoods as well as tourism development as a force for adaptation actions (Chapter 5). With the different impacts that climate change has on tourism resources (mainly in vegetation covers) and tourism development (revenues, activities, and strategies), each national park has different adaptations. In this chapter, we analyze adaptation actions in two local communities, especially in the tourism sector, and the relation of adaptive capacity and adaptation choices. We argue that the traditional view of adaptive capacity is not true for all cases. The idea that the more assets one possesses, the more adaptation actions they do is not always the case. This is especially true in the tourism sector where there are always interactions between internal (destination) and external (tourists, DMOs) Actors, which can bring the exchange of perception, awareness, culture and continuous innovation for each stakeholder in adaptation. Therefore, besides analyzing the basic components of adaptive capacity such as financial capital, physical, social, political, and human capital, we will analyze factors related to social-psychological and especially application of the concept of panarchy in investigating the interaction between top-down and bottom-up in adaptation and tourism development to adapt to climate change and for sustainable development. Consequently, it will provide a multi-

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dimensional view of the options for livelihood development and the response of NPs in the context of climate change and propose a reference for decision-makers in implementing regulations or strategies in the development of WPA in the context of climate change, especially in the VMD where there is a tipping point of environmental change as well as policy changes but there has been no research on this issue so far.

This chapter intends to answer the research question "***How do people (local government and residents) in WPA perceive and adapt to climate change from tourism perspectives***?" This chapter includes 5 main sections. Section 6.2 will explain how adaptive capacity will be measured in our study where participants in tourism are not enough for statistics-based analysis using content analysis and interrater reliability by agreement percentage. In section 6.3, we will present and analyze the adaptive capacity of two national parks in regard to resources, social-psychological based capacity and the social inclusion as it relates to climate change adaptation actions under interaction among macro – meso – micro levels. In section 6.4, we will present and analyze existing adaptation options in two national parks and the relation between adaptive capacity and adaptation actions. Finally, we will conclude this chapter in section 6.5.

6.2 Adaptive capacity and content analysis of in-depth interviews

To answer the question "**How do people (local government and residents) in WPA perceive and adapt to climate change from tourism perspectives?"** we analyzed adaptive capacity and cross-scale interaction between local communities and governments in adaptation. There are diverse tools and methods of analyzing AC in general and AC of social ecological system by quantitative, qualitative or mixed methods, which depends on contexts, research's objectives, time, and financial budget (Whitney et al., 2017). Our study

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was conducted in the context of Covid-19 when the ability to approach individuals is limited and cannot be calculated as statistic-based. In addition, the research objectives, which aim to revise the SES framework with a focus on the social approach to investigate the interaction of governance systems, actors (local people), and resources systems (mainly in tourism). In responding to external related systems (climate change and its impacts) through their perception and adaptation actions, we used qualitative interview approach and governance approach in adaptive capacity analysis. To have an insightful understanding of a community with households' or individuals' responses to climate change we used a qualitative interview approach. This is an inductive qualitative assessment within a community using local knowledge engagement (Whitney et al., 2017). Indicators include resources, institutions, and other supports mentioned by interviewees to help them adapt to changes and their impacts (Knapp et al., 2014; Bennett et al., 2015; Ruiz-Mallén et al., 2015; McCubbin et al., 2015). The governance approach in AC evaluation is to understand dimensions of institutions such as policy, rules, norms and AC. It provides insights on the interaction of institutional and governance dimensions of AC developed inductively from case experiences and the role of current institutions and governance arrangements in enhancing the capacity of communities to adapt to change and contribute to bottom-up and top-down assessments of adaptive capacity. The scale of analysis is local with community based institutions and governance arrangements, and macro in case of national arrangements (Smit & Wandel, 2006; Pahl-Wostl 2009; Gupta et al., 2010; Brown et al., 2010; Armitage & Plummer, 2010).

Combining two above adaptive capacity evaluation approaches, in this study, besides analyzing the basic components of adaptive capacity such as asset, financial capital,

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social, political, and human capital, we focus on analyzing factors related to the social-psychological interaction and especially to the interaction between top-down and bottom-up within tourism development adaptation to climate change and sustainable development. We used a grounded theory approach at this step with qualitative methods. The data is mainly collected from in-depth interviews and focus group discussions. The data is analyzed qualitatively by thematic analysis with the support of NVIVO 12. After collecting 45 interviews, including 26 TCNPs, 15 UMTs, and 3 NGOs, I transcribed verbatim. To reduce bias and improve the reliability of qualitative analysis the transcripts will be intercoded by two people (which is known as rater or inter coder). We used the percentage agreement to test interrater reliability. After having 45 transcripts, I read through all to remove substandard passages such as digressions, too many suggestions from the interviewer and to get the general sense of data and reflect the overall meaning. Finally, we eliminated 1 transcript and have a total of 44 transcripts for analysis. Based on that and the theoretical framework, I formed the first version of codebook which still can be revised during the whole coding process.

Several statistics have been used to measure interrater and interrater reliability. In this study, we will use one of the most common measures - percent agreement. To calculate the percent agreement, I created a matrix with columns representing the various raters and rows representing variables for which the raters had collected data (Table 6.1). When the percent agreement reaches 80%, it means the data coding is reliable.

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Table 6.1 Results of percent agreement

	First co-coding transcript		**Two raters independently & randomly code 3 transcripts**						**The second rater randomly recode two transcripts**			
Transcript ID	TGP5		TLT10		NGO 1		ULT2		TLT2		UGC1	
Items	Agree	Total	Agree	Total	Agree	Total	Agree	Total	Agree	Total	Agree	Total
Adaptation action	12	12	8	9	5	5	15	18	7	8	5	6
Leadership	17	17	2	2	4	4	4	7	0	1	6	10
Adaptive capacity												
Perception of climate change and its impacts	17	19	9	9	4	4	38	40	20	21	20	20
Perception of tourism resources and development	6	6	2	2	9	10	3	3	2	2	5	5
Social capital	9	9	4	6	13	13	1	1	1	1	3	3
Knowledge	*	*	*	*	1	1	0	0	8	8	2	2
Technology (B.8.10)	1	1	2	2	0	0	0	0	0	0	0	0
Equipment	*	*	*	*	*	*	4	5	0	0	1	1
Infrastructure	*	*	*	*	*	*	2	2	3	4	0	0
Information	*	*	*	*	*	*	1	1	1	1	0	0
Interactions												
Bottom-up management	2	2	7	7	11	12	1	2	1	1	1	1
Learning process	7	7	4	4	1	1	1	1	5	5	4	5
Top-down management	9	10	11	12	7	8	9	12	0	0	0	0
Number of agreement codes	80		49		55		79		48		47	
Number of total codes		83		53		58		92		52		53
Agreement percentage (%)	96.4		92.5		94.8		85.9		92.3		88.7	

(Note: * At that time there were no such sub-themes in the codebook, as the process progressed, some red color sub-themes were added and adjusted accordingly. This process is called axial coding (Strauss & Corbin, 1990; 1998))

The results show that the agreement rate between two codes is higher than 80%, therefore it is satisfactory and the coded text segments can be used for further analysis.

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6.3 Adaptive capacity

6.3.1 Resources based adaptive capacity or which resources people possess

Adaptive capacity dimensions from resources based in this study include financial (income, diverse livelihood), natural (land & forest, natural resources), physical (infrastructure, equipment), human (knowledge & experience, training skills), social capital (networks, supports), and political capital (leadership, empowerment). Based on the content of the in-depth interviews, we used word frequency to analyze which were mentioned most frequently and discourse analysis to compare the resources-based adaptive capacity of the two national parks (Table 6.2).

Based on the results of text analysis and local reports, we found that the UMTNP has an advantage over TCNP in terms of natural capital. In particular, UMTNP has a larger agricultural and forestry land area. Therefore, people's livelihood is mainly agriculture with a variety of crops (mentioned in chapter 4 section 4.2). However, the division of access to national park resources such as grass, fuelwood, and fish is different between the two national parks. In TCNP, vulnerable group households typically have priority to access those resources; while in UMTNP it is the households located near the national park which have priority to access. UMTNP explains that the purpose is to improve the living standards of people living in the vicinity of the NP and reduce illegal encroachment; however, it also oppresses people in the buffer zone areas of the NP, especially the poor because they argue that it is unfair.

TCNP shows more available resources in other capitals such as financial, human, physical, and social capital. Specifically, in terms of financial capital, due to the large

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number of people involved in tourism, they have more financial support from tourism development incentives. One provincial officer explained the benefit of people joining in the tourism business: "*First, support accommodations, cash support for each hotel which has from 30-15 rooms will be supported 50 million/1 room. Second, support of 500,000 VND per 1 m2 used for foodservice businesses and tourist souvenirs. The third is to support bank loans with a maximum of no more than 5 billion"* (TGP5, IPI, December 2020). This is a source of support that only TCNP has. Regarding human capital, TCNP's knowledge channels include internal networks such as tourism clubs, which makes training content more diverse while UMTNP's knowledge is disseminated in the form of local workshops and propaganda depending on external networks such as IUCN, or from provincial agencies. In TCNP, due to easier access to the internet and more facilities for tourism activities, in addition to traditional information channels such as TV and government broadcasting, they also use social networks (Facebook) and mobile apps (Zalo) to update the latest information. Experience of people in TCNP related to "living with floods", "exploiting benefits from floods"; and "observing and predicting water flow seasons". Meanwhile, in UMTNP, it is more about drought resistance such as "water storage".

There are common networks which local people participate in such as government organizations (farmers' union, women unions) and NGOs, and relatives who can support or exchange information. In TCNP, the social networks seem to be more diverse including tourism clubs and village clubs. Clubs or guilds are informal organizations based on each village or each group of people having a common livelihood. In Dong Thap in general and in TCNP in particular, they establish many villages or livelihood clubs such as the dry club (mainly in Phu Tho commune), the scallion club (Phu Hiep commune), and the tourism

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club. In each club, they will have a monthly meeting to exchange and learn from each other about livelihood experiences, how to cope with challenges, and networking. That presents a typical culture of the immigrant community and has significant support to the adaptive capacity of members of each club. In addition, the emergence of businesses in TCNP is demonstrated by the appearance of the company in disaster support and represents the opening of the region to external market forces. Regarding support after disasters, both NPs have a major occurrence of material support such as money and rice, and support for recovering livelihoods such as financial support for afforestation or seeds and seedlings for farming.

Regarding physical capital, both NPs have a dyke system with different functions, in TCNP, dyke system has a flood prevention function with a system of sluice gates to regulate water flow out and in for rice production and forest fire prevention. Meanwhile, in UMTNP, a dyke system was built for preventing saline intrusion. In both NPs, people also have household construction to reduce impacts of droughts such as pond digging.

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Table 6.2 Resources based adaptive capacity of two national parks

Adaptive capacity	TCNP	UMTNP
Natural capital		
Average agricultural land / person	Phu Tho commune is 0.35ha/person, Tram Chim town is 0.08ha/person;	Minh Thuan commune is 0.58ha/person; An Minh Bac is 0.64ha/person
Average forestry land/ person	Phu Tho commune: 0.23ha/person Tram Chim town: 0.003ha/person	Minh Thuan commune: 0.19ha/person An Minh Bac: 0.55ha/person
Approach to the national park resources (fish; grass; fuelwood)	The poor or vulnerable group	76 households near National park
Financial capital		
Income per capita	Phu Tho commune: 50 million VND Tram Chim town: 55 million VND	Minh Thuan commune: 54 million VND An Minh Bac: 52 million VND
Income resources	Farming 80% Tourism contributes about 11% of GDP in 2019 and provides jobs for about 100 laborers who work regularly in this field (Tam Nong District People's Committee (TNDPC), 2020).	Farming 80% 7 boat drivers are officially working in transport service for the tourism, and there are about 10 food shops and inns along the main road, 1 canteen inside UMTNP with the number of estimated labors about 30 people
Financial support	Cash support for tourism business especially in accommodation services Incentives for loans to support seeds and seedlings and technical support in farming The social policy bank will support people to borrow at low-interest rates or no interest Support households in erosion areas, arrange resettlement,	Financial support that lends people from 30 to 50 million with low interest or no interest The national park supports 76 households with a non-refundable investment with about 15 million VND/household

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<table>
<tr><td></td><td>support 10-20 million money for relocation</td><td></td></tr>
<tr><td colspan="3">Human capital</td></tr>
<tr><td>Training skill</td><td>
<table>
<tr><th>What they train</th><th>Frequency</th><th>Training contents</th><th>Who can attend?</th><th>Free?</th></tr>
<tr><td>Farmers' association meeting</td><td>3-4 times/ year</td><td>Knowledge related to farming, seeding, pesticides, livestock; food hygiene and safety;</td><td>Farmers</td><td>Free</td></tr>
<tr><td>Disaster prevention</td><td>Once per year</td><td>Forest fire prevention; drilling; communal rehearsal of forest fire extinguishing</td><td>Officers of the province, district, and commune Then local people</td><td>Free</td></tr>
<tr><td>Tourism training</td><td>2 times/ year</td><td>Tourism service skills, exchange experiences, networking, update new policy, incentives</td><td>People are working in the tourism</td><td>Free</td></tr>
</table>
</td><td>
<table>
<tr><th>What they train</th><th>Frequency</th><th>Training contents</th><th>Who can attend?</th><th>Free?</th></tr>
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<tr><td>Disaster prevention</td><td>Once per year</td><td>Forest fire prevention; drilling; communal rehearsal of forest fire extinguishing</td><td>Officers of the province, district and commune Then local people</td><td>Free</td></tr>
<tr><td>Organize propaganda workshop</td><td>1-2 times/ year</td><td>Raising people aware of environmental protection, climate change, the role of biodiversity conservation</td><td>People are living in the buffer zone especially 76 households living near National Park</td><td>Free</td></tr>
</table>
</td></tr>
<tr><td>Experience</td><td>- Water season (experience in predicting the time of water flow out and in)
- Flood (harvest before flooding; lift stuff; preserve fish)
- Soil alum treatment by using lime powder</td><td>- Water storage in drought (storage of water in jars)
- Inundation (pumping; build-up edge of the field)
- Soil alum treatment by using lime powder</td></tr>
</table>

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Knowledge	- Tourism - Clean farming - By training and experience	- By experience in farming - Propaganda
Information	- Weather forecast from TV - Warning system - Local government broadcast - Zalo weather forecast (Mobile apps)	- Weather forecast from TV - Warning system - Local government broadcast
Physical capital		
Infrastructure	- Dyke for flood prevention - Canals - Sluice - Road - Residential clusters - House stilts - Ponds	- Dyke for salinity prevention/ saltwater intrusion - Embankment (fields) - Pond - Canals - Culverts - House
Equipment	- Hygienic water - Water pump - Forest fire equipment - Water tanks	- Water pump - Forest fire extinguishing - Well water
Social capital		
Network	- Government organizations (Fatherland Front, state budget); Military & self-defense forces; local organizations (farmer, Women union) - Tourism club - NGOs: Red Cross; WFF; IUCN, WB - Company - Village club - Relatives	- Government organizations (agriculture department; Women's Unions, War Veterans, Fatherland Front); Policemen - NGOs: Red Cross; WFF; IUCN, WB - Relatives
Support after disasters	- Money - Rice - Clothes; equipment; tools, gifts - Agriculture supplements (seedlings; seeds) - Livelihoods	- Seedlings; seeds - Financial support for afforestation

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In general, each NP has its capacity to effectively respond to local disaster conditions. However, in TCNP the resources mentioned in text analysis are more diverse, especially tourism-related resources and incentives. Thus, we argue that tourism-oriented development with the intervention of external enterprises also contributes to helping TCNP improve its initiative and flexibility of collective adaptive capacity. While in UMTNP, adaptive capacity depends mainly on the government budget so it is more passive and top-down.

6.3.2 Socio-psychological AC or how people perceive climate change and its impacts

According to previous studies, adaptation actions are the result of many factors in which adaptive capacity plays an important role. However, empirical findings suggest that a higher AC does not always imply more adaptation actions (Matasci, 2013; Csete & Szécsi, 2015). In the context of AC-based tourism research, psychosocial factors and their role in influencing adaptation behaviors and actions of actors are a sub-stream with great potential. Psychological factors include attitudes and risk aversion, public perceptions, and awareness of risks associated with climate and environmental changes (Hall, 2006; Scott & McBoyle, 2007; Horng et al., 2012; Jopp et al., 2013; Probstl-Haider & Haider, 2013; Becken & Wilson, 2016). Therefore, in this study with the SES approach in the tourism system, we argue that tourism has a potential contribution to the shortcomings of AC in general, especially the psychological aspects. We hypothesize that more people recognize climate change and they would like to take more action to adapt to climate change so the perception of climate change and its impacts will be the first step in the adaptation process (Figure 6.2). To gain an understanding of the adaptation problem, we suppose that psychological aspects must play a key role in this phase.

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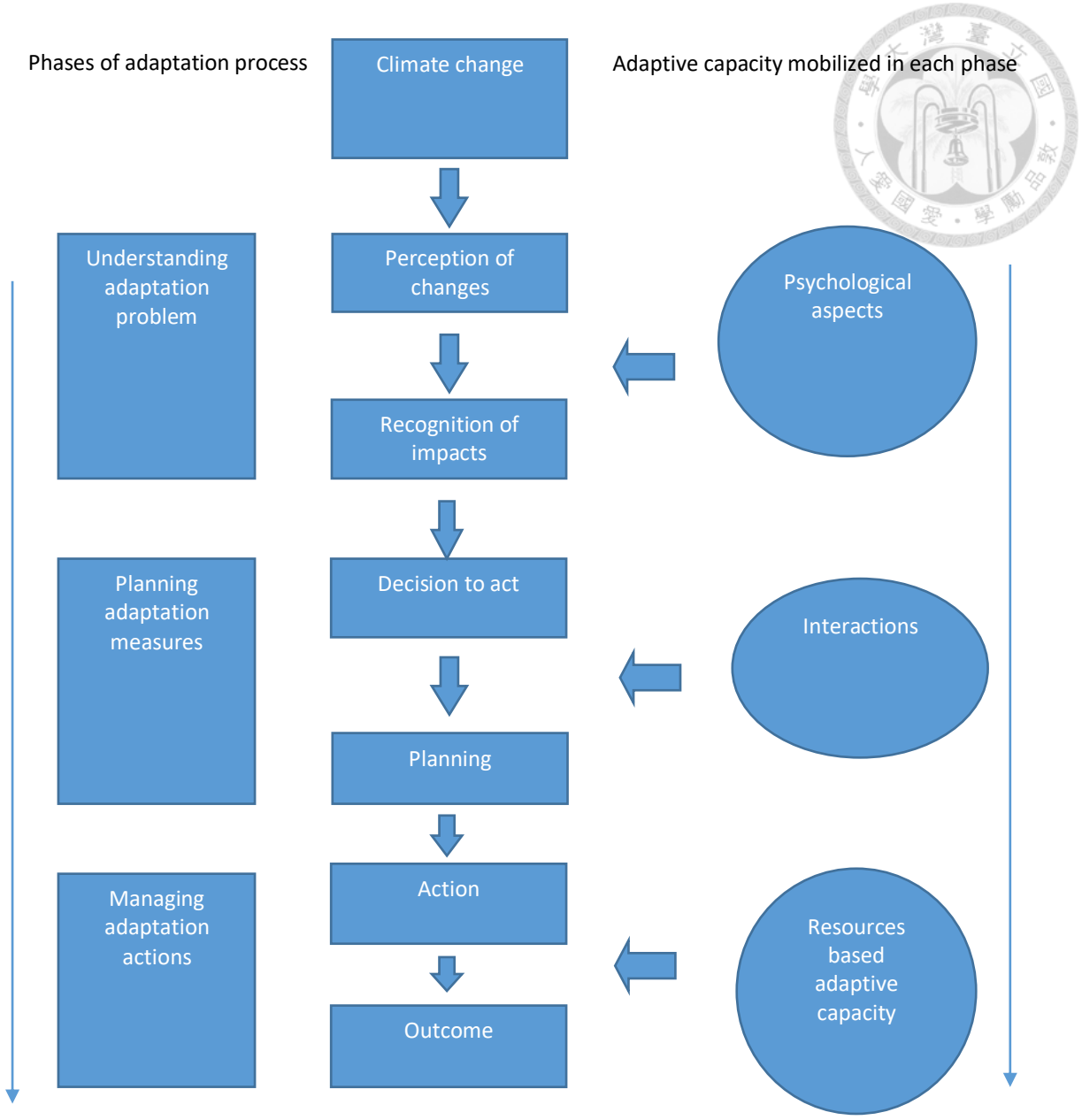

Figure 6.2 Phases of climate change adaptation and adaptive capacity mobilized for each phase

This study contributes to an overview of AC and the evolution of AC through different phases of the adaptation process which previous studies have not mentioned. In a comparative analysis of the two cases, tourism in TCNP, develops more, whereas in UMTNP tourism development is still restricted. We propose that this provides premises for

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the conclusion of the final research question “what role does ecotourism play in climate change adaptation in wetland protected areas?” In terms of perception of changes, we analyze the sub-themes: “climate change manifestation” and “causes of disasters.” In terms of recognition of impacts, we analyze the sentiment of the sub-themes “climate change or disasters impacts” (Figure 6.3).

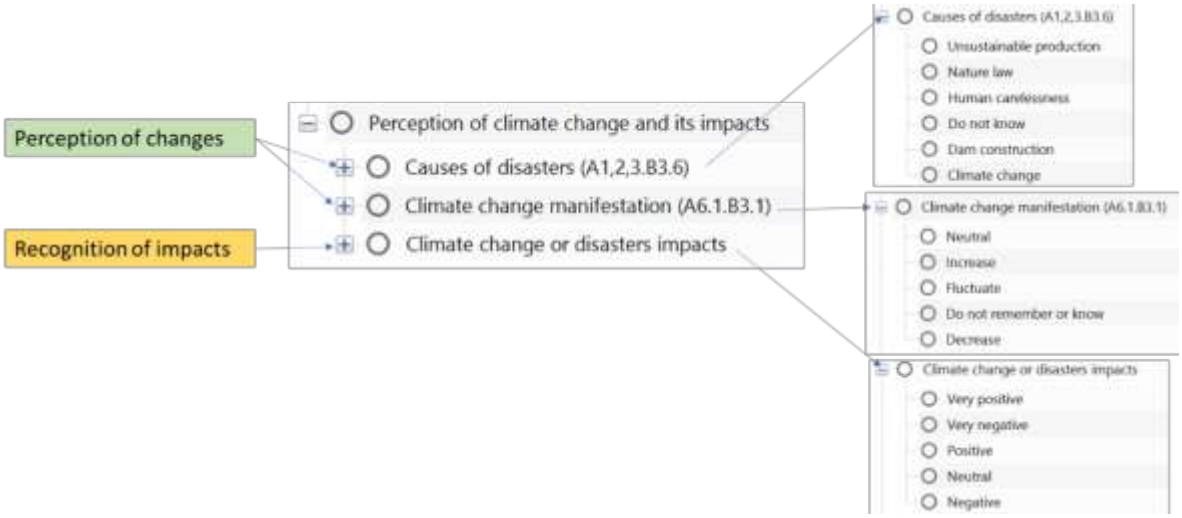

Figure 6.3 People’s perception of climate change and its impacts

6.3.2.1 Climate change manifestation

In general, the majority of respondents believe that climate change occurs with the manifestation of changes in extreme weather phenomena such as prolonged heat, unseasonal rain, drought, and torrential rain occurring with an increasing trend or fluctuating depending on location. Only 14% of responses showed no change, and 1% responded "do not know" or "do not remember" (Figure 6.4a). Notably, there was a difference between TCNP in the perception of the manifestation of climate change. In which TCNP (Figure 6.4b) found a reduction in some natural disasters.

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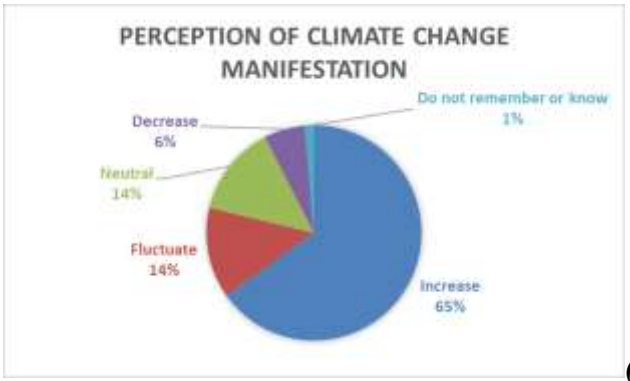

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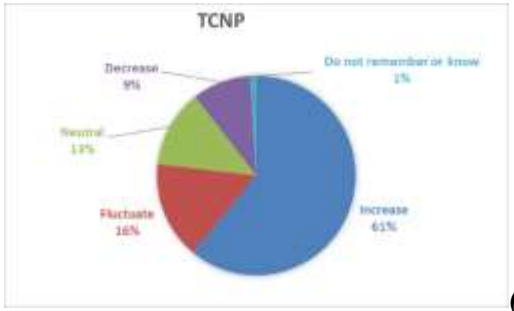

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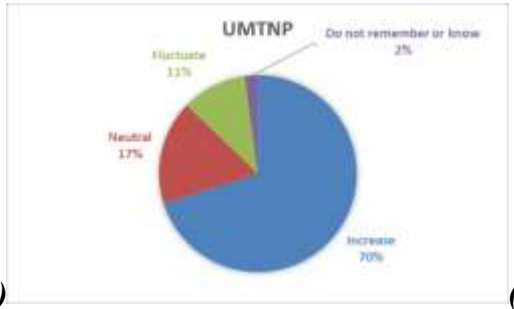

(c)

Figure 6.4 People perception of the manifestation of climate change in general (a); in TCNP (b); UMTNP (c)

Further text analysis by word frequency in 44 interviews (Table 6.3), we found that in TCNP, the disasters which are perceived to have an increase of both frequency and intensity through the most frequent words mentioned which are “lack of water,” “unseasonal rain,” and “drought.” Meanwhile, in UMTNP, the most mentioned disasters are “heavy rain,” “flood,” “hot,” “drought,” and “salinity”. Thus, the change of UMTNP is more complicated with heavy rain increasing in the rainy season, but drought and heatwave occur in the dry season along with saline intrusion, which affects the adaptation strategy differently in each NP.

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Table 6.3 Top 10 most frequent words of perception of climate change manifestation in two national parks

CC manifestation	Increase		Decrease		Fluctuate	
Word frequency	Word	Weight percentage (%)	Word	Weight percentage (%)	Word	Weight percentage (%)
TCNP	rains	5.05	flood	25.42	rains	6.91
	water	4.70	big	10.17	floods	5.32
	season	2.47	2011	5.08	seasons	4.26
	drought	2.12	past	5.08	water	3.72
	dry	1.88	decrease	3.39	weather	3.72
	flood	1.88	flow	3.39	april	2.13
	unseasonal	1.88	small	3.39	come	2.13
	past	1.65	water	3.39	july	2.13
	last	1.41	2015	1.69	longer	2.13
	level	1.41	2016	1.69	cycle	1.60
UMTNP	rains	7.67			flood	16.67
	floods	5.67			come	5.56
	drought	3.00			fluctuates	3.70
	increasing	2.33			monsoon	3.70
	occurs	2.33			southwest	3.70
	hot	2.00			storm	3.70
	water	2.00			2018	1.85
	heavy	1.67			back	1.85
	salinity	1.67			complex	1.85
	dry	1.33			disasters	1.85

The elements in TCNP that were mentioned which fluctuated the most were “rain” and “flood.” Rainy and flood season is not as normal as it was before because it came late or was unpredictable. Meanwhile, in UMTNP, changes in monsoon regime from southwest winds were mentioned and floods by a change in local rainfall regime was mentioned. Regarding the decrease in disasters, only in TCNP are there some responses, especially in a decrease of the frequency of the term “flood.”

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Thus, analyzing the perception of changes in the two NPs we found that people in the two NPs highly recognized the change of climate which is presented by changes in disasters and climate parameters. In TCNP, with the significant impacts of the Mekong river system, people are aware of the change of "floods" and "water flows" more than changes in climate parameters themselves. Meanwhile, in UMTNP, changes of local climate are more aware such as "torrential rain," "locally flooded," and "salinity" due to the impact of the sea. In brief, the people in the two NPs are aware of the changes of main local disasters. Especially in TCNP, the changes mentioned are mainly related to river flows changes while in UMTNP the changes are perceived as directly related to climate parameters and sea level rise.

Perception in causes of disasters

In the interview question of "what can be the reasons for disasters in your area?" people mentioned mainly five factors: human carelessness (such as accidental burning, not preparing well, warning system); climate change; dam construction; natural law; and unsustainable production (3rd rice crop, aquaculture). In which, human carelessness makes up the highest proportion with 42%; followed by climate change (21%) and dam construction (18%).

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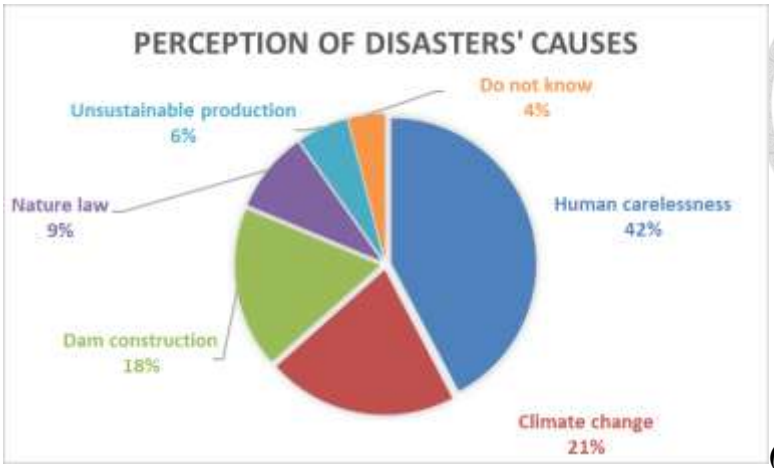

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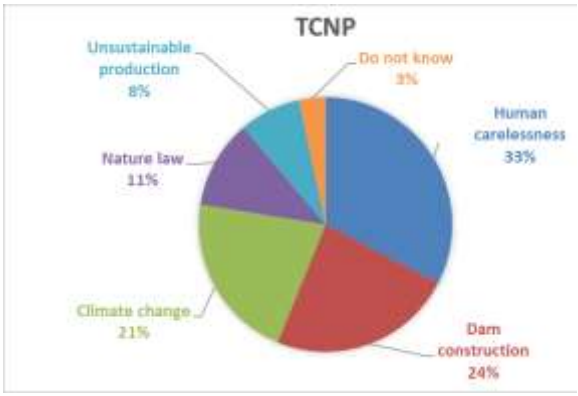

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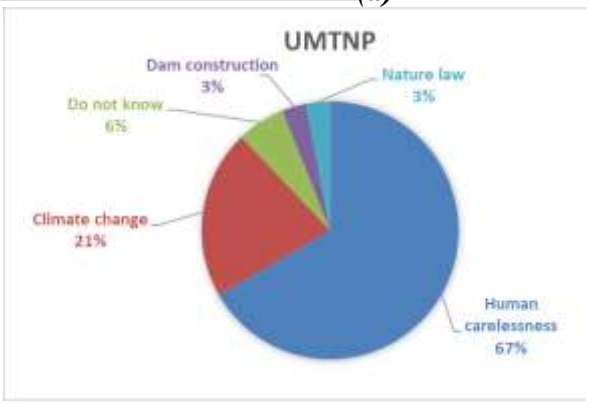

(c)

Figure 6.5 Perception of local people of disasters' causes in TCNP (b); UMTNP (c)

There are differences in the perception of disaster causes in two NPs; in which in TCNP (Figure 6.5b) human carelessness accounts for 33% meanwhile in UMTNP (Figure 6.5c) this factor is explained for 67% of the disasters; and in TCNP, dam construction as an external factor accounts for 24% which is only mentioned at a rate of 3% in UMTNP. Interestingly, climate change explains 21% of disasters in both national parks.

For recognition of impacts

In general, the people in the two NPs are aware of the impacts of climate change on their lives with negative and very negative responses accounting for the highest proportion (56% and 25%, respectively). However, in TCNP, there are 4% of responses who suppose

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that climate change has a positive effect on their livelihood (Figure 6.6). One provincial officer stated that: "*In the VMD in the dry season, tourists in the city prefer to come here to have a more ecological environment, near the national park, and the air is cool and pleasant*" (TGP5, IPI, December 2020).

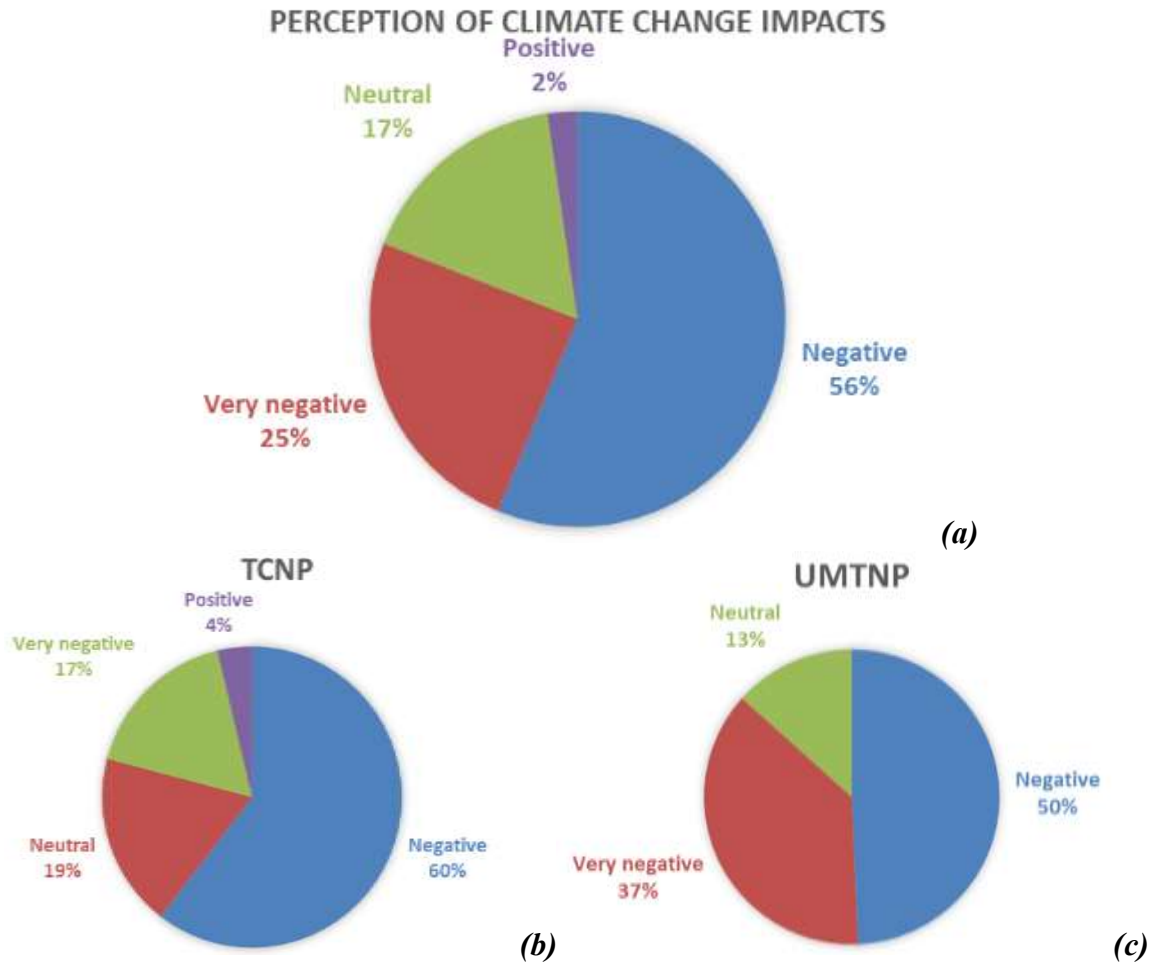

Figure 6.6 Recognition of disaster impacts in general (a); in TCNP (b) and in UMTNP (c)

*(**Note**:* We coded text segments of interviewees answers for the question "how climate change impacts your livelihood or your life?", in which, we categorize:

- Very negative: in the sentence has words such as very, serious, greatly, a lot, badly impacts; or impact all, destroy all, etc
- Negative: in the sentence just describe impacts in general
- Neutral: not impact
- Positive: describe the good sides of changing in climate in general

Given score: Very negative: 2; Negative: 1; Neutral: 0; Positive: -1
A higher score means they perceive more impacts from climate change)

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Table 6.4 Comparison of recognition of climate change impacts by scoring between TCNP and UMTNP

Scores	TCNP	UMTNP
Recognition of impacts	0.91	1.24

Between the two NPs, UMTNP people recognize that climate change causes more negative impact on people's livelihood than in TCNP (Table 6.4). Thus, comparing TCNP and UMTNP, people in these two localities both realize the most basic and typical manifestations of climate change, they are also aware of the impact of climate change on their lives but think that climate change is not the main reason for disasters, but that others are more significant such as human carelessness. Regarding the impact of climate change on people's lives, the people in the TCNP have a less negative perception of the impacts of climate change than people in the UMTNP.

6.3.3 Interaction - social inclusion of local people in climate change adaptation plan and management

A knowledge gap in tourism studies is the social inclusion of vulnerable communities, individuals, tourism businesses, and tourists in AC and climate change adaptation (Phan et al., 2021). In this study, we analyze the inclusion of local people in the interaction between community and government and we argue that this inclusion will support planning adaptation solutions at phase II when government and local people interact and agree on the way they mobilize their resources in the decision and planning to take action to adapt to climate change. Three factors that might weaken resilience are a mindset that views innovation as negative, a set of controlling social ideas, and a predisposition toward centralized decision-making (Davidson-Hunt & Berkes, 2003). In

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two cases, we analyzed the three above characteristics by stabilization by top-down and destabilization by bottom-up.

6.3.3.1 Stabilization by top-down

In this study, the tendency toward centralized decision-making will be analyzed by how the policy implementation process (tourism and climate change-related policy) in the two national parks. The two cases are the two provincial NPs which were analyzed in chapter V. Provincial People' Committee and Provincial departments and related agencies are responsible for and have power to propose and implement policy under the orientation of the state. Meanwhile, local governments from district to commune are the ones who implement regulations or policies under the supervision and monitoring of higher government.

Regarding climate change-related policy, from provincial department perspectives, although climate change adaptation policy implementation is flexible based on local conditions, they found many difficulties in implementing general policy enacted by central government and suitable to local needs, for example, lack of apparatus, lack of clear guidance, lack of collaboration among locals, and current climate change adaptation solutions are too vague for local people and take a long time in the decision making process. One provincial officer explained the top-down approach in climate change policy: "*From the past until now, to have a policy on climate change, it has to come from the central government to the province. There are also 2 ways of interaction, but mainly top-down from the central government. For example, for the past 5 years, the central government has issued this resolution 120. Previously, it was the central resolution 24 on adaptation to climate change, natural resource management and environmental protection. The province started to develop a plan according to the central framework. Then in 2017 and 2018, there was a resolution 120 that the Mekong Delta*

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adapts to climate change. The province also relies on that to do the province, and then the plan to implement the Paris Agreement on climate change, those are the central agency's decisions and based on that framework. [..] In which each locality has its characteristics and in that resolution is also flexible, not rigid. But at present, regional policies have the difficulty that 13 provinces do not have any agency to act as a focal point, now it is difficult to do so. It means that the center has already issued it, but from the Central Government to manage 13 provinces in the VMD, it does not have its apparatus, so it is difficult" (TPG2, IPI, December 2020). However, the policy is criticized to be not clear and policymaking processes are slow, especially non-construction solutions, one local resident shared: "*I think a majority of policymaking processes are slow, for example, the environmental policy, most people know they need to protect the environment but they haven't made a clear policy. Policies on the environment and the protection of natural resources are not clear. But in terms of a large construction like a dike system, just after their request for financial support was approved, they can build it quickly. But about small things like garbage and water sources, they don't have a clear policy, they don't care much*" (TLT10, IPI, December 2020).

Regarding the tourism policy, in Dong Thap, particularly in TCNP, there are great conditions for tourism to develop because tourism is identified as a key economy. One provincial officer shared: "*there are resolutions (nghị quyết) of the provincial Party Committee, the People's Council, there is a program of the People's Committee that is the whole political system for tourism, the whole people and comprehensive tourism, not just our agencies doing tourism. [..]Dong Thap authorities are very active and supportive in this tourism*" (TGP5, IPI, December 2020). Meanwhile, in UMTNP, people do not mention the existence of the tourism-related policy, about climate change adaptation policy, there is a contrast in the opinion of communal officers and district officers. That marks a question of communication or interaction cross-scale on the local government system and it can have bad impacts on policy implementation. Several communal officers shared about

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miscommunication in policy implementation between commune and district government: "*The policy hasn't been closely based on local conditions, so the models suggested from the top are not suitable here. The higher levels enact general models and our local have to adjust it to suit the locality"* (UGC2, IPI, December 2020) or UMTNP officer shared: "*The policymaking process is very one-way, no local investigation. [..] Proposals like voter contact or democracy, but after proposals then what? [..] We have public opinion polling, but opinion pollsters can make up their own opinions, not make them transparent*" (UN4, IPI, December 2020). Meanwhile, one district officer strongly trusts that their communication is still good: "*People here believe in the party and the people believe in state policies. […] In my opinion, the local policy to implement is very good, people are very satisfied with the policies.*" (UGD1, IPI, December 2020).

In addition, in our investigation, we found NGOs play a very important role in connecting two of those levels in the policy. The two selected research sites are also two Ramsar sites. Therefore, NGOs have many activities related to biodiversity conservation and sustainable livelihoods here. First of all, NGOs are bridges to link and support in terms of human resources, material, and policy consultancy with the macro-level such as central government and provinces. One NGO officer shared details about the role of their organization "*Our advisory group is to support the province and connect the province with the central government. For example, if the province has any suggestions, they will send it to the central government, the central government will ask the consulting group to consider and have a solution for the central government. [..] Then the central government reviews and responds to the province, asking the province to correct it or something like this proposal, that proposal or a plan or estimate, there are many people in the group, each person specializes in one expertise. [..] Usually, the provincial side will actively contact me*

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or I also contact to see where the provincial side is ready, do they need my support or I remind them. Or if the provincial side directly contacts the central government, the two sides work directly with each other, I only stand on one side to support the province or to support the central government, when they are completed they send it to me to see if I have any suggestions or support, then the province sends it to the central government, then the central government reviews it. We connect and support to improve the activities to be better or to check with the central government to evaluate if the central government does not have enough expertise, they need consulting groups, need experts to give them suggestions so that they can direct more accurately and better" (NGO1, IPI, December 2020).

And with the local communities, the NGOs engage with the community to investigate and analyze the context and do pilot projects related to conservation and livelihoods to contribute to sustainable development. One NGO officer shared their project in UMTNP "*We supported the development of Trichopodus pectoralis (endemic species) farming, supporting them to raise more sustainably in the buffer zone of UMTNP[..] We always give priority to native species and minimize migrating the species from other places to NP, which will cause imbalance. To protect the ecosystem of the NP, we have to discuss with the people about what species to raise to promote livelihoods and provide free deep training on techniques and free distribution of fertilizer. They see the benefit and from there they join. After that, I support the output connection to get a better product or sell at a higher price*" (NGO2, IPI, December 2020).

Thus, NGOs with staff and resources from external budgets such as WB can facilitate policy decision-making and also reduce the tendency toward centralized decision-making. However, those actions are only effective when the provincial government actively collaborates with NGOs and supports NGOs in their local work. One NGO officer shared

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that: "*Our organization considers the Government of Vietnam as a partnership, we cooperate. Sometimes, at some activities, the Government can consult with our NGO on issues related to our expertise. IUCN also has a network (development partner) for all development organizations, including the World Bank, (inaudible) and all the major international organizations (NGOs). So our network as a unit that corresponds to the state works collaboratively with each other and we are partners with agreement on voice. So when talking about something, the Government will listen, and then they will agree to our proposal*." (NGO3, IPI, December 2020). In two surveyed cases, TCNP shows their activeness in their policy especially in tourism development and calls for NGOs support in this sector. Meanwhile, in UMTNP, the government has more tendency toward centralized decision-making. Local people's voices were heard less when we asked them about both climate change and tourism-related policy.

The reaction of the government to innovative

When we asked local people the question "how the government should react to local innovations in climate change adaptation or tourism," the most frequent word mentioned is "support." However, the local government will need to monitor and manage those innovations based on current policy. One TCNP officer shared about the support of the government of new innovations: "*We will assess which models are suitable for current policy to support, for example, to support the expertise to make that model better, to develop. Which is not suitable, I suggest they adjust because tourism is to please everyone, so how to meet the needs of visitors to attract them*" (TN2, IPI, December 2020). Sharing this opinion, one UMTNP officer emphasized the importance of following legal procedures: *"The state does not ban but will manage by having to register the procedures for temporary residence declaration and tax payment. There are regulations on tourism*

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business such as fire prevention and extinguishing, food hygiene, and safety". (UGP2, IPI, December 2020).

6.3.3.2 Destabilization by bottom-up

Empowerment

To investigate how local people are empowered, first of all, we survey the reactions of the people and officials as well as NGO officers of current local policy. "How do you rate the following policy in the local area?" (Table 6.5)

Table 6.5 Response of local people, NGO officers and local government officers to current policies related to climate change and tourism development

	Totally agree	Agree	Neutral	Disagree	Totally disagree
Dyke construction	***xxxx	**x	+++		
Contract forest or forest environmental leasing	****+	+x	*+x		
Call for external investors in tourism development	*****xxx	+x	++		
Water retention at national parks in the whole year	*x	x	**	+	**++

(**Note**: Neutral: not agree or disagree but need to be careful when implementing that solution)

Local people: x

Officer: *

NGO: +

All opinion we synthesized here based on the interviews, many people did not respond to the question related to policy evaluation)

The results show that there is a significant opposition in the evaluation of policy between NGO officers, local governments and local people. Firstly, 100% of NGO officers responded to all mentioned policies; meanwhile, only 27.8% of local government officers responded to mentioned policies and from 8.7% to 21.7% of local people responded to the mentioned policies; especially in regard to some policies, local people have never heard of

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or aware of things such as water retention and contract foresting or forest environment leasing. In addition, officers in NGOs respond to the local policy with mainly neutral, disagree, and totally disagree. They are concerned mostly with the environmental impacts of those policies on the national park ecosystem, such as dyke construction which can disturb the environment or tourism development which can harm biodiversity conservation. They are especially against water retention policy because it can cause damage to the upland vegetation communities of the two national parks. Meanwhile, local government and local people have an intention to more "totally agree" and "agree" with most policies, only the water retention policy they share the same worries because of the bad impacts in can have on the ecosystem, which is consistent with NGO officers' concerns (Table 6.5). In the responses, the majority from TCNP, the number of people giving opinions in UMTNP only account for 24.4% meanwhile TCNP opinion accounts for 62.2%.

We asked local people "how often do you participate in community meetings?" and "how often do you propose opinions in the meeting?" and "How often are your opinions recognized or listened to?" In general, local people responded that they have participated in local meetings especially when they are members of local organizations with 10% rarely attending; 60% often attend; and 30% sometimes. In TCNP, 66.7% say "Yes" for the question "How often do you propose an opinion in the meeting?" Meanwhile, in UMTNP, this ratio is 50%. Also, 66.7% responded that their opinions are listened to; which is 50% in UMTNP. Only 1 respondent in total shared with us when they have a proposal to the local government they will write a petition: "*I usually have opinions at the district level. Because I can observe the real situation of the district, then I can make a petition. Like I made a petition at the district of "don't catch fish with electricity so as not to destroy fish stocks" to*

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limit the eradication of fish stocks by electric pulses" (TLT10, IPI, December 2020). People working in tourism also have more interaction and are willing to join in the meeting and propose opinions in the meeting with the government more than people who do not work in tourism

Revolt actions

Based on the interview results, we found that NP staff have two-axis interaction with vertical interaction with higher-level agents and horizontal interaction with equal power agents on the issues they manage such as natural resources management or tourism development management. We also found that leadership plays an important role in this interaction. When leaders are active and have an entrepreneurship mindset, their revolt actions will be more frequent and changes of regulation are more significant. One provincial officer shared the norm for the time scale of each proposal: "*We just can propose by year, cannot for long term. [..] Many times I went to the meeting in the province and did not agree with their point of view. I would propose a more appropriate way including writing petitions to the Ministry of Natural Resources and Environment, not just the province*" (TGP1, IPI, December 2020).

Local people, especially key people such as reputed people or leaders of villages, have proposed their opinions in the local meeting about their needs. One local person who lived in the village for most of his life shared that: "*I used to work in this national park for a long time. I was reputable, well-spoken, and helped several poor and near-poor households. The director invited people to give suggestions and we explained some issues. […] Let cadres sit there and carefully calculate to keep life a little easier, everyone protects*

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NP, but strengthening the security force does not stop the fire. If people have a good life, then nothing happens. Uncle Ho said that if people agree, anything is fine" (TLN3). He emphasized that the consensus between the people and the government is key to local sustainable development.

Revolt actions also popularly occur via creating new forms of livelihoods which have not been planned by the government. One farmstay owner in TCNP shared: "*Normally, tourism operators do things that have not to be mentioned in any policy. Like my case, I'm the first one to have a farm-stay in Dong Thap. They have no policy regarding this in Dong Thap."* (TLT10, IPI, December 2020). One local farmer shared about the process of their livelihoods shifting and emphasized the flexibility of adaptive governance in TCNP: "*You can do it first and then register later, it's not possible in other places; In other places, registration must be done first, but here, when farming is not effective, farmers switch to gardening; here, there is no orchard tourism service, only Homestay and catering service*" (TLN5, IPI, December 2020). We suppose that the openness and facilitation of the local government in livelihood diversity makes people more active in communication or "revolt" to government by their own simple way, one local homestay owner shared: "I *met the head of the hamlet at that time, I asked for advice on tourism; at that time, the head of the hamlet informed the secretary, and then I met the Vice President of the Farmers' Union to ask for help (laughs); That afternoon I went up to meet the Secretary, he said he had heard about my idea but had not yet had time to visit me; he welcomed, encouraged me and then inquired about the resources I had and enthusiastically came down to the house to provide support. I invited the secretary of the commune to drink*" (TLT9, IPI, December 2020).

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Meanwhile, in UMTNP, we suppose that the way local governments revolt against the higher government decisions in more passive ways such as a request for subsidies or calling upon enterprises for financial support to construct public infrastructures or support the poor. One district officer shared that: "*My district which was just established a few years ago is still poor, so we use the method of advocacy. Mobilizing big companies from Saigon and Binh Duong and campaigning for support. We've been campaigning a lot for the people these past few years. Our district mobilized tens of billions of VND to drill fresh water wells for the people, build bridges, roads, and houses for the people*" (UGD1, IPI, December 2020).

Revolt actions in UMTNP are not as active as TCNP, people are quieter and decide to keep silent even when they feel they are being treated unfairly. One local person shared the way he responded to unfairness: "*Actually, from the past to now, there is some inadequacy, sometimes, I am not satisfied but I do not know whom I should share with. Hmm, this area is for nature conservation, I will not work here for long, if I insist on making some changes I will have conflicts and disagreements with many people. So I try to endure*" (ULN2, IPI, December 2020). And when they cannot stand it anymore, they will revolt in an extreme way such as protests. One local person shared about one disaster event in the last year: "*when heavy rain occurred, water was everywhere but the local commune government did not open the sluice gates, so people could not stand anymore, they carried gears to break the sluice gates. […] We feel frustrated about the issue of land that cannot be mortgaged, we always have a voice in community meetings but we feel discriminated against by local authorities among villages*" (ULN1, IPI, December 2020). Another local person also mentioned the same issue: *"last year, there was a protest here. Because when it*

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had heavy rain, it was flooded in the fields which are rental land, so local people asked for the sluice gate to be opened to reduce damages from flooding in their fields" (ULN2, IPI, December 2020). We found several issues in balancing resources management between UMTNP and the buffer zone of this NP. As we can observe from the disaster map of UMTNP (Figure 5.10), we can see in UMTNP, there are many different types of disasters occurring in the buffer zones, especially in the recent years. Meanwhile, in TCNP, the disasters occur less in the buffer zone (Figure 5.9) compared to inside of the NP boundary. It seems that these two NPs have spatially opposite disaster management strategies, and we suppose that this is one of the main reasons for people's frustration. Climate change and its impacts may increase the conflict between conservation and ensuring stable development in different management areas of NPs if managers do not have a reasonable choice of management strategy between trade-off or synthesis.

In brief, based on the comparison between the two NPs with TCNP having more advanced development of tourism and UMTNP having limited tourism development, we find that TCNP has many resources related to financial, physical, human, and social capital as well as fairer access to natural capital; while at the UMTNP, although the natural resources (land, forest) is larger, the resource accessibility has implicit elements of inequality and conflict. The adaptive capacity of TCNP is also more proactive while in UMTNP it depends on support from higher government. Regarding the awareness of climate change, people in both NPs have noticed the change of climate factors, but in TCNP there is also the impact of factors related to water flows in the Mekong river and factors such as dam construction. Both national parks believe that it is the local human factor with carelessness and weak management that are the main reasons for disasters, not

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climate change. With such awareness, we believe that it will make people more proactive in adjusting their behavior and changing in the direction of adapting to the change of the environment. However, the facts have shown that in TCNP people have more ways to interact and be included in climate change actions; meanwhile, in UMTNP, people are more passive and also react in negative ways. We argue that the activeness and entrepreneurship of leaders play a key role in engaging local people in adaptation action. People working in tourism also possess more capacity and are more active in response to climate change. Therefore, tourism development and climate change adaptation policy are mingling and supporting each other. The development of tourism with synchronous management from top to bottom helps improve the adaptive capacity of locals. In the next section, with comparative analysis, we will investigate how the two NPs mobilize their adaptive capacity for adaptation actions

6.4 Adaptation options

There are several ways of categorizing adaptation actions such as time-based adaptation we have long term and short term adaptation; or adaptive capacity based adaptation we have technical, behavioral, and management adaptation (Jopp et al., 2013; Njoroge, 2014). In this study, from SES approach with the argument that climate change adaptation is an outcome of the interaction between local community (meso level) and government (macro level) we propose our categories in which the government engaged adaptation it is more planned and rigid while the actions deriving from the local community are more spontaneous and flexible. However, the category is relative and many adaptation actions are hybrid such as creating new livelihoods in which many actions are long-term, like reducing rice production, switching to jackfruit plantation, or doing tourism. Short term

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actions include planting lotus. Preparation for climate change is done through some long term actions such as dyke construction and some short term actions such as equipping a water pump (Table 6.6).

Table 6.6 Category of climate change actions in two national parks

	Community-based adaptation action	**Government based adaptation action**
Long term		Afforestation; Policy; Planning
Short term	Disaster reduction action	
Hybrid	Create a new livelihood or switch to new livelihood; preparation; livelihood supports; migration; collaboration	

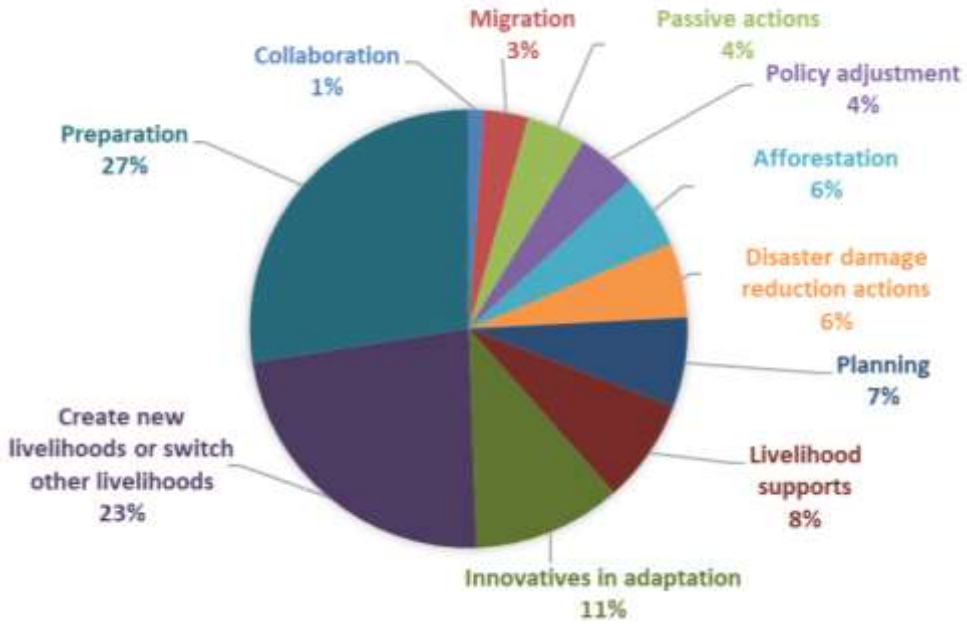

Figure 6.7 Responses of adaptation options in two national parks

Eleven adaptation options can be categorized in the responses to the question "how does your household adapt to climate change?" In which "preparation" has the highest

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proportion with (27%) and includes things such as adapting to floods by building dykes and dredge canals; adapting to droughts by using water tanks or water jars to collect rainwater; or by using information and equipment, people can prepare well before disasters such as storms and heavy rain (Figure 6.7). One local person at TCNP shared his experience to cope with flooding: "*every year in the 7th month of the lunar calendar, the water will rise, if the flood peak rises high, I will put things up high"* (TLN6, IPI, December 2020). One local person in UMTNP shared another experience in flooding: "*When the flooding came, the policemen told us to use sandbags to put on the roofs of the houses*" (ULN2, IPI, December 2020). In TCNP, the model of free swimming courses for children helped reduce the number of deaths significantly after 2011. One provincial officer shared some models to adapt to disasters: "*the model of living with floods and teaching children to swim, we call it the most successful model of the old policy. The second is the model of disaster prevention training, every year each district has training on prevention and control disasters in their locality*" (TGP2, IPI, December 2020).

The solution of "create a new livelihood or switch to other livelihoods" was selected by 23% of respondents by mainly switching from rice production to other crops such as lotus, vegetables, or fruits. Tourism is also considered as an alternative livelihood. One district officer in TC shared about this solution: "*There are many people around here who have adapted by switching from growing rice to growing lotus, selling lotus milk products, raising fish, and switching to drying productions: Trichopodus pectoralis, snakehead fish; raising scads or pigs or something. Generally, converting livestock or crops that are drought tolerant such as jackfruit*" (TGD1, IPI, December 2020). One local resident also shared his own experience in transforming livelihoods: "*it's climate change that is the*

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culprit of all those transformations; when planting traditional trees that are no longer suitable, they must switch to those; In the past, this locality did not grow durian, but now experts see it as suitable. Now I have to switch to growing mango or dragon fruits; those are because of climate change; In general, I can't go against nature" (TLT8, IPI, December 2020). Tourism is an alternative livelihood with the support from government, one provincial officer in TCNP shared: "[..] *the locals need to develop tourism. It is necessary to raise awareness of the benefits of forest conservation. If the national park is protected, then they can develop tourism, then they will be responsible for protecting the forest. [..] tourism can develop other livelihoods and additional services such as how to catch eels, how to sail the boat, etc*" (TGP5, IPI, December 2020). Besides creating high profit, developing tourism can help local people enhance the value of their available agriculture products, one local person working on tourism shared: "*Currently, tourism services are gradually adapting to climate change. Some households in my club also do tourism combined with fruit trees, they do gardening"* (TLT2, IPI, December 2020).

Tourism is also an industry with a lot of creativity in adaptation, in the two NPs, some innovations are mentioned in adaptation (11%) such as the "living with floods" model. One provincial officer shared about the combination of tourism development with agriculture and climate change adaptation as an ideal example of a circular economy: *"In Dong Thap, there are a number of models that take advantage of floods for aquaculture, inflow of water washes away pathogens and exchanges and recirculates water in ponds. […] We make flower rigs on a large scale, but it is still ecotourism, and combined with modern farming, it is more attractive to tourists. Because now we can safely produce things such as building greenhouses or using microclimates, it is possible to switch to organic*

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production, which is not only resistant to climate change but also resistant to an epidemic, and the number of pesticides and fertilizer will be lower. Production will be safer, and responsible tourism also requires safety. So we have "2 in 1" tourism, both ecological and safe, it is very good for tourists, too attractive, and Dong Thap has been and will develop it. For example, the AQUA system is a circular economy, you raise fish and use water from fish ponds to water plants. No fertilizer is needed, and people can both harvest vegetables and raise fish." (TGP5, IPI, December 2020)

Some adaptation options with the supports of the government were mentioned as livelihood supports (8%), planning (7%), disaster damage reduction (6%), afforestation (6%), and policy adjustment (4%). Some responses also mentioned migration (3%) and only 1% of respondents mentioned collaboration in tourism to adapt to climate change. This can be because tourism here has just formed so the connection of tour operators and stakeholders is still loosening. Strikingly, 4% of respondents mentioned passive actions in climate change such as "I don't know how to respond to disasters" (ULN2, IPI, December 2020) or "*I don't have any plan*" (TLT7, IPI, December 2020).

Those adaptation actions are not separate but interact together. For example, I found that "preparation" has an engagement of government like policemen; dyke system investment/construction is also considered as a preparation or resident cluster; so it has a strong connection with "*planning.*" Most of the solutions involve government intervention through "policy" which clearly shows the top-down characteristic in the adaptation of a communism country. Long-term solutions such as afforestation; planning, and policy adjustment accounts for 17%; while short term solutions account for 14% and most are hybrid solutions such as preparation, creating new livelihoods or switching to other

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livelihoods, livelihood supports, and migration. Collaboration accounts for 69% (Table 6.7). This also demonstrates openness and flexibility in adaptation actions despite government control. This is also what local governments operate to achieve two-way interaction between the central government and the local community.

Table 6.7 Adaptation actions and adaptive capacity mobilization for each action in two cases

Adaptation actions	**%**	**Adaptive capacity mobilized**
Preparation (before the disaster)	27%	Construction, equipment; policy; settlement/relocation planning; warning system; information; forest fire prevention (patrol); Skills (swimming)
Create new livelihoods or switch to other livelihoods	23%	Awareness; policy; social network (tourism club); financial supports
Innovative	11%	Experience; Creativity
Livelihood supports	8%	Policy; incentives; Finance; social capital (NGO)
Planning	7%	Policy; Infrastructure
Disaster damage reduction action (in and after disasters)	14%	Forest fire extinguishing equipment and training; construction; facilities (water pump; water tank)
Afforestation	6%	Policy, NGOs
Policy adjustment	4%	Policy; Finance
Passive actions	4%	
Migration	3%	
Collaboration	1%	Social networks

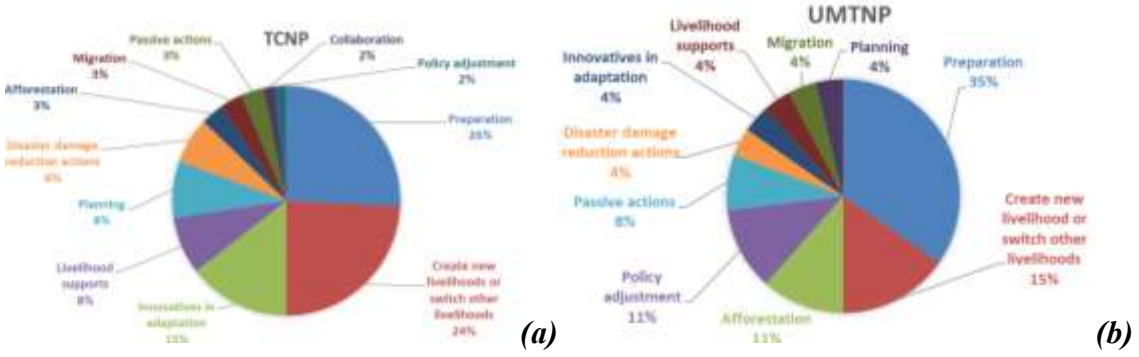

Figure 6.8 Climate change adaptation actions in two national parks TCNP (a) and UMTNP (b)

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Preparation and creating new livelihoods or switching to other livelihoods are options mentioned in high frequency in interviews in both of the NPs. Meanwhile, in TCNP, more adaptation regarding innovative livelihood supports and even having collaboration which is not in UMTNP. In UMTNP adaptation is more top-down with the high engagement of government control such as afforestation, policy adjustment, and many responses which are passive actions that local people do not know how to adapt (Figure 6.8).

We argue that differences can derive from the tourism situation in TCNP being more developed and people engaging in tourism have more adaptive capacity to adapt or have a choice to adapt to change. Such as in TCNP, they have a tourism club where people can meet, exchange information, and do business. People in UMTNP have more awareness of climate change impacts, but they have less empowerment and less adaptive capacity, therefore, they do not have firm resources for adapting actively to climate change. The top-down management which focuses on forest fire prevention and conservation makes people feel they are receiving unfair treatment even as a group of people located nearby a national park who receive a lot of financial support. People's voices are not listened to and people are not included in climate change adaptation management. This results in climate change actions lacking individual innovation and collaboration. People become more passive and feel unsatisfied with their government but also do not know how to react. That situation can put them at risk of being severely vulnerable to disasters.

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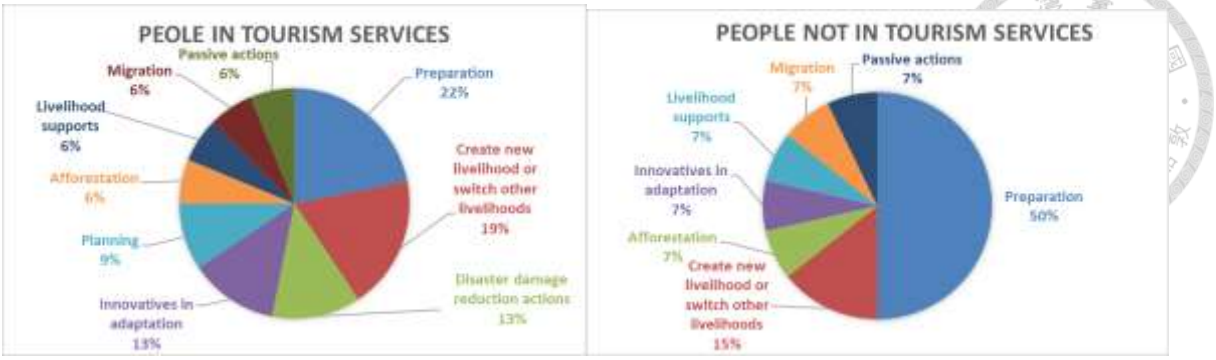

Figure 6.9 Climate change adaptation actions between tourism groups (1) and not in tourism groups (2)

With the help of NVIVO, we compared the contents mentioned in the text segments of the tourism services (group 1) and not in tourism services (group 2) (Figure 6.9). The ratio of participation of the work groups in the interview was 54.5/44.5. As a result, we found a significant difference between these two groups. Specifically, group 1 mentioned 9 adaptation actions. Meanwhile, group 2 just mentioned 7 adaptation options. Group 1 does not depend strongly on 1 option but has an even approach to different options. Whereas group 2 mentioned preparation at a rate of 50%. In addition, “passive actions” to climate change of group 1 also have a smaller proportion than group 2, which shows the proactive adaptation of working in the tourism group. They also have a higher rate of the innovative option than group 2. Thus, flexibility and diversity in adaptation options of group 1 are higher and it can help them be less vulnerable to climate change than group 2. This also shows that in the context of climate change, the participants in the field of tourism services have more initiative and diversified adaptation to reduce the influence and take advantage of development opportunities. All in all, we argue that working in tourism can help local people mobilize more adaptive capacity for adaptation.

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6.5 Conclusion

Community-engaged research (CEnR) approach in investigating adaptive capacity and adaptation in SES: In SES, a community/communities are identified as actors in the system - which are using/harvesting resources and under the rule of GS. The idea of engagement of the community in SES was found in various studies of collaborative environmental governance (Bodin, 2017), adaptive governance (Plummer & Fennell, 2009; Soliku & Schraml, 2020); integrated management (Wyborn, 2009); community based conservation institution (Baral et al., 2010) in which actors play a role in collaborative environmental governance because it helps to understand complex and social dynamics. Partnerships with the local community also help to utilize available assets, improved adaptive capacity, and reduce socioeconomic vulnerability (Metcalf et al., 2015). Previous studies emphasized the importance of multi-level or nested relationships in shaping community resilience and have been more recently reinforced by actor agency, decision-making power, social capital, etc. However, previous studies with the SES approach are criticized to focus more on ecological systems modeling and ignore several social system components such as complicated power interactions or actor agency (Huong et al., 2020). Therefore, in this research, the main contribution is the integration of the sustainable livelihood approach (Scoones, 2001) in investigating 5 capitals in AC, and also in terms of socio-psychological aspects and panarchy in cross-level interaction in the adaptation process. This provides a more comprehensive view of AC assessment with consideration of both the elements of the complex power relation and actor agency through stabilization by top-down and destabilization by bottom-up in the adaptation process. In addition, we also used the inductive qualitative assessment within a community-engaged research approach.

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This provides more insights into the community-based analysis of SESF developed by Ostrom which focuses on quantitative analysis.

As a result, we analyze these two cases to compare the two pictures of tourism and its management and interactions in economic development and climate change response. Obviously, from the SES approach, we can see that intervention and opening the door for external flows such as tourism enterprises can bring to the NP and the buffer zone not only income but also the dynamism of the people and local leadership, a change in mindset and more initiative to take advantage of opportunities and overcome difficulties that climate and environmental change brings.

Since the number of participants working in the tourism sector in both study areas accounts for a very small percentage, the number of respondents to our interview is not enough to have a statistics-based analysis. That makes the conclusions impossible to be completely objective. However, we use NVIVO with text analysis based on word frequency and interrater reliability to enhance the subjectivity of our data and analysis. We cannot conclude that TCNP with the trend of tourism development will promote response to climate change and that UMTNP which is still timid about tourism development and needs to consider developing in the direction of TCNP. We realize that the problem may not be in tourism development but in the proactiveness of leaders and people, which requires long-term and persistent intervention. In choosing whether to develop tourism or not, many factors need to be considered, especially the willingness of people. However, with the current dominance of top-down in the management of PAs in Vietnam, the initiative and creativity of the people are not common. The best way is through transparency and democratic attributes like legitimacy and accountability, transparency of decision-making

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progress, and procedural fairness in tourism development which is found more in the case of TCNP compared with UMTNP.

In several drivers for the adaptation process of the two PAs, we argue the role of property rights and the transition of communism to the adaptation choice of PA. According to the Constitution of the Socialist Republic of Vietnam, the legal basis for establishing the all-people ownership of land is provided for in Article 53 of the 2013 Constitution: "Land, water resources, mineral resources, resources in the sea, airspace, other natural resources and properties invested and managed by the State are public property owned by the entire people and owned by the State. State represents the owner and unified management". The two NPs also represent most of the NPs in Vietnam in terms of property rights with 100% of the park area being owned by the government and the land in the surrounding area being privately owned by individual farmers (TCNP case) or titled to individual farmers (UMTNP case).

State ownership and management over CPR have frequently been highlighted as the effective way to ensure the enforcement of management agreements and prevent free-riding by individuals (Wade, 1987). In Vietnam, 80% of NPs are under Territorial Jurisdiction of PPC, and District and Commune level institutions are part of the state property resource management system. Besides their conventional roles as resource allocators in agriculture and other locally marketed economic activities, they also join in controlling resources accessibility management by patrol or sanctions with their power and police forces.

However, resources management of WPA and surrounding areas in Vietnam is quite flexible with a transition of communism under drivers of oriented market economy and

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others to be harmonious with the demands of local resource users. In the process of economic development, NPs in Vietnam are mostly classified as special-use forests, so afforestation and forest protection are important tasks of both core zones and buffer zones. However, WPAs also made adjustments in land use to ensure the livelihoods of the people. In the UMTNP, the adjustment is reflected in the fact that, in the past, each household in the buffer zone was assigned 4 hectares with 2 hectares used for afforestation purposes, and 2 hectares used for agricultural purposes. However, at present, due to the decrease in the economic value of afforestation, there is an adjustment with only 1 ha used for afforestation and 3 ha for agricultural purposes. That makes the buffer zone gradually transform to a livelihood zone (Figure 6.10).

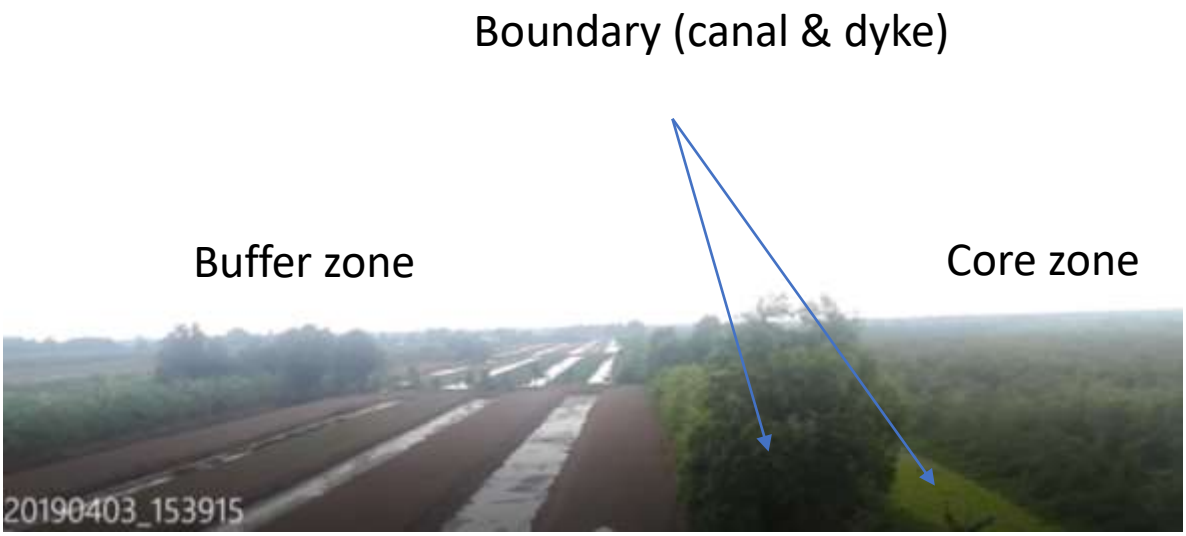

Figure 6.10 Landscape of UMTNP with buffer zone where people cultivate crops (land is titled to farmers) and core zone (land is state owned). The boundary is a canal and dyke. (Photo by Loan - April 2019)

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We argue that it is the state ownership of resources in WPA in Vietnam that leads to top-down dominance in planning and management of adaptation actions and consequent community passivity in climate change response. The high reliance on construction solutions such as the construction of dikes and water canals leads to the inability of people to respond promptly when local governments choose the trade-off between conservation and livelihood (case of UMTNP). The sharing of information mostly comes from local meetings and censored information with the Communist Party's policies, which is sometimes concealing fundamental trade-offs and contradictions, thereby increasing the long-term conflicts among different stakeholders in resource uses.

In addition, the two NPs have larger arable land area but also high instability of property rights because of PA policy in land ownership, so the two communities depend strongly on its local resources, and is thus vulnerable to the possible spatial redistribution of the resources (e.g. changes in land conversion and ownership by time), or ability to utilize its adaptive capacity to adjust to emerging opportunities (such as incentives in developing new livelihoods).

Interestingly, when we asked people about their investment intentions after the ecotourism master plan of two NPs would be passed, most people choose to invest in accommodation services. This is understandable because when tourists stay, they consume and bring profits to tourism operators. However, in both NPs, there is only a guest house located in the administrative zone which serves the accommodation needs of groups of experts or students for seminar/collaboration or study purposes. For ordinary visitors, it is necessary to reserve in advance because of the limited number of rooms. Around the NPs, there are small-scale hostels and inns. In surrounding areas of TCNP there are some

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community-based tourism models with homestays and farm stays. However, in addition to the limited residential land area, the construction of homestays and farm stays is not carried out on a large scale because of the restrictive regulations in the conversion of land use purposes such as not building on agricultural land. Innovation within communities is a good solution and can include building tourism stilt houses on ground land with bamboo material, however there needs to be awareness of tornadoes which can sometimes occur.

Land use under state control is deemed appropriate in the PA area because conservation is the priority. However, this causes frustration for people in diversifying their livelihoods and increasing people's incomes. However, the management capacity of UMTNP managers is still weak, for example, the problem of land use in the NP is misunderstood by the National Park Management Board which is the Functional Jurisdiction body of this NP. There are many accommodations built in the form of camps, but due to the pouring of concrete on the park's foundation, they have been stopped (Figure 6.11).

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Figure 6.11 A concrete road and camps are built for tourism (according to the 2015 tourism master plan). However, it was dismantled and decommissioned due to a violation of building regulations in the NPs. (Photo by Loan in April 2019)

Therefore, the economic restructuring in the coming time through tourism development in the two NPs is predicted to be still slow despite the great potential. Adaptation solutions largely depend on financial, technical, and directional support from the state. The main focus is on agricultural development, conversion to crops that are resistant to drought and salinity and have high economic value or are combined with agriculture and tourism such as flowers and fruits. In addition, migrating to big cities is also an option for young people and many workers.

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Chapter 7. Discussion and Conclusion

7.1 Ecotourism contributes to biodiversity conservation and climate change adaptation in WPA of the VMD

Ecotourism revenue and conservation budget sharing

In the previous studies, ecotourism is considered as a tool for pro-poor, climate change adaptation (Hornoiu, 2014; Jamaliah & Powell, 2017), conservation, and women empowerment (Weaver, 2011; Becken, 2005) or a solution for balancing the 'triple bottom line' discourse of sustainability. In this study, from the social-ecological system approach, we argue that ecotourism presents fundamental changes in the social system in PA and may play in shaping the path of transformation in the ecological systems of WPA (Moore et al., 2014). The presence and development of ecotourism in NPs reflect social innovations at the local scale and can be expected to alter a linked ecological system and the dominant feedbacks existing in the existing SES. This study analyzed the impacts that ecotourism had on changes to social and ecological outcomes which present in local income, biodiversity conservation and climate change adaptation.

Based on the results of content analysis in qualitative data from a community-engaged research approach the study found that ecotourism has made significant contributions to WPA regions in both economy and conservation as well as enhanced the adaptive capacity for climate change adaptation. Firstly, ecotourism development in the two national parks contributes to income at the household scale and to the economic development of the national parks in the core zone and buffer zones. This is reflected in the higher income of households doing tourism in comparison with households not doing

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tourism. Also, it extends the economic value chain of agricultural products in the form of agritourism in the buffer zones and provides jobs for local people in idle time of agriculture production. In terms of tourism space in the national parks and surrounding areas, ecotourism within the NP boundary develops as a "magnet" to attract tourist flows and investors and spread that influence to promote the economic development of buffer zones as satellite tourism points. As a result, it diversifies tourism products and services around national parks.

In addition, ecotourism also brings certain contributions to conservation when sharing a part of revenue for conservation according to the provisions of the Law on Forestry (2018). However, different from previous studies that stated that the contribution of ecotourism to conservation depends strongly on infrastructure, location, and the business model that the park adopts (De Vos et al., 2016; Baum, et al., 2017***),*** our empirical results show that ecotourism contributions to conservation depend mainly on revenue sharing related to the implementation of laws in each national park. Although, according to state regulations, NPs conducting tourism activities need to share no less than 1% of revenue depending on the form of ecotourism business and mutual agreement by the parties, the actual implementation of this regulation in national parks still causes many frustrations about benefit-sharing between the parties. Specifically, in TCNP, only 1% of tourism revenue is deducted for biodiversity conservation; meanwhile, in UMTNP, this ratio is 25%. With the lower sharing amount, it is easier for TCNP to attract more investors, but it raises the question of sustainable development, especially in the concerns of power and benefit-sharing between different agents in NPs. Due to the low revenue sharing rate in TCNP, many officers in the conservation agency body of NP complain that it is unfair when they

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are responsible for conservation but do not get direct benefit from it. They continue to complain that there are few forest rangers and their salary is low. Meanwhile, the revenue from tourism activities based on national park resources mainly belongs to other stakeholders (such as tourism operators). This situation can even make ecotourism become a potential threat to biodiversity conservation in NPs.

We suppose that the number "no less than 1% of total revenue for conservation" is a small and vague number, there are several legal loopholes for management, especially with ecotourism, a special type of business with strict environmental principles and priority to biodiversity conservation rather than economic benefit (Honey, 1999). This regulation on the Law of Forestry (2018) shows the looseness in the policymaking and implementation in the context of a communist country like Vietnam, especially the environmental law which is sometimes inconsistently implemented and flexibly serves the interests of a certain group in a certain period. Therefore, we suggest that in order to ensure the sustainable development of ecotourism in NPs, it is necessary to be transparent in benefit-sharing among stakeholders. In terms of compiling legislation related to ecotourism development in Vietnam, it is necessary to refer to the principles and practices of ecotourism development in international and other countries as well as comply with the laws appropriate to the local circumstances to ensure effective conservation as well as economic development and social justice.

Ecotourism contributes to enhancing adaptive capacity

Through comparing two pictures of tourism and its management and interactions in economic development and climate change response in two NPs, we found that, similar to previous studies, ecotourism development helps people to ***enhance self-organization and***

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deal with uncertainty (Baral, 2014). In the case of TCNP when ecotourism is encouraged to develop, even in political conditions dominated by top-down management under the control of communist governance from state to local, people still have opportunities to revolt and be empowered. They can expand social networks by participating in livelihood groups, training classes, expanding collaboration opportunities, and becoming more proactive in selecting adaptation choices. In addition, regarding resource-based adaptive capacity, in general, each national park has a capacity to effectively respond to local disaster conditions. However, in TCNP the resources mentioned in text analysis are more diverse, especially tourism-related resources and incentives. Thus, we argue that tourism-oriented development, with the intervention of external enterprises, also contributes to helping TCNP improve its initiative and flexibility of collective adaptive capacity. While in UMTNP where tourism is still undeveloped, adaptive capacity depends mainly on the government budget so it is more passive and top-down.

Thus, from the SES approach, it is noticeable that when WPA opens the door for external flows such as tourism enterprises, this can bring to the NP and the buffer zone not only income, but also ***the dynamism of the people and local leadership, a change in mindset and more initiative*** to take advantage of opportunities and overcome difficulties that climate and environmental change brings. The local community becomes more active and engaged in PA management strategies, which leads to more revolt actions and several pilots of co-management modes which were conducted to facilitate integrated development.

Ecotourism development is also considered as a way to connect stakeholders, empower local people and raise awareness about the protection of common resources.

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This study found that NP managers link tourism with forest fire prevention activities, for example, boats used for tourism are also involved in carrying people and firefighting equipment when a forest fire occurs. In contrast, the policy of water retention in the dry season facilitates year-round tourism, which improves the stability of this livelihood. In the past, boat tours were not available in the dry seasons. In addition, in the two NPs we found that community engagement in tourism activities in two cases was strongly influenced by their social capital, but mainly by bonding ties which means relation between them and local authorities or local organizations. For example, in TCNP where tourism is more well-developed, the workforce involved in tourism is trained annually with the support of specialized tourism agencies from the provincial level. Therefore, they have more attachment to common resources and dedication to their profession.

The benefit-sharing is not only decided by the local government which has power and responsibility but it is also formed by key people who are reputable in the community and have good relations with the government and the NP managers as well as have the business capacity. They will gather people who want to participate in tourism services, and do training and job assignments. They have their own operating principles to ensure the achievement of profit and safety goals such as the motor-taxi driver group in TCNP. While in the case of UMTNP where tourism development is still limited, people participate mainly through their individual relationships with NP managers to get jobs such as boat drivers. They also do not have a tour guide and tourists come here mainly to explore the landscape by themselves or most of them are regular visitors who come for recreational fishing activities. The key barriers to community engagement in tourism activities in UMTNP are mainly leadership ability, a centralized public administration, inadequate

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information, and non-transparency in benefits and trade-offs between stakeholders. That makes people apathetic toward tourism development, and tourism in the UMTNP is almost exclusively scattered with a few people having direct interests. Although the coherence between the core and buffer zones is constructive, in reality, it is very loose, lacking cooperation and interaction.

Ecotourism can facilitate the adaptive capacity of the community in terms of assets, perception and readiness to take adaptation actions. Based on the comparison of the relation of tourism development and adaptive capacity between the two NPs with TCNP's tourism being more developed and UMTNP having restricted tourism development, we find that TCNP has more abundant resources related to financial, physical, human, and social capital as well as fairer access to natural capital. While at the UMTNP, although the natural resources (land, forest) is larger, the resource accessibility has implicit elements of inequality and conflict. The adaptive capacity of TCNP is also more proactive. In UMTNP it is more passive and depends on support from higher levels of government. Regarding the awareness of climate change, people in both NPs have noticed the change of climate factors, but in TCNP there is also the impact of factors related to water flows in the Mekong river and factors such as dam construction. Both national parks believe that it is the local human factor with carelessness and weak management that are the main reasons for disasters, not climate change. With such awareness, we suppose that it will make people more proactive in adjusting their behavior and changing in the direction of adapting to the change of the environment. However, in TCNP people have more ways to interact and be included in climate change actions. Meanwhile, in UMTNP, people are more passive and react negatively. We argue that the activeness and entrepreneurship of leaders play a key

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role in engaging local people in adaptation action. People working in tourism possess more capacity and are more active in response to climate change. Therefore, tourism development and climate change adaptation policy are mingling and supporting each other. The development of tourism with synchronous management from top to bottom helps improve the adaptive capacity of locals.

Ecotourism can increase the magnitudes of social-ecological system changes to adapt to climate change in the long term and create a fundamental change in the system. In this study, we used the category of adaptation in the Social-Ecological system (Fedele et al., 2019) with 4 main types of adaptation strategies to categorize local people's adaptation options in our two cases (Table 7.1 and Figure 7.1).

Table 7.1 The category adaptation options by magnitudes of climate change responses (based on frequency mentioned in text analysis (Unit: %))

Categories	**Adaptation options**	**TCNP**	**UMTNP**
Inaction	Passive option	3	8
Total		**3**	**8**
Coping	Disaster damage reduction actions (equip water pump)	6	4
	Replanting after disasters or receiving financial support for repairing a house after whirlwinds	8	4
	Migration	3	4
Total		**17**	**12**

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Incremental adaptation	Preparation (infrastructure)	26	35
	Planning (human settlement clusters on dikes)	8	4
Total		**34**	**39**
Transformative adaptation	Innovative in adaptation	15	4
	Policy adjustment	2	11
	Create new livelihood (from farming to tourism)	24	15
	Afforestation	3	11
	Collaboration	2	0
Total		**46**	**40**

Among all adaptation actions, ranked at the lowest response level is inaction, i.e. a person or system suffers damage passively from disasters and has no response. At this level, there is no adaptive capacity mobilized and no change occurs in the system. In both TCNP and UMTNP, some responses have inaction responses with more proportion from UMTNP. At the second magnitude of adaptation, coping strategies are tactics that individuals use to fight the effects of climate change and preserve the impacted social-ecological system in a comparable condition or business-as-usual operation (Perrings, 2006; Kates et al., 2012). Coping strategies normally do not change the features or functions of the current social or ecological systems. They are reactive and can be used when the impacts are not severe or when they do not recognize any need for changes. For example, in the two national parks, annually, when disasters occur, the government mobilizes financial support from charities

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or philanthropists and supports people to buy new plant species to replant new crops without any change in crop structures. Alternatively, tourism accommodation operators receive financial support after a whirlwind to repair the roof of their house without changing the structure.

At the third level, incremental adaptation drives minor and small-scale alterations to the existing SESs, which focuses on increasing their resilience to climate change impacts (Adger & Jordan, 2009; Kates et al., 2012). Compared to coping strategies, incremental adaptation is more anticipatory. Adjusting land management methods, such as establishing irrigation systems, and narrowing down cultivated areas or livestock numbers are some examples of incremental adaptations for SESs to adapt to climate change impacts (Nhemachena & Hassan, 2007; Ash et al., 2012; Nguyen et al., 2013). This is evident in both NPs in the construction of dyke systems for disaster prevention. In TCNP, the relocation of people into new residential clusters can reduce the damage from floods.

At the highest level of adaptation, transformative adaptation means changes that substantially affect the entire SESs in terms of characteristics and functions. Its goal is to address the core causes of climate change vulnerabilities (Kates et al., 2012; Future Earth, 2015). In the two case studies, we can observe several options of adaptation in the two NPs which apply the transformative adaptation, especially with government financial support such as afforestation, and policy adjustment to adapt to new changes. More individual adaptation actions such as innovation, creating new livelihoods to adapt to new environmental changes, and collaboration are also found to be more prevalent in TCNP. Transformative adaptation may have less societal or political support due to the significant

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resources required (human, financial, and time) and the prolonged time required for the advantages to recognize (Adger et al., 2005; Kuntz & Gomes, 2012).

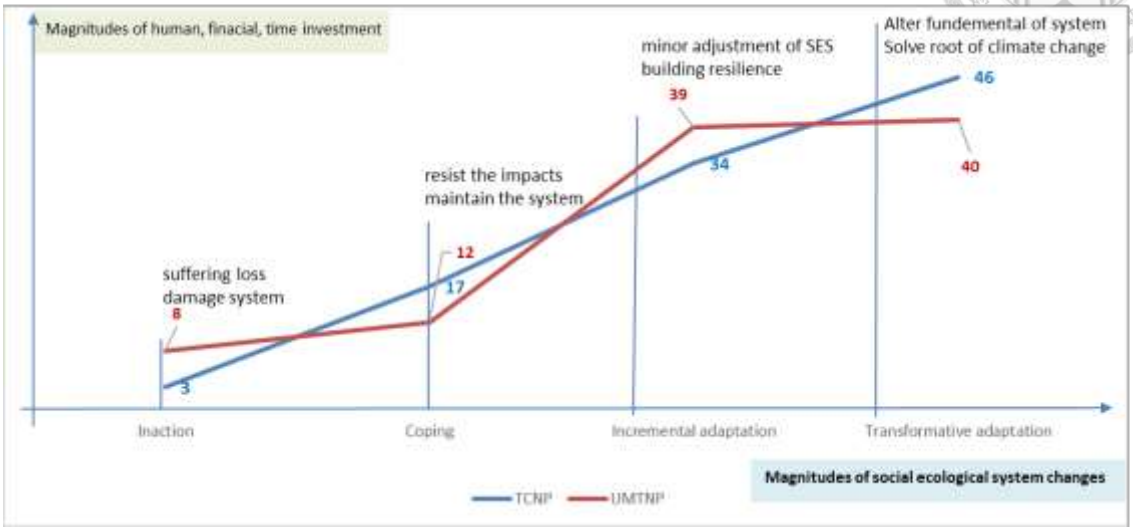

Figure 7.1 Types of strategies for reducing the impact of climate change based on SESs with the example from tourism, along a gradient of increasing magnitude of SES changes.

In brief, comparing the adaptive solutions mentioned in the two NPs, one can see that in TCNP there is an increasing rate in the trend of solutions requiring higher magnitudes of human, financial, and time investment. Meanwhile, that trend in UMTNP is more unstable and inaction solutions and incremental adaptation is also higher than in TCNP. With the position of the two NPs and the two Ramsar sites, the two NPs receive investment and orientation for sustainable development towards conservation, afforestation, or adaptation. They received a huge amount of money for things such as infrastructure investment which was a big advantage for the two NPs. However, we suppose that these policies will increase the financial dependency of these areas on the financial budgets of the government and will not create the fundamental changes that come from the perception,

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human capital, and political capital of local people. TCNP has a wider selection of transformative adaptations and more individuals than UMTNP, especially in individual adaptation actions. We argue that differences can derive from the tourism situation in TCNP being more developed and people engaging in tourism having more adaptive capacity to adapt or have more choices to adapt to change. Such as in TCNP, they have tourism clubs where people can meet, and exchange information and experiences in doing business. People in UMTNP are more aware of climate change impacts, but they have less empowerment and less adaptive capacity, therefore, they do not have firm resources for adapting actively to climate change. The top-down management which focuses on forest fire prevention and conservation makes people feel as though they are being treated unfairly even for the group of people located nearby national parks who receive a lot of financial support. People's voices are not listened to and people are not included in climate change adaptation management. This leads to a lack of climate change actions, individual innovation and collaboration. People become more passive and feel unsatisfied with their government but also do not know how to react. That situation can put them at risk of being severely vulnerable to disasters.

7.2 Rethinking ecotourism in the VMD from SES

Ecotourism definition and implementation in the VMD

In Vietnam, there is no common definition or official principles for ecotourism development. The use of ecotourism terms is abused by tour operators as a marketing strategy to attract tourists, creating the fantasy of a trip to an area far from the hustle and bustle of the city, enjoying the beauty of nature, freshness, and peace of the wild landscape. Therefore, for some tourism managers, climate change, with the impact of increased

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temperatures (especially in summer), can promote the flow of tourists from big cities to relax in national parks. Every week, the two national parks welcome many tourists from Ho Chi Minh City, Bien Hoa (Dong Nai), and Long An city with the main activities of recreational fishing and enjoying the cuisine of the wetland areas. If tourists search for places with the term "ecotourism in the Mekong Delta," travel companies will recommend several places such as the floating villages and the floating markets on the river wharves. Here, tourism activities are based primarily on human-made landscapes instead of real ecotourism which is defined as a small segment of nature-based tourism and impacted by additional management, education, and conservational criteria (Buckley, 1994).

Under the existing absence of a clear general principle on ecotourism in Vietnam, the organization of ecotourism activities depends on the available conditions of human and natural resources of each NP. In the two national parks we studied, ecotourism activities in the boundary area have some nature-based activities such as sightseeing and birdwatching, however, up to 50% of the revenue still comes from recreational fishing activities. Business forms such as catering services onboard the tourism boats also attract many tourists to TCNP. These activities bring great revenue to the community and the NP but are controversial in regard to the nature of ecotourism. Although the regulations on fishing time and fishing tools quite clearly limit over-harvesting, more diversity in the tourism activities in the two NPs is still needed to promote sustainable values.

Solar panel boat, why not?...

One of the typical examples reflecting the perception of WPA managers in ecotourism is the case of TCNP in using solar panel boats in transportation services.

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Revenue from transportation services in the NP is relatively high in revenue proportion and is one of the main benefits that local people can enjoy when working in this service, especially at the peak time of tourism such as vacations and weekends. Each NP has a group of boat drivers who are local people, and the income is divided equally per capita. In 2015, TCNP applied a pilot of 06 solar panel boats (Figure 7.2b) in this service, but after the trial period, the current means of transport are still traditional motorboats (Figure 7.2a). Motorboats have obvious advantages of moving quickly, being easy to operate, being suitable for the current skills of laborers, needing a lower investment and transporting more passengers per trip which meet peak times that have high volumes of traffic. However, the big disadvantage of the traditional motorboat is that it pollutes the environment due to running on gasoline, causes noise pollution that affects experiences such as bird watching, and makes it difficult to hear the tour guide due to the loud noise, thereby reducing visitor satisfaction. Many people attribute that to the low return rate of visitors to this service.

(a)

(b)

Figure 7.2 The motorboats that are currently being operated at TCNP (a) (Photo: by the author in April 2019) and the solar panel boat that was tested in 2015 (b) (Photo: Hoang Phuong)

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The use of solar panel boats in 2015 was an initiative of a local person. This initiative has claimed to bring advantages such as being environmentally friendly, reducing CO2 emissions, increasing customer satisfaction, and bringing long-term benefits. However, after testing, this initiative was rejected due to reasons such as low transportation productivity, slow movement, high investment capital, current drivers not meeting technical requirements when operating, equipment risks due to long travel routes and insufficient battery life, and being unsuitable for high numbers of visitors during peak periods. However, we suppose that if this innovation receives the proper and timely technical and financial support from the government, and boat drivers are adequately trained, then the long-term benefits will be obvious and this will become a remarkable and special advantage of TCNP in attracting tourists, especially international visitors.

Thus, the above example shows that, among adaptation choices, local governments still select livelihood options that have more economic benefits than environmental benefits. The choice of transportation service, therefore, prioritizes economic efficiency instead of long-term sustainable value. Thus, there are still many gaps in the awareness and management of NPs in the VMD on ecotourism. Even if the ideas and initiatives on sustainable tourism come from the local people, if there is a lack of timely support, those initiatives can be ignored and forgotten. The viewpoint of ecotourism in the case of TCNP still puts short-term and economic benefits over long-term benefits and environmental sustainability. Therefore, the perception of proper ecotourism operation needs to be improved for leaders, not just grass-roots people.

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The relationship between ecotourism and climate change

Similar to previous studies, ecotourism in the two NPs is highly exposed to climate change impacts in both direct and indirect, and positive and negative ways. This causes confusion and difficulty in making adaptive decisions that involve both short-term and long-term benefits and requires integrated management and a holistic approach in WPA management of the tourism system and climate change adaptation in an uncertain context. Considering the impact of climate change and the change of vegetation on tourism activities, both NPs show that the negative impacts are prevalent. Climate change leads to aggravating forest fires in the two NPs because of the increase in temperature which increases the evaporation rate causing a fire risk, especially in the dry season. However, adaptive governance is supposed to have a stronger impact on the change of vegetation. The adaptive governance such as water retention in the dry season has stopped wild forest fires in both of the national parks, but has contributed to the degradation of vegetation. The vegetation in TCNP shows a marked degradation in the dry season after water retention solutions are implemented. Those solutions increase the area of aquatic plants and reduce the area of native species that prefer the original hydrological regime with a flooded season and a dry season such as Eleocharis and following consequences in biodiversity degradation. For example, the reduction of Eleocharis causes a decrease in the number of Sarus Crane (Ni & Tuan, 2015) (because Eleocharis is the main food of Sarus Crane) and because Sarus Crane is the flagship product of ecotourism in TCNP, so it seriously threatens to ecotourism of this NPs. In regard to TCNP, the problem of late arrival or no flood is perceived as the main problem of tourism because flood-based tourism cannot operate according to the plan of the province and tourism center. Thereby it causes visitors'

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dissatisfaction, reducing tourism revenue and affecting the long-term development of tourism in the locality. With UMTNP, forest fire prevention is a top priority, so the drought situation shortens the travel time and the revenue is also modest and decreases over time.

Ecotourism and climate change adaptation also reflect a complicated interaction in spatial management of risk in a SES, in our case study there are two WPAs. In the case of UMTNP, after 2010 the ecosystem was restored thanks to the adjustment of water and forest management to keep the water not too moist and to keep water on a terraced level for each region. However, effective management of water and fire in the area within the boundary of the UMTNP pushes water pressure into the buffer zones, which causes conflicts with people's traditional livelihoods. Therefore, we can observe two stories about different management strategies in these two NPs. In regard to TCNP, economic interests are prioritized to ensure economic and social stability over conservation. While the UMTNP prioritizes conservation and water regulation for the restoration of the Melaleuca forests, which experience many ups and downs. The management board has proposed several master plans, but all have been considered and denied many times. UMTNP has been struggling to find a suitable plan for ecotourism development. In terms of the relationship between ecotourism and climate change, the benefits in terms of adaptive capacity and adaptation to climate change can be better observed in TCNP than in UMTNP, however, in terms of long-term sustainability, further studies are needed.

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7.3 WPA management in Lower Mekong River from SES

Contribution of applying SES to WPA management to adapt to climate change and other externally related ecosystems

This study contributes to the lack of empirical studies which can balance coverage between the set of second-tier variables and Related Ecosystems such as climate patterns. It especially contributes to the understanding of the complex dynamics of an adaptive SES under adaptation processes and in supporting sustainable management. SES based tourism research can strengthen the bridge between tourism development, including local and regional links, and sustainable development. As a result, Table 7.2 presents the proposed SES framework adapted to tourism and climate change context in wetland protected areas of our empirical study.

Table 7.2 Proposed SES framework adapted to tourism and climate change context in wetland protected areas from two case studies in TCNP and UMTNP

Social-ecological – political settings (S)	
S1. Economic settings (Main livelihoods; Land use; Income & poverty; Economic transformation; Market incentives) S2. Social settings (Demographic trend; Culture and history context); S3. Political settings (Political stability; Government policy in livelihood diversity; Government disaster prevention and post-disaster support)	
Resource systems (RS)	**Resource units (RU)**
RS1. Sector (e.g., water, vegetation covers, fish, birds, animals)	RU1. Location, Zones, and boundaries of resources units

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RS2. Clarity of system boundaries RS3. Size of resource system (vegetation covers) RS4. Customary and formal restrictions of using resources in tourism	RU2. Spatial and temporal characteristics RU3. Changes of resources units
Governance Systems (GS)	**Actors (U)**
GS1. Relevant stakeholders Government organizations Non-government organizations Network structure Customary institutions Local leaders/patriarch Role of the community GS2. Governmental regulatory framework for natural resources Biodiversity conservation Monitoring processes/ Sanctioning processes Operational rules Property system	U1-General Characteristics Number of users Socioeconomic attributes and livelihood strategies of users Role of tourism to local users U2-Socio-cultural capital and leadership Human capital Leadership/entrepreneurship Norms/social capital Financial capital U3-Dependence and technology Dependence on resource Technology used U4 Social – psychological adaptive capacity Perception of climate change Recognition of impacts U5 Interaction in cross-scale capacity

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	Stabilization by top-down (reaction to innovations) Destabilization by bottom – up (empowerment; revolt actions)
Focal Action Situations (FA)	
FA1. Number of tourists FA2. Annual revenue FA3. Sharing benefits with local people FA4. Sharing benefits with biodiversity conservation FA5. The health of natural resources for tourism (vegetation covers (NDVI; Forest fires) FA6. Adaptation actions	
External ecosystems (ECO)	
ECO1. Climate change manifestation ECO2. Climate change impacts natural resources and local users	

Through researching tourism and climate change adaptation from protected areas from SES, the study has made some contributions to the research with the SES framework, especially in second-tier variables (Table 7.2). Firstly, in social economic and political settings, we have more variables in political settings such as Government disaster prevention and post-disaster support or market incentives in tourism which is adopted from climate change and tourism perspectives. Resource systems and units, based on the current tourism situation of each destination, are used to identify which sectors are tourism resources. Further, they are used to show how zoning tourism and customary and formal

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restrictions of using resources in tourism work. In the subsystem of Actors (local users) we used the adaptive capacity lens to analyze the situation of local users in tourism as well as the addition of social-psychological adaptive capacity (perception of climate change; recognition of impacts) and interaction in cross-scale capacity (stabilization by top-down (reaction to innovations), destabilization by bottom-up (empowerment; revolt actions)).

One significant contribution of our study in SES is in the focal action situation when we used second-tier variables from tourism and climate change such as FA1. The number of tourists; FA2. Annual revenue; FA3. Sharing benefits with local people; FA4. Sharing benefits with biodiversity conservation; FA5. The health of natural resources for tourism (vegetation covers (NDVI; forest fires); FA6. Adaptation actions. Lastly, in this study, we analyzed details related to the ecosystem in regard to climate change, climate change manifestation and climate change impacts on natural resources and local users. Overall, our study with its approaches to tourism and climate change, have contributed to the SES framework as well as the lack of current literature in terms of climate change adaptation in protected areas. We show that tourism development in NPs can contribute to climate change adaptation by enhancing social inclusion in cross-scale interactions and adaptive capacity improvement for local people and local leaders. At the same time, it can enhance individual adaptive capacity and reduce the financial budget pressure of the government for NPs. However, it is necessary to monitor the benefit-sharing mechanism, especially between tourism revenue and biodiversity conservation budget to reduce potential conflict between economic and conservation aspects of NPs. Improving the management capacity of local leaders at communes and national park levels are also essential and still have a lack of NPs. It can contribute to increasing the social inclusion of

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the local community in climate change adaptation and lead to the fundamental change of SES in PAs.

The contribution from the panarchy approach to SES in cross-level interaction of climate change adaptation

Ecotourism development can balance the social system and ecological system through enhancing integrated management and improving ecological knowledge and understanding. From the panarchy approach in investigating cross-level interaction of climate change adaptation in the two NPs, the study found that institutions with stabilization functions and "remember" the lower-order still lack sufficient experience in adaptive management under the context of climate change and significant transition in the adaptation policy. That reflects a mismatch among different government levels, including policy-making agencies and implementing ones; and between state to regional and provincial to district agencies. This is a common obstacle and also a long-term problem that needs to be overcome, even in a communist country like Vietnam where policies and regulations are mainly issued and implemented according to the top-down process. Sharing of local people shows that there have been many efforts to facilitate bottom-up progress and "revolt" actions such as the one-stop-shop mechanism in policy implementation and more willingness of the government to listen to people's opinions. However, the prudence and fear of accountability in many law and policy enforcement agencies also caused many initiatives to be abandoned or forgotten such as the solar panel boats innovation in TCNP. This requires more learning process to both leaders and local communities, especially advanced "train for trainer" activities for leaders and a transformation from the intrinsic of WPA itself in critical aspects of the social system such as power asymmetry and social

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justice issues (Leach et al., 2010) to adapt to the change of the ecological system and improve ecological knowledge and understanding (Berkes & Folke, 1998) for sustainable feedback of the whole SES.

Compared with the conventional concept of panarchy we argue that ecotourism can facilitate cross-level interactions between higher and lower scales. Communities do not passively respond to external forces such as climate change but instead they have their own "remember" of their experiences and strategic adaptation to increase their resilience and take opportunities to improve their well-being. In the case of TCNP, we observed there are several key people working in tourism and they have good vision and readiness for change and can become main actors for social system changes. However, their "revolt" responses by innovation still need more incentives and support from the government in terms of technical, financial, and legal to sustain and develop.

Combining community resilience and conservation together with a WPA is another theoretical contribution of this study. Communities in buffer zones are an integral part of core zones of NPs, so identifying and balancing short-term and long-term benefits as well as finding a strategy to balance these two benefits among stakeholders in uncertain contexts are essential in WPA management (Bodin, 2017). In terms of adaptation, we find that in the case of TCNP, the local government has made an effort to find an equilibrium in short-term benefits for local people such as diversifying local livelihoods and improving people's income, and long-term benefits such as biodiversity conservation. As a result, local people have more AC, more choices and an ability to implement adaptation actions that have made several fundamental changes in the SES of WPA towards more sustainability. After a time, rapid growth in ecotourism in protected areas can coincide with a shift in protected area

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management strategies towards integrated development for sustainability. Accordingly, the economy and people's livelihoods are secured and the ecosystem is maintained at a recoverable level, the conservation strategy of TCNP can be oriented into a sustainable trajectory.

UMTNP has another model of conservation which prioritizes the ecological system but lacks integrated management with the local community, which makes for a better ecosystem recovery rate, but threatens the sustainable development of buffer zones. Along with the changes in the ecological system and ECO such as climate change, and water flows, it is necessary for the social system to adapt to it and increase the resilience of the whole system. In the long run, providing land and financial support to these households when water-related damage occurs will make people more passive and dependent, and weaken people's self-adaptation capacity to the changes in the environment in general and climate change in particular. In other words, in the case of UMTNP, we observe that the movement of the social system is discrete and not parallel with the ecological system. That in turn threatens the sustainability of the NP conservation strategy and becomes a vicious cycle that many NPs in Vietnam are facing. Therefore, improving people's self-control and self-adaptation capacity should be taken into account; livelihood models reduce dependency on resources and social capital, and human capital should be enhanced in this case. Thus, from the interaction analysis, this study asserts the importance of cross-level interactions within a community. More interaction will have more active adaptation and an essential impact of interaction on adaptation action, especially in communist countries.

Another contribution of this study from empirical analysis in the cross-level interactions between higher and lower order, it is necessary to combine scientific

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knowledge with local knowledge and experience in exchanging and upgrading knowledge and understanding of ecological systems to identify common social-ecological outcomes. The typical examples are the current management of changes in the hydrological regime and vegetation covers of the two NPs. Using mainly construction interventions and active water management mechanisms to control forest fire, it makes a transition in the vegetation community from upland to lowland community. This is opposite to the change of climate factors and threatens the biodiversity of the entire land of the NPs. Forest fire prevention is still a priority of many NPs in Vietnam because of the great damage caused when forest fires occur. However, taking an extremely negative view of forest fires and ignoring scientific evidence for the role of forest fires in ecological system evolution can threaten general conservation targets and the sustainability of the whole system. Given the context of the current implementation of directives in Vietnam in general and the VMD in particular, assigning responsibility to an individual at the head of an organization who only holds power for a 4-year term (a very short period of time) for long-term issues like climate change adaptation and biodiversity conservation is absurd and needs to be adjusted for the common good and long-term benefits.

Community-engaged research in SES

In this study, community engagement is mainly used in evaluating adaptive capacity and adaptation options. Perceptions of extreme events caused by climate change are essential to community resilience and facilitating transformative learning for adaptation. Regarding social-psychological adaptive capacity, in this study with the SES approach in the tourism system, we argue that tourism has a potential contribution to the shortcomings of AC in general, especially the psychological aspects of resource users. Therefore, besides

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the resource-based AC analysis, we focus on analyzing the perception of climate change of users. This study contributes to an overview of AC and the evolution of AC through different phases of the adaptation process which previous studies have not mentioned. The results show that the people in the two NPs highly recognized the change of climate which is presented by changes in disasters and climate parameters. In TCNP, with the significant impacts on the Mekong river system, people are aware of the change of "flood" and "water flows" more than changes in climate parameters themselves. Meanwhile, in UMTNP, people were more aware of changes such as "torrential rain," "local floods," and salinity caused by the impact of the sea. However, local people assumed that climate change was not the main reason for disasters, but instead the main reasons were related to human carelessness. Regarding the impact of climate change on people's lives, the people in the TCNP have a less negative perception of the impacts of climate change than the people in the UMTNP. Indeed, people's perception of changes and causes of disasters are consistent with reality and also our scientific data investigation in the impacts of climate change and human intervention (through water retention regulation). Therefore, we concluded that in both NPs, people have proper awareness of the ecological system and its changes as well as the main reasons for its changes. That can be the result of education, propaganda, or from mass media which is strictly controlled by the government in the communist country of Vietnam. It can facilitate the social learning process in the future (Hirschnitz-Garbers & Stoll-Kleemann, 2011; Cebrián-Piqueras et al., 2020) and it can also be a reference for WPA managers in selecting a suitable management strategy which can utilize collective adaptive capacity and achieve sustainable social-ecological change based on local context.

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With community engagement we also investigated several challenges in WPA management in two cases which can be representative for many WPA in the VMD. Conflicts in benefit-sharing between stakeholders, lack of local community engagement in WPA management, lack of transparency in information, and the law on property rights is in the process of amending and supplementing leads to precarious and passive investment. Challenges of ecotourism can be caused by both internal and external factors. From the failed lesson of UMTNP's tourism development (with many tourist facilities built but abandoned due to violations of the law), we agree with the study of Mach and Vahradian (2021). In their study, they state that internal factors such as governance system, property system, benefit-sharing mechanism, and power have decisive impacts on the effectiveness of PA management and these factors need to be taken into account before launching initiatives and developing collaborative and adaptive management approaches for promoting tourism in and around protected areas. When internal factors are not taken into account carefully, it can lead to a waste of wealth, as well as anti-tourism development in many NPs and wrong development strategies that affect the development of tourism and long-term sustainable development.

7.4 Contributions, limitations and recommendations for future research

Contributions in fulfilling the research gaps, methodology and SES framework

Fulfill the research gaps: In the SES framework, climate change is considered a global issue and an external related ecosystem (ECO). However, by applying an empirical approach in the External Related Ecosystems (ECO) with the focus on climate change as a part of SESs and Adaptation actions, the study found that climate change is not simply a change of temperature, precipitation, or seasonal climate regime, but instead it needs to be

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seen in relation to other systems such as water regime changes or vegetation cover changes. Further, it needs to be seen in relation to the social system, such as how managers perceive adaptive management and how people's economic activities are adjusted to adapt to it. Therefore, this study suggests that climate change should be considered at a deeper level and as a key component of SES in order to diagnose and predict system changes so that there is a corresponding adaptation rather than an optional variable of ECO as it is now.

This study also contributes to the lack of preparedness from tourism in climate change adaptation (Scott, 2011). Tourism differs from the traditional livelihoods of PAs such as agriculture, forestry, and fishery. Tourism often comes from the needs of the market, and this study shows that the issues of urbanization, climate change, and environmental pollution create a driving force for the flow of tourists who want to change the current living environment, explore or go into nature. Therefore, this study predicts that the world's growing challenges will be an opportunity for ecotourism to flourish. Ecotourism from the SES perspective can fulfill many roles. It is social innovation in the transformation of an SES (Moore et al., 2014) as a livelihood innovation in our empirical cases in WPA. It is also considered an SES with both ecological systems, such as natural resources (climate, vegetation, animal, landscapes, water, etc.) and social systems (local managers, DMOs, local people, visitors, etc.). In our study, the analysis of ecotourism is considered from both perspectives above with the confirmation of the role of ecotourism in enhancing AC and adaptation to climate change. Further, the investigation of the change of the ecological system of ecotourism (vegetation) in a link between climate change and governance system and actors. Therefore, analyzing tourism and its roles in SESs of WPAs

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in this study can contribute to the lack of a social system in early SES models (Huong, 2020).

From a comparative analysis of two empirical studies, this study partially fills the gap in empirical tests of a climate change adaptation framework in regional tourism destinations (UNWTO, 2008). It provides the basis for building a locally based adaptation framework in a tourist destination, and reinforces the adaptation process. Tourism is an industry that requires frequent exchanges of flows in regard to people, goods, and energy, so innovation and transformation can be stronger and have more potential than traditional livelihoods in PAs. Therefore, this empirical research in tourism using the SES approach, especially in a developing country, can contribute to enhancing resilience and managerial capacity which are still weaknesses of PAs in many developing countries.

Methodology contributions: There are 6 types of research that applies the SES framework (Partelow, 2018), however, this study is the initial research that uses a comparative analysis diagnosing multiple case studies with a mixed-method. Therefore, the study contributes to the methodology of SES in several ways. Firstly, the study used a community engaged approach with engagement of local students and local people in self-assessing their adaptive capacity through local workshops, focus group discussions and in-depth interviews. The core approach of these methods is from pragmatism and grounded theory which mainly explore local realities and requires researchers to integrate and understand the livelihood choices and experiences of the people. The researcher in this case does not stand on the ivory tower of knowledge to read and understand research sites, and the local people are not the object of research, but they are actually partners and jointly

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exploit and build knowledge through communication and objective experience of both the research team (local students) and the people's engagement.

Another contribution of this study is in the adaptive capacity assessment of local communities in a communist country where the engagement and openness of both the people and the government are limited. It is necessary to have in-depth contact and analysis from communication and engagement to understand more about the culture, the people, concerns and beliefs, people's intentions, reality, challenges in innovations and in cross-level interaction, and to have hands-on experiences. All of these factors influence and contribute to forming the adaptive capacity of a community, but contemporary research on AC, adaptation and SES is still lacking. From a tourism perspective, adaptive capacity is not only conceptualized in asset based resources like five capitals from the sustainable livelihood approach (Scoones, 1998), but also in social-psychology in perceiving climate change manifestations, causes and impacts. Which strongly influences adaptation and facilitates transformation from adaptation thinking to actions. This research also brings a new approach with local students' engagement as a part of community-engaged research that can be applied to the context of global system turmoil such as the covid-19 epidemic when research abroad or in remote areas is hindered by the ban on international travel. Thereby we also encourage the creativity of students, and young scientists to continue to create and conduct research in times of uncertainty and improve their adaptive capacity and resilience in the new world context.

***Social ecological system theory*:** This study is a combination of two important streams of the SES, one provides a descriptive framework and emphasizes the relationship between social and ecological system interactions among multi-level scales in SES with

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community resilience (Berkes & Folkes, 1998; Berkes & Ross, 2016) and another provides a set of generalizable components that can be utilized as a diagnostic tool to facilitate solving environmental problems and evaluate SES sustainability (Ostrom 2007; 2009). Each stream has its own approach and advantages, but it is rare for studies to test the combination of these two streams in one study. This study suggests the potential for this combination, with the panarchy concept (Holling & Gunderson, 2002), the strengths of the social system and the cross-level interactions of SES can be fully exploited. Meanwhile, with Ostrom's SES, the variables of ecological and governance systems and actors are analyzed. This combination helps make the analysis of the problem in SES more deep, wide, and complete, which promotes the strengths of both streams.

Limitations and recommendations for future research

Since the number of participants working in the tourism sector in both study areas accounts for a very small percentage, the number of respondents to our interview is not enough to have a statistics-based analysis. This limitation makes it impossible for the conclusions to be completely objective. However, we use NVIVO with text analysis based on word frequency and interrater reliability to enhance the subjectivity of our data and analysis. We cannot conclude that TCNP with the current trend of tourism development will promote a response to climate change and that UMTNP, which is still timid about tourism development, needs to consider developing in the direction of TCNP. We realize that the problem may not be in tourism development but in the proactiveness of leaders and people, which requires long-term and persistent intervention. Choosing to develop tourism or not needs to consider many factors, especially the willingness of people. However,

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tourism development in national parks is not as bad as traditional stereotypes, because it can enhance local AC and diversify ways to adapt to climate change.

This research had the ambition of covering all sub-themes of SES but failed to include all second-tier variables of sub-systems because of the limitations of time, data, and budget. Conducting on-site research in tourism in the context of the Covid-19 pandemic significantly influenced the data collection in a larger sample, especially in regard to the engagement of tourists, who are vital actors in the system. The lack of quantitative data makes it impossible to draw adequate conclusions and make persuasive assessments of how ecotourism can contribute to climate change adaptation in the two cases. Therefore, we hope that future studies will continue to develop and fill the gap in current research of SES from tourism and climate change in protected areas. Although history and culture are two important aspects that are still lacking in current studies from the SES approach, we also did not have enough time and engagement with the local community to investigate these aspects. Adaptive renewal cycles with an analysis of changes and adaptation changes by time are very interesting from a tourism and climate change perspective. However, in this study we did not have enough data for analyzing these aspects. We recommend that the future studies fulfill these gaps in order to have an insight into tourism and climate change adaptation from SES.

In this study, we use the community-engagement approach. Traditionally, the use of this method, especially from the SES which incorporates mixed social and ecological research, requires the researcher to use ethnographic methods to better understand the cultural and historical context. The author has not lived and grown up in the Mekong river delta, with the two scoping trips to the field sites being short in time, I suppose it is not

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enough for me to fully understand people's lifestyles and also the settings of the two areas. Therefore, I also read many historical and cultural pieces of literature related to the two research sites as well as videos, biographies, and memoirs that were available. Writing a research diary helped me to reflect and understand more about the lifestyle of the people here before approaching local communities in the two research sites. The implementation of these methods has shortened my distance to the research sites and ease the community-engaged research when the researcher cannot be present at the research site.

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Appendix

Appendix 1. Methodology in the research of tourism and climate change adaptation

No	Method or formula	Stakeholder	Reference
1	Quantitative (the contingent visitation methodology)	Visitors	Richardson and Loomis, 2004
2	Quantitative	Resorts/Ski tourism	Hennessy et al, 2008
3	Quantitative (An econometric analysis)	Swiss ski lift operators	Hoffmann et al, 2009
4	Quantitative	Ski resorts operators	Pickering and Buckley, 2010
5	Quantitative	**Stakeholders** in: Accommodation Gastronomy Transport Activities Entertainment Information Public actors	Luthe et al, 2012
6	Quantitative (Correlation between willingness to act and perceptions of the need to act)	Community	Matasci et al, 2013
7	Quantitative	Skiers	Dawson and Scott, 2013
8	Quantitative	Tourists	Jopp et al, 2015
9	Quantitative (network analysis)	**8 sectors:** Accommodation. Gastronomy Entertainment Transportation Activities. Destination management organization Public sector Retail	Wyss et al, 2014
10	Quantitative	Tourism industry	Bujosa et al. 2015
11	Quantitative	Tourists	Schwirplies and Ziegler, 2016
12	Quantitative	Tourists	Han et al, 2016
13	Quantitative (regression analysis)	Community	Tsai et al 2016
14	Quantitative (A micro econometric analysis)	Tourists	Schliephack and Dickinson, 2017
15	Quantitative (confirmatory factor analysis)	Community	Jamaliah and Powell, 2017
16	Quantitative (structural	Community	Gou et al, 2018

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	equation modeling)		
17	Quantitative	Industry	Dogru et al, 2019
18	Longitudinal qualitative study	Tourism entrepreneurs	Hambira, 2006
19	Interview, qualitative methods	tourism entrepreneurs	Saarinen and Tervo, 2006
20	Qualitative (review article)	Tourism operators	Scott and McBoyle, 2007
21	Qualitative (In-depth interview)	resort managers and government representatives	Bicknell and McManus, 2006
22	Qualitative	Destination	Jopp et al, 2010
23	Qualitative (A postmodern constructivist research)	Tourist and climate change	Kachel and Jennings, 2010
24	Qualitative	Tourist and tourism promoters	Buzinde, et al, 2010
25	Qualitative	Community	Roman et al, 2010
26	Qualitative	Review article	Hernandez and Ryan, 2011
27	Qualitative	Tourism	Klint et al, 2012
28	Qualitative	Tourist	Go¨ssling et al, 2012
29	Qualitative (Thematic interviews)	Tourism operations and organizations	Saarinen et al, 2012
30	Qualitative	Expert representatives from both the public and private sectors	Ruhasen and Shakeela, 2013
31	Qualitative (a choice experiment)	Tourists	Ulrike Pro¨bstl-Haider and Wolfgang Haider, 2013
32	Qualitative	Framework	Kajan and Saarinen, 2013
33	Qualitative (semi structured interview)	Tourism operators	Hambira et al, 2013
34	Qualitative	Conservation managers, the tourism industry, and local communities	Morrison and Pickering 2013
35	Qualitative (perceptual study)	Ski tourism (core industry, wider industry actors, local community and tourists)	Hopkins, 2013
36	Qualitative (interpretivist methodology)	Ski industry	Hopkins and Maclean, 2013
37	Qualitative (deductive-inductive, case study)	Tourism business	Becken, 2013
38	Qualitative	Sustainable tourism	Mycoo 2014
39	Qualitative	Framework	Njoroge 2014

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40	Qualitative (case studies)	Community	Kajan, 2014
41	Qualitative	Protected areas/ecotourism	Hornoiu 2015
42	Qualitative	Tourism	Njoroge 2015
43	Qualitative	The IPCC Fifth Assessment	Scott et al, 2015
44	Qualitative	Community	Hornoiu 2016
45	Qualitative	Tourism operators	Becken and Wilson, 2016
46	Qualitative (review)	Tourism industry	Hoogendoorn and Fitchett, 2016
47	Qualitative	Accommodation providers	Parson et al, 2017
48	Qualitative	Community resilience	Rahmawati et al, 2019
49	Mixed	Tourism operator (accommodation providers)	Becken, 2005
50	Mixed	Tourists and operators	Horng et al 2012
51	Mixed method (Participatory integrated assessment)	skiers, tourism managers, farmers	Behringer et al, 2000
52	Mixed method (A Delphi study)	Regional	Jopp et al, 2013
53	Mixed method (Work shop and interview)	Tourism industry	Hughey and Becken, 2014
54	Mixed method	travel agencies, accommodation providers; other service providers	Csete and Szécsi, 2015
55	Mixed method ("Network Analysis – Creative System Modelling – Decision Support")	Tourism actors	Bonzanigo et al 2016
56	Mixed method	Adaptation evaluation	Huynh and Piracha, 2019
57	Quantitative	Marine tourism	Wabnitz et al, 2017

Appendix 2. Key informants involved in tourism in two research sites

Actor	**Organization**	**Actor**	**Organization**	**The role of actor**
Tram Chim National Park		**U Minh Thuong National Park**		

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Government officer	Department of Natural Resources and Environment	Government officer	Department of Culture, Tourism Center	Provincial Departments
		Government officer	Department of Natural Resources and Environment	
Government officer	Department of Agriculture (Biosphere Reserve)	Government officer	Department of Science and Technology (Biosphere Reserve)	
Social enterprise	Center for Investment and Tourism promotion			
		Government officer	U Minh Thuong District People's Committee	District department
Local government officer	People's Committee of Phu Tho commune	Local government officer	People's Committee of An Minh Bac commune	Commune departments
Local government officer	People's Committee of Tram Chim town	Local government officer	People's Committee of Minh Thuận commune	
NGOs officer	International Union for Conservation of Nature and Natural Resources (IUCN)			Policymaking consultancy
NGOs officer	World Wildlife Fund (WWF)			
NGOs officer	World Bank (WB)			
National Park	Tram Chim	National Park	U Minh Thuong	National Park

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manager	National Park Management Board	manager	National Park Management Board	Management Board
Tourism enterprise	Ecotourism and environmental education center	National Park Department	Ecotourism and environmental education center	
Rangers	Ranger county	Rangers	Ranger county	
Handicraft producer (toward tourism products)	02	Fruit farmers (toward tourism products)	02	Local residents
Accommodation providers	01 farm stay owner; 01 homestay owner	Accommodation providers	01	
Transportation providers (boat drivers)	02	Transportation providers (boat drivers)	01	
Souvenir/shop sellers	02	Souvenir/shop sellers	01	
Food providers	02	Food providers	02	
Tourism staff	01			

Appendix 3. In-depth interview questions for policy making bodies:

(Government officers of provincial, district and commune people committee)

The interviewer will first explain the objectives of the project. Before we start this interview, can you please introduce yourself?

(1) Your role in community/agencies. How long have you worked at this position?

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Before interviewing, the interviewer also need to explain what are disasters, which manifestations of flood, drought, heatwave, wild forest fire, unexpected rain and its consequences.

<table>
<tr><th>Dimensions</th><th>Questions</th></tr>
<tr><td>Perception of climate change and its impacts</td><td>
Q1. In the past 30 years, how about frequency of natural disasters in your local? How about its intensity? In your opinion, which year event do you remember the most? Why?
<table>
<tr><th>Disasters</th><th>Frequency</th><th>Intensity</th><th>The most memorable event (year)</th></tr>
<tr><td>-Flooding</td><td></td><td></td><td></td></tr>
<tr><td>-Drought</td><td></td><td></td><td></td></tr>
<tr><td>-Storm</td><td></td><td></td><td></td></tr>
<tr><td>- Heatwave</td><td></td><td></td><td></td></tr>
<tr><td>- Heavy rain</td><td></td><td></td><td></td></tr>
<tr><td>- Unexpected rain</td><td></td><td></td><td></td></tr>
<tr><td>- Forest fire</td><td></td><td></td><td></td></tr>
</table>
Q 2: In your opinion, what is the main cause of the above natural disasters (climate change, unsustainable production, hydropower dams, ...) According to you, if climate change is not the main cause which are main cause of the above natural disasters? Why? .....
</td></tr>
</table>

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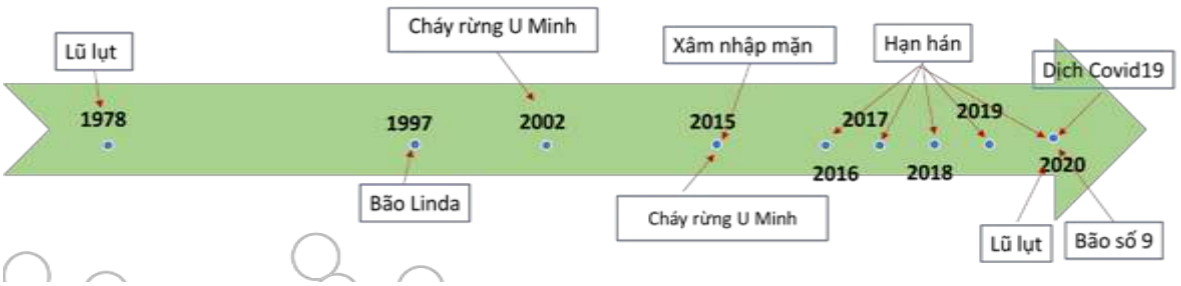
	.... We have a timeline here. Do you think the nature and causes of natural disasters change over time? (Example: Typhoon Linda 1995 ..... passed through all disaster event milestones one after another)
	
Policy of climate change adaptation	**Q 3:** With the above natural disasters, in the past 30 years, what policies have the government been enacted to adapt to? Livelihood policy? (Policy of mitigation, policy of living together; How to adjust economic structure? What policy does the tourism industry have? (For example, after the storm in 1997; after the forest fire 2002; after the forest fire in 2005 ...)
Policy in tourism adaptation	**Q 4:** How have your agency integrated the content of climate change in tourism policies and local economic development?
	Q 5: How has the policy making process occurred? The efficiency of

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<table>
<tr><td></td><td>policies?

<table><tr><th>Name of policy</th><th>Purpose</th><th>Agency issued</th><th>Time issued</th><th>Effective deployment</th></tr><tr><td></td><td>For tourism:
.....</td><td></td><td></td><td></td></tr><tr><td></td><td>For climate change adaptation
.....</td><td></td><td></td><td></td></tr></table></td></tr>
<tr><td>Leadership</td><td>Q 6: According to you, the role of your agency (...) for tourism development; and climate change adaptation in Tram Chim National Park?</td></tr>
<tr><td>Cross-level interactions
Empowerment</td><td>Q 7: According to your observation, currently in the buffer zone and Tram Chim National Park, what are the solutions people are taking to develop tourism; to respond to climate change (natural disasters)?

Which solutions are issued by the state?

What solutions are derived by people?

How do you evaluate or compare the effectiveness of the two groups of solutions based on the following criteria:

- Target groups to participate
- Feasibility (suitable with local circumstances, time, cost)
- Efficiency (economic, environmental, conservation, job creation, increased income for people, justice in benefit sharing)</td></tr>
</table>

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	Q 8: In your opinion, there are spontaneous solutions/initiatives implemented by local people such as homestay, spontaneous tourism services, energy solutions such as using solar panels, etc. How is the response of your agency with those solutions (support, need to examine, not support)? Does your agency based on those bottom-up solutions to adjust policies accordingly?
	Q 9: Currently, many localities doing tourism in the National Park in Vietnam or around the world, they use green energy such as solar batteries for households, boats, or green solutions such as recycling and sorting garbage; What do you think about applying these solutions locally? What are the advantages and disadvantages?
	Q 10: What are the role of implementing agencies like the Management board of Tram Chim National Park; or local communes in decision-making decisions of developing tourism or climate change adaptation in the National Park?

Appendix 4. In-depth interview form for implementing policy agencies

(Including Tram Chim National Park Management Board; Ecotourism and environmental education center; Department of Agriculture and Rural Development; Department of Culture, Sports and Tourism Trade; Center for Investment and Tourism promotion; Forest Ranger 3; Kien Giang Forest Protection Department)

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The interviewer will first explain the objectives of the project. Before we start this interview, can you please introduce yourself?

(1) Your role in community/agencies. How long have you worked at this position?

Before interviewing, the interviewer also need to explain what are disasters, which manifestations of flood, drought, heatwave, wild forest fire, unexpected rain and its consequences.

<table>
<tr><th>Dimensions</th><th>Questions</th></tr>
<tr><td>Perception of climate change and its impacts</td><td>Q1. In the past 30 years, how about frequency of natural disasters in your local? How about its intensity? In your opinion, which year event do you remember the most? Why?
<table>
<tr><th>Disasters</th><th>Frequency</th><th>Intensity</th><th>The most memorable event (year)</th></tr>
<tr><td>-Flooding</td><td></td><td></td><td></td></tr>
<tr><td>-Drought</td><td></td><td></td><td></td></tr>
<tr><td>-Storm</td><td></td><td></td><td></td></tr>
<tr><td>- Heatwave</td><td></td><td></td><td></td></tr>
<tr><td>- Heavy rain</td><td></td><td></td><td></td></tr>
<tr><td>- Unexpected rain</td><td></td><td></td><td></td></tr>
<tr><td>- Forest fire</td><td></td><td></td><td></td></tr>
</table>
Q 2: In your opinion, what is the main cause of the above natural disasters</td></tr>
</table>

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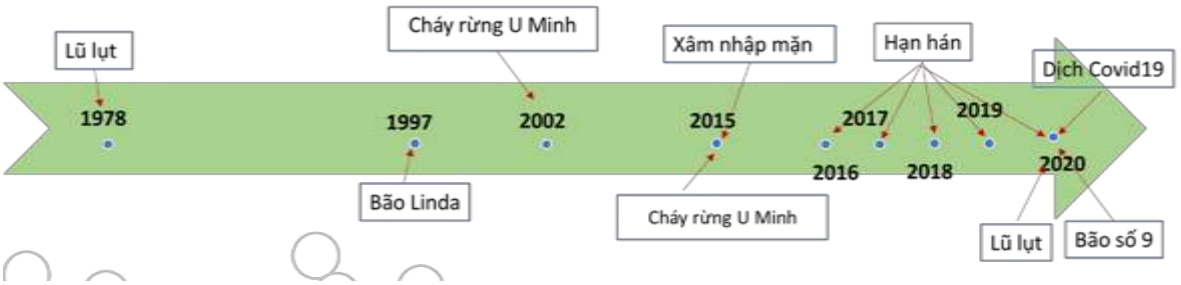
	(climate change, unsustainable production, hydropower dams, ...) According to you, if climate change is not the main cause which are main cause of the above natural disasters? Why? .... We have a timeline here. Do you think the nature and causes of natural disasters change over time? (Example: Typhoon Linda 1995 ..... passed through all disaster event milestones one after another)
	
Policy of climate change adaptation	**Q 3:** With the above natural disasters, in the past 30 years, what policies have the government been enacted to adapt to? Livelihood policy? (Policy of mitigation, policy of living together; How to adjust economic structure? What policy does the tourism industry have? (For example, after the storm in 1997; after the forest fire 2002; after the forest fire in 2005 ...)

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<table>
<tr><td>Policy in tourism adaptation</td><td>Q 4: How have your agency integrated the content of climate change in tourism policies and local economic development?</td></tr>
<tr><td></td><td>Q 5: How has the policy making process occured? The effeciency of policies?

<table>
<tr><th>Name of policy</th><th>Purpose</th><th>Agency issued</th><th>Time issued</th><th>Effective deployment</th></tr>
<tr><td></td><td>For tourism:
.....</td><td></td><td></td><td></td></tr>
<tr><td></td><td>For climate change adaptation
.....</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Leadership</td><td>Q 6: According to you, the role of your agency (...) for tourism development; and climate change adaptation in Tram Chim National Park?</td></tr>
<tr><td>Cross-level interactions Empowerment</td><td>Q 7: According to your observation, currently in the buffer zone and Tram Chim National Park, what are the solutions people are taking to develop tourism; to respond to climate change (natural disasters)?

Which solutions are issued by the state?

What solutions are derived by people?

How do you evaluate or compare the effectiveness of the two groups of solutions based on the following criteria:

- Target groups to participate</td></tr>
</table>

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	- Feasibility (suitable with local circumstances, time, cost) - Efficiency (economic, environmental, conservation, job creation, increased income for people, justice in benefit sharing)
	Q 8: In your opinion, there are spontaneous solutions/initiatives implemented by local people such as homestay, spontaneous tourism services, energy solutions such as using solar panels, etc. How is the response of your agency with those solutions (support, need to examine, not support)? Does your agency based on those bottom-up solutions to adjust policies accordingly?
	Q 9: Currently, many localities doing tourism in the National Park in Vietnam or around the world, they use green energy such as solar batteries for households, boats, or green solutions such as recycling and sorting garbage; What do you think about applying these solutions locally? What are the advantages and disadvantages?
	Q 10: What are the role of implementing agencies like the Management board of Tram Chim National Park; or local communes in decision-making decisions of developing tourism or climate change adaptation in the National Park?
Challenges	**Q11:** What are the challenges in implementing policies from higher levels to localities on tourism or climate change adaptation?

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Benefit-sharing	**Q12:** In the National park tours, which tour attracts the most tourists? Why? Which services and tourism products are offered (need the tourism map)? Are there any shops or restaurants located on this tour? Are products sold on different tours the same or different? **Q 13:** How revenue from tourism is used on conservation activities? How much? Does revenue from tourism is used on forest fire prevention and water management? How much? Is there a clear regulation on benefit-sharing by documents?

Appendix 5. In-depth interview form for local residents

The interviewer will first explain the objectives of the project. Before we start this interview, can you please introduce yourself?

(1) Your role in community? How long have you lived here? How long have you worked in tourism services? Which services you or your household provide? How it contributes to your household incomes

Before interviewing, the interviewer also need to explain what are disasters, which manifestations of flood, drought, heatwave, wild forest fire, unexpected rain and its consequences.

Dimensions	**Questions**
Perception of	**Q1.** In the past 30 years, how about frequency of natural disasters in

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<table>
<tr>
<td>climate change and its impacts</td>
<td>your local? How about its intensity? In your opinion, which year event do you remember the most? Why?
<table>
<tr><th>Disasters</th><th>Frequency</th><th>Intensity</th><th>The most memorable event (year)</th></tr>
<tr><td>-Flooding</td><td></td><td></td><td></td></tr>
<tr><td>-Drought</td><td></td><td></td><td></td></tr>
<tr><td>-Storm</td><td></td><td></td><td></td></tr>
<tr><td>- Heatwave</td><td></td><td></td><td></td></tr>
<tr><td>- Heavy rain</td><td></td><td></td><td></td></tr>
<tr><td>- Unexpected rain</td><td></td><td></td><td></td></tr>
<tr><td>- Forest fire</td><td></td><td></td><td></td></tr>
</table>
Q 2: In your opinion, what is the main cause of the above natural disasters (climate change, unsustainable production, hydropower dams, ...) According to you, if climate change is not the main cause which are main cause of the above natural disasters? Why? .... We have a timeline here. Do you think the nature and causes of natural disasters change over time?

(Example: Typhoon Linda 1995 ..... passed through all disaster event milestones one after another)

Q 3. When such a natural disaster occurs, how does tourism impact</td>
</tr>
</table>

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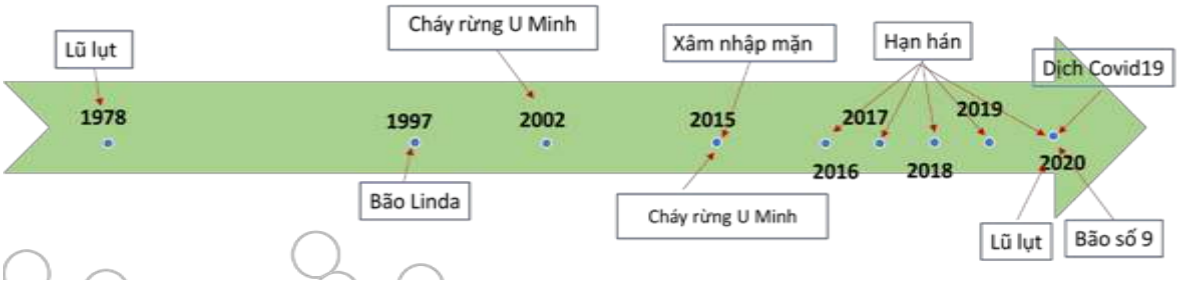
	(tourism season (shorten, lengthen, unchanged)? Income? Specifically: based on the timeline?
	
Livelihoods and tourism	**Q4**: What do your family make a living by? How much does tourism contribute to family livelihoods? Who in your family is involved in tourism service provision? Detail? How much income? Working time, is it stable, is it seasonal? If not stable, when not working in tourism, what do your family members do?
Experience and learning process	**Question 5**: What solutions do you use to adapt to the above natural disaster? (timeline) When a drought occurs, do you have any experience to handle it? Specifically? Do you have any experience dealing with floods? Specifically? During forest fire/salt intrusion / heavy rain/heatwave, do you have any

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	experience to deal with it? Specifically? Are there any new experiences or experiences that you learnt from your previous generations (parents, grandparents' time)? Do you think that the experiences from the past are still effective? How do you get support from the state and local authorities to implement the above solutions? (in terms of money, facilities, technology, training) (how have the government supports been changed over time?)
	Question 6: In the locality, when there is an initiative of the people effectively implemented (such as a new tourism product; a new form of tourism; or new solutions to reduce damages caused by natural disasters), how do you respond (learn from them, innovate to suit you, don't care?) **Question 7:** According to your experience, does the experience in reclaiming and conquering nature from the past (or from your previous generations) help you to cope with current natural disasters? **Question 8:** After each natural disaster event happened, have you or your family learned any experiences or accumulated experiences? Can be specifically shared?

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Perception of tourism resources and activities	**Question 9**: In the National Park currently there are ..... tours. If you can choose 3 tours that you think are the most beautiful, many things to explore and many things to enjoy and suggest for tourists, which 3 tours will you choose? If you sell goods, or drive passengers (if you are a boat driver) or guide tour, which tour do you often work?
Benefit sharing	**Question 10**: How about the arrangement of passenger boats? Is income fixed or dependent on passenger transportation? (transport services) is bidding? Who is allowed to bid? How long? Bidding method? How to assign a tour guide? Fixed income or depends on the number of tours or visitors? How about the arrangement of a shop place? Can you select the place to settle your shop? Bidding? Who is allowed to bid? How long? Bidding method?
Empowerment/ Cross-level interaction	**Question 11**: Do leaders listen to the people's contributions? Do you see your voices heard during discussions, community meetings on tourism, or climate change adaptation?
Perception of policy	**Question 12:** How do you evaluate the impact of these policies on your family's livelihood? Are there any policies that you feel are unreasonable? Why?

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Policy	Policy your household engaged	Positive impacts	Negative impacts
In tourism: - Forest contracting - Rent forest environment - Homestay - Bidding - Inviting external tourism businesses to invest in tourism development			
In response to climate change: - Store water in the flood season and all year round - Digging canals, expanding irrigation canals - Prevention of forest fires			

Question 12: Do you think the local tourism products and activities are attractive? If you are the one who has the power to make decisions about organizing and managing effective tourism / or disaster coping, what

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	will you make first? Or what policies will be adjusted? **Question** 13: At present, many localities doing tourism in the National Park use green energy such as solar panels for households, boats, or green solutions such as recycling and sorting garbage; What do you think about applying these solutions locally? What are the advantages and disadvantages? According to you, which are the success actors? (state, management, citizens, or tourists?) **Question 14:** According to your observations or your own experience, when the locality has a successful tourism model, a new tourism product is developed by the people, how often do the local authorities respond?

Appendix 6. In-depth interview form for NGOs

A. Name of interviewer

A.1 Name of the participant

A2. Sex Male (1) Female (0)

A3. Year of Birth Below 20 and above 75 will disqualify

A4. Where do you work?

A5. What is your position at the office? What is your professional background?

A6. When have you started in this position (Starting year)?

A7. Which agency did you work in the past? What expertise?

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A8. How do you assess the current status of biodiversity conservation in the current national parks in the Mekong Delta using for example U Minh National Park? TCNP?

A9. What are the main conservation challenges in UMT, TCNP?

A10. Which support is available from your organization (WWF / IUCN), and what types of support for biodiversity conservation in National Parks in the Mekong Delta, specifically UMT & TCNP? Are there any challenges to support?

A11. In your opinion, is climate change considered a major conservation challenge in national parks in the Mekong Delta and UMTNP? why? When natural disasters (flood, drought, forest fire, etc.) occur in the National Park, will your organization provide any support? Specifically, which? What are the difficulties of supporting? Which impacts do those support have on the local community? (casualties and damages)

A12. Does your organization have policy intervention to respond or mitigate climate change impacts on national parks in the Mekong Delta and UMT &TCNP? What specifically? is there any problem? and solving problems like?

A13. Do you see that the Mekong Delta, especially protected areas, has potentials for ecotourism development? What is the challenge for ecotourism development?

A14. Ecotourism in the Mekong Delta and in particular UMT, TCNP has any contribution to conservation? According to you, many national parks such as UMT, TC National Park, tourism development is still conservative, according to you, what are the reasons? Do you support that strategy?

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A15. According to your observations, at local management levels such as province, district, commune, and the management boards of national parks, have they responded to the current impacts of climate change?

A16. According to your observations, at local management levels such as province, district, commune, and the management boards of national parks, how they have responded to the development trend of tourism, especially ecotourism? If your organization wants to intervene with conservation policy in the NP, then your organization intervenes by, means, strategy like?

A17. In your opinion, which role do local communities in the buffer zone play in responding to climate change? In your opinion, what role do local communities in the buffer zone play in ecotourism development?

Appendix 7. Focus group discussion

Part 1: Introduction

The researcher introduces the objective of research, members of the workshop and main contents.

The local workshop with invitation of an expert from National Park

Expert will introduce about tourism resources, activities, tours and also climate change and disasters and some suggested solutions

- We will ask local experts and facilitators to suggest households who have been working in tourism, combine with snow ball techniques to find new participants.

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- We will have an invitation letter with information of research purposes, right and benefit of participants and time and place for a local workshop where participants will have focus group discussions.
- Local facilitator will help us to send the invitation letter with consent form to potential invitation (we will ask the advice from local experts and facilitator about how many letters we should send to have at least 21 people to attend in each research site)
- ***In the workshop,*** local people working in tourism services can (1) introduce themselves, their occupation, how long they have lived in community, which tourism service they have provided and for how long and role in community (if any) they will have a tag name (the participants have right to refuse to give the real name and keep anonymity)

Part 2. Focus group discussion:

- They will be divided into 4 groups: 1 leader group and 3 local resident group (ideally each group can imitate the local society with diverse elements of ages, genders, ethic groups, religion, tourism services, etc) and work together in their group of 03 tasks:

(*tools: 01 A0 paper, 02 sketch maps of national park and buffer zone on A0 paper; highlighters, sticky notes, symbols of natural and cultural tourism resources (bird, fish, flowers, bat, rat, etc); symbols of natural disasters (drought, flood, forest fire)*

Task 1: Timelines of climate related disaster in 10 years

(Discussion and completion time: 30 minutes)

Tools: A0 paper has a timeline

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Black, blue, and red markers

Sticky notes with different colours

Proceed:

Invite people to discuss and create a timeline of climate related disasters (such as droughts, floods, wildfires, unseasonal rain, etc. over the past 10 years (or more).

In which clearly: which year did the event take place? What are the consequences? What was the causes of that disaster? Which solutions have people used to prevent or overcome consequences?

Task 2: Make disaster map

Tools:

Map of the National Park

Simple symbols of forest fire (....); dead fish (…); pollution water (…); flooding (….); drought, lack of water (….)

Proceed:

Participants discuss put disaster symbols on the map

Participants discuss and list the 5 greatest difficulties that people face when disasters (droughts, floods, forest fires, etc.) occur?

Participants discuss and list the 5 most urgent needs from the local government or international organizations to enhance resilience to disasters?

Task 3: One day becomes a tour guide

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Tools: A0 paper with map of the national park and buffer zone; Black, blue, and red markers; Paper remember the colors

Please join us to discuss the following situation:

If there is a group of tourists coming to the garden:

1. Where will people take them to visit so that they can fully enjoy the beauty of U MINH THUONG National Park (Draw on a map of the route that grandparents take them to (from where, where do you go through? What or what, what beautiful scenes to see along the way or what activities can be involved (people can write a simple symbol (what, what, what scene, what activity) on the map) What is transportation?

2. Where will people take them to eat and drink? (Mark the symbols of the restaurants you suggest on the map)? What are the specialties you would recommend to them? If they want to buy take-away gifts, what local specialties can you recommend?

3. If they want to have fun activities, stress relief, what activities in the garden can you recommend? (mark where the activities and activities take place?). If they want to stay one night, what places do you have for the group (in the case of a group of 5-10 people, or in the case of a group of over 50 people)

4. Assuming that, when you see an opportunity for tourism development to come, what field will you put your capital into? Why? (can be sorted by priority)

5. According to your group, how does local tourism contribute to the conservation of wildlife and the environment of the Park?

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Appendix 8. The official questionnaire with guidance step by step

TCNP_Đánh giá năng lực thích ứng với BĐKH (Phiếu dành cho người dân)

A. Tên người phỏng vấn

_____

A.1 Tên người tham gia

_____

A2. Giới tính
Nam (1) Nữ (0)

_____

A3. Năm sinh
Dưới 20 và trên 75 sẽ loại

_____

A4. Ông bà sống ở đâu?
(Ra ngoài trời)

_____

latitude (x.y °)

_____

longitude (x.y °)

_____

altitude (m)

_____

accuracy (m)

_____

A5. Ông bà sống ở đây từ năm nào?
(Sinh ra ở đây hoặc năm cụ thể) (Dưới 5 năm sẽ loại)

_____

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A6. Thời gian làm trong lĩnh vực du lịch (Năm bắt đầu)?
Dưới 3 năm sẽ loại

_____

A7. Dân tộc

- [ ] Kinh
- [ ] Khơ me
- [ ] Khác (cụ thể)

B.1.1 Học vấn của chủ hộ

- [ ] Không có
- [ ] Chưa học hết tiểu học
- [ ] Tiểu học
- [ ] Trung học cơ sở
- [ ] Trung học phổ thông
- [ ] Đại học
- [ ] Sau đại học

B.1.a Học vấn của chủ hộ
Nếu ông/bà không phải chủ hộ

- [ ] Không có
- [ ] Chưa học hết tiểu học
- [ ] Tiểu học
- [ ] Trung học cơ sở
- [ ] Trung học phổ thông
- [ ] Đại học
- [ ] Sau đại học

B.2.1 Thu nhập hộ gia đình trong một năm là bao nhiêu? (hộ có bao nhiêu người)
(Con số cụ thể hoặc nếu người trả lời không muốn nói thì cần ghi rõ)

_____

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B.2.2 Thu nhập của hộ gia đình ông/bà đến từ những nguồn nào?

(Nêu câu hỏi và chờ người được phỏng vấn (NĐPV) liệt kê hết các nguồn)

- [ ] Kinh doanh du lịch/làm dịch vụ du lịch
- [ ] Lúa hai vụ
- [ ] Lúa ba vụ
- [ ] Trồng rau và hoa màu ở vùng đất cao
- [ ] Chăn nuôi gia súc
- [ ] Nuôi tôm quảng canh
- [ ] Nuôi cá
- [ ] Luân canh / trồng kết hợp lúa-rau và nuôi tôm
- [ ] Luân canh / trồng kết hợp lúa-rau và nuôi cá
- [ ] Làm công
- [ ] Ngư dân/đánh bắt cá tạp
- [ ] Trồng rừng
- [ ] Làm việc tại nhà máy
- [ ] Công chức nhà nước

B.2.3 Phần trăm (%) đóng góp của các sinh kế sau vào thu nhập là bao nhiêu?	<10%	10-30%	30-50%	50-70%	>70%	100%
Kinh doanh du lịch	○	○	○	○	○	○
Lúa hai vụ	○	○	○	○	○	○
Lúa ba vụ	○	○	○	○	○	○
Trồng rau và hoa màu ở vùng đất cao	○	○	○	○	○	○
Chăn nuôi gia súc	○	○	○	○	○	○
Nuôi tôm quảng canh	○	○	○	○	○	○
Nuôi cá	○	○	○	○	○	○
Luân canh / trồng kết hợp lúa-rau và nuôi tôm	○	○	○	○	○	○
Luân canh / trồng kết hợp lúa-rau và nuôi cá	○	○	○	○	○	○
Làm công	○	○	○	○	○	○
Ngư dân/ hoặc đánh bắt cá tạp	○	○	○	○	○	○
Làm việc tại nhà máy	○	○	○	○	○	○
Công chức nhà nước	○	○	○	○	○	○
Trồng rừng	○	○	○	○	○	○

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B.2.4 Hộ gia đình ông/bà kinh doanh/tham gia loại hình dịch vụ du lịch nào?

- [ ] Dịch vụ lưu trú (khách sạn, nhà nghỉ)
- [ ] Dịch vụ ăn uống (nhà hàng, quán ăn)
- [ ] Dịch vụ di chuyển (thuyền, xe điện, ...)
- [ ] Bán hàng, đồ lưu niệm
- [ ] Hướng dẫn viên du lịch
- [ ] Khác (ghi rõ)

B.3.1 Tần suất của các thiên tai tại địa phương trong vòng 10 năm qua *(Nên mở đầu bằng việc thăm dò xem NĐPV có từng nghe cụm từ Biến đổi khí hậu chưa? Nếu chưa thì tiếp tục gợi ý bằng cụm từ thiên tai và giải thích 1 chút về BĐKH. Chú ý lắng nghe NĐPV trả lời hết ý rồi mới được gợi ý.*	Tăng	Giảm	Không đổi	Không biết
Trong vòng 10 năm qua tình hình lũ lụt ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình hạn hán ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình nắng nóng kéo dài ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình mưa trái mùa, mưa lớn ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình cháy rừng ở VQG diễn ra như thế nào?	○	○	○	○

B.3.2 Cường độ (sức tàn phá) của các thiên tai tại địa phương trong vòng 10 năm qua	Tăng	Giảm	Ko đổi	Ko biết
Trong vòng 10 năm qua tình hình lũ lụt ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình hạn hán ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình nắng nóng kéo dài ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình mưa trái mùa, mưa lớn ở địa phương diễn ra như thế nào?	○	○	○	○
Trong vòng 10 năm qua tình hình cháy rừng ở VQG diễn ra như thế nào?	○	○	○	○

B.3.3a Lũ lụt ảnh hưởng thế nào đến các dịch vụ du lịch và sinh kế của hộ gia đình ông/bà? (Cần chờ NĐPV trả lời xong, nếu họ ko đưa ra được đáp án có thể gợi ý) *0. Không ảnh hưởng; 1. Ảnh hưởng không đáng kể; 2. Ảnh hưởng nhẹ; 3. Ảnh hưởng nghiêm trọng; 4. Ảnh hưởng cực kỳ nghiêm trọng; 5. Không biết*	0	1	2	3	4	5

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Tài sản (thu nhập từ dịch vụ du lịch)	○	○	○	○	○	○
Thời gian mùa du lịch, cơ hội việc làm trong ngành du lịch	○	○	○	○	○	○
Thiệt hại về nhà ở, trang thiết bị phục vụ du lịch	○	○	○	○	○	○
Thiệt hại về người (bị thương, thiệt mạng)	○	○	○	○	○	○
Cung cấp nước sạch	○	○	○	○	○	○
Cung cấp điện	○	○	○	○	○	○
An ninh lương thực	○	○	○	○	○	○
Sản lượng và năng suất nông nghiệp	○	○	○	○	○	○
Ao trồng thủy sản	○	○	○	○	○	○
B.3.3b Hạn hán ảnh hưởng thế nào đến các dịch vụ du lịch và sinh kế của hộ gia đình ông/bà?	0	1	2	3	4	5
Tài sản (thu nhập từ dịch vụ du lịch)	○	○	○	○	○	○
Thời gian mùa du lịch, cơ hội việc làm trong ngành du lịch	○	○	○	○	○	○
Thiệt hại về nhà ở, trang thiết bị phục vụ du lịch	○	○	○	○	○	○
Thiệt hại về người (bị thương, thiệt mạng)	○	○	○	○	○	○
Cung cấp nước sạch	○	○	○	○	○	○
Cung cấp điện	○	○	○	○	○	○
An ninh lương thực	○	○	○	○	○	○
Sản lượng và năng suất nông nghiệp	○	○	○	○	○	○
Ao trồng thủy sản	○	○	○	○	○	○
B.3.3c Mưa lớn, mưa trái mùa ảnh hưởng thế nào đến các dịch vụ du lịch và sinh kế của hộ gia đình ông/bà?	0	1	2	3	4	5
Tài sản (thu nhập từ dịch vụ du lịch)	○	○	○	○	○	○
Thời gian mùa du lịch, cơ hội việc làm trong ngành du lịch	○	○	○	○	○	○
Thiệt hại về nhà ở, trang thiết bị phục vụ du lịch	○	○	○	○	○	○
Thiệt hại về người (bị thương, thiệt mạng)	○	○	○	○	○	○
Cung cấp nước sạch	○	○	○	○	○	○
Cung cấp điện	○	○	○	○	○	○

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An ninh lương thực	○	○	○	○	○	○
Sản lượng và năng suất nông nghiệp	○	○	○	○	○	○
Ao trồng thủy sản	○	○	○	○	○	○
B.3.3d Nắng nóng bất thường ảnh hưởng thế nào đến các dịch vụ du lịch và sinh kế của hộ gia đình ông/bà?	0	1	2	3	4	5
Tài sản (thu nhập từ dịch vụ du lịch)	○	○	○	○	○	○
Thời gian mùa du lịch, cơ hội việc làm trong ngành du lịch	○	○	○	○	○	○
Thiệt hại về nhà ở, trang thiết bị phục vụ du lịch	○	○	○	○	○	○
Thiệt hại về người (bị thương, thiệt mạng)	○	○	○	○	○	○
Cung cấp nước sạch	○	○	○	○	○	○
Cung cấp điện	○	○	○	○	○	○
An ninh lương thực	○	○	○	○	○	○
Sản lượng và năng suất nông nghiệp	○	○	○	○	○	○
Ao trồng thủy sản	○	○	○	○	○	○
B.3.3e Cháy rừng ảnh hưởng thế nào đến các dịch vụ du lịch và sinh kế của hộ gia đình ông/bà?	0	1	2	3	4	5
Tài sản (thu nhập từ dịch vụ du lịch)	○	○	○	○	○	○
Thời gian mùa du lịch, cơ hội việc làm trong ngành du lịch	○	○	○	○	○	○
Thiệt hại về nhà ở, trang thiết bị phục vụ du lịch	○	○	○	○	○	○
Thiệt hại về người (bị thương, thiệt mạng)	○	○	○	○	○	○
Cung cấp nước sạch	○	○	○	○	○	○
Cung cấp điện	○	○	○	○	○	○
An ninh lương thực	○	○	○	○	○	○
Sản lượng và năng suất nông nghiệp	○	○	○	○	○	○
Ao trồng thủy sản	○	○	○	○	○	○

B.3.4 Sự kiện thiên tai năm nào khiến ông bà nhớ nhất?

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B.3.5 Vì sao?

Nó có tác động gì đến gia đình ông/bà? (thiệt hại về người và của)

B.3.6 Theo ông/bà đâu là nguyên nhân dẫn đến các thiên tai trên? *(Ko nên đưa gợi ý luôn mà cần chờ NĐPV trả lời hết ý)*	Biến đổi khí hậu	Xây đập thủy điện ở thượng lưu	Sản xuất lúa 3 vụ/năm gây áp lực về nước	Nuôi trồng thủy sản gây áp lực về nước
Lũ lụt	○	○	○	○
Hạn hán	○	○	○	○
Nắng nóng kéo dài	○	○	○	○
Mưa lớn, mưa trái mùa	○	○	○	○
Cháy rừng	○	○	○	○

B.3.7 Dưới đây là dòng thời gian của các thiên tai đã xảy ra trong quá khứ ở địa phương, hãy cho biết nguyên nhân các thiên tai trên?	Do biến đổi khí hậu	Do cơ sở hạ tầng	Do ý thức con người	Do chính quyền	Do thiếu thông tin	Khác	Không biết
Lũ lụt năm 2000	○	○	○	○	○	○	○
Lũ lụt năm 2001	○	○	○	○	○	○	○
Lũ lụt năm 2002	○	○	○	○	○	○	○
Lũ lụt năm 2011	○	○	○	○	○	○	○
Sạt lở đất 2018-2020	○	○	○	○	○	○	○
Dịch NCOVID 2020	○	○	○	○	○	○	○

B.3.8 Dưới đây là dòng thời gian của các thiên tai đã xảy ra trong quá khứ ở địa phương, hãy cho biết ảnh hưởng các thiên tai trên tới du lịch và sinh kế?	Option	Option
Lũ lụt năm 2000	○	○
Lũ lụt năm 2001	○	○
Lũ lụt năm 2002	○	○
Lũ lụt năm 2011	○	○
Sạt lở đất 2018-2020	○	○
Dịch COVID	○	○

B.4.1 Ông/bà đã làm gì để giảm thiệt hại và tận dụng cơ hội từ những thiên tai sau?	Giảm thiệt hại	Tận dụng cơ hội	Kinh nghiệm từ thế hệ trước	Kinh nghiệm từ bản thân	Ko biết
Lũ lụt năm 2000	○	○	○	○	○

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Lũ lụt năm 2001	○	○	○	○	○
Lũ lụt năm 2002	○	○	○	○	○
Lũ lụt năm 2011	○	○	○	○	○
Sạt lở đất 2018-2020	○	○	○	○	○
Dịch COVID	○	○	○	○	○

B.4.2a Kinh nghiệm của ông bà khi đối phó với hạn hán là? Những kinh nghiệm từ xưa là? Những kinh nghiệm từ xưa còn hiệu quả không?

(Với những câu hỏi nhiều ý thế này, cần hỏi từng ý 1: Ví dụ Kinh nghiệm của ông bà khi đối phó với hạn hán là gì ạ?.....(sau khi NĐPV trả lời xong mới hỏi tiếp Những kinh nghiệm từ xưa là? ...)

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B.4.2b Kinh nghiệm của ông bà khi đối phó với lũ lụt là? Những kinh nghiệm từ xưa là? Những kinh nghiệm từ xưa còn hiệu quả không?

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B.4.2c Kinh nghiệm của ông bà khi đối phó với mưa trái mùa, mưa lớn là? Những kinh nghiệm từ xưa là? Những kinh nghiệm từ xưa còn hiệu quả không?

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B.4.3d Kinh nghiệm của ông bà khi đối phó với nắng nóng kéo dài là? Những kinh nghiệm từ xưa là? Những kinh nghiệm từ xưa còn hiệu quả không?

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B.4.3e Kinh nghiệm của ông bà khi đối phó với cháy rừng là? Những kinh nghiệm từ xưa là? Những kinh nghiệm từ xưa còn hiệu quả không?

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B.4.4 Dựa vào dòng sự kiện thiên tai trên, ông bà cho biết các biện pháp mình sử dụng để ứng phó có gì thay đổi theo thời gian? Tại sao ông bà lại có sự thay đổi đó?

Tương tự như trên, cần tách ý câu hỏi ra

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B.4.5 Theo ông bà thì kinh nghiệm từ xưa để lại, kinh nghiệm trong khai hoang, chinh phục tự nhiên có giúp ông bà trong việc ứng phó với các thiên tai hiện nay không?

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B.4.6 Sau mỗi thiên tai xảy ra, ông/bà hoặc gia đình có rút ra được kinh nghiệm hay tích lũy được kinh nghiệm gì ko? Có thể chia sẻ cụ thể?

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B.5.1 Khi ông bà gặp khó khăn về thiên tai, hoạt động sản xuất du lịch và sinh kế nói chung, ông bà nhận trợ giúp từ đâu?

- ☐ Bạn bè, bạn làm ăn
- ☐ Người thân, họ hàng
- ☐ Từ các tổ chức xã hội tôi tham gia, nơi làm việc
- ☐ Từ nhà nước, chính quyền địa phương
- ☐ Không nhận được sự trợ giúp nào
- ☐ Khác

B.5.2 Ông bà nhận được sự hỗ trợ như thế nào từ nhà nước, chính quyền địa phương để thực hiện các biện pháp ứng phó, cải thiện sinh kế? (về tiền, phương tiện, kỹ thuật, đào tạo) (sự trợ giúp đó thay đổi thế nào theo thời gian?)	Tăng	Giảm	Ko đổi	Ko có
Tiền	○	○	○	○
Phương tiện	○	○	○	○
Kỹ năng qua đào tạo, tập huấn	○	○	○	○

B.6.1 Trong thời gian qua, hoạt động du lịch ở địa phương có gì đổi mới không? Phản ứng của ông/bà là gì? *(Người được phỏng vấn có thể nêu ví dụ cụ thể)*	Nhanh chóng học và nhân rộng	Học hỏi có điều chỉnh phù hợp với hoàn cảnh của mình	Không quan tâm	Không biết
Sáng kiến mô hình du lịch mới	○	○	○	○
Sản phẩm du lịch mới	○	○	○	○
Biện pháp ứng phó mới với thiên tai	○	○	○	○

B.7.1 Hiện nay tại VQG Tràm Chim có mấy tours du lịch chính? theo ông bà tours nào đáp ứng tiêu chí sau đây?	Cảnh đẹp nhất	Nhiều hoạt động du lịch nhất	Nhiều dịch vụ ăn uống nghỉ ngơi nhất	Bán được nhiều SP du lịch nhất	Chở được nhiều khách nhất	Được du khách yêu thích nhất
Tour 1	○	○	○	○	○	○
Tour 2	○	○	○	○	○	○
Tour 3	○	○	○	○	○	○
Tour 4	○	○	○	○	○	○
Tour 5	○	○	○	○	○	○

B.8.1a Phân công chỗ bán hàng ra sau? Có phải đổi chỗ không? Có phải đấu thầu không? Ai là người được tham gia đấu thầu? Thời gian là bao nhiêu? Cách thức đấu thầu như thế nào?

(Nếu người phỏng vấn là chủ cửa hàng, đồ lưu niệm, quán ăn ở/gần VQG)

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B.8.1b. Phân công dẫn tour thế nào? Thu nhập cố định hay phụ thuộc vào số lượng tour hoặc khách dẫn?
(Nếu người phỏng vấn là người dẫn tour)

B.8.1c. Thu nhập cố định hay phụ thuộc vào lượng khách?
(Người lái thuyền thuê)

B.8.1d. Đấu thầu hay không? Ai là người được tham gia đầu thầu? Thời gian là bao nhiêu? Cách thức đấu thầu như thế nào?
(Người lái thuyền là chủ thuyền)

B.8.2. Kể tên các tổ chức, các cơ quan, ban ngành, tổ chức dân sự, các hội nhóm tại địa phương mà ông/bà tham gia?

B.8.3. Có hiệp hội nào về du lịch hay bảo tồn không? (Cụ thể là hiệp hội nào? thành lập năm bao nhiêu? hoạt động ra sao?)

B.8.4. Kể tên 3 tổ chức, hội nhóm mà ông bà tham gia nhiều nhất?

B.8.5. Mức hỗ trợ nào của các cơ quan, ban ngành, tổ chức dân sự / tập thể / cá nhân tham gia hỗ trợ sinh kế cho người dân? *(Lưu ý: 1-Rất tệ; 2: Không tốt; 3: Bình thường; 4: Tốt; 5: Rất tốt)*	1	2	3	4	5	Các hoạt động kết nối và hỗ trợ người dân
Các sở ban ngành địa phương	○	○	○	○	○	○
Trung tâm Du lịch Sinh thái và Giáo dục Môi trường	○	○	○	○	○	○
Ban quản lý rừng	○	○	○	○	○	○
Hội nông dân	○	○	○	○	○	○
Tổ hợp tác sản xuất	○	○	○	○	○	○
Hợp tác xã	○	○	○	○	○	○
Công ty chế biến xuất nhập khẩu	○	○	○	○	○	○
Thương nhân	○	○	○	○	○	○
NGO (WFF, IUCN..)	○	○	○	○	○	○
Khác	○	○	○	○	○	○

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B.8.6. Ông/bà có thường đóng góp ý kiến, nêu quan điểm trong các buổi họp mặt của các tổ chức trên ko? Ý kiến của ông/bà có được lắng nghe ko? Cụ thể ntn?

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B.8.7 Ông bà đánh giá sao về tác động của các chính sách dưới đây với sinh kế của gia đình ông/bà? Có chính sách nào ông/bà cảm thấy không hợp lý không? Tại sao? *(Càng cụ thể càng tốt)*	Việc thực hiện chính sách với hộ gia đình ông/bà	Tác động tích cực	Tác động tiêu cực
Khoán rừng	○	○	○
Thuê môi trường rừng	○	○	○
Homestay	○	○	○
Đấu thầu	○	○	○
Mời các doanh nghiệp du lịch bên ngoài vào đầu tư phát triển du lịch	○	○	○
Trữ nước vào mùa lũ và quanh năm	○	○	○
Đào kênh, mở rộng kênh thủy lợi	○	○	○
Chống cháy rừng	○	○	○

B.8.8. Ông bà hãy kể tên các sản phẩm du lịch ở địa phương? Ông bà có cho rằng các sản phẩm, các hoạt động du lịch ở địa phương hấp dẫn không?

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B.8.9. Nếu ông bà là người có quyền được ra quyết định về tổ chức và quản lý du lịch hiệu quả/ hoặc ứng phó với thiên tai, ông bà sẽ ra quyết định gì đầu tiên? Hoặc sẽ điều chỉnh những chính sách gì?

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B.8.10. Hiện nay nhiều địa phương làm du lịch ở VQG họ sử dụng các năng lượng xanh như pin năng lượng mặt trời cho hộ gia đình, cho thuyền, hoặc các giải pháp xanh như tái chế phân loại rác; ông bà nghĩ sao về việc áp dụng các giải pháp này tại địa phương? Có những thuận lợi và khó khăn gì?

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B.8.11. Theo ông bà yếu tố thành công của các giải pháp trên là do đâu? (nhà nước, ban quản lý, người dân, hay khách du lịch?)

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B.8.12. Theo ông bà quan sát hoặc theo kinh nghiệm bản thân, khi địa phương có một mô hình du lịch thành công, một sản phẩm du lịch mới do người dân tự phát triển, phản ứng của các cấp chính quyền địa phương là gì?

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B.8.13. Các diễn biến của thiên tai, biến đổi khí hậu hiện nay có ảnh hưởng gì đến các sinh kế mà ông/bà dự định hoặc đang triển khai không? Cụ thể là gì?

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B.8.14. Các diễn biến của thiên tai, biến đổi khí hậu hiện nay có ảnh hưởng gì đến các dịch vụ du lịch mà ông/bà đang triển khai hoặc dự định triển khai không? Cụ thể là gì?

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B.8.15. Khi tiến hành chuyển đổi cơ cấu kinh tế ở địa phương, hay các hoạt động du lịch ở địa phương, ông bà có quan tâm đến yếu tố thời tiết, thiên tai, hay diễn biến của biến đổi khí hậu không? Cụ thể là gì?

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Appendix 9. Codebook and description

Codes	Descriptions
Indicator I	
Theme III. WPA resource governance in tourism	The government and other organizations that manage the park, the specific rules related to the use of the park, and how these rules are made
Subtheme III.1. Relevant stakeholders	Stakeholders related to tourism operation and management
Code 1. Government organizations	Presence or absence of different organizations at local level (state organizations; Communitarian organizations)
Code 2. Non-governmental organizations (NGOs)	Presence of NGOs
Code 3. Network structure	Network configuration at local level and their interactions (social networks, community networks, environmental networks, market networks)
Code 4. Customary institutions	Customary or traditional authorities related to natural resources use and management
Code 5. Local leaders/patriarch	
Code 6. Role of the community	
Subtheme III.2 Governmental regulatory framework for natural resources	Top-down policies adopted by the national, regional and local governments to manage natural resource (Delgado-Serrano & Ramos, 2015)
Code 1. Biodiversity conservation	
Code 2. Property-rights systems	Local property-rights systems and their relation to resource management (property rights systems; Excludability; Subtractability)
Code 3. Operational rules	Local rules for defining Who, How, Where, When, and Why have access to local natural resources
Code 4. Constitutional rules	Legal framework defined by regional and national governments
Code 5. Sanctioning processes	Locally adapted processes to monitor and sanction natural resource use and management strategies
Code 6. Monitoring processes	Monitoring activities on the use and

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	management of resources (e.g. locally-defined by users, controlled by the government) and their performance
Code 7. Collective-choice rules	Rules set defined by involved actors according to local environment and political and economic conditions
Subtheme III.3. Climate change adaptation policy	Policy and regulations from top-down to coping/adapting to climate change and its impacts
Code 1. Climate change manifestations and impacts[21]	
Code 2. Policy in disaster prevention in national parks	
Code 2. Water management	
Code 3. Forest fire management	
Theme IV. Users of SES in tourism sectors[22]	Actors are affecting or affected by the resource system in tourism
Subtheme IV.1 General Characteristics	Social-economic characteristics of people who working in tourism services
Code 1. Number of people working in tourism	
Code 2. Socioeconomic attributes and livelihood strategies of users	Demographic attributes (Age, gender, education level) Ethnic group Main livelihoods How they transform or diverse their livelihood? Why?
Code 3. History of use	Time they migrated or started to live here Time they started to working in tourism
Code 4. Location	Geographical location of resource system's users (e.g. settlements, villages, dispersed)
Subtheme IV.2. Socio-cultural capital and leadership	Knowledge, social networks, trust, reciprocity The type of leadership existing and the acceptance of and respect for leaders, entrepreneurial skills of actors and leaders

[21] The information of this code is synthesized based on local reports and previous research. In the second research question, we will provide more detail of climate change and impacts based on our primary data. If interviewees provide their knowlegde of Climate change, we can code in this code and also in Subtheme. Perception of climate change and its impacts

[22] Major information of theme IV cannot be found in local reports, therefore, we based on information of in-depth interviews from 44 informants to synthesis and analyze

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Code 1. Knowledge of SES/mental models	(Level of knowledge among the users of the SES conditions, the potential and real disturbance patterns and its possible effect: - The effect of overharvesting - Knowledge of the effect of social attitudes toward resource management - Knowledge of the effect of biological shocks on the SES - Mental models related to SES management (e.g. conservation, exploitation, human-nature relationships)) Their understanding of natural resources (forest, fish, water, bird)
Code 2. Leadership/entrepreneurship	Existence of, and attitude towards leadership and entrepreneurship among users
Code 3. Norms/social capital	(Levels of social and institutional interactions among users, including aspects like reciprocity and trust) A6a. Traditional forms of collaboration A6b. Social capital A6c. Attitude toward corruption A6d. Traditions and community values related to natural resource use Who they working with in tourism, natural resource using. How they share benefit and collaborate, how they support each other?
Code 4. History or past experiences	Chronological description of the main events related to the resources and its management
Subtheme IV.3. Dependence and technology	Importance of resources and technology available
Code 1. Dependence on resource	Users dependence on resources for livelihood
Code 2. Technology used	Type of technologies used to extract, harvest and manage the resource, and access of users to different technologies
Theme V. Tourism development	**The role, situation, management and masterplan of tourism**
Subtheme V.1. Role of tourism in WPAs in livelihood and biodiversity conservation	Contribution of tourism in income, livelihood diversity, basic services (education, public facilities), biodiversity conservation

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Code 1. Income	How much they earn per month or year from tourism? How many percentages of tourism contributing to income per month or year?
Code 2. Basic services	Role of tourism in education, cultural exchange, infrastructure, health services, etc
Code 3. Biodiversity conservation supports	Environmental education, budget contribution, forest fire prevention and fighting, etc
Subtheme V.2 Tourism facilities	Facilities related to tourism activities
Code 1. Traffic	Roads, paths, water canals Vehicles: boats, gas station, electric trams
Code 2. Accommodation	Homestay Hotel Hostel Guesthouses
Code 3. Public facilities	Canteen, museums, Public toilets, electricity, water
Code 4. Technology	Solar power, transportation
Subtheme V.3 Tourism operation management	All tourism related regulations to facilitate tourism activities and services in national parks
Code 1. Tourism policy and incentives	Financial incentives Physical incentives (equipment) Land use policy Tourism products Tourism services Tourism networks
Code 2. Tourism using zones	Areas and tourism services Time of tourism activities
Code 3. Legal provisions on rights and obligations in tourism exploitation in National park	
Code 4. Legal provisions on rights and obligations in tourism exploitation in buffer zones	
Subtheme V. 4. Tourism products and masterplan	Existing tourism services and products and strategies for development
Code 1. Tourism routes and time for exploitation	Existing tour routes and time for services in year
Code 2. Tourism services inside national	Tourism services and scale

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park and in buffer zones	
Code 3. Plan and promotion strategies	Strategy of people and government in tourism in the future to adapt to climate change and promote tourism activities
Indicator II.	
Theme V. Climate change impacts on tourism development	
Subtheme 1. Impacts of climate change to tourism activities and services)	Changes in temperature, rainfall, extreme events to: Time of tourism Income Satisfaction Tourism products (fruits, honey) Tourism resources (water, birds, animal, vegetation)
Subtheme 2. Impacts of climate change adaptation to tourism development	Changes in water management (water retention; canal open; close forest in dry seasons, divide forest into segments) impacts to tourism resources, and tourism time, tourism plan
Indicator III. Stakeholder perception and adaptation to climate change	
Theme I. Adaptive capacity	The ability or potential of a tourism system to respond successfully to climate variability and change; this includes adjustment to both behavior, and resource and technology uses
Subtheme 1. Perception of climate change and its impacts	
Code 1. Climate change manifestation	Changes extreme events in locals in frequency and intensity
Code 2. Causes of disasters	People perception of disaster reasons (human cause or nature cause)
Code 3. Climate change impacts	Negative and positive impacts of climate change to income, livelihood, health, tourism resources and activities
Subtheme 2. Perception of tourism resources and development	
Code 1. Tourism resources	Natural and cultural resources can be exploited for tourism activities

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Code 2. Tourism route	Formal and informal tour routes and tourism sites in NP
Code 3. Tourism service and products	Existing tourism services (food, accommodation, transportation, recreational services, etc) Local tourism products (tangible and intangible elements, such as natural, cultural and man-made resources, attractions, facilities, services and activities)
Code 4. Tourism impacts	
Subtheme 3. Leadership	The type of leadership existing and the acceptance of and respect for leaders, entrepreneurial skills of actors and leaders
Code 1. Decision making in community	Who make the decision in community regarding nature resources and tourism operation? How decision making process happen?
Code 2. Strategy and right	Masterplan and right of leaders in natural resource use and management and tourism development
Code 3. Tourism entrepreneurism/ Tourism operation regulation	Benefit sharing mechanism Leaders and power
Subtheme 4. Adaptation action	Experience and current actions to adapt or reduce the damage of changes in climate factors and its impacts
Code 1. Disaster damage reduction actions	Before or after disasters, what they do to reduce damage and take advantages
Code 2. Experiences	What they usually do when disasters happen What they learn from the past
Code 4. Innovative in adaptation	New ideas, solutions
Subtheme 5. Social capital	Social networks, trust, reciprocity
Code 1. Networks	Organizations they have participated and impacts of those organizations to their livelihood
Code 2. Supports post-disasters	Financial, mental, political supports from networks or authorities to them after disasters
Subtheme 6. Technology	Presence of technology in disaster monitoring and prevention
Theme II. Interactions	Interaction among subsystem like tourism – climate change and climate change adaptation of local people and government

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Subtheme 1. Top-down management	Policies and regulations from state or local government to climate change, tourism and adaptation
Code 1. Regulation/Policy of climate change adaptation	State/government policy/actions to prevent or reduce damages of disasters and adapt to the changes of climate change and its impacts
Code 2. Regulation/Policy in tourism adaptation	State/government policy/actions in tourism to prevent or reduce damages of disasters and adapt to the changes of climate change and its impacts
Code 3. Benefit sharing	Efficiency, social sustainability, economic sustainability, equity to explain the distribution of benefits among SES users
Code 4. Policy/regulation evaluation	Different stakeholders react to policies regarding nature resources and tourism development
Subtheme 2. Bottom-up management	Actions and reactions from local people to policy and regulation of government
Code 1. Empowerment	Participation of people to decision making, propose opinions and voices listened
Code 2. Reaction of government to local innovative	Government reacts to local people innovations
Code 3. Role of NGOs	NGOs in facilitating empowerment and policy making
Code 4. Reaction of community/people to the government	Agree or disagree; Follow or against the rules/regulations/government actions
Subtheme 3. Learning process	Formal and informal training to improve people adaptive capacity and adapt to climate change and its impacts: Learning from past experience Learning from multi sources (neighbors, friends, organizations; social media, internet, etc)

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