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# **Living With Climate Change: Vulnerability and Adaptation in the Mekong Delta, Vietnam**

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**Declaration**

I, Erlend Markus Olafsrud, declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

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Date.....

## **Abstract**

The Mekong Delta in southern Vietnam is a region considered to be among the most exposed to climate change hazards in a global context. When the climate and conditions for farming are changing considerably, adaptation becomes a necessity rather than a luxury for millions of farmers in the delta. This research employs theory on vulnerability, adaptation, and adaptive capacity, with a particular focus on both a contextual approach and an outcome approach to vulnerability. Through semi-structured interviews with multiple actors in the districts of Tieu Can and Tan Phu Dong, certain drivers generating vulnerability among smallholders are identified. Furthermore, the study explores and discusses interventions for adaptation and reduced vulnerability. Findings reveal that climate change is perceived as a severe threat to the livelihoods of smallholders in the districts, especially due to saltwater intrusion and drought. However, market dynamics, upstream dams, diseases on crops and livestock, as well as socioeconomic conditions on household-level are also highlighted as central factors that reduce adaptive capacity and generates vulnerability. The thesis argues that climate change cannot be seen as an isolated threat to smallholder livelihoods, as it takes place in a context where multiple processes are shaping vulnerability and hamper the capacity to adapt. The interventions that are highlighted in the thesis include farmer cooperatives, dykes, adapted agricultural models, changing crops and value-adding, as well as livelihood diversification. These interventions are both technical and social, aiming to address different drivers of vulnerability. Findings indicate that the level of equitability, and the degree in which the interventions succeed in reaching the most vulnerable households, is varying. Finally, as vulnerability is seemingly shaped by multiple stressors, it is argued that adaptation efforts should go further than solely focusing on climate-related issues, and apply a holistic approach where vulnerability is addressed in a broader sense.

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## **Acronyms and abbreviations**

AMD – Adaptation to Climate Change in the Mekong Delta in Ben Tre and Tra Vinh Provinces

COP – Conference of Parties

CPV – Communist Party of Vietnam

DARD – Department of Agriculture and Rural Development

GDP – Gross domestic product

GHG – Greenhouse gases

IFAD – International Fund for Agricultural Development

IPCC – Intergovernmental Panel on Climate Change

LMB – Lower Mekong Basin

MOLISA – Ministry of Labour, Invalids and Social Affairs

MRC – Mekong River Commission

NDC – Nationally determined contributions

NGO – Non-governmental organisation

NMAV – The Norwegian Mission Alliance in Vietnam

SLR – Sea-level rise

USD – United States Dollar

VND – Vietnamese Dong

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# 1. Introduction

There exists a delicate ecological balance on our planet. During the last approximately 10 000 - 12 000 years of the Holocene – the geological epoch after the last glacial period – humans have been able to develop agricultural practices in a relatively stable climate (Feynman and Ruzmaikin, 2007). However, the last century has seen significant changes in the earth system. Annual emissions of CO<sub>2</sub> have multiplied vastly from approximately 2 billion tons in 1900 to more than 36 billion tons today (Boden et al., 2017). Mankind's impact on the earth system is so significant that scientists now argue that we have entered what is called the Anthropocene: the epoch of mankind (Crutzen, 2002; Waters et al., 2016).

The changing climate in the Anthropocene means new, and often challenging, circumstances. Surface temperatures are rising, heatwaves occur more often and are more long-lasting, extreme cases of precipitation increase in frequency and intensity, water shortages are increasingly prevalent, while the oceans continue to warm and rise (IPCC, 2014). While these changes are challenging for everyone, some people are more exposed than others. For instance, farmers feel the impact on their fields long before consumers notice any impact in grocery stores. Climatic changes threaten the livelihood, health, and food security of millions of farmers worldwide, as they depend on highly climate-sensitive activities.

The report *Global Warming of 1.5°C* by the Intergovernmental Panel on Climate Change (IPCC) (2018) explains that an average temperature rise of 2°C will have severe consequences. However, UNEP (2019) estimates that with a continuation of current policies, we are steering towards a global temperature rise of 3.4 - 3.9°C by the year 2100. Due to inertia in the climate are further changes inevitable, even if emissions were eliminated today (IPCC, 2018; Matthews and Caldeira, 2008). This means that mitigating emissions is not enough: adaptation to changes is needed. If smallholders in climate-change exposed areas are to maintain their livelihoods, vulnerability must be reduced and measures for adaptation need implementation. It is often said that those who are contributing the least to climate change are the ones who are the most vulnerable to its effects. But who are the vulnerable, and why is it so? These are relevant questions in this study. In the risk of stating the obvious: If vulnerability is to be reduced through adaptation, one needs to know the dynamics which generate the vulnerability. When understanding who is vulnerable, and why, one may be able to implement successful interventions for the maintenance of agricultural livelihoods in a changing climate.

Yet, vulnerability to climate change is not created by climate change alone. There are multiple processes taking place as a part of this picture.

Mekong Delta, located in southern Vietnam, is a fertile region where the Mekong river runs into the sea through nine river mouths. Millions of small-scale farmers in this region depend on agricultural activities as a primary income source, and high agricultural output gives the delta considerable importance for the national economy, as well as the food security for several countries (Renaud and Kuenzer, 2012). However, climate variability has increased in the region, exposing farmers to a number of climate-related threats. This comes as an addition to other socio-political and economic processes local farmers are facing, and which might produce vulnerability.

This study is aimed to be a contribution to insights in understanding what generates vulnerability for farmers in the Mekong Delta, and how current interventions succeed in reducing vulnerability and adapting to climate change. Furthermore, it is asked whether interventions are accessible to the most disadvantaged smallholders. To frame the study the following objectives and research questions are used as a basis:

**Objective 1:** Identify factors generating vulnerability among small-scale farmers in Tieu Can and Tan Phu Dong, Vietnam.

Research question 1: To what extent is climate change perceived as a driver of increased vulnerability in the respective districts?

Research question 2: What non-climatic factors are generating vulnerability and hampering the capacity to adapt to climate change?

**Objective 2:** Explore what measures that are being initiated to reduce vulnerability and adapt to climate change and discuss the outcome of the measures.

Research question 3: What specific interventions for reducing vulnerability and adapting to climate change are promoted and implemented?

Research question 4: Are efforts to reduce vulnerability and enhance adaptive capacity in favour of the most disadvantaged smallholders?

## 1.1. Thesis structure

*Chapter 2*, after this introductory chapter, provides contextual background on Vietnam, with a particular focus on the Mekong Delta and its environmental challenges through an approach rooted in scientific measurements. Also, the specific districts that are used as study areas are introduced.

*Chapter 3* outlines the theoretical foundation for the research. Vulnerability, adaptive capacity, and adaptation are key terms.

*Chapter 4* is explaining the methodological approach which has been applied to answer the objectives and research questions, while furthermore discussing study limitations, trustworthiness, and ethical considerations.

*Chapter 5* is the first chapter that is presenting findings from data collection and includes discussion. The focus is on different drivers in which generate vulnerability on household level in the respective districts. This chapter is mainly addressing the first objective of the study.

*Chapter 6* is the second chapter of findings and discussion, where local interventions to reduce vulnerability and adapt to climate change are presented and discussed. This chapter addresses the second objective of the study. While chapter 3 presents both climatic and non-climatic changes through measurable scientific data, chapter 5 and 6 are more anthropological, representing the experiences of local people. Also, findings and discussions are integrated in the same chapters.

*Chapter 7* concludes the research and summarises the answers that have been obtained concerning the objectives and research questions.

## 2. Contextual background and study areas

In order to answer the objectives in this study and provide fruitful discussions, it is crucial with contextual insight into the area that is being studied. The purpose of this chapter is to explain general recent socio-political and economic changes in Vietnam, as well as introducing the Mekong Delta and specific study areas. Additionally, key climate change issues are illustrated to provide an understanding of the need for adaptation among smallholders in the delta.

### 2.1. Situating Vietnam

The Communist Party of Vietnam (CPV) is the sole ruler in the country with more than 97 million inhabitants – a country that is probably known to many due to the horrific war between the 1950s and 1970s. After the war had ended, Vietnam was considered among the poorest countries in the world (Glewwe et al., 2004). In 1986 however, CPV decided to abandon its central planning economy and embarked on transformative economic reforms. The transformation is called "doi moi": it refers to a series of new policies to build a "social market economy" (Boothroyd and Nam, 2000; Beresford, 2008). Doi moi has involved privatisation of state-owned industries and comprehensive changes in agricultural property rights, among other things. Political control is nevertheless retained by CPV (Kelly and Adger, 2000). Few countries have had a comparable economic growth in recent decades: In 1989, the gross domestic product (GDP) per capita in Vietnam was at 94.5 United States dollar (USD), while in 2018 it had increased to 2 556.6 USD (World Bank, 2018a). Corrected for purchasing power, the GDP per capita stands at more than 7 000 USD (World Bank, 2018b). Thus, it is considered as a lower-middle-income country. Parallely with economic growth, there has been a shift in the sectoral distribution: Although agriculture still is the most important source of employment, the share of GDP from this sector has been gradually reduced as industry and services have seen significant growth. However, agriculture still plays an important role in the national economy as the country is among the top global exporters of products such as rice and coffee (Knoema, 2017). Such large quantities of food exports arguably also play an important role in securing food availability for the global community.

However, the effects of doi moi and economic growth are not free from social problems: benefits from economic development are not shared equally, as 95% of the poor in Vietnam are living in rural areas (FAO, 2019). Ethnic minorities and rural populations are experiencing an increasing gap in income compared to their counterparts. The economic inequality is reinforced

by a lack of opportunities. According to Oxfam (2017) there is a lack of safety nets for the disadvantaged, and rising inequality is visible in several ways, including education, health, and social mobility. Small-scale farmers are among those who are more likely to be poor, face the most discrimination, and are excluded from services and political decision making. This sheds some light on the importance of emphasising small-scale agriculture when researching vulnerability and adaptation.

Rapid economic growth has furthermore escalated environmental pressure. Increased demands for energy and resources have been supported by unsustainable exploitation of natural assets. The government of Vietnam has over time increased the efforts to address the issue of climate change and unsustainable natural exploitation, while parallelly pursuing prosperous economic growth. Currently, there are, for instance, national strategies on socioeconomic development, cleaner industrial production, climate change, environmental protection, and sustainable development (Viet Nam Government Portal, n.d.). These strategies aim to improve living standards for the population, mitigate Vietnam's contribution to climate change and environmental degradation, as well as adapting to current and predicted changes. The success and coherency of these strategies are nevertheless disputed and debated. For instance, while one goal is to mitigate climate change impact, the widespread development of coal-fired power plants is taking place at a rapid pace, significantly increasing national emissions (EREA and DEA, 2019). Furthermore, Vietnam's nationally determined contributions (NDCs)<sup>1</sup> to the Paris Agreement are far from sufficient for what is needed in order to reach the agreement's goal of limiting global temperature rise to preferably 1.5°C or maximum 2°C (Climate Action Tracker, 2019).

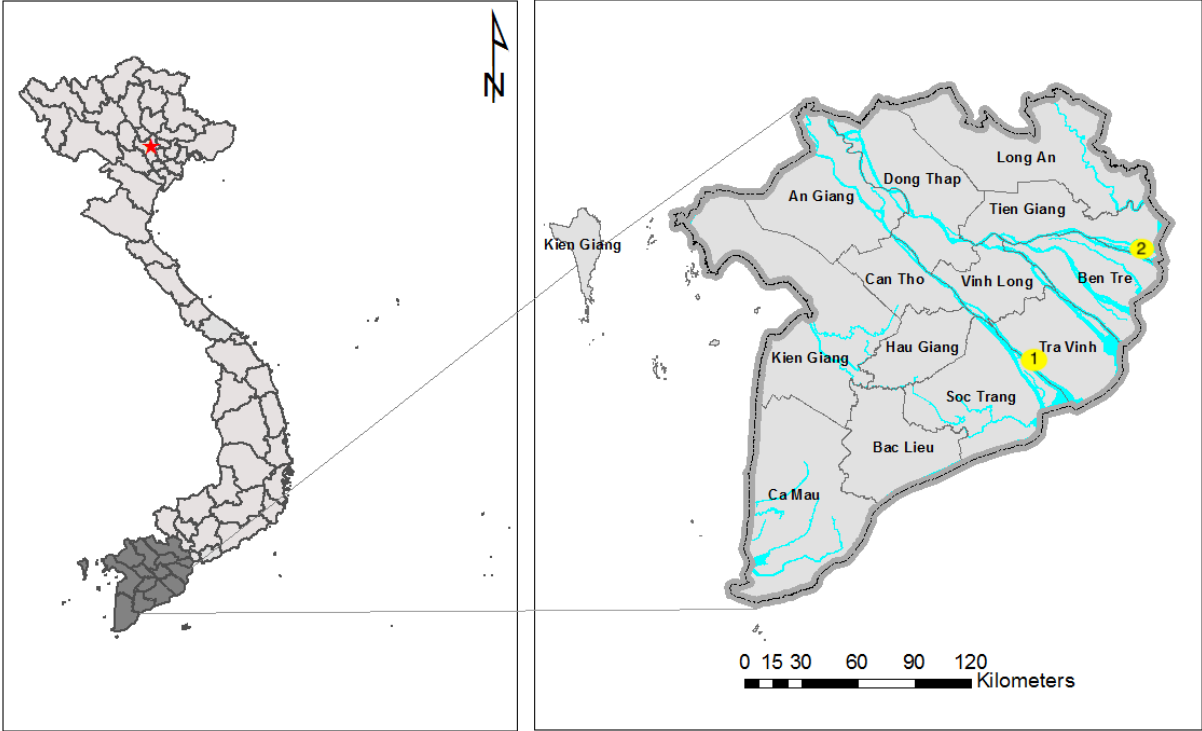
## **2.2. The Mekong Delta**

The Mekong river runs through the countries of China, Myanmar, Laos PDR, Thailand, and Vietnam before it drains into the sea through nine river mouths. With a length of more than 4700 km, the river supports millions of livelihoods along the basin, arguably making it among the most important river basins in the world. Within the Vietnamese borders, we find the Mekong Delta: A region comprising one municipality, 12 provinces, and almost 20 million

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<sup>1</sup> At the Conference of Parties (COP) 21 in 2015, the global community compiled "The Paris Agreement". The overarching goal of the agreement is to keep global temperature rise below 2°C, while furthermore "pursue efforts" for limiting the increase to 1.5°C. To reach this goal, it is required that every state initiate their best measures through so-called nationally determined contributions (NDCs) (UNFCCC, 2015).

inhabitants (Mekong River Commission, 2019). The river delta in southern Vietnam is a fundamental source of life for the inhabitants as the majority relies on agriculture, aquaculture, and/or fishing. The combination of several factors, such as sediment supply from the river, water access, rainy season, and the flat surface makes it an exceptional area for farming. With extensive use of dyke-systems, many farmers in the delta are able to harvest three rice crops a year (Garschagen, 2012). In 2014, the Mekong Delta accounted for approximately 90% of Vietnamese rice exports and 50% of the national production of rice (Cosslett and Cosslett, 2018). Due to these assets, the Mekong Delta is known as the “rice bowl of Vietnam”, also making it a key geographic area for the national economy as a whole. Although the delta provides great conditions for agricultural activities, a large proportion of the population lives in poverty and uncertainty. As this thesis will show, this is both due to social and environmental conditions.



Map 1. Left: Vietnam with the Mekong Delta in the south. Right: The Mekong Delta. Tieu Can district is marked as 1, while Tan Phu Dong district is marked as 2. Adopted from Pham et al. (2018). Modified by Erlend Olafsrud (2020).

### **2.2.1. Study areas**

As explained in the chapter of research methods two districts in the Mekong Delta are focused on in this study.

#### **2.2.1.1. *Tan Phu Dong***

The district of Tan Phu Dong is a part of Tien Giang province. It is an island subdivided into six communes: Phu Dong, Phu Tan, Phu Thanh, Tan Thoi, Tan Phu, and Tan Thanh. The district, which is considered to be among the poorest in Tien Giang province, is only accessible by boat. The population of 45 000 inhabitants (Government statistics. Received through: Personal communication – NMAV Staff 3, 2020) is highly dependent on agriculture, with important crops and products being lemongrass, coconuts, rice, livestock, and shrimps/prawns. It is a low-lying island, bordering to the sea with rivers on both sides. Thus, it is highly exposed to sea-level rise (SLR) and saltwater intrusion.

#### **2.2.1.2. *Tieu Can***

Tieu Can district is in the province of Tra Vinh. The district is located noticeably further up the river compared to Tan Phu Dong (see Map 1), with 107 000 inhabitants divided on 29 500 households. Also, there is a relatively large proportion of a Khmer minority, counting one-third of the inhabitants (Government statistics. Received through Personal communication – NMAV Staff 3, 2020). Some key agricultural products in the district include livestock such as cows, pigs, and ducks, as well as rice, fruits, and vegetables.

### **2.2.2. Environmental externalities induced by the recent development**

In common with the country as a whole, national policy has led to high-intensity economic growth in the Mekong Delta. But this growth has caused several externalities: Ecological imbalances, land subsidence, environmental pollution, coastal erosion, and groundwater depletion are some of the changes that are seen in the delta (Government Resolution 120, 2017). The most crucial non-climatic environmental change in which the reader should be aware, is the construction of upstream dams: Large dams have been constructed in different Mekong-countries, especially China and Laos, to support further economic growth. Some dams are currently under construction, while others are planned. Through the first decade of the 2000s, Mekong was among the least regulated large rivers globally, but changes are happening at a great pace (Hecht et al., 2019; Kummu et al., 2010).

Dams are threatening biodiversity and local fisheries. Furthermore, the livelihood and food security of farmers depend on the seasonal flooding and supply of sediments driven by the

river, as it is a fundamental pillar for agricultural production. Already in 2010 did Kummu et al. (p. 196) conclude that “a significant part of the Mekong’s sediment will be trapped in the reservoirs if the plans to build them go ahead”. After many of the planned dams have been built, the Mekong River Commission (MRC) confirms: “Reservoir developments in the basin have caused a significant change in the flow regime of the Mekong and are contributing to the observed substantial decrease in sediment concentrations” (Mekong River Commission, 2019, p. xvii). Piman and Shrestha (2017) conclude that if all the dams that are proposed in the Lower Mekong Basin (LMB) are developed, approximately 96% of sediments will be trapped. If the sediment load reaching the delta is only 4%, the consequences for erosion, soil fertility, and other aspects will be tremendous. For instance, the total decrease in Vietnamese rice production could be as much as 552 000 tons due to this sediment reduction (Piman and Shrestha, 2017). This means that when dams are constructed upstream, this has implications for local communities in the downstream delta whose livelihoods depend on the river.

### **2.2.3. Climatic changes in the delta**

Not only is the delta highly affected by the environmental change as a result of local and regional development in recent decades, exposure to climate change is also considered to be another severe threat. When modelling exposure to climate change, Vietnam and the Mekong Delta often end up among the most high-scoring areas globally. For instance, Eckstein et al. (2019) map out the ten most “affected” countries by extreme weather events between 1999 and 2018 worldwide: Vietnam comes out as number 6. This rating is based on the number of events, death tolls, and economic losses.

Saltwater intrusion is arguably the most threatening environmental change in the Mekong Delta. The term is, easily explained, referring to the displacement of freshwater due to the advancement of saltwater, as saltwater has a greater density (Bates et al., 2008). The problem with saltwater intrusion is that the vast majority of crops do not grow well in saline soils. More salt in soils and waters means lower yields or no yields at all. Also, it reduces access to freshwater used for household consumption. Hence, saltwater intrusion is threatening the livelihoods of high numbers of smallholders in the Mekong Delta. As this thesis will explain and discuss, there are different drivers of saltwater intrusion in the delta – both climatic and non-climatic. Nevertheless, among climate change factors, drought and SLR are the most severe in causing saltwater intrusion (Smajgl et al., 2015). In years when El Niño is particularly strong, drought is increased, and saltwater intrusion is noticeably more severe (CGIAR, 2016). Drought exacerbates saltwater intrusion because it “reduces the pressure from freshwater resources that



otherwise supports the balance of coastal ecosystems by naturally helping to keep seawater out” (Epanchin-Niell et al., 2018). SLR, on the other hand, reduces the elevation difference between land and sea and thereby makes it possible for saltwater to move beyond the "original" sea.

Projections on the danger of SLR have been varying because several factors determine the level of potential inundation (including groundwater extraction, average SLR, the elevation of the delta, etc.). Recent research by Minerhoud et al. (2019), as well as Kulp and Strauss (2019), argue, based on new elevation models, that exposure to SLR in the Mekong Delta is significantly more severe than first thought, because the average height of the area may be substantially lower than previously estimated. By using new models, Climate Central (2019) estimates that 31 million people in Vietnam, most of them in the Mekong Delta, live below potential average annual flood levels in 2050 in a RCP4.5-scenario<sup>2</sup>. These numbers nevertheless only refer to the elevation of populated places compared to potential SLR and do not include coastal defences such as dykes, meaning that the number of people living below potentially inundated areas is, in reality, lower than 31 million.

Other future climate projections for Vietnam indicate increased risk of drought, abnormal rain, storms, higher temperatures, harmful flooding in wet seasons, and increased probability of heatwaves, among other consequences. In sum, the Mekong Delta is often considered to be among the most climate change-exposed deltas in the world (IPCC, 2014b; World Bank, 2020; INFORM, 2019). Such severity of exposure underpins the need for adaptation if smallholders in the delta are to maintain their livelihoods. Hence, this study is thematically placed in the crossroad between development, vulnerability, and adaptation.

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<sup>2</sup> IPCC provide four different scenarios based on possible pathways of greenhouse gas emissions. RCP2.6 is the “best case” scenario, RCP4.5 and 6.5 are lower-mid and upper-mid scenarios, while RCP8.5 is the “worst-case” scenario. Different scenarios include great variation in population growth, economic growth, land use, and energy consumption, while also include great variation in consequences (IPCC, 2014a).

## 3. Theoretical framework

### 3.1. Vulnerability

As vulnerability is a central concept of this study, it is important with an elaboration on the meaning behind the term. There are numerous understandings of the word “vulnerability”, while there are also different approaches to how vulnerability can be assessed. IPCC provides a framework which is essential for a large body of research on vulnerability and climate change. The definition has changed over time, but in the well-known report *Global Warming of 1.5 °C*, vulnerability is explained as “the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including sensitivity or susceptibility to harm and lack of capacity to cope and adapt” (IPCC, 2018, p. 560).

The IPCC-framing of vulnerability is most prominently seen as a function of three concepts: *Exposure*, *sensitivity/susceptibility to harm*, as well as *adaptive capacity*. In such a conceptualisation, there is both an external dimension represented by exposure to climate variations, as well as an internal dimension represented by sensitivity and adaptive capacity (Füssel and Klein, 2006). Exposure is the “extent to which the system is physically in harm’s way” (Engle, 2011, p. 649). Certain geographic areas are, for instance, more exposed to hurricanes than others. Furthermore, sensitivity is “how affected a system is after being exposed to the stress” (Engle, 2011, p 649), meaning the actual consequences of the exposure. The concept of adaptive capacity is nevertheless somewhat more debated and will be further elaborated upon below. The IPCC-conceptualisation of vulnerability is visualised through the following scheme:

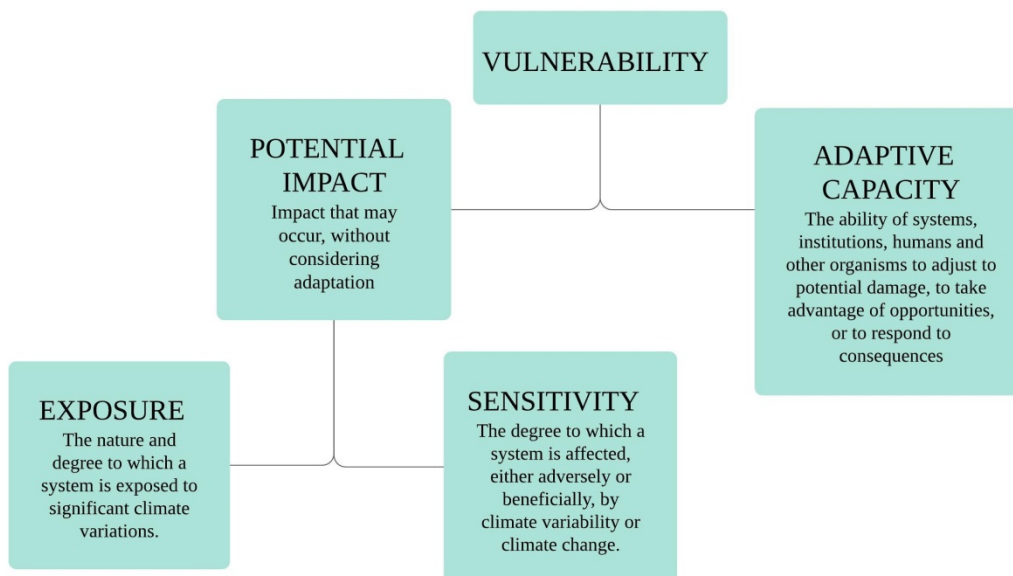


Figure 1. Visualisation of vulnerability as explained by IPCC, adopted from a scheme by Žurovec (2018).

### 3.1.1. Different interpretations and approaches serve different purposes

The broad framework of IPCC opens up for a wide set of interpretations and approaches. Kelly and Adger (2000) identify two fundamentally different approaches to vulnerability within science: *end-point* and *starting-point*. On the one hand, when vulnerability is considered as the endpoint of the analysis, one begins with “projections of future emission trends, moving on to the development of climate scenarios, thence to biophysical impact studies and the identification of adaptive options” (Kelly and Adger, 2000, p. 327). Thus, the remaining impact *after* adaptation has taken place defines the level of vulnerability. Such an analysis is convenient when the question is “what are the net impacts of climate change?”. That is often the case in the work of IPCC, and research with an end-point approach often, therefore, refers to the IPCC-definition of vulnerability illustrated above.

On the other hand, the starting point approach considers vulnerability as a *current* lack of ability to adapt to changes, which in this case is climate change. In such a view, “vulnerability is considered a characteristic of social and ecological systems that are generated by multiple factors and processes” (O’Brien et al. 2007, p. 75). As O’Brien et al. (2004a, p. 3) point out, the fundamental difference between these two approaches lies in how one looks at adaptation: “Viewing vulnerability as an endpoint assumes that adaptations and adaptive capacity determine vulnerability, whereas viewing vulnerability as a starting point says that vulnerability determines adaptive capacity and hence adaptations”.

Based on the ideas of end-point and starting-point approaches to vulnerability, O’Brien et al. (2007) make a distinction between two interpretations:

- *Outcome vulnerability* is considered to be a linear result pointing to the offset from adaptation measures towards the exposure from climate change. This interpretation explains that vulnerability can be reduced either through mitigation of climate change (reduction of exposure) or adapting to reduce the adverse outcomes of the exposure.
- *Contextual vulnerability*, on the other hand, can be understood as a more complex view on the interactions between climate and society. “Both climate variability and change are considered to occur in the context of political, institutional, economic and social structures and changes, which interact dynamically with contextual conditions associated with a particular ‘exposure unit’” (O’Brien et al., 2007, p. 76). The understanding of vulnerability as illustrated in Figure 1 does not grasp all these contextual factors.

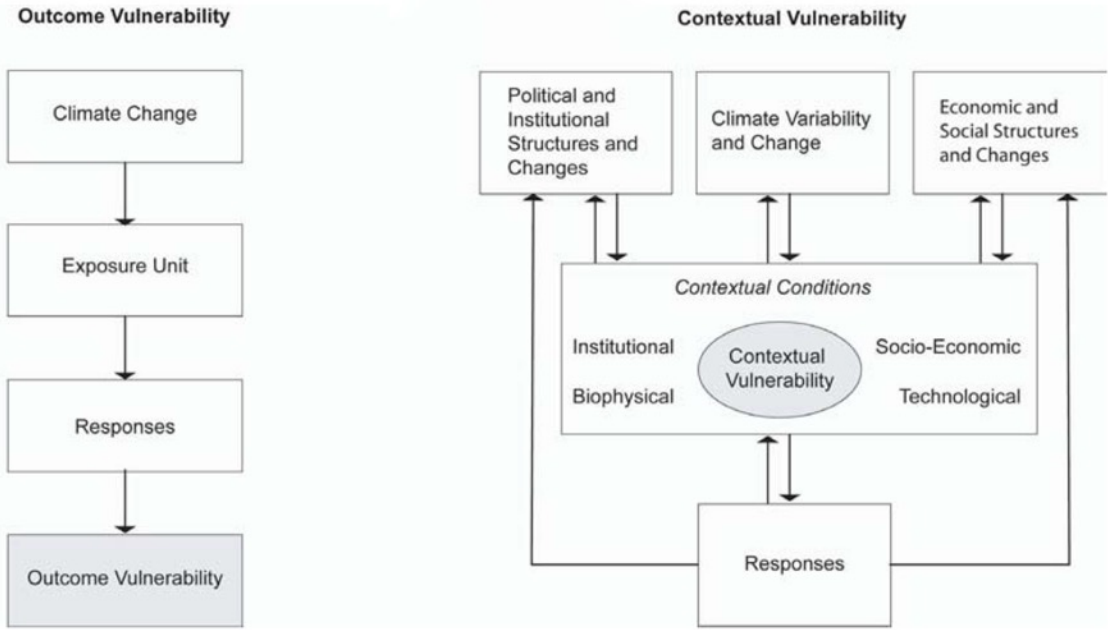


Figure 2. Frameworks depicting two interpretations of vulnerability to climate change: outcome vulnerability and contextual vulnerability (O’Brien et al., 2007, p. 75).

Contextual vulnerability emphasises the multiple dimensions of the interaction between nature and society. Figure 2 illustrates how – according to a contextual approach – climate change occurs in the presence of multiple processes both within nature and society. Hence, the vulnerability towards climate change will deeply depend on the context, so will the responses.

The responses will then again affect the processes that are taking place in both nature and the society. Conditions may vary significantly, not only on a regional, national and local level but also between households and among individuals. Thus, reducing vulnerability involves both mitigating climate change and adjusting the context in which climate change is taking place, so people are in a better position to respond (Adger, 2006). Barnett (2006) argues, for example that societies in, or recovering from, conflict are the most vulnerable towards climate change. A familiar argument is that climate change can create conflict. However, in this case, Barnett (2006) makes a twist on the argument by showing that conflict in itself is a key factor in creating vulnerability towards climate change. That can, for instance, be due to the inability to meet food needs (which is important to cope with climate change), as a violent conflict is associated with undernutrition and malnutrition. In a simplified sense, reducing conflict therefore has the potential to reduce vulnerability towards climate change. Such an example touches on the importance of emphasising contextual conditions and different non-climatic processes.

Furthermore, a critique of the outcome approach and mainstream exposure/sensitivity/adaptive-capacity interpretation, is that it fails to open up for discussions on how socio-political processes are creating vulnerability. The contextual approach argues that power relations, emissions, land reforms, consumption, national policies, market structures, etc. are all deeper drivers of vulnerability. Hence, it is important to address these dynamics when reducing vulnerability. Also, an interesting question is whether adaptation measures challenge the dynamics in which induces vulnerability.

In sum, it is salient to be aware that there are multiple approaches, definitions, and conceptualisations regarding vulnerability in climate change-related studies. The literature presented in this chapter categorises some specific interpretations, but it is worth knowing that other research suggests different categories. As seen, some interpretations of vulnerability emphasise the biophysical and external aspects of pressure, meaning the frequency and severity of environmental changes. Other interpretations focus on the social aspects of vulnerability, meaning the inherent assets of a social system, including e.g. politics, socioeconomics, and culture (Brooks, 2003). Some research views vulnerability as an end-point, other as a starting point. The reason for performing these distinctions is to acknowledge the fact that different interpretations serve different purposes and will also lead to different responses. O'Brien et al. (2007) argue that the representations outlined above are not solely interpretations of the word

vulnerability, but they are rooted in different discourses<sup>3</sup> of the climate change problem. “There has been a failure to appreciate that these differing definitions are manifestations of different discourses on climate change – discourses that not only represent different approaches to science, but also different political responses to climate change” (O’Brien et al., 2007, p. 74). Discourses impact how vulnerability is framed; thereby it may affect responses for reducing vulnerability. One should, therefore, be aware that the way vulnerability is interpreted in this study, including the responses that are highlighted and discussed, is not an objective or universal understanding of the term.

This study was focused on household interviews; with a particular focus on livelihoods, adaptation strategies, and constraints to local responses. Questions such as “is climate change a relevant problem?” and “who is negatively affected by climate change?” are asked both explicitly and implicitly in the research. According to O’Brien et al. (2007), all of these features are typical for a starting-point, contextual vulnerability-framing. However, also discussed are some technological adaptations, drawn on climate predictions and scenarios, as well as particular sensitivity within a specific sector (agriculture). These features of the study belong more in a framing of outcome-vulnerability. Furthermore, there is an emphasis on the interrelated system of the social and natural spheres. Both biophysical and social vulnerability are addressed and seen as two parts of the same system, to understand how the effects of climate change are distributed within society. This thesis acknowledges exposure and sensitivity, as well as long-term climate predictions; meanwhile, there is an emphasis on current vulnerability of communities and households through a starting-point approach. With this in mind, the thesis will not be anchored in a specific definition of vulnerability. Rather, elements from different “schools” will be detectable in different discussions.

### **3.2. Adaptation and adaptive capacity**

In addition to vulnerability, *adaptation* and *adaptive capacity* are key concepts in this thesis. Smit et al. (2000, p. 225) refer to climate change adaptation as “adjustments in ecological-socio-economic systems in response to actual or expected climatic stimuli, their effects or impacts”. Adaptations are nevertheless not always creating positive outcomes,

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<sup>3</sup> A discourse is something that provides a framework for the way we see the world. It is highly related to words and language - how phenomena are described and defined. Through emphasising discourses, one often aims to overcome the traditional separation of language and practice (Hall, 1997).

meaning that it is important to avoid actions that may reproduce vulnerability – thus becoming maladaptations (Eriksen and Brown, 2011). The two concepts of adaptation and vulnerability are highly connected, but as mentioned: while an end-point approach to vulnerability sees adaptation as a critical component in measuring the net vulnerability, do the starting point considers vulnerability to take place without looking at adaptation efforts. Reduction of vulnerability may or may not enhance adaptive capacity, while the actual adaptation efforts can both decrease and increase vulnerability. Thus this thesis often refers to “reducing vulnerability” and “adapting to climate change” separately, but as a part of the same context. In such an understanding the concepts of both vulnerability and adaptation are highly dynamic and interlinked, as they continuously affect each other. Schipper (2007) argues for the need to reduce vulnerability to allow people to adapt to climate change. To do that, drivers of vulnerability must be assessed.

Traditional adaptation interventions have tended to focus specifically on climate impacts, without addressing underlying social and economic causes of vulnerability. This has often been conducted in a technical way, as a part of “development as usual”: construction of sea-walls or introduction of climate-resilient crops are two examples. Although technical solutions are necessary, research argues that they are insufficient in solving the climate vulnerability issue alone (Vincent et al., 2013; Eriksen et al., 2015). This thesis sees adaptation as both a technical and a social process. Social adaptation includes interventions in which may not seem as climate-related, as they are primarily aimed towards socio-economic causes for vulnerability. When vulnerability to climate change is not solely driven by climate impact, other non-climatic interventions emerge as relevant.

Adaptations are, to a considerable extent, manifestations of the adaptive capacity of a system (Smit and Wandel, 2006). As mentioned, adaptive capacity is a key dimension in different interpretations of vulnerability. It is defined by IPCC (2014a, p. 118) as: “The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences”. This means that adaptive capacity can have a direct effect on vulnerability by inflecting exposure and sensitivity (Engle, 2011), which is a view mainly seen in outcome vulnerability-research. A simplified explanation could therefore be that adaptive capacity is needed to perform adaptations: The more and better adaptive capacity, the bigger is the potential for performing functional adaptations. A justification of the importance of adaptive capacity can be provided through Engle (2011, p. 649) who, with what one could classify as an outcome approach to vulnerability, argues: “Because of its unique position as being shaped by human actions and as influencing both the

biophysical and social elements of a system, adaptive capacity is considered critical for reducing vulnerability”.

The concept of adaptive capacity focuses on flexibility rather than looking for solutions aimed at very specific hazards. Changes in the climate are uncertain, and the idea is that reduced vulnerability and increased adaptive capacity will make one more able to respond to these uncertainties (Tompkins and Adger, 2004). Most research agrees on the general idea that more and better adaptive capacity is linked to reduced vulnerability. However, while outcome vulnerability sees adaptive capacity as something inherently positive and an isolated goal itself, can contextual vulnerability see building adaptive capacity as an activity in which may cause vulnerability. The latter approach would also argue that if local communities and households are promoted as the sole actors in building adaptive capacity, an inequitable amount of responsibility is placed on those who are already disadvantaged. Building local adaptive capacity locally while maintaining development as usual on a structural level (where deep-rooted vulnerability often originates), is arguably problematic regarding equity, according to Eriksen et al. (2015). This will be discussed through findings in this thesis. Also, a high level of adaptive capacity does not necessarily create vulnerability-reducing actions and activities, which is important to bear in mind (Noble et al., 2014).

Adaptive capacity is not static; it changes over time and is locally affected by several factors. Smit and Wandel (2006, p. 287) argue: “Adaptive capacity is context-specific and varies from country to country, from community to community, among social groups and individuals, and over time”. This means that although one can measure adaptive capacity at e.g. national level in a numeric and comparable way, there are significant differences in the adaptive capacity of households and communities within that nation. This makes the level of vulnerability different within a community, although the exposure may be fairly similar. However, the adaptive capacity is not completely separated from scales, as the capacity of a household to adapt to some degree depends on the adaptive capacity of the community, region, and country. Knowing that adaptive capacity is highly context-specific nevertheless underpins the importance of assessing vulnerability and adaptive capacity on household level, not only nationwide (Smit and Wandel, 2006; Kelly and Adger, 2000; Engle, 2011).

Several researchers have pointed out specific factors influencing the total level of capacity, but again there is no universal framework to define the components of adaptive capacity. When mapping vulnerability, including adaptive capacity, researchers often develop their own “profile” for assessment containing different variables. Some research prefers to



apply quantifiable and comparable factors<sup>4</sup>, while others emphasise more qualitative and “softer” ways of assessing adaptive capacity<sup>5</sup>. This depends on the purpose of the assessment and is often bound to scales. Examples of factors which are applied when evaluating adaptive capacity are income, education, market access, kinship network, political influence, knowledge, managerial abilities, health, infrastructure, and technology. (Yusuf and Francisco, 2009; Engle, 2011; O’Brien et al., 2004b; Smit and Wandel, 2006). This study aims to use a holistic approach combining relevant factors from the data collection (including secondary quantified data and primary non-quantified data) to characterise vulnerability and adaptive capacity. A composite index of adaptive capacity is arguably more appropriate for comparison on a larger scale and is avoided in order to emphasise the variations between local communities and households. Here adaptive capacity is also referred to as the *present* ability to cope with and adapt to climate change and secure livelihoods, relating to the starting-point approach to vulnerability, as explained in section 3.1.1. (O’Brien et al. 2004a).

Both in policy and research the concepts of adaptation and mitigation are separated, mainly because these two concepts refer to different goals and actions. This is also the case in this thesis, as adaptations are looked at without explicitly discussing the mitigation of greenhouse gases (GHG). However, such a view is arguably breaking with a holistic understanding of the environment-society system. Nightingale et al. (2019, p. 2) argue: “By holding these processes [mitigation and adaptation] separate, the ways in which climate change is both a product of and complicit in producing political economies, cultural practices, knowledges as well as ecosystems is obscured”. In this thesis, the process of reducing vulnerability and adapting to climate change is discussed isolated from mitigation mainly for the purpose of clarity. Also, it is implicitly taken for granted that reducing vulnerability will also demand significant mitigation of GHGs globally. The limits to this framing are nevertheless something of which the reader should be aware. When speaking of adaptive capacity, the thesis looks at the term through different lenses. Through an outcome approach, it is assessed how adaptive capacity is potentially increased, and vulnerability is reduced as communities and households are given increased resources. Through a contextual approach, it is discussed whether building adaptive capacity changes deeper dynamics and reduces inequality in which creates vulnerability, or if vulnerability may be reproduced.

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<sup>4</sup> See for instance Yusuf and Francisco (2009).

<sup>5</sup> See for instance chapter 5. in O’Brien et al. (2004a).

## 4. Research methods

This chapter describes the methodological approach that was applied to collect and analyse data, as well as writing this thesis. There will be an overview of the choices that have been made, as well as an exploration of limitations, challenges, and trustworthiness. Finally, ethical considerations are discussed.

### 4.1. Qualitative research

Overall, a qualitative research approach was utilised in this study due to its applicability with perceptions of the social sphere. Bryman (2016, p. 375) states that qualitative research features “an epistemological position described as interpretivist, meaning that, (...) the stress is on the understanding of the social world through an examination of the interpretation of that world by its participants”. Such a framing is transferable to this study, where the social sphere in the respective geographical areas is examined through the input from local actors.

Deeper insight from the situation of local actors in the presence of climate change was obtained using the qualitative approach. Vulnerability, adaptive capacity, climate change, and adaptation are complex and multi-layered concepts, and an in-depth understanding can be fruitful. According to Bryman (2016) the social world should be interpreted from the perspectives of the people that are being studied. Such perspectives could, in this case, most comprehensively be obtained through interviews. On that basis qualitative research was chosen as it opens some doors for seeing through the eyes of research participants, which was an initial goal in doing this research. This means that there is an aspect of anthropology in the research, as the discussions orbit around perceptions of the smallholders of their own situation. While the background is rooted in scientific models of climate change and its impact, the subjective experiences are highlighted through primary data collection. This is justified through the fact that local smallholders are after all the ones who are living with the changing climate, and their experiences are real.

#### 4.1.1. Selecting the area of study

The following criteria were applied in the selection of a study area:

1. A hotspot for climate change exposure
2. Small-scale agriculture is the predominant sector of employment
3. Where relevant actors - such as farmers, local governments and non-governmental organisations (NGOs) - are initiating specific measures for adaptation

Feasibility of conducting data collection is another aspect that is essential in all research: informants and interpreters need to be accessible, and the study area should arguably be safe. The Mekong Delta in Vietnam answered to all criteria above, thus emerging as an appropriate study site.

#### **4.1.2. Sampling approach**

A sample is “the segment of the population that is selected for research” (Bryman, 2016, p. 695). The sampling itself is thus the process of selecting subjects for retrieving data. *Purposive sampling* is the approach that was chosen. It is a form of non-probability sampling, meaning that the researcher is aiming to sample in a strategic way that gives access to informants who are relevant for answering the research questions (Bryman, 2016). The methodological goal of the study was to explore phenomena among a certain group of people – purposive sampling was thus a natural and useful approach. Conducting research through purposive sampling nevertheless often involves more than one sampling approach. Two forms of purposive sampling were used: *generic purposive sampling* and *snowball sampling*.

The key sampling approach being utilised in this research is generic purposive sampling, often also referred to as a *generic inductive approach*. It is a way of sampling that incorporates different strategies (Bryman, 2016). Liu (2016, p. 129) explains that “the main feature of a generic inductive approach is methodological flexibility”, meaning that it is challenging to point at one universal feature of such an approach. Firstly, the first draft of objectives and research questions were designed. On that basis, it was possible to draw a profile of relevant informants to answer the questions. The sample was then discussed with the gatekeepers (see section 4.1.3.1.), and a set of informants was agreed upon. The study aims to identify drivers of vulnerability in the agricultural sector, as well as to explore relevant measures that are being implemented. Thus, through a generic purposive approach, both public authorities, NGOs, small-scale farmers (including farmer groups), and business were considered relevant, as they all work with climate change adaptation.

While collecting data, a second sampling approach was used: Snowball sampling. It is an approach where the researcher uses one set of informants to establish contact with other informants (Bryman, 2016). This choice of approach is justified by the fact that it opened up access to new relevant participants that were not accessible through the prior sampling approach. Some of the contributors to this research were only reachable through the network of the original set of samples and provided valuable insights for discussing the research questions.

Finally, it can be argued that there is also a minor aspect of *convenience sampling* in the research approach. This approach differs from the two approaches outlined above as it is not purposive, but is rather characterised by the accessibility for the researcher (Bryman, 2016). Due to language barriers, geography and infrastructure, political and judicial aspects in Vietnam, all potential informants are simply not accessible. A specific example is smallholders who live outside sea-dykes on the very border to the sea. Although such informants would have been valuable for the research as they live in a highly climate-exposed area, they were only accessible to a very limited degree. Hence, other informants were interviewed as substitutes. This has an element of convenience sampling and may be seen as a weakness.

#### **4.1.3. Data collection and analysis**

This study is based on both primary and secondary data. Before collecting primary data, interview guides were designed. The guides varied in content based on what type of participant for whom it was meant. For instance, the interview guides aimed towards local authorities had questions that were different from the ones aimed towards farmers, although the topics were fairly similar. The majority of the interviews were semi-structured. Bryman (2016, p. 466) argues: “In qualitative interviewing, there is greater interest in the interviewee’s point of view”. A semi-structured form of interviewing makes it possible to put this point of view in the centre. As mentioned, interview guides were designed in advance, but in the interview setting the goal was always to let the informants tell their own story. This meant that none of the interviews was identical, and new insights and nuances were provided every time. The advantage of this approach is that one can obtain a more in-depth understanding of the interviewee’s perspective, which was an inherent goal in the research. In sum, 26 interviews were conducted: 10 in Tieu Can district, 12 in Tan Phu Dong district, one interview in Lac Duong district, one in Dalat, one in Ho Chi Minh City, and one interview in the city of Hanoi. However, the interviews in Lac Duong and Dalat are not referred to in the thesis, although they are a part of Table 1 below. The reason is that the interviews turned out to be highly context-specific for areas in which are not a part of the scope of the thesis. Lac Duong and Dalat are in the central highlands of Vietnam, and not in the Mekong Delta. Thus, findings from this area do not apply to the research objectives – but including them would probably not have changed the conclusion.

<b>Sample category</b>	<b>Number of interviews</b>
Small-scale farmers	12
Production groups	3
Cooperative groups	1
Governmental bodies <sup>6</sup>	6
NGOs	3
Private sector	1

Table 1. An overview of the sample and the number of interviews (qualitative).

As indicated in section 4.1.2., data collection was based on a mix of individual and group interviews. The ratio of male and female participants was relatively equally distributed. The interviews with “production groups” and “cooperative groups” were conducted in groups, varying from three to six people. In this thesis the group as a whole is anonymously referred to when an individual in that group stated her or his opinion. All other interviews were of individuals. In total, 31 different smallholders took part in a semi-structured interview – either individually or through one of the groups. Three of the farmers participated both in a group interview and an individual interview. One farmer participated through informal conversation and is not included in Table 1.

The advantage of individual interviews was that the participant had the opportunity to share information and state their opinion without being affected by other participants. Group interviews allowed the participants to discuss with each other, which contributed to fruitful reflections. However, the dynamics of group interviews are often threatened by the fact that certain people are more dominant in providing answers, while others may stay more silent. Hence, it was attempted to aim questions to those who had spoken less throughout the interview. Furthermore, group interviews can be a challenge also for the interpreter, as there is more information to translate and people sometimes tend to speak at the same time or complete each other’s sentences.

The stay in Vietnam was from the 15<sup>th</sup> of August to the 29<sup>th</sup> of September in 2019. Most weeks were spent in Ho Chi Minh City, and rural areas were visited over several days with a

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<sup>6</sup> “Governmental bodies” refers to all informants representing public authorities. This includes staff on commune and district level, employees in technical departments and a governmental union named “Women’s Union”.

relatively tight schedule. In Ho Chi Minh City, several weeks were spent in the office of the Norwegian Mission Alliance in Vietnam (NMAV). Through this process, it was made possible to observe and continuously ask questions, contributing to a more comprehensive body of data and clarifications of potential misunderstandings. During the field visits, I was in a continuous dialogue with NGO staff. Hence, informal conversations and observation were used for data collection in addition to the semi-structured interviews. These conversations (referred to as “personal communication” in the thesis) were unstructured but contributed to interesting insights and information of value to the research. Such conversations are nevertheless not included in Table 1. All semi-structured interviews were audio-recorded with approval from the informants, while informal conversations were preserved through written notes. Most interviews were conducted in Vietnamese through English-speaking interpreters – this is further discussed in section 4.2.2.

#### **4.1.3.1. Gatekeepers**

In order to get access to the participants for the research, assistance was needed. This was especially the case with local farmers, as informants from the respective organisations were mostly accessible without assistance. A gatekeeper is someone who smoothens the access to the sample, either by simply introducing the researcher to the group or by granting formal access (O’Reilly, 2009). In this case, NMAV, more specifically the two employees with particular responsibility and knowledge on the respective thematic area, functioned as gatekeepers. They were able to approach others to ensure a formal approval for visiting the field and conducting interviews, while also making the household visits possible. These participants would not have been accessible without the gatekeepers; thus, they were essential for the feasibility of the study.

Due to the position of the NMAV staff, in combination with the presence of a governmental representative, it may be argued that there were uneven power relations present in the interview setting on the household level. This may have affected the answers that were given or pressured the participants to agree to a meeting. However, it was made evident in all of the interviews that participation was voluntary. The participants also seemed confident in stating their opinions. Furthermore, the informants probably had certain associations connected to the ones being present in the interview setting together with me, which then again could have affected the answers. For instance, since the gatekeeper was an NGO that funds development programs among poor people, one could consider whether certain participants were framing their situation as extra challenging to gain some sort of support. This cannot be known for certain but should nevertheless be reflected upon.

#### ***4.1.3.2. Secondary sources***

Although primary data collection through qualitative interviews makes up the basis for analysis in this study, secondary sources also play a role. The majority of secondary sources applied are academic papers and relevant reports. Furthermore, some data are received from local governments through contacts in Vietnam. This data includes statistics on poverty rates, literacy, and school attendance. The thesis is placed within the field of social sciences, but there are nevertheless elements of natural sciences as a part of the discussions. These elements are largely based upon secondary sources. In general, macro-structures in which affects vulnerability is mainly derived from secondary sources, as they are challenging to observe at a local level.

#### ***4.1.3.3. Analysis***

Unlike quantitative data analysis, the sphere of qualitative data analysis does not have a clear set of procedures for analysis. Some writers would even argue that strict rules for analysis would not be desirable anyway (Bryman, 2016). However, after doing all the interviews, where a sizable data set was obtained, some sort of organised structuring became necessary. Primarily, all audio-recorded interviews were transcribed. The length, number of participants, and location of the interviews were noted down, meanwhile, the informants themselves were anonymised. The transcriptions were stored on university servers in accordance with NMBU-guidelines for research data management. While transcribing, responses that were of particular relevance to one or more of the research questions were continuously color-coded. Through this approach, it has been possible to return to the raw material and effectively withdraw relevant data.

However, doing research and analysing data are not part of a linear process. Although research questions and objectives were made early in the process, the data from primary and secondary sources led to several revisions of these questions. While staying in Vietnam, and especially after the first round of interviews, some analysis was conducted. Such analysis provided a foundation for further research, and modifications were made to the interview guides.

## **4.2. Study limitations, challenges and trustworthiness**

In all research certain aspects create limitations and challenge the trustworthiness of the results. As this research is no different, limitations and trustworthiness are discussed below.

In general, qualitative research is sometimes criticised for being subjective, as the results depend on the researcher's unsystematic views on what is important (Bryman, 2016). This paper, as in much qualitative research, started relatively broad and gradually narrowed down the topic and research questions. Thus it may be difficult for the reader to fully understand why the respective topics in the thesis were prioritised, and how I as a researcher arrived at the conclusion. This is arguably a challenge regarding transparency.

### **4.2.1. Political situation**

Understanding the political situation in Vietnam is essential in order to reflect on the study's trustworthiness. As explained in chapter 2, Vietnam is a single-party state, ruled by the Communist Party of Vietnam. Freedom House, a highly acknowledged organisation on the field of freedom and democracy, categorises Vietnam as "not free" (Freedom House, 2019). Freedom of expression, religious freedom, media freedom, and civil society activism are considered to be highly restricted according to Freedom House. The government aims to possess a high level of control at all scales of the political and administrative hierarchy, while furthermore silencing dissenting voices. Corruption is furthermore considered to be widespread (Transparency International, 2020).

Why is this relevant for the data collection? Practically speaking, police permission for conducting fieldwork in both of the respective areas was needed. Furthermore, most household visits were accompanied by a representative from local governments, as they wanted to be in control of what types of research were conducted in the rural areas. Although the government representatives usually did not contribute to the interview setting, their presence may have affected the answers given by the informants. However, the government representatives, in this case, were operating on the "lowest" level, meaning very close to the grassroots in small communities. This meant that the small-scale farmers were familiar with them, and their relationship seemed to feature mutual trust and respect. In a few cases, the representatives from the local authorities expanded on the answers from the farmers or "helped" them answer if they were not sure. In these cases, it had to be clarified to the representative that it was essential to solely hear answers from farmers themselves and that local authorities had the opportunity to state their opinion when they were interviewed. In sum, one should always try to create a safe space for informants when conducting an interview – a space where they feel confident to



express their personal thoughts and experiences. One fear is that the presence of the government representatives was in some cases a limitation to this safe space. However, on a general basis the small-scale farmers appeared willing to state their opinion, even when they were critical towards the local authorities. This did not lead to any reactions from the representatives.

Another potential limitation in the data collection occurred when interviewing local authorities: As explained, the freedom of speech in Vietnam is restricted, and criticism towards the government is often silenced. Furthermore, the country is often portrayed positively by state-owned media. A personal assumption is that this may have had an impact on the answers given by governmental bodies themselves. In governmental interviews, a positive picture was often provided – a picture that was not always corresponding with the view from inhabitants in the same communes and districts. Also, critical questions were sometimes met with oversimplified answers or even denial. Of course, this is not guaranteed to be connected to the socio-political dynamics of the country - other factors may play a role. Nevertheless, it is something that the reader should be aware of.

#### **4.2.2. Language**

In all studies conducting interviews, where the researcher and informant do not speak the same language, communication is an issue. As I do not speak Vietnamese, and most Vietnamese people do not speak English, this research was no exception. To conduct the interviews, two different collaborators acted as interpreters in the Mekong Delta – the same people who were functioning as gatekeepers. Sufficient time was spent together with these interpreters to build good communication. In the Lac Duong district, a third interpreter was contributing for a single day – this was also without any major complications.

Interviewing through an interpreter can be a challenge, as an extra link in communication is added. This means that some information may be changed, tweaked, or even lost on its travel through the interpreter in both directions, between the one asking questions and the interviewee (Bryman, 2016). In some cases, the interpreter misunderstood the question, and something else was answered. In other cases, the interviewee talked for a relatively long time before the interpreter had the opportunity to translate, increasing the difficulty in remembering all the information and provide direct quotes. This was a challenge in data collection, and was something that needed good collaboration. Luckily, the interpreters have been accessible throughout the process of analysis and writing, making it possible to ask for clarifications. This has lowered the chance of misunderstandings and is a strength in both the data collection and analysis. Furthermore, it should be mentioned that since Vietnamese was

usually spoken in the interviews, most quotes in the thesis have been translated. Thus, they are not completely directly quoted.

### **4.2.3. Trustworthiness**

In qualitative research, a common understanding is that trustworthiness consists of four different factors: *credibility*, *transferability*, *dependability*, and *confirmability* (Bryman, 2016). Credibility is arguably the most important factor in ensuring trustworthiness in research. Simply explained one could say that the goal is to link study findings with reality. *Triangulation* is a way of using different methods and/or data sources, and thereby provide credibility (Bryman, 2016). This particular research includes a varied spectre of respondents, a broad selection of literature, statistics, and form of interviews. Hence, I argue that credibility is strengthened through triangulation.

Transferability can be understood as the degree to which data can be generalised. But as Lincoln and Guba (1985, p. 316) stated, it is not the researcher's "task to provide an index of transferability, it is his or her responsibility to provide the database that makes transferability judgments possible on the part of potential appliers". As explained, this research is preoccupied with depth rather than breadth: *Thick description* is explained, in a simplified sense, as providing detailed descriptions of a context, culture, or social setting (Geertz, 1973). It is used in this thesis with the goal to allow outside readers to make transferability judgments themselves. However, a weakness in the research is the timeframe of the fieldwork and arguably also the lack of participant observation. If more time had been spent in the field together with key actors, an increasingly deeper understanding could have been obtained and a thicker description would have been provided.

Dependability is to what extent the findings would be similar if the study were repeated by other researchers (Bryman, 2016). Most likely, the information gathered would not be identical because there are several factors which impact the findings, not just the interview guides or the specific informant. For instance, all of the interviews conducted had their differences, because a key feature in semi-structured interviews is allowing the interviewee to elaborate. Although the fieldwork was conducted in the fall of 2019 and the writing process was more or less concentrated to the first five months of 2020, the process as a whole started already in the fall of 2018: I have continuously written down ideas and notes, and sources have been gathered through the whole process. Hypothetically speaking, if another researcher were to conduct the same research on a later stage, one could have utilised these notes: Access to

them, as well as interview guides, would increase the odds of similar findings, strengthening the dependability.

Complete objectivity is impossible to achieve in qualitative research, but confirmability emphasises that the researcher at least should aim to disallow personal values to intrude the research to a high degree (Bryman, 2016). As human beings, we all carry our own experiences, perceptions, and values, but a researcher's goal should be to act open-minded in meeting with other social phenomena, cultures, people, etc. Personal subjectivity has potentially affected the findings, or at least how they are presented. On the one hand, although personal presumptions were tried to be set aside, the dynamics in the Mekong Delta are nonetheless seen and presented through the lens of a foreigner. On the other hand, being aware of this subjectivity is arguably a methodological strength regarding trustworthiness in itself. In some cases, personal presumptions turned out to be false. In these cases, the thesis is transparent about the surprising findings and aims to discuss why these results are obtained.

### **4.3. Ethical considerations**

Being aware of ethical issues is important when doing research, arguably especially important when involving people. Firstly, prior to the fieldwork, a research proposal was submitted to the Department of International Environment and Development (Noragric) at NMBU. The proposal, which included a discussion of ethics, was approved. Secondly, one of the most salient and universal aspects of research ethics is to steer clear of undue copying (Bryman, 2016). As explained, many sources are applied in this research, and references are provided to avoid such breaches.

Furthermore, there are numerous potential pitfalls regarding research ethics - some important principals are to never harm participants, ensure informed consent, as well as avoiding invasion of privacy and deception (Bryman, 2016). The research was never presented to be something else than what it actually was, and everyone involved was aware of the purpose. Thus, I argue that the aspect of deception can be excluded in this case. Ensuring informed consent means that "prospective research participants should be given as much information as might be needed to make an informed decision about whether or not they wish to participate in a study" (Bryman, 2016, p. 129). Hence, to provide the participants with this opportunity, they were introduced with information on the researcher, the purpose of the interview, what it would be used for, that the researcher acted independently, and the topic of the research. Furthermore, participants were asked if they were comfortable with audio recording – everyone agreed orally

to this. Meanwhile, their anonymity has been ensured both in data storage and in the written thesis.

Coming from the “outside” and meeting people in their own space demand some humbleness, as there is a risk of invading the participant’s privacy. All of the meetings with small-scale farmers took place in their own homes: hospitality was strong no matter the situation they were in. More or less all of these farmers are what one could categorise as “vulnerable” and some of them live below the line of extreme poverty. Therefore, consciousness about what questions which were appropriate to ask and what should rather be avoided, was important. Through cooperation with gatekeepers and interpreters, I argue that this principle was addressed sufficiently, especially in combination with anonymisation. Participants were open and willing to answer questions, and rarely did they appear uncomfortable. Specific information on personal topics such as income and health are only presented in the paper when it is considered to be of high relevance, and when there is no risk of harming the participant.

The general issue of being a foreign researcher in a local community for a limited time should also be emphasised. One goes abroad to get answers and draw some conclusions, and local people are essential to secure these answers. In this case, people spent their valuable time in helping the researcher, and one can, therefore, argue that the research also should be valuable for the ones contributing to it. However, that is often a challenge to achieve. In many cases, researchers get their answers, write their papers (often in a language the informants cannot understand), and get the papers published, while research participants go on with their lives without getting any benefits. This thesis is shared with its English-speaking contributors – I hope that it may contribute with some new perspective and insight on relevant topics so that it can be seen as a resource in the continued work on climate adaptation and development.

Finally, it is arguably a paradox and an ethical challenge that while studying climate change and its consequences, severe personal emissions were made. Air travels had to be made, thus emitting more than 3.2 tons of CO<sub>2</sub>, according to emission-calculators. This roundtrip alone significantly surpassed the annual emissions of an average Vietnamese person (World Bank, 2014). As will be seen, this study argues that in order to reduce vulnerability among small scale farmers in the Mekong Delta, GHGs needs to be reduced dramatically globally. On that basis, it may be found ethically challenging that the process of conducting the research itself contributed with tons of GHGs. A fee for CO<sub>2</sub>-compensation was paid for the emissions connected to international flights, while all domestic travels were conducted by train, bus, and car.

## 5. Multiple drivers of vulnerability

The following two chapters present the core findings from the data collected from the districts of Tieu Can and Tan Phu Dong; as well as discussing these findings in relation to objectives and research questions in this study. A comprehensive vulnerability assessment would be beyond the scope of this study. Instead, this part of the thesis draws on what the informants themselves highlighted as important, in order to assess who is vulnerable and why vulnerability occurs. The main finding is that there is a combination of both societal, economic, and climatic stressors in which generate vulnerability for small-scale farmers in the districts of Tieu Can and Tan Phu Dong. This includes market structures, biophysical changes, policies, power relations, health, ethnic marginalisation, poverty, landlessness, and job access. In short, findings indicate that multidimensional poverty is a deep-rooted driver of vulnerability, while climate change operates as a stressor that pushes people “over the edge” and creates large amounts of uncertainty.

### 5.1. Market structures and access

Any farmer who is not solely producing food for self-subsistence depends on a form of market to profit from the yields. Hence, market access and price may be salient in determining the economic situation of the household. Widespread research has been conducted on how local and global market structures marginalise small producers as the prices of agricultural commodities are often low and volatile. More value is added to the commodity when it is processed (Markelova et al., 2009; Clapp, 2016). Findings reveal that this issue is highly relevant for local small-scale farmers in the two respective districts in the Mekong Delta. Volatile and low prices, inadequate infrastructure and mobility, as well as lack of power in price-negotiations are all challenging contributors to vulnerability. Numerous informants highlighted the problem of the market and how this is an obstacle for a stable and satisfying income. In line with theory, one can say that this is a part of the context where climate change is taking place, causing a hinder for adapting to climate change.

On Tan Phu Dong, an increasing number of farmers are growing lemongrass as their main source of income. Lemongrass can be considered a cash crop, as the product is not used for self-subsistence. Findings nevertheless reveal that smallholders face low and volatile prices. When asked about the stability of their income, one small-scale farmer described: “My income is unstable because it depends on the price of lemongrass” (Interview – Farmer 7, 2019).

In Tieu Can district, although farmers rarely grow lemongrass, the problem is similar for commodities such as rice. Farmer 1, living in Tieu Can, explained that the price of rice is usually around 5000-5200 Vietnamese Dong (VND) per kilo (equating to approximately 0.22 USD). If the price is lower than 5000 VND, they are barely breaking even or facing economic loss. This particular household is harvesting rice three times a year, but the size of the yield varies with the seasons. The following calculations present the profits made from their rice farming during one quarter of the year: The total investment from seeds, fertilisers, labour, etc. equals 1 330 000 VND (57 USD). From their 1000 m<sup>2</sup>-sized land, they harvested 450 kg in the recent season and sold for a market price of 5100 VND per kilo, giving an income of 2 295 000 (99 USD). By considering input-costs, the final profits obtained by the family is 965 000 VND (41.5 USD). This income has to be divided into at least three months and is supposed to support the whole household, counting two adults. It is worth noting that when there is more rain, they can harvest a bigger yield and thereby profit more, but the total income from rice production is nevertheless not sufficient to provide this household with their daily needs (Interview – Farmer 1, 2019). This is only one of the cases: other farmers nevertheless illustrated similar realities. The market is one of the drivers of this, as the price per kilo is only around 0.2-0.25 USD per kilo. But to claim that the market price is the only reason for a low smallholder income, would be a simplification. There are several dynamics in place, such as land distribution, infrastructure, and macro-policy on trade.

According to informants in all categories of the sample, many small-scale farmers have small or non-existing opportunities for negotiating the price that is offered to them. Lack of personal contacts, transport, knowledge, and poor general market access make farmers dependent on buyers who function as middlemen brokers. This is especially the case for products such as lemongrass and rice, because certain other non-exported products may be more natural to sell at local markets. However, in the interaction between farmer and buyer, the farmer often has to simply accept the price that is suggested. This can be due to the fact that there are no other ways of selling their products than through middlemen, it can be because of an inability to store the products until the price is higher (waiting for better prices also involves delayed income, which demands a certain level of financial reserves), due to lack of information, etc. (Interview – Farmer 5, 2019; Interview – Farmer 6, 2019; Interview – Farmer 7, 2019; Interview – DARD Tieu Can, 2019). The fact that brokers put a squeeze on farmers was also confirmed by NGOs:

“The farmers are the vulnerable people. They get less income, lose a lot of money, and don't have good access to the market. Regarding small scale production, a lot of middlemen take advantage of the local farmers” (Interview – Asia Foundation, 2019).

Findings furthermore indicate that due to a lack of information, there can be a challenge for a small-scale farmer in determining what one could expect of payment from a middleman. Several farmers in both of the districts base their deals with the buyer on information from fellow farmers and neighbours. Through dialogue, smallholders share which price they received from the buyer, and then other farmers will apply this as a benchmark (Interview – Farmer 1, 2019; Interview – Farmer 4, 2019). There is either a lack of information or inability to access other markets, which is why the middlemen are providing their services in the first place. Arenas for selling are often far away: sale of goods without intermediaries would demand not only more information about the market, but also proper tools for transportation. Most farmers do not have this opportunity. Farmers in Production group 2 shared information on another issue, affecting smallholders in Tieu Can: Certain buyers come by boat along the river and not by road. When these boats are supposed to travel to local communities, they sometimes have to pass through gates in the river dykes. However, there are times when the gates cannot be opened because it would bring more saline water into the freshwater, which would be destructive for the local communities (dykes and saltwater intrusion will be further discussed). This particular buyer may then only travel to another commune, as they cannot pass through the gate (Interview – Production group 2, 2019). Thus, inadequate infrastructure is causing the link between small-scale farmers and buyers to become even more complicated.

Local authorities in Tan Hung commune, Tieu Can district, pointed out that unjust market dynamics are not only a local issue caused by local dynamics. It is a problem faced among farmers in the whole of Vietnam, caused by larger processes (Interview – Tan Hung commune, 2019). This puts the market issue of small-scale farmers in the districts of Tieu Can and Tan Phu Dong into a greater context: a context where deep-rooted societal dynamics are causing the vulnerability. Leichenko and O'Brien (2008) argue, for instance, based on research from India, how trade liberalisation (which has been the case in Vietnam) has different effects for different people. For some, it is a driver of increased vulnerability due to increased competitiveness. I argue, through a contextual approach to vulnerability, that market liberalisation has unequal benefits for smallholders in Tieu Can and Tan Phu Dong. Those who are producing in a small volume and with limited access to markets may grow even more

vulnerable. When climate change exposure is added to the mix, vulnerability is further increased, and adaptation becomes more farfetched.

In sum, every informant in the data collection stressed market structures and access as focal points among the challenges in which local small-scale farmers are facing in their daily lives. One can argue that it creates climate change vulnerability among farmers because it hampers adaptive capacity. When small-scale farmers are continuously struggling to make sufficient profits from their yields, they are hindered in building up an economic buffer for adaptation to future changes. It is also causing rising inequality, where those who are already poor often struggle the most to handle unsatisfying market dynamics. This relates to the theory of contextual vulnerability.

## **5.2. Non-climatic changes in farming conditions**

Farmers not only depend on markets to sell their products, but they also need favourable natural conditions to grow crops or raise livestock. The Mekong Delta is a highly fertile area, making it one of the most productive places in the world for agriculture and aquaculture. However, findings reveal that there are changes in biophysical conditions which create potential vulnerability for small-scale farming households. These changes affect unequally, and people who are the most disadvantaged are likely to be profoundly impacted.

### **5.2.1. Upstream dams**

As explained in the background section, the construction of upstream dams in the Mekong river is causing severe environmental changes in the delta. Findings from the data collection indicate that upstream dams have a direct effect on the lives of small-scale farmers in Tieu Can and Tan Phu Dong. Informants explained how more saline water harms their crops and access to freshwater has decreased noticeably after the rapid dam-construction started. Furthermore, a continuous provision of sediments is important to avoid erosion: Currently, the decreased flow of sediments downstream is making the river a driver of erosion rather than a provider of deposition of landmass. Hence, the land area is reduced. Informants among governmental bodies, NGOs, and farmers explained how a decreased supply of natural sediments also might decrease soil fertility, which means that nutrients must be replaced if yields are to be maintained. Hence, some farmers invest in more mineral fertiliser, making input costs increase (Interview – DARD Tan Phu Dong, 2019; Interview – Asia Foundation, 2019). Then again, some farmers highlighted the environmental issue of excessive use of fertiliser (as a consequence of less sediments), as it creates runoff into the river systems, forming an



environmental externality of pollution (Interview – Production group 1, 2019; Interview – Production group 2, 2019; Interview – Farmer 5, 2019). One can also say that local waters are extra exposed to pollution when the dykes for preventing saline intrusion are closed, as the water becomes trapped inside the dykes. Hence, vulnerability is created by dams as an external factor but is exacerbated by responses due to increased costs and degradation of water quality essential for agriculture. How responses to stressors may cause further vulnerability are discussed throughout chapter 6.

A particularly interesting aspect of the upstream dams is that such a factor is arguably not covered by the mainstream “exposure-sensitivity-adaptive capacity”-framing of vulnerability, described in the theoretical framework. Dams are constructed due to societal, political, and economic processes. There are ambitions of economic growth on a national and regional level, leading to policies where extremely rapid development of dams is the outcome. Thus, the dams are potentially not the only issue here; policies are as well. It should nevertheless be clarified that most dams are constructed in China and Laos, meaning that Vietnamese authorities do not have a main responsibility for the construction and thus the consequences arising from them. Vietnam has nevertheless invested in some of the developments to gain electricity. By referring to theory, this is an example of how vulnerability and adaptive capacity are bound to scales which affect each other: geopolitical and international processes create specific drivers of vulnerability at household level. Although there are rational and good reasons for building these dams, one cannot ignore the fact that such changes contribute to further vulnerability among disadvantaged households that depend on nature-sensitive activities. In a contextual framing of vulnerability, I argue that in order to reduce vulnerability on local and household level in Tieu Can and Tan Phu Dong, there is a need to address the deeper policies which create the vulnerability.

### **5.2.2. Diseases on crops and livestock**

In addition to issues related to water and sediments, farmers in Tieu Can and Tan Phu Dong have increasingly experienced diseases on their crops and livestock. The “African Swine Fever” is a highly contagious animal disease that is responsible for tremendous loss in profitability and production for farmers globally, and currently, there are no vaccines (OIE, 2018). When data for this study were being collected in the Mekong Delta, the World Organisation for Animal Health (OIE) (2019) reported a total of 8 239 ongoing outbreaks of the disease globally: 6 083 of them were in Vietnam. At the same time, millions of pigs had been culled nationally due to the disease.

For many small-scale farmers, especially in Tieu Can district, pig farming is an important source of income. The numbers presented above, therefore, indicate the severity of such an outbreak. Small-scale farmers shared their worries when meeting with the disease. Commune staff stood by the views of the farmers, explaining how it has a major impact on many households in the area (Interview – Tan Hung commune, 2019). Without any information on how to prevent the disease from spreading and in the absence of a vaccine, smallholders simply had to accept the situation and were burning their dead animals (Interview – Farmer 1, 2019; Interview - Production group 1, 2019). For farmers who base their main source of income in pig raising, such a disease can be devastating. Many small-scale farmers have invested a considerable amount of their capital into pig raising and face losses when they are hit by the disease. Equally, a household that is not raising pigs is, in this case, less contextual vulnerable. The African Swine Fever may have reached its peak in the Mekong Delta in 2019, and one can, therefore, argue that it is not a threat to the long-term reduction of vulnerability and adaptation in the delta. However, this disease is nevertheless just one example of how sudden and unpredictable changes in conditions for farmers represent a severe stressor and may impact their adaptive capacity. While biophysical change due to construction of dams represents a deep-rooted issue, the African Swine Fever is an example of dynamic and sudden stressors.

On Tan Phu Dong, many farmers are growing soursop because it has a better market price than rice and has the potential to be intercropped with lemongrass. However, in recent years pest on soursop has become more widespread and severe. One smallholder explained:

“In the past, when we planted soursop, we had more productivity and were less affected by pests. However, recently when we plant soursop, the yield is smaller, and we cannot see any healthy soursop on the trees. There is more disease now” (Interview – Farmer 10, 2019).

Later, he continued:

“Normally we harvest the soursop all year around. This year we have only harvested 400 kilos, but usually, there are several tonnes” (Interview – Farmer 10, 2019).

When a specific crop is essential for a household’s livelihood and the yield is reduced to a fraction, there is no doubt that it creates a problematic situation for local farmers. Furthermore, due to investment in e.g. pesticides and protective fruit covers to cope with the disease, a farmer

needed a price of approximately 20 000 VND per kilo to make a profit. However, he had only got paid 13 000 VND per kilo, thus getting an economic loss from his production. Once again, this example illustrates the importance of emphasising the context which every household faces in order to understand how the vulnerability is created. Additionally, the linkage between biophysical changes and marginalising market structures is made visible.

This particular crop disease may not be equally serious in a longer timeframe, but potentially there will be other diseases. It is relatively uncertain what kind of biophysical conditions that will affect farming in Tieu Can and

Tan Phu Dong in the future. However, it is an example of how sudden changes in conditions for farmers affect their vulnerability. I argue that such sudden stressors produce vulnerability as they hamper the adaptive capacity that is needed to adapt to climate change. When the goal is to reduce the long-term vulnerability of a household towards climate change, one needs to understand the context in which climate change is taking place. A holistic approach to stressors is fruitful in order to address climate change.



Photo 1. An infected soursop on Tan Phu Dong (Erlend Olafsrud, 2019).

### **5.3. Socioeconomics and household differences**

A core finding from data collection is that socioeconomic conditions play an important role in shaping vulnerability on a household level. Informants in all categories of the sample explained how they perceive that some of the smallholders in the districts live in what one can consider multidimensional poverty, and that this affects their adaptive capacity. In this section it is elaborated on socioeconomic conditions in the respective districts, mainly through specific household examples, in order to both identify vulnerability-producing drivers, as well as highlighting differences.

First of all, Vietnam has, as mentioned, experienced tremendous economic growth, and most people have seen a rise in living standards. Life expectancy at birth, years of schooling, and GDP per capita have all increased over the last 30 years (World Bank, 2019). This development was recognised by several informants, as many stated how their economic

situation has improved since the 90s. However, the rise in living standards is not equally distributed, and millions of people still face widespread challenges regarding socio-economic factors. According to government statistics the poverty rates in both districts are higher than the national average, although they are noticeably lower in Tieu Can than on Tan Phu Dong (at a provincial level the story is different). Furthermore, the illiteracy rate is considerably higher on Tan Phu Dong, school attendance is high in both places, but the educational level among the adult population is lower (Government statistics. Received through personal communication – NMAV Staff 3, 2020).

However, one can discuss the definition of poverty as used by the Vietnamese government: The poverty limit in rural areas is currently set to 700 000 VND (30.25 USD) a month, while near-poverty is considered 1 000 000 VND (43.25 USD) a month (The Socialist Republic of Viet Nam, 2015). This equals approximately 1 and 1.4 USD a day respectively, which is very low. Commune staff in Phu Tan commune illustrated a serious poverty rate: “In this commune, the poverty rate is around 40%. The living conditions are not high, and I think that it is difficult to meet basic needs for many people” (Interview – Phu Tan commune, 2019).

Such information indicates that small-scale farmers in both Tan Phu Dong and Tieu Can face economic challenges; but the issues are generally worse on Tan Phu Dong both in regard to income and literacy. What follow are some specific examples of situations in which socioeconomics are important determinants for vulnerability at household level.

### **5.3.1. Household examples**

A small-scale farmer in Tieu Can explained her situation: She has a small garden for growing vegetables outside of her house, as well as approximately 2000m<sup>2</sup> for rice crops. However, due to her age she is no longer fit for taking care of the rice. Thus, she has left that resource for her oldest daughter to take care of, while she is provided with rice for personal consumption. Through her brother in law she can sell her vegetables at the local market, providing an income of approximately 500-600 000 VND (between 21.5-25.5 USD) a month. Furthermore, she is taking care of her disabled relative. The Ministry of Labour, Invalids, and Social Affairs (MOLISA) provide monthly economic support for this relative, making her total income around 1 100 000 VND (47.5 USD) a month (Interview – Farmer 3, 2019). This is supposed to support both herself and her relative, meaning they live beneath the international poverty line of 1.9 USD per day.

However, the vulnerability cannot be explained through the low income alone. This woman is also a Khmer – considered an ethnic minority in Vietnam. The Khmer population in

Vietnam has historically experienced collectivisation of their land, resettlement, and other societal disadvantages. Currently, they reportedly have more restricted access to rights, higher rates of illiteracy and lower education level, lack of access to land, higher poverty rates, and lower access to credits, among other factors (Tung, 2018; Ministry of Agriculture and Rural Development, 2016; Minority Rights Group, 2018; Human Rights Watch; 2009). This particular woman also has a limited understanding of the Vietnamese language: In a society where most of the communication is in Vietnamese, speaking mainly Khmer arguably involves some restrictions and difficulties. This is the case even when approximately one-third of the population in Tieu Can is Khmer (Personal communication – NMAV Staff 3, 2019). Finally, she emphasised how knowledge is an issue, for instance, because she feels that she does not know how to adapt to changes in the climate (Interview – Farmer 3, 2019). Altogether, small land area, low income, age, ethnicity, language, knowledge, and health are all factors that contribute to the vulnerability of this small-scale farmer. On that basis, I argue that these factors are important to acknowledge if one aims to enhance the capacity of a household to adapt.

Another example is the household of Farmer 4: Their housing is simple, and they do not own any land. Without any crops to sell, they are highly dependent on other farmers who can potentially hire them in the harvest season. If they are lucky, her husband can earn up to 700 000 VND (30 USD) a week of casual employment in certain seasons. However, such an income is very unpredictable. Farmer 4 has become sick; thus she is not able to conduct as much work. Information about access to health services in the two districts was not obtained, but previous research suggests that rural and poor people in the Mekong Delta, in general, have lower access to services (Kotsila, 2012; Shibuya, 2015).

Farmer 4 explained that they do not always have enough money in order to provide themselves with their daily needs. Thus they had taken up a loan of 8 000 000 VND (345 USD) 10 years ago from the “social policy bank”: a loan with low interest in support for poor people. Whenever they have enough money to repay something, they often quickly end up borrowing more money to cover their expenses. Being indebted, their son has been forced to work in a factory in an industrial zone, although they aspired to send him to university. (Interview – Farmer 4, 2019). This way one can argue that the household is “trapped” in a negative spiral with low social mobility, where it is challenging to make transformative changes. Other smallholders confirmed similar stories of being in debt: Farmer 9, for instance, got indebted of 200-300 million VND in 1993. It is a debt he is still profoundly struggling to repay, as the household’s yearly income is around 20 million VND, which is just enough to cover necessary expenses.

Landlessness, as faced by the household of Farmer 4, was seen among several informants in the sample. Many farmers interviewed only possess 1000 m<sup>2</sup> or 2000 m<sup>2</sup> of land. Being landless in an area where most people depend on their crops can be a severe challenge and cause of vulnerability, especially if there is a lack of other income sources. When a new land law was introduced in 1993, land distribution quickly changed. Some farmers were able to collect much land in the Mekong Delta, while others less well-off farmers sold away their land (Ravallion and van de Walle, 2008; Oxfam, 2002). Furthermore, poor households who experience, for instance, sickness or loss in yields may be forced to sell their land to cover expenses or pay debts. This way, people with little land and no financial buffer become increasingly vulnerable. Landlessness is an issue related to both economic and social processes at a structural level, as well as household circumstances (Quang, 2018). It is an underlying cause of social vulnerability among some rural households in both Tieu Can and Tan Phu Dong.

Other household circumstances illustrate different stories: Farmer 5, living in a climate change exposed area on Tan Phu Dong, demonstrated, for instance, impressive knowledge on the topic of climate change, adaptation, and potential future changes. He was among the few farmers on Tan Phu Dong who has organised in a cooperative (further elaborated on in section 6.2.) and is secured a more or less fixed price on lemongrass. Furthermore, his adult children can contribute to the family economy, which has led to the construction of a high-standard house (Interview – Farmer 5, 2019). Another case is one of the farmers in production group 4: she explained that her household has almost 15 000 m<sup>2</sup> of land and water tanks for rainwater-storage. Although 15 000 m<sup>2</sup> is not especially large in an international setting, is it a considerable contrast to other farmers in the area who are landless:

“There are some people in the commune who are landless, and some are so poor that their house easily collapses. So, when there are storms, they have to move to another house to get shelter” (Interview – Production group 4, 2019).

Another farmer in the same district, who had just escaped poverty, assumed:

“For example, if we have ten people living in this area, just three or four of them have enough money to provide their family with their needs. But six or seven people are not earning enough money” (Interview – Farmer 6, 2019).

### **5.3.2. Household vulnerability: created on the household level?**

The examples from Tieu Can and Tan Phu Dong above illustrate the difficulties in generalising levels of vulnerability even within relatively small communities. Some farmers have relatively large land areas; others have nothing. Some have good health, economic security, and good knowledge, while others are victims of societal marginalisation, trapped in debt, or are unable to conduct work. Some farmers do not know the concept of climate change, while others show an impressive ability to access information. The same household examples show how people have fundamentally different baselines for coping and adapting. When this empirical evidence is linked up to theory, it becomes evident that vulnerability varies from household to household, even though the exposure to external stressors may be fairly similar. Vietnam has, as shown, been gradually decreasing poverty while some groups seemingly are falling behind. Hence, I argue for the importance of emphasising household conditions to be able to map out the most vulnerable groups. Such analysis provides a greater local insight in which quantified models with an end-point approach to vulnerability may struggle to do. The context in which local small-scale farmers are operating is fundamentally important when the goal is to reduce their vulnerability.

Nonetheless, all these differences are not necessarily created at household level or in the local community. When household situations are exemplified, the goal is not to indicate that these households should be the only architect of their own future. Instead, it is to illustrate how these differences can both be due to household circumstances, but also due to socio-political processes. Ethnic marginalisation, access to health care, land distribution, and market structures are examples of key dimensions regarding contextual vulnerability. “At a deeper level, the underlying causes of vulnerability must be tackled if we are to develop a sustainable response to extreme events and climate change. It will be necessary, for example, to address directly the maldistribution of resources” (Kelly and Adger, 2000, p. 347). Furthermore, if adaptation is only supposed to take place on a local level while development as usual is maintained on a structural level, disproportionate responsibility is arguably placed among those who are already the most vulnerable.

## **5.4. Perceptions of climate change**

Until now, it has been argued and exemplified how “non-climatic” factors are important to consider when characterising vulnerability locally, thus answering research question 2. Research question 1 asks to what extent climate change contributes to increased vulnerability among farmers in the two districts. In the background section, exposure to climate change in

the Mekong Delta was explained through scientific measurements and models of future predictions. However, climate change does not only belong in scientific discussions where it is made visible through quantifications and computer-generated models. Through interviews among actors in the local communities of Tieu Can and Tan Phu Dong, exposure to climate change was often highlighted as a salient threat for the maintenance of livelihoods and a key concern for vulnerability. It is an ongoing phenomenon where small-scale farmers can observe changes and their livelihoods are currently affected. Here, the exposure of previous and current relevant climatic factors is described and discussed based on local observation and perceptions. In section 5.4.2. the linkage between climate and society will be further discussed.

Findings reveal that saltwater intrusion is currently perceived as a severe threat for most farming households on Tan Phu Dong, while also being highly relevant in Tieu Can. As already explained, upstream dams and groundwater extraction are causing land subsidence and decreased presence of freshwater, hence replacement by seawater (Interview – Asia Foundation, 2019; Personal communication – NMAV Staff 1, 2019; Personal communication – NMAV Staff 2, 2019; Interview – DARD Tan Phu Dong, 2019). However, climate change adds up to this intrusion through SLR and drought. The fact that most crops, including rice, is sensitive towards saltwater, causes the agricultural productivity to decrease. This particular issue was highlighted by informants in all of the interviews conducted. It is also a threat to human health, as people need freshwater for daily consumption. When asked about how life has changed from when he was younger, Farmer 5, living on Tan Phu Dong, explained that one of the most significant changes for him personally over the years had been the climate. It is unstable, and the period of saltwater intrusion is getting longer. Since the Mekong Delta has one dry season and one rainy season, a prolonged dry season means a more extended period of salty soils. According to him, saltwater intrusion is the single most critical threat to the farmers on Tan Phu Dong (Interview – Farmer 5, 2019).

Informants from governmental bodies confirmed the farmer's viewpoints, saying that it is the main challenge because it is so deep into the soil and is killing crops in vast quantities (Interview – DARD Tan Phu Dong, 2019). An employee in Phu Tan commune explained how he, over the five years he had been living there, had seen how erosion is removing landmass, and the sea is gradually intruding more of their freshwater, making it hard to maintain agricultural output. Furthermore, “the yields are always lower here than in other areas”, he said (Interview – Phu Tan commune, 2019). A small-scale farmer in the same district explained:

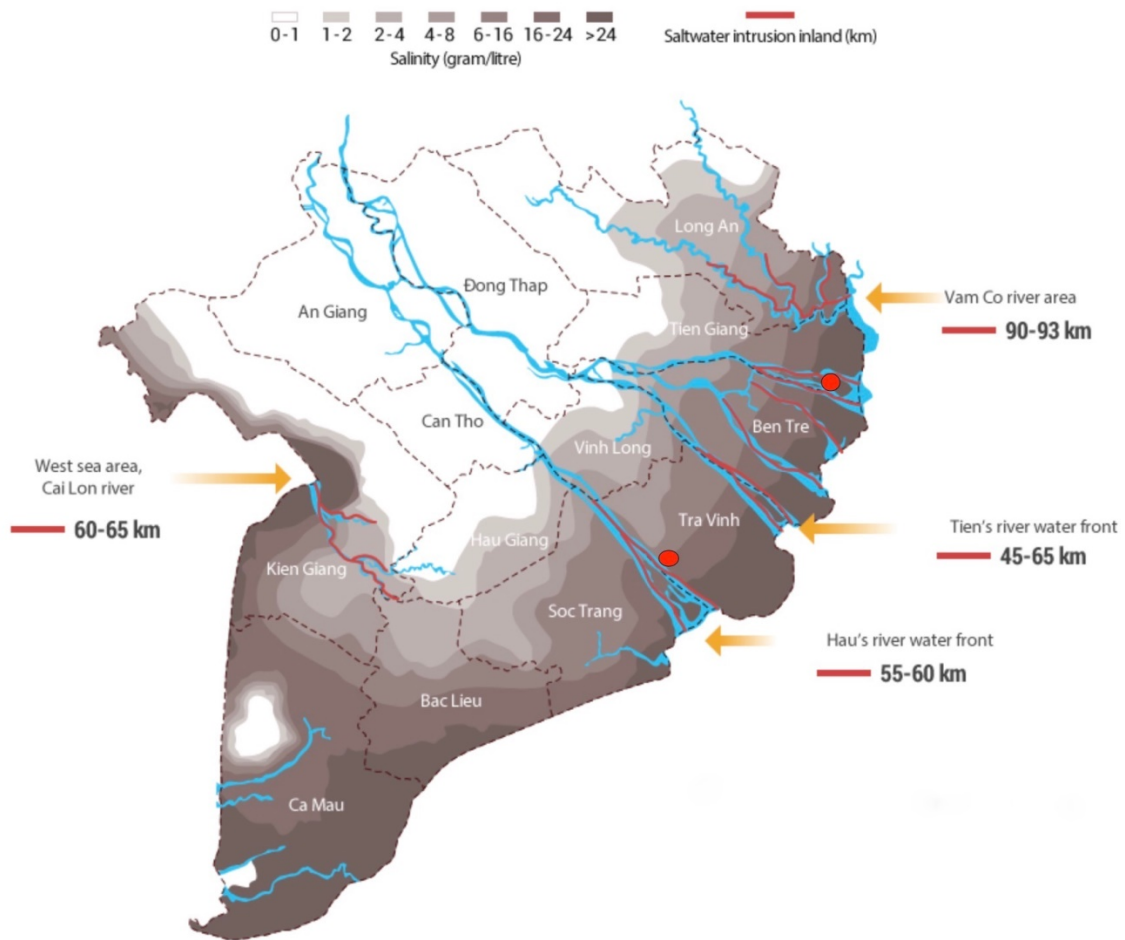


“The climate is unstable. Especially this year. For example, in the past we had six months with freshwater and six months with saline water. In June, we usually get freshwater. But this year, the saline water lasted until August, meaning we did not have any freshwater. It has a big effect on the economy of the household” (Interview – Farmer 8, 2019).

In the current season, 50% of their rice crops were dying due to saltwater intrusion. Similar stories were being told by all the farmers on Tan Phu Dong island.

As the district of Tieu Can lies further up the river compared to Tan Phu Dong, saltwater intrusion is not equally severe. However, it is still causing significant challenges for local small-scale farmers. Commune staff in Tan Hoa, a commune that has direct borders to the river, believe that the current harvest of two rice crops a year will be reduced to one rice crop a year within a timeframe of 10 years due to saltwater intrusion. Furthermore, he explained how it already had reduced the area suitable for rice crops by 30% throughout the last ten years. The neighbouring commune of Cau Quan has suffered a similar development (Interview – Tan Hoa commune, 2019).

Unpredictability is here a central concern because saltwater intrusion is highly correlating with the two seasons in the Mekong Delta. Nevertheless, when seasons are changing, the level of salt becomes unpredictable. Such unpredictability is in the nature of vulnerability and adaptation, simply because the environment cannot be completely controlled, and the year-to-year weather is uncertain. Adapting to a specific phenomenon of weather or climate variability one cannot predict is challenging, which argues for the importance of building adaptive capacity.



Map 2. Saltwater intrusion in the Mekong Delta during a drought in 2016. The districts of Tieu Can and Tan Phu Dong are marked with red dots. Modelled by Southern Institute of Water Resources Research. Retrieved from Thanh (2016). Modified by Erlend Olafsrud (2020).

When asking about serious weather events in the past, most farmers highlighted a severe drought that was taking place in 2015-2016. The map above illustrates saltwater intrusion in the delta in late February 2016, under conditions of severe drought. Salt levels as shown in the map has dramatic consequences, and such events are estimated to increase in the future<sup>7</sup>. According to staff in Phu Tan commune on Tan Phu Dong, farmers lost around 70% of their rice yields at that time in that particular area (Interview – Phu Tan commune, 2019). While informants explained how the drought had severe effects on their livelihood, they also nevertheless felt they were in a position where they could not do anything to cope with the

<sup>7</sup> At the time of writing – in the spring of 2020 – the Mekong Delta is once again hit by a severe lack of freshwater as a combined result of several factors. The saltwater intrusion has reportedly never been further into the delta (Osborne, 2020; Beech, 2020).

situation (Interview – Farmer 5, 2019). Farmer 8 stated: “I did not do anything to solve the problem. I had to accept it. The local authorities provided freshwater for our daily living”.

When asking if they would be able to handle a similar drought today, the commune staff in Phu Tan stated:

“I think that if the drought happens again, the people here will still be affected. Because this area borders the sea and we do not have dykes around to prevent salinity. It is very costly to build the dykes, and we do not have the capital to do that”.

He then continued:

“In some other areas people can drill wells to access freshwater, but that is impossible in this area. If we drill wells, we just find saline water. So, if the drought happens again, the local farmers will still be affected” (Interview – Phu Tan commune, 2019).

The respective staff presented here has a highly technical focus and explains that dykes and freshwater wells would solve the problem. The absence of dykes and freshwater wells is an example of lacking adaptive capacity through the lens of an outcome approach to vulnerability. If vulnerability lies in societal processes however, it may not be that “simple”, seen through the lenses of starting-point contextual vulnerability. With the starting-point approach, one can argue that vulnerability was in this case not only caused by exposure to climate variability, but it was inherently present within the community and among households. Climate variability nevertheless brought that vulnerability to light.

Both scientific and local knowledge highlight how the livelihoods of small-scale farmers in the Mekong Delta are threatened by climate change. However, while scientific knowledge to a great extent is emphasising long-term changes, local farmers were more concerned with current threats. A potential determinant of the short-term perspective of the smallholders is the fact that most farmers are highly dependent on their next yield in order to cover their investments and be able to afford their daily expenses without getting indebted. While a lack of knowledge on future projections may be present, the focus on current threats is seemingly explained by priorities. This research finds that when there are both current climate variability and non-climatic factors in which a household is facing, future long-term changes are not a top priority. Furthermore, it should be emphasised that although several informants talked about their experience with a changing climate over a long period, others were mainly referring to changes in which has happened recent years. Short term changes cannot be considered as climate change; instead, it is recognised as climate variability or simply weather. Thus, some of the weather patterns the smallholders are experiencing and describing are not

guaranteed to be linked to climate change, but they nevertheless represent sudden shocks which the farmers need capacity to cope with.

The small-scale farmers that were interviewed tended to see climate-related issues in the presence of other dynamics that are taking place, such as diseases, lack of land, and market access. Drought, storms, saltwater intrusion, changing seasons, abnormal raining, higher temperatures, prolonged heatwaves, and lack of freshwater are nevertheless all factors that are emphasised by both science and local farmers. Hence, one can conclude that climate change and variability are perceived as salient in causing vulnerability among farmers in Tieu Can and Tan Phu Dong. One could also be concerned that with increasing frequency of extreme events, the time to recover becomes limited, which then again may be an obstacle in building adaptive capacity. However, given the uncertainty in predictions and forecasts, it may be unwise to fully aim vulnerability reduction efforts towards specific climate variabilities.

#### **5.4.1. Challenging the narrative of climate change as merely a threat**

Although previous scientific studies, equally to this thesis, considers climate change as a severe threat to the livelihoods of smallholders in the Mekong Delta, this study presents some data in which challenges the perception of climate change as a solely threatening phenomenon.

When asking local actors about their perception of the future in a changing climate and unpredictable weather, the answers had wide diversity. On the one hand, some smallholders were pessimistic: “With the climate change situation like this, the farmers will be in a more and more difficult situation and struggle to reduce poverty” (Interview – Farmer 6, 2019). “I think that in the future if the weather continues like this, more people will migrate to other places. There is no future here if climate change continues like this” (Interview – Farmer 8, 2019). Governmental bodies also stated their worrying about a changing climate:

“I think that in the future, the sea level will be higher and higher. Because I know that in other districts there used to be no saline intrusion. For instance, Cai Be district [further inland] did not use to have saline intrusion, but in recent years that area has got saline intrusion. So, I think that it could be even worse in the future” (Interview – Phu Tan commune, 2019).

Others pointed to the uncertainty in climate variability and weather: “I cannot predict the future of farming. Because last year there was not much saline intrusion, but this year is different. I cannot even predict next year” (Interview – Production group 3, 2019).

On the other hand, certain informants did not see climate change and weather patterns as something negative only: An officer of the Department of Agriculture and Rural Development (DARD) on Tan Phu Dong perceived, for instance, increasing saltwater intrusion as a potential resource. For him, higher salt levels mean an opportunity to switch to producing shrimps and other products instead of rice. This can give increased productivity and higher incomes for local farmers, he argued (Interview – DARD Tan Phu Dong, 2019). A business owner in the same district represented a similar view, as saltwater intrusion has sparked a shift in crops from rice to lemongrass. In his view, this is positive because lemongrass demands less inputs, has higher productivity, and has generated increased income among local farmers and for him as an entrepreneur (Interview - Lemongrass business, 2019). Such adaptation efforts are further elaborated on in section 6.3.

These nuances are important to highlight because they challenge the narrative of framing climate change as solely harmful. The informants who predicted a bright future for farming in Tieu Can and Tan Phu Dong, did so based on a belief that they would be able to adapt to constant changes and transform their practices. In that case, climate change is an incentive to stimulate positive changes. However, this is highly dependent on the contextual conditions for performing necessary adaptations, and the perceptions of the future are thus greatly varying. Actors who stated they could not predict the future or did not see opportunities for sufficient adaptations were more pessimistic. In general, findings indicate that the better-off farmers and non-farming informants have the least negative perception of climate change, while the most vulnerable are more pessimistic. When adaptation to climate change is within reach, other drivers of vulnerability – such as market dynamics – may emerge as more worrying.

As reflected upon in section 4.2.3. there is a challenge in research, especially qualitative research, that the researcher carries personal values, beliefs, and assumptions. Before collecting data, it was presumed that climate change would be considered as a critical threat for the whole communities in Tieu Can and Tan Phu Dong. Thus, these findings occurred as surprising and is challenging the researcher's (and potentially reader's) personal assumptions. Thus, they are essential to emphasise. The point of presenting these varying views on climate change consequences is, in accordance with the theoretical framework, to shed light on how climate change means different things to different people. Hence, generalising becomes difficult, and contextual household circumstances appear as increasingly important. Although climate change poses a threat to millions of livelihoods in the Mekong Delta does not mean that the threat can, or should, be generalised. For farmers who see themselves as in the power of conducting “sufficient” adaptation, other drivers of vulnerability are more important. For smallholders who

feel powerless in the presence of climate variability, climate change is experienced as a severe threat to their livelihood. For some actors, climate-induced environmental change is even seen as a resource. This is highly relating to research question 1.

#### **5.4.2. The intertwined environment-society system**

This chapter has, in line with theory, aimed to assess how a set of different factors is contributing to vulnerability in Tieu Can and Tan Phu Dong *without* discussing adaptation measures that are being implemented. This has been deliberate to frame how vulnerability can exist independently from eventual adaptations, following a starting-point approach. In this study, farmers themselves were given an opportunity to reflect on what creates vulnerability for them. Here, the discussions have been drawn from the most significant factors deduced from interviews. As shown, both upstream dams, diseases, ethnic belonging, market dynamics, knowledge, poor health, land access, and low income are factors determining vulnerability on the household level in the two districts. Climate change is added to this context as an overarching driver of vulnerability. I argue that in the same way non-climatic factors affect how vulnerable one is towards climate change, is climate change affecting the context of how one can respond to both climatic- and non-climatic changes. O'Brien et al. (2007, p. 76) argue well for the importance of climate change in this case: "Climate change is important because it modifies biophysical conditions, which alter the context for responding to other processes of change (e.g. economic liberalisation, political decentralisation, the spread of epidemics). These other processes, in turn, alter the context in which climate change occurs".

Regarding the 1<sup>st</sup> objective in the study, this chapter has shown how multiple stressors must be addressed when assessing vulnerability, and that climate change alone is not the only driver. Sometimes, it may even be perceived as something positive. However, in areas that face multiple stressors, such as Tieu Can and Tan Phu Dong, climate change may act as the last straw that breaks the camel's back.

## 6. Reducing vulnerability and adapting to climate change

As different drivers of vulnerability have been identified; the next task is to present findings of measures that are implemented in order to reduce vulnerability, build adaptive capacity, and adapt to climate change. It is relating to the second objective in the study, including research questions 3 and 4. As explained in the theoretical framework, studies of outcome vulnerability and contextual vulnerability often end up suggesting different solutions. While seeing vulnerability as an outcome, it is possible to identify sensitivities in which could be reduced through, often technical, adaptations. When vulnerability is seen as contextual, the responses that emerge are often more social rather than technical (Kelly and Adger, 2000). Through both an end-point outcome approach and starting-point contextual approach, this chapter presents findings of technical and social interventions to reduce vulnerability and adapt to climate change in the respective districts.

### 6.1. Power relations

Adaptation is a highly political process (Eriksen et al., 2015). The development and implementation of interventions, including priorities that have to be made, are to a great extent a political question. Therefore, national and local power relations will affect the interventions that are implemented, and how this is done. Understanding that power relations affect the dynamics within the sphere of climate change vulnerability is crucial. Therefore, this part of the thesis starts by presenting and discussing findings on local power relations.

A tendency in the interviews was that farmers were described as vulnerable and in lack of knowledge. This was both the case among governmental bodies, organisations, and some of the farmers themselves. For instance, a strategy by Vietnamese authorities to achieve reduced vulnerability is the use of local experts employed by DARD. These employees are, among other things, working with sharing agricultural knowledge with farmer communities. When asking DARD in Tieu Can about the challenges regarding working with climate adaptation, the answer was:

“The big challenge is the educational level of the farmer. That is very important. We want to transfer technology and knowledge, but many of them have low education or low awareness. That has a big effect on the implementation of [climate-smart

agricultural] models. This makes it very difficult when working in remote areas and with poor people” (Interview – DARD Tieu Can, 2019).

Working actively with sharing knowledge about climate change is positive and necessary. However, here the local farmers are framed as incapable and uneducated. In several cases the farmers were perceived as “the problem” and a constraint for adaptation. Hence the natural solution to the problem is teaching farmers how to do better. Some authorities showed frustration regarding “traditional” farmers who were slow, or did not want to apply the techniques as promoted by DARD. A similar view was present on Tan Phu Dong. By promoting such a view, there is a danger that smallholder farmers end up as passive recipients of expert advice.

It should also be mentioned that some farmers framed themselves as passive and in lack of knowledge, meaning these perceptions are not held only among authorities. A farmer in Production group 4 (2019) said that she needed to be provided with more knowledge from others to cope with climate change because now she just has to accept the situation. Other farmers saw themselves as depending on help from the government or NGOs to adapt to changing circumstances. As mentioned, giving good advice and sharing knowledge is not inherently wrong. It is rather necessary. Interviews and observation indicate that technical staff in DARD is important for connecting governmental bodies and farmers. Moreover, many farmers stated how useful it has been with training on the application of new techniques. However, this thesis nonetheless argues that if there is a one-way communication regarding knowledge, values, and interest, and farmers are framed continuously as the problem; unequal power relations are developed, and reproduction of vulnerability is possible. When asking how the farmers were allowed to share their knowledge and ideas, there was rarely any specific examples given. However, a few cases were exemplified in the interviews where farmers themselves are allowed to contribute with their opinions and knowledge. For instance, on Tan Phu Dong the level of salinity is varying between the communes. Therefore, farmers are sitting down together with DARD to discuss the best time for planting rice in each commune. Then, all the farmers choose their own schedule for planting, and DARD is respecting their choice (Interview – DARD Tan Phu Dong, 2019). The debate on cooperation between local and scientific knowledge is concluded in section 6.5.1 when actual adaptation efforts have been presented.



## **6.2. Farmer cooperatives**

Establishing and strengthening local farmer cooperatives is one of the clearest examples of governmental policy on reducing vulnerability among local small-scale farmers. Vietnam is a highly organised society, and the development of farmer cooperatives began even before the well-known war (Cox and Le, 2015). Cooperatives can vary in type and number of members, as well as the level of formalisation. For the purpose of clarity, this thesis is using the word *production group* for cooperatives that are more informally organised. Production groups are under the umbrella of cooperatives and serve somewhat similar purposes, but are less binding and do not enjoy all the same benefits (Personal communication – NMAV Staff 2, 2019).

### **6.2.1. The benefits of cooperatives**

Findings indicate that the cooperatives serve three main purposes: Regarding the market issue, which is causing vulnerability for farmers, the cooperatives are meant to enhance the farmer's ability to negotiate on prices and make larger-volume agreements with buyers. When small-scale farmers are selling individually, it is easier for middlemen brokers to push down prices. Also, when selling in larger volumes, one can increase efficiency and reduce labour costs (Interview – Cooperative 1, 2019; Interview – Tan Hung commune, 2019). Hence, the first core purpose of the cooperatives is increasing and stabilising incomes through better handling of market dynamics (Interview – Farmer 5, 2019).

A second purpose is to share knowledge, experience, and information. The cooperative is an arena where farmers can share common issues and discuss how to solve them. Whether it is regarding the weather, diseases, or market access – it is a way of reducing risk (Interview – Production group 2, 2019; Interview – Cooperative 1, 2019). Also, it makes it easier for governmental bodies to connect with local small-scale farmers. For instance, when staff from DARD is in the field to give advice and provide information, they do not need to travel to every single household, as all of the households in the cooperative are growing similar crops

The third purpose is the coordination of actual agricultural activities: Farmers in Cooperative 1 explained that before establishing the cooperative, they were operating with different schedules for planting. This meant that they needed different input at different times, especially freshwater for irrigation. Through the cooperative they can coordinate planting and harvest. Thus, flooding is controlled to fit everyone's schedule. This makes farming more cost-effective, as well as giving the products higher quality, according to them (Interview – Cooperative 1, 2019).

As mentioned, establishing these cooperatives is a key strategy for local authorities. Therefore, cooperatives often receive different kinds of benefits in addition to the advantages outlined above. Benefits can include tax relief, subsidised seeds, and an office the members can use freely for meetings (Interview – Cooperative 1, 2019). Furthermore, Cooperative 1 explained that the government is providing them with a minimum price. This means that if the price of their product falls below the market average, the government will cover the price gap. The sum of all these advantages indicates that cooperatives are potentially a useful way for small-scale farmers to reduce their vulnerability regarding multiple stressors and build adaptive capacity. All informants interviewed stated their enthusiasm towards the establishment of cooperatives and production groups. Cooperatives address several of the drivers of vulnerability that is identified in chapter 5, such as market access, socioeconomics, knowledge, and communication between authorities and farmers. They also contribute directly to climate change adaptation, as smallholders are given a fruitful platform for exchanging knowledge on how to adapt to changes. On that basis one can argue that cooperatives reduce vulnerability both in a starting-point and an end-point approach to vulnerability.

### **6.2.2. Challenges in establishing and managing cooperatives**

There are also some difficulties concerning cooperatives that should be addressed and discussed. An early step for many smallholders is first to create a production group. There they can share information and knowledge, but do not enjoy the same benefits as in cooperatives. NGOs, such as NMAV, also often cooperate with production groups, giving the poor and nearly poor households a channel of taking part in development projects. However, smallholder-informants wanted to establish a cooperative to obtain better market deals and receive subsidies from the government (Interview – Production group 1, 2019; Interview – Production group 3, 2019). This had not yet been achievable, because establishing or joining a cooperative demand certain resources, and there are criteria that need to be met.

When asking non-organised farmers why they had not organised in a cooperative, they pointed to different reasons: One reason is that they live in the “wrong” geographical place. Organising in a cooperative is often easier if all members live closely and grow the same crops. Another reason is that establishing and joining a cooperative demand both time, human resources, and capital. Although the government may subsidise the certification process, farmers still need to buy a share, as well as meeting certain criteria relating to e.g. land size (Interview – Production group 3, 2019). Also, farmers pointed to another reason: local authorities in the two districts are aiming their cooperative efforts towards certain crops. This

means that crops which are produced in larger quantities and sold to a bigger market are prioritised. In Tieu Can, most cooperatives are therefore rice cooperatives, meanwhile, people who are raising livestock do not have the same opportunities (Interview – Production group 2, 2019; Interview – Production group 1, 2019; Interview – Tan Hoa commune, 2019).

When asking local authorities why they had not established more cooperatives, the answers were somewhat different from the farmer's answers: For instance, staff in Tan Hung commune stated that they were trying to mobilise more farmers, but smallholders needed more time to understand the functions of cooperatives. What was called “traditional” farmers did, according to him, conduct farming and economic steering in a less efficient way. He said that the future depends on the willingness of the farmers to organise in cooperatives (Interview – Tan Hung commune, 2019). Again, this frames the small-scale farmers as slow in transitioning and as an obstacle for positive change. Meanwhile, farmers themselves in the same commune appeared more than willing to establish a cooperative but did not feel like the government supported them enough in order to do just that. “The reason why some farmers do not belong to a cooperative is not because they don't want to” (Interview – Production group 1, 2019). This points back to the issue of power relations in reducing vulnerability and adapting to climate change. Continuously framing the smallholders as the problem and a restraint for positive change are inherently matters of inequity.

Findings reveal that another potential challenge, not relating to the actual establishment, is the steering of the cooperatives. Some farmers pointed out the importance of the skills and competence of the leader: Several cooperatives are, according to informants, not functioning well because the leaders lack skills to manage the cooperative and negotiate with buyers. This can lead to internal frustration and disappointment, which then again may produce unfruitful dynamics within the cooperative (Interview – Production group 2, 2019). It seems as the leaders have a lot of the responsibility for the success of the cooperative. As explained in the theoretical framework, research often sees managerial abilities as a factor when measuring adaptive capacity. On that basis, training in management, coordination, and negotiations grow increasingly important to avoid the creation of further vulnerability among the cooperative members.

### **6.2.3. The matter of accessibility and equitability**

The findings above foster an important discussion: When functioning well cooperatives are arguably a good way to address vulnerability on a local level, but they are not accessible to everyone. To establish or join a cooperative, one needs both economic resources and human

resources, as well as living in the right place and grow crops that are prioritised by the government. Hence, the farmers who are the most vulnerable are arguably not able to access the benefits of being in a cooperative. Thus, the government is possibly not able to reach the most vulnerable with one of their main strategies. None of the poorest and most vulnerable farmers interviewed were members of an official cooperative, and some were not part of a production group either. Meanwhile, those who were members often had larger land areas, higher income and did not live in some of the more remote areas.

When governmental informants were asked if they could say for certain that the farmers in cooperative groups earn more than those who are not in a cooperative group, the answers were always confirmative. According to informants, the income of the farmers in the cooperatives are much more than the income for non-organised farmers. This may have different explanations: One natural conclusion to make is that the cooperative is improving the income of the farmers. However, another potential reason is that it is simply those farmers who are already better off who are able to establish cooperatives, meanwhile the most disadvantaged are not organised at all. Findings in the data collection indicate that both hypotheses might have some reason to them. For instance, in the district of Tan Phu Dong, there are very few formal cooperatives. “It is not easy to establish a cooperative here. Until now, there are just one or two cooperatives in this district” (Interview – Production group 3, 2019). The only cooperative-organised farmers interviewed on Tan Phu Dong were those who enjoyed the highest standards of living. Meanwhile other smallholders were not able to meet the criteria. However, those farmers who are organised explained how their income and the general living standard have improved and stabilised as a direct consequence of the cooperative’s functions. In sum, these findings indicate that cooperatives do enhance the adaptive capacity of the members, but the most disadvantaged farmers are in danger of not being included. Hence the level of adaptive capacity is enhanced differently.

A final point of discussion: If one is establishing cooperatives so farmers can better handle unjust market structures, without actually addressing these market structures that create vulnerability, one could argue for lack of equitability. I argue that the issue of inequity is important to bear in mind, as building adaptive capacity should not take place isolated from efforts to change structural processes. If smallholder farmers in Tieu Can and Tan Phu Dong are given the responsibility to reduce vulnerability through the establishment of cooperatives, while business as usual is maintained in market structures, there is a risk of continued reproduction of vulnerability and inequality. However, these market structures are nevertheless to a large extent rooted in global dynamics, meaning that local governments are not necessarily

in power to change such structures. This sheds some light on the limitations of local actors in the reduction of vulnerability when they are operating in a globalised society.

In sum, findings in this research reveal that the establishment of cooperatives serve positive functions both regarding the reduction of vulnerability, building adaptive capacity and adaptation to climate change. At least this is the case for those who are able to establish or join such cooperatives. Findings furthermore reveal that those who are already the most disadvantaged, are not enjoying the benefits from cooperatives as much as those who are, to a greater extent, able to mobilise resources. Hence this thesis argues that if the cooperatives are to reduce vulnerability and contribute to adaptation in an equal way, they need to be accessible to those who are the most vulnerable. But understandably the establishment of cooperatives must rely on certain criteria. It is the nature of the model to contribute to the group and build mutual responsibility. If the majority of the households in the respective districts were to be organised in the future, this is likely to contribute to positive changes for these households. But the most disadvantaged farmers would be more likely to be among the remaining, and vulnerable smallholders would probably be left behind. However, production groups that are reportedly also reducing vulnerability, build adaptive capacity and contribute to adaptation, is more accessible to the most disadvantaged smallholders. Both forms of organising furthermore empower small-scale farmers due to the opportunity to share their knowledge and experience.

### **6.3. Changing agricultural practices**

In section 5.2. and 5.4. it was illustrated how environmental changes are causing severe difficulties for smallholders in Tieu Can and Tan Phu Dong. To adapt to these changes (that are both climatic and non-climatic) farming practices must be modified. These adaptations take place on different scales and through different approaches. Here findings of agricultural adaptations are presented and discussed.

#### **6.3.1. Dykes**

Due to the threat of saltwater intrusion the government of Vietnam has actively been building sea dykes. Construction of dykes is arguably among the clearest examples of governmental policy on adaptation to climate change. The country relies heavily on technical high-cost engineering when battling environmental change. These dykes are essential for the maintenance of agriculture in the delta, as they are used for irrigation purposes, flood control, prevention of saltwater intrusion in dry seasons, and hinder complete inundation. When controlling flooding with dykes, farmers in several provinces of the Mekong Delta can harvest

three rice crops a year. Thus, findings indicate through the lens of outcome vulnerability, that dykes are an adaptation effort that reduces vulnerability towards climate change (Interview – DARD Tieu Can, 2019; Interview – Cooperative 1, 2019, Interview - Production group 4, 2019).



Photo 2. A gate preventing seawater to intrude the district of Tieu Can in dry seasons. Many people live outside the high-dyke (Erlend Olafsrud, 2019).

However, although dykes are built to protect people and enhance production, they may not be advantageous for everyone because ecosystems are altered. First of all, when flooding is decreased with the purpose of harvesting more frequently, the supply of nutrients from sediments is reduced. Thus soil fertility is reduced and farmers need to apply more artificial fertilisers (Interview – Tan Hoa commune, 2019). This is not only creating environmental externalities: for those who are poor, increased production costs can be a challenge. Dykes are also causing further negative externalities: saltwater intrusion and erosion are intensified outside the dyked areas, because water is pushed off to other areas (Personal communication – NMAV staff 1 and 2, 2019). Thus, dykes as an adaptation effort is driving vulnerability for those who are not recipients of its benefits. If dykes breach (which previously has happened), the flooding that follows may create significant damage and bring tremendous costs to communities. On that basis, in a contextual approach to vulnerability, it becomes clear that the construction of dykes as an adaptation effort may increase vulnerability among some groups. This is questioning the sustainability and equitability regarding dyke-construction. There are

growing differences between those who live behind and in front of the dykes, as well as those who can afford increased production costs versus those who cannot. I argue that on the one hand there are positive adaptive outcomes from such a technical fix, while on the other hand there are several negative outcomes pointing in the direction of maladaptation. In sum, dykes as an adaptation effort is a clear example of how different approaches to vulnerability lead to different conclusions regarding the outcomes of interventions.

### **6.3.2. Adapted farming**

Nature is constantly changing, and farmers have at all times needed to be able to adapt to these changes to maintain their yields. No one has more competence and knowledge on how to cope with climate variability in agriculture than those who live with change every day. Findings reveal that smallholder farmers in Tieu Can and Tan Phu Dong are no exception. Their output per square meter is impressive, given the few resources many possess. One of the clearest examples of adaptation interventions on a household level in the two districts is the adaptations that are made in agricultural techniques. This is also deeply rooted in local government policies and strategies from NGOs. NMAV operate for instance with what they call “Climate Smart Livelihood” models, based on four principles: The models should (1) build resilience towards local negative effects of climate change, (2) not contribute to climate change or pollute the local environment, (3) be economically sustainable after external supports stops, and (4) be economically accessible to poor farmers (NMAV, n.d.). My data collection provides information on several strategies for adapting agriculture to a changing climate. Here, findings of a selection of core adaptations are presented.

#### **6.3.2.1. *Integrated rice/shrimp farming***

On Tan Phu Dong, farmers are adapting to saltwater intrusion through mixed crops. The high salt levels in the dry season make it impossible to grow rice. While other areas in the Mekong Delta can achieve several rice yields in a year, the high salt levels in certain communes on Tan Phu Dong limit production to one harvest every year. The income from one crop only is not enough to support a household. Hence, smallholders utilise their land for shrimp production during the first half of the year; then they grow rice in the other half (Interview – Farmer 9, 2019). Such an integrated model has been applied over time in coastal areas in the world that face similar issues as on Tan Phu Dong. It is a product of the flexibility of farmers who are constantly facing changes in circumstances for farming.

Findings reveal several advantages of this particular model: First of all, producing shrimps makes it possible to utilise land areas at a time of the year when rice growing is impossible. For many farmers income from this shrimp harvest is fundamentally important: “My income from shrimps is around 10 million dong per year. Thanks to the shrimp [in addition to rice], my family can survive” (Interview – Farmer 9, 2019). Furthermore, when shrimps are cultivated, there will be organic waste left in the pond before the rice is planted. This waste makes the soil more fertile, and less input is needed. The rice reduces potential toxic substances in the soil as well as adding natural substances (Interview – Farmer 9, 2019). Farmer 9 explained that he does not need to buy feed for his shrimps, as they live off organic matter in the pond. In sum, this efficiency has both environmental and economic advantages. Smallholders need less investment for inputs, making the profits increase; meanwhile, environmental offsets are reduced through the decreased use of artificial fertilisers and pesticides. Findings furthermore reveal that shrimps produced through this model are considered as “clean” and of high quality, due to the low input of fertilisers and pesticides. This provides farmers with better market access and higher prices (Interview – Production group 3, 2019).

I furthermore argue that a strength in integrated rice/shrimp farming is the accessibility for poor farmers. Investments are relatively low and many local farmers are familiar with the technique. This means that NGOs and governmental bodies can arguably more easily reach the most vulnerable farmers (clearly except those who are landless), and many farmers will not be highly dependent on advice from external experts. Additionally, the implementation of the model is to a great extent an initiative from farmers themselves (Interview – Women’s Union Tan Phu Dong, 2019), addressing the issue of power relations and expert opinions. When asking Farmer 9 how he learned about this intercropping technique, he explained that he had learned it by himself (Interview – Farmer 9, 2019). This highlights the value of local knowledge in



Photo 3. Farmer 9 alongside his rice field. A few months later, the same field will be covered with water for shrimp production. (Erlend Olafsrud, 2019).



adaptation to climate change and the importance of considering this knowledge when designing adaptation interventions. In sum, this thesis argues that integrated rice and shrimp farming is reducing vulnerability among smallholders on Tan Phu Dong both through both a contextual and outcome approach to vulnerability.

### **6.3.2.2. *Integrated polyculture***

Findings reveal a second example of an effort to enhance the resilience and resource efficiency of agricultural (and aquacultural in this case) models: the development of integrated polyculture systems. Farmer 2, living in Tieu Can, conducts, for instance, a multi-species system where catfish and ducks are combined. The freshwater pond is a suitable environment for ducks, meanwhile their manure is used as fodder for the fish. This also contributes to reduced pollution as the leftover feed from ducks and their waste is consumed and utilised (Personal communication – NMAV staff 2, 2019; Interview – Farmer 2, 2019). If one also grows crops along the pond, the pond water can be used for irrigation and bottom wastes can be utilised as fertiliser. Vegetation around the pond contributes to increased nutrition.

According to findings in the data collection there are several advantages to this model. In similarity with the rice-shrimp farming on Tan Phu Dong, the integrated use of different species contributes to enhanced resource utilisation and less need for other inputs. This is positive in an environmental sense and also economically. Furthermore is there a limited need for land to practice the model: Farmer 2 only owns a small plot around his house, but with the pond he can earn an income for the family. The income from a pond of this size will nevertheless never be enough to fully support a household. Low investment and low need for land area mean that this model is available for poor and vulnerable farmers, as long as they have access to freshwater. Another advantage is the fact that this polyculture model is not time-consuming. In the case of this particular smallholder, it means that he has extra time to take care of his



Photo 4. Ducks, fish and vegetation as a part of the same polyculture system (Erlend Olafsrud, 2019).

daughters and work as a labourer for other farmers to earn a much-needed extra income (Interview – Farmer 2, 2019). More about that in section 6.4.

### **6.3.2.3. *Livestock and biogas***

A final example of a model exemplified from findings is the combined use of livestock and biogas, which is widely used in the district of Tieu Can. The model functions as follows: Farmers are raising livestock, often pigs or cows, which are sold in local markets. However, while the animals are raised, their waste is used for creating biogas or composted as fertiliser. Animal manure is collected and placed in a covered digester where it is decomposed. Biogas develops and is used for cooking or electricity. The whole process takes place at household level and is something the smallholder farmers manage themselves (Interview – Production group 1, 2019; Interview – Farmer 1, 2019; Interview – Farmer 4, 2019).

Findings reveal that there are several advantages with this model: Livestock is less sensitive than crops when it comes to climate change exposure, as the weather may not particularly influence animals. Neither does raising animals demand much land, meaning that farmers who have small land areas or are practically landless have the opportunity to conduct the model. As explained, landless farmers are a vulnerable group, implying that such a model has the potential to reach disadvantaged people. In the district of Tieu Can, the market access for livestock is also good, meaning that farmers quickly can sell their products. When it comes to the production of biogas through animal manure, there are further advantages: When animal waste is utilised for other household needs, resource efficiency is increased and money is saved. Farmers who apply this model do not need to buy gas for their cooking. The decomposed manure is also utilised as fertiliser for those who have crops. Environmentally speaking, such waste treatment is additionally reducing emissions of GHGs, thus contributing to local climate change mitigation (Personal communication –



Photo 5. Biogas from pigs is brought to an indoor stove through the pipe on the wall (Erlend Olafsrud, 2019).

NMAV staff 2, 2019; Interview – Production group 1, 2019).

However, findings also point to some challenges: Although animals are more climate-resilient, may not mean that they are not threatened by biophysical factors. As explained in section 5.2.2., farmers in Tieu Can, for instance, are hit hard by the African Swine Fever. Furthermore, investing in animals, especially cows, can be expensive for those who are the most disadvantaged. This economic challenge is enhanced by the fact that it takes time to profit from the investment. And although the market access for meat is good, are the prices relatively low and unpredictable. A high supply of pig meat often pushes down the prices. Additionally, the equipment needed for producing biogas is expensive for poor farmers: When asking Farmer 7 if he was using this particular model, he answered that it is inaccessible to him because he cannot afford to build the biogas system. The investment is nevertheless a lump sum and can be covered through external support. In Tieu Can district the government, together with NGOs, is working actively with supporting farmers with finances for buying livestock and installing biogas systems.

One can argue that the livestock-biogas model is not necessarily an intervention for climate change adaptation. However, this model is a way of reducing starting point vulnerability through enhancement of adaptive capacity. Combining livestock production with the production of biogas improves socioeconomic conditions at household level. Poverty is, as already argued, a deep-rooted cause of vulnerability, and in Tieu Can this model is linked to a project particularly aimed towards the disadvantaged households. For instance, Farmer 4 – one of the poorest informants – was able to invest in the model through combined support between local governments, NMAV, and a national poverty reduction program (Interview – Farmer 4, 2019).

Here I argue that the livestock-biogas model is successful in the sense that it does not require much skills, land or labour, and local farmers in Tieu Can are highly familiar with raising livestock. It has also previously been pointed out that aiming adaptation interventions towards highly specific climate variables may be unwise, as predictions are uncertain. The livestock-biogas model arguably avoids that issue, as the main goal is to increase socioeconomic conditions and resource efficiency. However, when farmers are facing animal diseases as they currently do with pigs, a key income source is under severe threat. Another weakness is the demand for a relatively high level of capital for investment, to which the poorest farmer does not have access. Farmer 6 – a (lemongrass and livestock-) smallholder who has been able to escape poverty – explained that he had improved his socioeconomic conditions

through NGO's microfinancing and support for livestock. When asking if he would have been able to make the same changes to his farming without the support from NGOs, he answered:

“It depends. Some households are very poor - too poor to be able to invest. If they receive some capital from a project, they can buy livestock, and gradually they will earn money. It depends on the economy of the household” (Interview – Farmer 6, 2019).

Hence, the ability of local governments and NGOs to seek out and reach the poorest smallholders is essential for the equity of the intervention. It should nevertheless be emphasised that other farmers interviewed who have received similar support as Farmer 6, have not been able to make transformative changes to their household conditions. This indicates that there are other over-individual processes that contribute to the (re)production of vulnerability.

### **6.3.3. Shift in crops and adding value**

Similar to the models described and discussed above, is changing of crops a way of adapting to climate change. When biophysical conditions are changing some crops are struggling; meanwhile other crops emerge as more appropriate. Findings reveal that local governments in Tieu Can and especially Tan Phu Dong are encouraging local farmers to change their crops, meaning that authorities see this is an important strategy in adapting to climate change. One example is the introduction of improved rice varieties, which are more salt-tolerant than conventional varieties. Another significant shift in crops is from rice to lemongrass on Tan Phu Dong: Lemongrass is more resilient towards saline conditions; thus it is substituted for rice as saltwater intrusion gradually has become more severe (Interview – Women's Union Tan Phu Dong, 2019; Interview – DARD Tan Phu Dong, 2019). According to an informant, the land used for lemongrass has been multiplied by 20 on Tan Phu Dong since he started working there in 2008 (Interview – Lemongrass business, 2019). Both Farmer 5, 6, and 7 used to be growing rice, but due to increased saltwater intrusion they switched to lemongrass. According to all of them, yields are now better, production costs are lower, and their economic situation is generally improved.

“In this area, we have six months of freshwater and six months of saline water. Therefore, I was only planting one crop of rice and could not earn much money. It was not enough money to cover the costs of my family. Life at that time was very hard” (Interview – Farmer 6, 2019).

A further advantage is the fact that the production of lemongrass often stimulates job opportunities for poor farmers: When harvesting, increased labour is needed and other farmers in the local community are often recruited as labourers. This is further discussed in section 6.4.

Parallely with the increased production of lemongrass on Tan Phu Dong a new intervention for reduced vulnerability has emerged: A local business is cooperating with small-scale farmers to produce lemongrass oil and straw mushrooms. Pure lemongrass oil is considered a high-quality product and is greatly sought after in large parts of the world. Poor smallholder farmers on Tan Phu Dong are providing the company with raw lemongrass, from which oil is then extracted. In return, smallholders obtain a more predictable and direct market link which pays significantly better than standard middlemen. This is directly addressing the lack of market access as a key driver of vulnerability.



Photo 6. Residues from lemongrass production are utilised for growing straw mushrooms. (Erlend Olafsrud, 2019).

Another advantage, in addition to the higher price per kilo, is the utilisation of resources: After lemongrass is harvested, the residues – which many previously disposed of – can be used for growing straw mushroom or as fertiliser. Straw mushroom production can either be done on the household level by the farmers themselves or by the company after the oil is extracted. Findings indicate that this is a positive way of taking advantage of a useful resource, and that straw mushroom production provides farmers with a valuable addition to their income (Personal communication – Farmer 11, 2019).

This is a multiparty intervention where governmental bodies, scientists, local smallholders, private sector and civil society are cooperating. All actors interviewed stated their enthusiasm for the efforts. I argue that when participants with many different roles in the society are involved in such interventions, there is reduced risk for maladaptation and increased potential for democratic implementation. For those who have the opportunity to cooperate with the lemongrass company, it is seemingly reducing vulnerability.

#### **6.4. Livelihood diversification**

Data collection from the field reveals that small-scale farmers in Tieu Can and Tan Phu Dong are diversifying their livelihoods to reduce vulnerability or simply survive. The production of lemongrass oil and straw mushrooms, as described above, is one way for farmers to perform this diversification. Here further findings on livelihood diversification are presented in order to discuss how vulnerability is reduced.

The vast majority of farmers interviewed explained how they are doing extra work for other farmers to cover their daily needs. This is the main form of income diversification. Low-intensive agriculture gives smallholders extra time; time in which can be used for other activities. For farmers who have a small land size, the income generated through casual employment is essential for survival (Interview – Farmer 1, 2019; Interview – Farmer 10, 2019; Interview – Farmer 7, 2019).

A challenge is that the most vulnerable farmers may not be able to be employed. Farmer 4 (Tieu Can) and 9 (Tan Phu Dong) – two of the smallholders who are considered as the most vulnerable among those interviewed – are not able to conduct work themselves in harvesting seasons due to their health conditions. However, they still tend to search for alternative income sources. Farmer 4 creates handicrafts that she sells, meanwhile Farmer 9 collects goat waste which is sold by his children. The income from these activities is minimal, but it exemplifies the willingness and abilities of smallholders to cope with their socioeconomic situation within the relatively limited scope of action they possess.

As argued in section 5.4.2. it is important to consider the intertwined relationship between nature and society when assessing vulnerability and adaptation to climate change: On Tan Phu Dong rice is substituted by lemongrass as a climate change adaptation measure. This intervention has generated a further option for reducing vulnerability, namely employment opportunities. Hence, one can argue that this is an example of a positive adaptation measure which has direct consequences for reducing vulnerability. However, drivers at a structural level (in this case referring to global emissions of GHGs and upstream dams) are causing more

frequent droughts and heatwaves, as well as disturbing the flow of water, thus threatening yields. Reduction in yields furthermore reduces job opportunities and thus opportunities for income diversification:

*Researcher:* Is it easy to get job opportunities? Do you get as much as you want?

*Informant:* Currently, in this season, it is not easy. 50% of the rice is dying because of saline water. Last year, for example, someone would maybe hire me to work in this season, but this year they have losses and do not hire me. It is very hard for me to find work in this commune (Interview – Farmer 8, 2019).

These dynamics exemplify how processes in nature and society are interconnected. On that basis I argue that the dynamics between vulnerability and adaptation are not linear. Rather, it is a dynamic process of continuous changes in the environment and society where local farmers are constantly adapting through multiple activities. It is therefore important that adaptation measures do not further increase vulnerability.

This thesis argues that instead of seeing the activity of searching other income sources in addition to farming as a sign of vulnerability, the ability of local farmers to diversify their income should be considered as a tool to reduce starting point vulnerability. In contrast to e.g. the construction of dykes, diversifying livelihoods is a social rather than technical activity. Here it is argued that such measures enhance the capacity to respond to current stressors, which then again have the potential to strengthen capacity to adapt to long term (uncertain) climatic changes. Findings indicate that, due to the nature of uncertainty, coping with climate stressors are often reactive rather than proactive. On that basis, better adaptive capacity becomes salient. Livelihood diversification is also a form of reducing risk, as one avoids putting all eggs in the same basket. If the primary source of income falls due to climate stress, the economic buffer from other activities may emerge as fundamentally important. Hence, the activity of income diversification is arguably something policymakers and development actors should emphasise when implementing climate change interventions in the district of Tieu Can and Tan Phu Dong. While intensifying agriculture may seem like a good idea in order to increase productivity, one should ask if smallholders are interested in such an intervention. If it implies increased consumption of time and resources and less time for other activities, the answer may not be obvious.

### 6.4.1. Migration

Another way of diversifying livelihoods is through seasonal or permanent migration. Migration is a topic which arguably should be emphasised with great caution – this is not possible within the scope of this study. However, a few points are necessary to make regarding migration in relation to livelihood diversification. Findings reveal that a significant number of smallholders in the districts of Tieu Can and Tan Phu Dong choose to migrate as they see a lack of opportunities in their local communities. “Nearly all people move to the city in search of a job, others stay and earn their living by harvesting lemongrass for better-off families. 70–80 per cent of people migrate to cities” (Interview – Farmer 5, 2019). Farmer 8 believed that there are not enough opportunities for young people on Tan Phu Dong. As the industrial sector in Vietnam has been booming in recent decades, there is often a labour demand in industrial zones.

“The local authority has no policy to encourage people to stay here. (...) If they open a factory here, I am ready to work for them. Even if I just make 100 000 dong [4 USD] per day, I am ready” (Interview – Farmer 8, 2019).

This quote underpins the claim that some small-scale farmers see a lack of opportunities in farming, and hypothetically working in a factory for 4 USD a day is considered as a better option.

All smallholder households interviewed either had someone in their household, or knew people in other households, who have moved to industrial zones to work in a factory. For some, permanent migration may be an adaptation effort seen as the last way out when maintaining an agricultural livelihood is no longer possible. For others, there are family members who move away in periods to earn money for the household. This is their way of both building adaptive capacity and coping with stressors. Farmer 2 explained, for instance, that his wife is working at a shoe factory in an industrial zone so that their family can save up money to invest in a cow. Farmer 6 explained that in families in his commune on Tan Phu Dong the mother often stays at home with the children while the father migrates to another province to support the household.

On the one hand this thesis argues, based on data collection, that widespread migration among smallholders in Tieu Can and Tan Phu Dong is a symptom of an agricultural sector under pressure where people have a lack of opportunities. Rural-urban migration is not unique, it is rather a global trend. However, the migration rate from the Mekong Delta is significantly higher than the national and global averages (Kim and Minh, 2016). This implies that there are



certain circumstances in the delta in which force local populations to seek better opportunities elsewhere. Climate change is possibly a vital feature of these circumstances.

On the other hand, migration should arguably not be underestimated as an effort to enhance adaptive capacity and reduce starting-point vulnerability towards climate change. For many smallholders in Tieu Can and Tan Phu Dong, the migration of a family member is essential for survival. Also it is made possible through the relatively low labour demands in many agricultural models – a strength in which is also highlighted above.

## **6.5. Reaching the most vulnerable**

If the global poor are to adapt to global change, it will be critical to focus on poor people, and not on poor countries as does the prevailing North-South dialog. The interests of the poor are not always the same as the interests of poor countries, since in the interest of ‘development’, the poor may grow poorer (Kates, p. 16, 2000).

Research question 4 in this study is: *Are efforts to reduce vulnerability and enhance adaptive capacity in favour of the most disadvantaged smallholders?* As the thesis is approaching an end, it is important to discuss whether the most disadvantaged smallholders actually experience reduced vulnerability, or if efforts are mainly benefitting those who can mobilise resources. Findings from my data collection indicate that local actors, such as governmental bodies and NGOs, have policies on reaching those who are the poorest and most vulnerable. For instance, a representative in the Women’s Union on Tan Phu Dong, listed up some groups in the district that the union considers as vulnerable: poor and nearly poor households, older women, people with disabilities, and children. It is in their policy to work with people in these groups – nearly all of their activities are aimed towards poor women and women with disabilities (Interview – Women’s Union Tan Phu Dong, 2019). Furthermore, staff in Phu Tan commune stated: “The number of poor households in this commune is very large, so we just select the poorest to receive support from the programs” (Interview – Phu Tan commune, 2019). Findings presented throughout the chapters above nevertheless indicate that making transformative changes on the local level can be a challenge. The same commune staff also said:

“It is difficult to help the poor households out of poverty and develop their economy. Because when they earn their money, their only focus is to cover their basic needs”.

Later, he continued:

“The medium-income households often have enough resources to shift to another model, but it seems impossible for the poor households” (Interview – Phu Tan commune, 2019).

His point was that disadvantaged households do not get the opportunity to invest in factors that may reduce their vulnerability. Performing adaptations often include investments which the most disadvantaged cannot afford, and the benefits are potentially only seen several years later. Statements from the smallholders themselves support that claim: “We are trying our best to develop our family economy through the investment in husbandry. However, it is hard to break out of poverty. Currently, I do not know what the best way is to achieve that” (Interview – Farmer 1, 2019).

Although there is local policy to support the poorest households, this may not always be that simple in reality. Positive interventions, such as the establishment of cooperatives, are not accessible to those who are landless, lack capital, live remotely, lack human resources, or grow the “wrong” crop. Thus, some of the most vulnerable farmers mainly receive “simpler” single-time support, such as financial contributions for a cow or housing. Some of the most vulnerable farmers among the sample had not heard about any programs in support of the poorest.

“I do not know if the government or any organisation has any project or program to support local farmers. I do not have any information about that. So, if the local authorities have any project, and they make contact, we will attend” (Interview – Farmer 7, 2019).

This may imply that it is easier for local actors to reach out to those who are able to mobilise resources.

Farmer 4, although receiving support for housing and livestock, as well as loans with low-interest rates targeted to poor people, was still among the most vulnerable informants in this study. The same thing goes for Farmer 9. By referring to contextual vulnerability, this implies that while the vulnerability is addressed through some policy, the rooted contextual causes are not sufficiently addressed in order to create transformative changes. Furthermore, livelihood diversification through casual employment appears as one of the key efforts to reduce risk and build adaptive capacity locally. However, smallholders who are too old, sick, or for some reason are not able to travel to the respective area where labour is demanded, do not have the opportunity to conduct this kind of work. Hence, some vulnerable farmers interviewed are

forced to taking up loans in which they struggle to manage or selling off land. In that way, vulnerability is further increased in the long run.

Other interventions, such as the construction of dykes, further produces vulnerability for those who live outside of these dykes – for some, it is thus arguably a form of maladaptation. Equally is the construction of dams in upstream Mekong-countries an intervention for increased economic growth, but for smallholders in Tieu Can and Tan Phu Dong dams are driving further vulnerability. Additionally, as mentioned in chapter 2, economic growth in Vietnam is supported by the rapid development of coal as an energy source. CO<sub>2</sub> emissions from the energy sector are increasing quickly, and coal is the main contributor (EREA and DEA, 2019). Quickly increasing coal energy in a country where people are already vulnerable to climate change, is arguably problematic and does not support climate-resilient development. The development of coal-fired power plants is a relatively new phenomenon in Vietnam, and the contribution to emissions is naturally low on a global scale. Hence the contribution to the actual rise in global temperatures is minimal. However, the point of mentioning fossil fuel-driven development is to point to the matter of equitability. It shows that climate change is not only a problem *for* development; it is also a problem *of* development. A paradox is that increasingly degrading the environment to pursue economic growth will increase the exposure of climatic and non-climatic biophysical changes. Thus, adaptation interventions are likely to become more expensive. Referring to the quote from Kates (2000) above: these factors contribute to a reality where the poor may grow poorer in the interest of development. Therefore, it is salient that transformative interventions are aimed at those who are the most disadvantaged.

I argue that adaptation efforts in the Mekong Delta should not see adaptation as isolated actions in responding to climate change, being separate from the socio-political processes which create vulnerability. When doing so, one may be in danger of, on the one hand, only addressing climate change symptoms, while on the other hand maintaining development as usual that creates the vulnerability to climate change in the first place. It seems as this issue is a reality in the Mekong Delta: Although there are several adaptation efforts in place aimed at the most vulnerable people, vulnerability at the local and household level seems to be reproduced by overarching development pathways. This argues for lack of coherence in vulnerability-reducing efforts in Vietnamese policy. It furthermore seems as interventions to reduce vulnerability, build adaptive capacity and adapt to climate change are often in favour of farmers who can mobilise resources, and often not including those who are the most vulnerable.

### **6.5.1. The importance of local ownership and participation in decision-making**

The three different models described in section 6.3.2. are arguably successful for local farmers in Tieu Can and Tan Phu Dong, and they are conducted by households on many different socioeconomic levels. It is noteworthy that studies which aim to quantify adaptive capacity often determine adaptive capacity as directly correlating with economic development. In such an understanding, poor smallholders in Tieu Can and Tan Phu Dong are considered having a lack of adaptive capacity. This thesis can, to a certain extent agree on such a conclusion. However, findings of farmers' development of climate-resilient agricultural models challenge that view, as it is exemplified how apparently vulnerable people show a high capacity to adapt to changes, rooted in their experience of living with variability.

A common denominator among the models is the fact that they build on local knowledge in cooperation with experts. It is not necessarily top-down interventions being forced upon smallholders - the models instead stimulate further efforts of what the farmers know and are skilled at. This is positive both regarding power relations and the success of the intervention. These techniques are not necessarily something an external actor told local farmers to do: smallholders have developed advanced models based on long-time practical experience. When the most vulnerable households are supported to cover small investments for better utilising their models, they can arguably implement interventions on their own premises. Referring to the research questions, such adaptation measures have the potential to both reduce vulnerability at household level, as well as being in favour of some of the most disadvantaged smallholders.

Findings furthermore reveal that other projects, which are not necessarily taking local knowledge and circumstances into consideration, may be more likely to fail. Tan Hoa commune staff (Tieu Can district) shared, for instance, his scepticism towards a specific measure implemented by local actors through a project financed by the International Fund for Agricultural Development (IFAD): As a part of a large project named *Adaptation to Climate Change in the Mekong Delta in Ben Tre and Tra Vinh Provinces* (AMD), it has been tried to implement a goat-rising model in Tieu Can. Due to different reasons, it has not been successful. First of all, the polyculture model described in section 6.3.2.2. (which IFAD also supports) is cheaper and more accessible to poor farmers than goats. Income is also obtained more quickly. According to the commune staff, neither are the environmental conditions in Tan Hoa suitable for goats. Finally, and maybe more importantly, local people in Tieu Can district do not have traditions for consuming goat meat, meaning that there is a weak market for such a product (Interview – Tan Hoa commune, 2019). In sum, these factors identify some weaknesses of a macro-planned intervention where local input is not included sufficiently in decision-making.

The lesson from this example is that it is fundamentally important to engage the smallholders themselves when performing interventions for reduced vulnerability. This is not only important regarding power relations and equity, as one actor becomes the expert and the other one the passive recipient – it is also important for the actual outcomes of the interventions. In this research, models in which are designed with a combination of both scientific and local knowledge emerge as significantly more successful interventions than those which are not, and is to a further extent able to reduce vulnerability in an equitable way. Poor planning, failing to anticipate consequences, and failing to engage the local community through decision-making, can in the worst-case result in maladaptation and reproduction of vulnerability. Findings from data collection nevertheless indicate that the most vulnerable farmers were the ones who contribute the least in decision-making, while more resourceful farmers were participating to a further extent. The Vietnamese government nevertheless has a history of top-down approaches through the rule of the communist party. How will the Vietnamese government, and society as a whole, be able to involve all levels in decision-making to achieve sustainable development in the face of a changing climate? This is a question that remains unanswered.

## 7. Conclusions

**The first objective** of doing this research has been to identify factors that generate vulnerability among small-scale farmers in Tieu Can and Tan Phu Dong. This has been framed through research question 1: *To what extent is climate change perceived as a driver of increased vulnerability in the respective districts?* Moreover, research question 2: *What non-climatic factors are generating vulnerability and hampering the capacity to adapt to climate change?* The way vulnerability has been assessed in this research should not be seen as a blueprint of how drivers of vulnerability are identified; rather, it is an example of how it may be done. Based on both a contextual approach and outcome approach, I have presented multiple drivers in which seemingly foster vulnerability, according to the informants in the study. These drivers can be broadly categorised as *market dynamics*, *socioeconomics*, as well as both *climatic* and *non-climatic biophysical changes in conditions for farming*.

Market dynamics is a stressor for small-scale farmers as they are highly dependent on middlemen brokers. The prices offered from the brokers are volatile, but generally at a low level. As prices on commodities are very low, smallholders struggle to make a living or even cover the investments in their production. Thus, they become increasingly vulnerable to sudden shocks, and their adaptive capacity is limited. The socioeconomic situation is varying significantly between households. This includes factors such as income, debt, literacy, health, and land size. While some are in good health, have multiple income sources, and a decent land size; others are struggling with illness, landlessness, and loans in which they are not able to repay. Many smallholders also face diseases on both crops and livestock. Furthermore, upstream dams and climate change are causing external stressors such as saltwater intrusion, lack of freshwater, and reduced sediment supply. Climate change is perceived as a stressor by the informants as they experience increased droughts and heatwaves, sea-level rise, abnormal rain and unpredictable seasons. These are, of course, not the only factors in which shape vulnerability for smallholders in the respective districts, but they are central in the processes I have observed through qualitative data collection on a local level. Findings in this research show that there are quite different levels of vulnerability even within small communities. This argues for the importance of focusing on the household level when assessing vulnerability, but also in order to reach the most disadvantaged farmers when aiming to reduce vulnerability and adapt to climate change.

Another core finding is that vulnerability cannot be fruitfully addressed when using a single-stressor approach. The complex web of processes that shape vulnerability suggests that this study is far from giving a comprehensive understanding of how the vulnerability is constructed. Vulnerability is also in constant change, not only because the climate is changing, but due to societal processes. Regarding research question 1, I conclude that climate change is perceived as a key driver of vulnerability and poses a severe threat to the livelihoods of farmers in Tieu Can and Tan Phu Dong. However, for some actors it may be seen as something that sparks positive change, such as the introduction of lemongrass and shrimps. Furthermore, climate change is taking place in a nature-society system where multiple stressors are present; hence it may act as the last straw that breaks the camel's back. Thus, it becomes clear that adaptation interventions should go further than *solely* focusing on climate-related issues, and instead aim to reduce vulnerability in a broader sense. On that basis, a spectre of both social and technical interventions for adaptation and reduced vulnerability has been identified and discussed.

**The second objective** of the research has been to explore and discuss interventions for reduced vulnerability and adaptation to climate change. Research question 3 sounds: *What specific interventions for reducing vulnerability and adapting to climate change are promoted and implemented?* While research question 4 asks whether *efforts to reduce vulnerability and enhance adaptive capacity are in favour of the most disadvantaged smallholders?* Through my data collection, several efforts were identified. The thesis has limited the scope to primarily discuss the establishment of cooperatives and production groups, changes in agricultural practices (including dykes, adapted farming models, as well as changing crops and value-adding), and livelihood diversification. Thus this means that the interventions are both social and technical: some of them are aimed towards specific climate stressors (such as dykes and introduction of salt-tolerant varieties) while others are primarily aiming to reduce starting-point vulnerability and enhance adaptive capacity (such as establishing cooperatives and seeking multiple income sources). I have been arguing that the degree to which different interventions succeed in reaching the most disadvantaged farmers and equitably reducing vulnerability is varying. One tendency is that better-off farmers are more able to mobilise resources. Thus, they are more likely to take benefits from adaptation efforts. This is the case with, for instance, the establishment of cooperatives, which is arguably an effective response in several ways but is mainly accessible to smallholders with both human and financial resources. Other efforts, such as farming models developed from traditional knowledge, is to a greater extent initiatives by the farmers themselves. These models, such as integrated rice-shrimp farming and polyculture,

are seemingly accessible to many smallholders, while they also illustrate the willingness and ability of smallholders to adapt to changes. Livelihood diversification, while representing an agricultural sector under pressure, it is also an essential measure for reducing vulnerability for smallholders in the respective districts, as it is useful in spreading the risk. All farmers interviewed conduct casual labour whenever there is a demand, primarily in harvesting seasons. For many, livelihood diversification also includes seasonal or permanent migration by one or several household members. Poorer households are depending on a narrower range of income sources and resources; thus, they are more vulnerable and have reduced opportunities to cope with sudden shocks and adapt to long-term changes.

This study finds that adapting to climate change in Tieu Can and Tan Phu Dong is not a luxury; it is a necessity. Smallholders are already feeling the impact in their fields, but climate change adaptation cannot be boiled down to be solely about technical interventions for reducing sensitivity. Fully aiming responses to specific climate hazards only may be unwise, given the nature of uncertainty in climate predictions. I endorse the view of Eriksen and O'Brien (2007, p. 337), stating that "there is a need to address local capacity to adapt, as well as the societal processes generating vulnerability". Contextual processes on local, national, and global level need to be addressed if the underlying causes of vulnerability are to be reduced. Nature is uncertain: One can never say for certain how long the next drought will be, when the next storm will hit, or how high salt levels will be next dry season. What one can say for certain, though, is that if a smallholder is landless, has limited access to freshwater due to upstream dams, is not able to find work, is marginalised due to ethnicity, and/or has weak market access; he/she may never be well equipped to adapt to climatic changes. Thus, the importance of a holistic approach to the interlinked processes of climate change and development becomes evident.

The rise in living standards in the Mekong Delta is positive, as poverty is a deep-rooted driver of vulnerability. However, inequalities are rising, and rural populations are lagging behind. Within the sample, multiple farmers were struggling to cover their basic needs, hampering their adaptive capacity. Interventions should therefore aim to continuously reduce poverty equitably and comprehensively, including multiple socioeconomic factors. It is nevertheless important to highlight that poverty reduction does not necessarily contribute to adaptation, nor does a reduction in vulnerability necessarily render poverty reduction. Furthermore, I suggest that interventions should aim to include both scientific and local knowledge in its planning. In that way there is arguably less risk of maladaptation and the target group is increasingly empowered. Finally, since vulnerability is often rooted in structural dynamics and is connected across scales, adaptation efforts cannot be considered to be a local



activity only. In other words: Vulnerability should be addressed at all scales, with adaptation and mitigation taking place in parallel. However, such structures have not been feasible to address in this thesis, due to the scope of the research. Therefore, it may be in relevance for further scientific research.

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