Women and Livelihood Adaptation to Climate Change

in the Coastal Areas of Thai Thuy District, Vietnam

Do Thi Diep

Consortium of Development Studies in Southeast Asia (CDSSEA)

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The Consortium of Development Studies in Southeast Asia has drawn on primary postgraduate research undertaken for theses from the master's programs of Asian Institute of Technology's Master of Science in Gender and Development Studies (MGDS), Chiang Mai University's Master of Arts in Social Science (Development Studies) (MASS); and the Chulalongkorn University Master of Arts in International Development Studies (MAIDS). Scholarships for the students of CDSSEA has been generously provided by the International Development Research Centre (IDRC) of Canada. With a diversity of academic approaches (gender studies, political science, social sciences), the individual works of this collection have in common a focus on the increasing interconnection and regionalization of the five mainland Southeast Asian countries (Myanmar, Thailand, Laos, Cambodia and Vietnam), and examine these exchanges and encounters within the context of the Greater Mekong Sub-region (GMS).

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Series Foreword

The Regional Center for Social Science and Sustainable Development (RCSD) at Chiang Mai University has extended its publication program to include Master's dissertations from The Consortium of Development Studies in Southeast Asia (CDSSEA). The CDSSEA series covers mainland Southeast Asia: Myanmar, Thailand, Cambodia, Laos and Vietnam, and regionalization, development encounters and exchanges within the Greater Mekong Sub-region (GMS).

The CDSSEA program brings together resources and expertise from three of Thailand's leading institutions offering Master's degrees in development studies: Chiang Mai University's Master of Arts in Social Science (Development Studies) (MASS); Chulalongkorn University's Master of Arts in International Development Studies (MAIDS); and the Asian Institute of Technology's Master of Science in Gender and Development Studies (MGDS). Although the Consortium's program focuses on the relationship between development studies and social sciences, each of the programs has a different emphasis. The Chiang Mai degree focuses on social sciences and anthropological perspectives, with research interests in environmental and resource management, food security and local livelihoods, labour migration and trans-border issues, ethnicity and development, health, tourism, and agrarian transitions. Chulalongkorn's program concentrates on the political dimension of development, including democratization, human rights, conflict resolution, international and civil society development organizations, community development and globalization. The Asian Institute of Technology focuses on the relationships between gender and development—including women's rights, civil society, and gender dimensions of urbanization and industrialization.

The CDSSEA program has a practical dimension, building leadership capacity in mainland Southeast Asia's regional development, bringing together postgraduate students, encouraging debate, and promoting the rethinking of development alternatives in such areas as social equality, justice and participation, environmental and economic sustainability, and community development. In this regard, a major objective is to develop the knowledge and skills of development practitioners and to enhance the quality and effectiveness of policy-making and its implementation in the region.

The publications in this series—selected from the CDSSEA Master's program—are designed to express this diverse range of interests in development studies and regionalization, and to emphasize the relationships between empirical and theoretical research, policy-making and practice.

Victor T. King, Senior Editorial Adviser,
Consortium of Development Studies in Southeast Asia series

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Abbreviations

ADPC	Asian Disaster Preparedness Center
EEPSEA	Economic and Environment Program in South-East Asia
FAO	Food and Agricultural Organization of the United Nations
FGD	Focus Group Discussion
Ha	Hectare
IISD	International Institute for Sustainable Development
IPCC	Intergovernmental Panel On Climate Change
MHH	Men-headed Households
VND	Viet Nam Dong
WB	World Bank

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Chapter 1

Introduction

Background of Study

Climate change has been identified as the global phenomenon which has spread to every region, country, and group of people; male and female, rich and poor, children and elderly people alike. "Climate change represents a serious challenge to sustainable development, social justice, equity and respect for human rights" (UN Vietnam, 2009, cited in Trung, 2013, p.3). Climate change can be seen in an "increase in temperature, changes in rainfall patterns, sea level rise, salt-water intrusion and a higher probability of extreme weather events such as flooding and droughts" (Tran, 2011, p.17). Many studies show that the negative impacts of climate change can be felt more strongly in less developed countries. Since the developing world is densely populated in vulnerable areas, livelihoods are largely based on natural resources, and institutional capacities have limited capacity for effective responses (Adger, 1999 cited in Tran, 2011). Accordingly, climate change is and has been affecting multiple–sectors, such as agriculture, food security, environment, and social welfare, particularly in developing countries.

According to a World Bank (WB) report and McElwee, Vietnam is predicted to become one of the most climate change-affected nations in coming decades, since it has a long coastal line and high resource dependency (2009; 2010). The weather in Vietnam is characterized by a tropical monsoon climate and "is exposed to high winds and storm surges brought by tropical cyclones

because of its low coastal lying" (Asian Disaster Preparedness Center [ADPC], 2003). Furthermore, the whole country faces a high risk of serious flooding by highly intensive and seasonal monsoons. In particular, the coastal areas in the North of Vietnam are likely to be affected by the most severe flash floods and whirlwinds (ADPC, 2003).

From a gender perspective, a variety of studies on gender and climate change illustrate that climate change's impact on women and men is very different depending on the specific context, age, social class, ethnicity, geographic condition, socio-economic and political situation, and gender role differences. Nelson, in his research indicates women and men have different roles, resources, rights, knowledge and time with which to cope with climate change (2008). In addition, women are underrepresented in the public sphere in most-poor societies, and their lives are reliant on livelihoods that are more sensitive to the climate (Food and Agricultural Organization of the United Nations [FAO], 2005).

Recently, climate change and gender have been recognized by their mutual interaction with one another. As such, the gender dimension in climate change includes two aspects: first, women, particularly in less developed countries, are more likely to be victims of climate change's consequences; secondly, women and men have different roles in responding to the impacts of climate change, and women are major protectors and saviors in some areas of adaptation and mitigation (Bäthge, 2010). Furthermore, many studies indicate that women are more vulnerable to climate change because "their limited adaptive capacities arise from prevailing social inequalities and ascribed social and economic roles that manifest itself in differences in property rights, access to information, and lack of employment an unequal access to resources" (Singh, 2011, p.55). Moreover, climate change often affects sectors that are traditionally linked with women's work, such as farming, crop cultivation, and fisheries. This means women's existing hardships are increased in the context of climate change.

Many researchers have argued, Bathge and Lambrou and Piana for example, that the changes in climate have resulted in negative impacts on women, specifically in regards to increasing their general workloads (2010; 2006). For example, in the case of drought due to climate change, women have to spend more time fetching water for domestic consumption and production to compensate for the shortage. Because of time constraints, women have fewer

opportunities to access other income generating activities and roles. In the same way, Nelson also argues that time poverty due to women's multiple roles and burdens, restricts them from engaging in long-term investments for higher productivity and land quality improvement (2008). In addition, lack of access to property rights, microcredit and decision-making power in the household, are major obstacles for women to engage in livelihood diversification. Women's workloads are increasing in the climate change adaptation process, and their burdens are not clearly visible yet due to social and cultural stereotypes on gender roles.

Furthermore, there is a lack of or limited scope for gender issues and women's representation in climate change policies at all levels (Nelson, 2008). From the national level, Kabeer and Subrahmanian reveal that "failure to integrate gender awareness into policy and planning processes gives rise to a variety of equity, welfare and efficiency costs" (1996). They also investigate gender–blind and gender-aware policy making and argue that even though both male and female interests are present in policy and planning, the male's perception is often prioritized since they tend to make up the majority of policymakers (Kabeer and Subrahmanian, 1996 cited in Abound, 2011).

Rationale of the Study

Climate change has affected the entire world, especially less developed countries, particularly vulnerable sectors and certain groups of people. From a gender perspective, the impact of climate change on women and men is disproportionate; many empirical studies reveal that women are often more vulnerable to the negative impacts of climate change as they have less capacity to access and control resources, an unequal division of labor, and less decision-making power at the household level. An Oxfam study carried out in Southeast Asia, South Asia and East Africa indicated that the Indian Ocean Tsunami of 2004 killed over 220,000 residents from 12 countries, and that male survivors were three times higher than women survivors (2005). Furthermore, women's ability to recover from disaster and climate variability is more than men's, in many cases. For example, in India, Bangladesh, Peru, and Kenya, women use their local knowledge to create change, mitigation and adaptation in their communities (Abeka, 2012). However, women's adaptation and recovery capacity are not well recognized in many societies, particularly in patriarchal societies.

In Vietnam, the government has integrated gender issues into many policies and legal frameworks; Vietnam's legal and policy framework for poverty reduction for example, emphasizes narrowing the gap between different regions and realizing gender equity and women's advancement. In addition, the 1992 Constitution states that "male and female citizens have equal rights in all fields–political, economic, cultural, social, and in the family. All acts of discrimination against women and all acts damaging women's dignity are strictly banned" (Vietnam, 2008). Until now, environmental protection policies have not effectively taking into account the climate change issue (Nguyen, 2011). Hence, Vietnam's policies and frameworks that integrate the gender dimensions into the climate change issue are limited.

To narrow the gender gap in environmental protection in general, and climate change adaptation in particular, the integration of the gender dimension in climate change research is necessary in the context of Vietnam. This study involves women with experience and characteristics, as referred to earlier, in climate change adaptation activities. In addition, it will benefit policy makers and researchers in environmental protection and climate change adaptation strategies to ensure more gender–neutral responses.

Statement of the Research Problems

Natural resources play an important role in the livelihoods of poor and vulnerable people. Poor people often depend heavily on ecosystem services; therefore, they are the biggest victims of environmental changes that cause limited capacity to access these services (Dat and Thu, 2012). Climate change makes particular natural resources, such as land and water, especially vulnerable. However, climate change also impacts material resources such as infrastructure, irrigation systems, roads and dams. As a consequence, the impact of climate change on livelihood resources highly affect household livelihood strategies. In many coastal communities, fisheries are the main livelihood activity, based on rich seafood resources. Therefore, sustainable livelihoods for coastal communities mostly depends on the protection and sustainable use of coastal resources (Dat and Thu, 2012).

In the context of climate change, the livelihoods of millions of people all over the world have been seriously threatened, causing negative impacts on the lives of poor and marginally-poor residents in mountainous, delta,

and coastal areas. According to statistics, there are around 2.7 billion people (40% of the total world population) living in coastal areas (Dat and Thu, 2012). Even without climate change, coastal areas would still be facing the current pressures of over-exploitation of marine resources and pollution. However, the impacts of climate change are predicted to continually amplify and worsen the current resource instability on the coastal zone.

In Vietnam, the majority of the population lives in rural, mountainous and coastal areas. Their livelihoods, especially livelihoods of the poorer households, are mostly based on farming, fisheries, and forestry that depends on the climate and natural conditions (Nguyen, 2009). Hence, climate change is a significant challenge to poverty reduction and sustainable livelihood development. It is no wonder then, that Vietnam is likely to be one of the most significantly impacted nations in the world from climate change, due to its very long coastal line, high dependence on agriculture, and relatively low levels of development in rural areas (McElwee, 2010). Thus, the livelihoods of coastal communities in Vietnam have already been affected. In the context of restructuring livelihoods to adapt to climate change, the nature of family systems, patriarchy for example, will influence the roles of each member in the household. The factors which influence these gender roles, including internal and external factors, need to be examined.

Thai Binh is one of the coastal provinces on the Red river delta, with more than 50 km of coastline, low terrain, slopes of less than 1% and a height of 1-2 meters above sea level (Statistical Department, 2013) Thus, the province is predicted to be one of the areas most affected by rising sea levels in Vietnam (Carew-Reid, 2007). According to a report by the Economic and Environment Program in South-East Asia (EEPSEA), Thai Binh is ranked 99th among provinces/districts in South–East Asia, and ranked 10th among provinces in Vietnam, in terms of vulnerability to climate change (Yusuf and Francisco, 2009). Being one of the two coastal districts of Thai Binh province, along with Tien Hai district, Thai Thuy has 27 km of coastline situated towards the Gulf of Tonkin, with most major natural resources coming from the sea. As a consequence, the livelihoods of local residents are mostly based on marine resources such as shrimp, clams, seaweed, and fishing. In recent years, local people have experienced many issues related to climate change, including climate fluctuations, sea level rises threatening granaries that are adjacent to the coast and aquaculture activities (Thai Thuy District, 2013). Frequently, in

recent years, irregular weather patterns in Thai Thuy district have caused storms/typhoons, floods, drought, and severe cold. Of these, storms/typhoons have often resulted in floods, are the most frequent expression of the climate variability and directly cause negative impacts on the livelihoods of local residents.

Gender inequality has existed in all societies and shapes not only the ways climate change is generated, but also the ways in which women and men respond to its impacts (Nelson, 2008). This is because of gendered divisions of labor and the existing social norms which mean that women and men have different roles, responsibilities, knowledge and skills, and are exposed to different risks (FAO, 2007 cited in Nelson, 2008). Women are frequently disadvantaged, face more vulnerability, and have less capacity to access resources and livelihood options (Nelson, 2008). Thus, in the climate change context, these inequalities are predicted to continually increase.

Traditionally, women's tasks are confined to domestic work in the private sphere. As urbanization has shifted livelihoods away from the rural-based, from subsistence to cash crops, from delta to coastal areas, these roles have been changed. For example, in some islands and coastal areas, women mostly engage in near-shore fishing activities where they are directly and frequently affected by irregular weather patterns. And as a result, climate change affects these women disproportionally (Anderson, 2009).

It is commonly understood that women and men have different capacities to respond to the impacts of climate change, depending on the specific situation, gendered division of labor, gender dynamics, and social norms. As described above, studies have shown that women (in this case, in Kenya, Peru, India, and Bangladesh) use their local knowledge to actively respond and adapt to climate change's impacts (Abeka, 2012). Traditionally, women are responsible for water and fuel collection for household consumption. Scarcity of these resources, as a result of climate change, will increase women's workloads and their time poverty. Women have many burdens, as they have many roles to play. Consequently, they often have no time for income generating activities, for accessing additional education and training, or participation in community management. Ultimately, "climate change intensifies the existing economic and social gender disparities" (Rodenberg, 2009, p.26).

Women's roles in the household and community are not well understood by society, especially within poor, ethnic minority groups, and patriarchal societies where women are often more disadvantaged than their male counterparts. Generally speaking, women can be active and innovative in order to secure the survival of their families and communities. Practically and theoretically, livelihood strategies are always changing, particularly in the climate change context, and follow the conditions and situation of a family and its members. Moreover, many studies of women and climate change in a range of societies show that women are not vulnerable to climate risk in the same way as men, and so they adapt to climate variability in different ways depending on their socio-economic status, and adaptive capacities of their family. Specifically, there has been many studies exploring the different dimensions of gender inequality in climate change vulnerability and adaptation strategies, particularly Nellemann, Verma, and Hislop, and Nelson (2011; 2011). However, women with different marital statuses have not been well researched by scholars, despite marital status having a close link to social and economic situations of women in the household and in the community.

This research investigates women of different backgrounds, particularly in different marital circumstances and household conditions, who are often the most disadvantaged and marginalized groups in society, and the livelihood adaptation strategies of their families in the context of climate change. Because it is a low coastal lying country, Vietnam is increasingly facing storms and typhoons, often resulting in floods, as a consequence of climate variability (ADPC, 2003). Therefore, this study focusses on the impacts of storms/typhoons and floods as the most frequent expression of irregular weather in Vietnam in general, and in Thai Thuy district in particular.

Chapter 2

Literature Review

The literature used for this research has been mapped in the proceeding chapter. Figure 2.1 shows that the dimensions of literature include effects of climate change and adaptation strategies in relation to gender and other factors such as institutions, social and cultural norms. There is a variety of climate variability expressions, however, much of the literature focusses on the most common expressions (droughts, floods, and storms/typhoons).

Climate Change Vulnerability and Adaptation

Climate change has been increasingly recognized all over the world, and is particularly linked to, and affecting, coastal and marine areas. In recent decades, demands on coastal resources have significantly increased, as coastal areas have become more densely populated, human settlements' vulnerability to typhoons, storm surges, and flash flooding events have also increased (Boesch et al., 2000).

Climate change has often resulted in negative effects on aspects of social and economic life. Many studies on the adverse effects of climate variability often mention the economic vulnerability of people and communities. In fact, climate–related vulnerability focuses not only on economic and material aspects, but there is also a social aspect to this vulnerability. Adger's research on social vulnerability to climate extremes is helpful to distinguish economic and social aspects of climate–related vulnerability (1999). Specifically, individual vulnerability is examined by capacity to diversify income sources and access

resources, as well as by social status in the household and community. Accordingly, there is a variety of indicators regarding individual vulnerability, such as the poverty index, percentage of income based on risky resources, dependency and stability (Adger, 1999). However, at the household and community levels, effects of climate change are not limited to this. As a whole, climate risks may affect socio-economic development as a whole, across-sectors, as well as all groups of people.

In terms of vulnerability due to the negative effects of climate variability; activities that adjust to natural or human systems in response to the effects of climate risks are considered as adaptation strategies. In other words, adaptation to negative impacts of climate change is ultimately reducing risks; protecting livelihoods of affected people and communities.

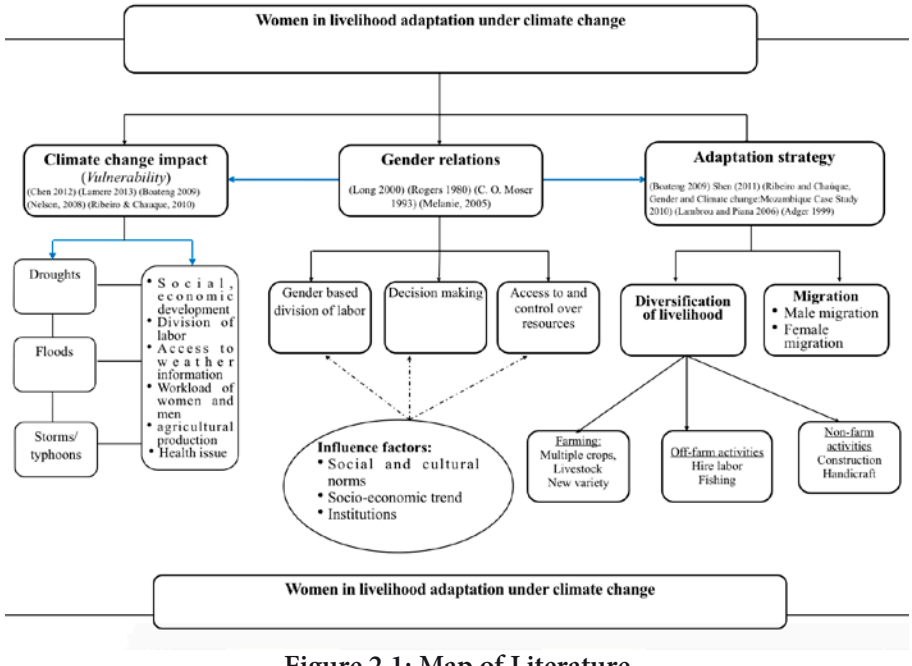

Figure 2.1: Map of Literature

Climate-related Vulnerabilities and Impacts

Climate change and its impacts are increasing recognized all over the world, particularly in developing countries, which are considered the most affected areas of climate variability. Climate change is expressed in many types of natural disasters and irregular weather occurrences: storms, typhoons, droughts, floods, severe cold, and so on. Of these, storms and typhoons are a typical expression of climate change in tropical weather systems, and are the "major contributors to the annual damage and economic lost due to natural disaster around the world" (Chen, 2012, p.1). For example, in 2012, Typhoon Bopha in the Philippines, caused negative impacts on thousands of people who were killed, displaced, and/or made homeless; their homes and farms were totally wiped out, along with their primary source of livelihood which was based on mining and agriculture (Lamere, 2013). Mindanao Island was the most affected area because of its high rate of poverty, limited security, and high growth in fertility (4.2 children per women) (ibid). Furthermore, remote locations make access to information and support from central areas difficult. Thus, in general, typhoons are likely to destroy the livelihoods of entire communities who are least able to recover from the disaster due to their already disadvantaged condition.

In terms of climate risk, the developing world is commonly thought as the most vulnerable region to climate hazards because of the geographic location of the countries in the Global South: many of them are located in tropical latitudes, which are expected to experience greater changes than countries closer to the poles (Lamere, 2013). However, Lamere also indicates other factors that increase the vulnerability of less developed countries, including existing poverty, environmental degradation, and lack of infrastructure (ibid). Generally, vulnerability to climate risks can be economic, political, social, and/or psychological, and can affect all groups of people, but particularly women and children (Moser and Stein, 2011).

In Vietnam, climate variations that are associated with natural hazards such as typhoons, flooding, and droughts have continuously threatened the life and assets of Vietnamese societies. However, the impacts of natural hazards vary across the different climate zones of Vietnam. The ADPC indicates that the most destructive hazards are whirlwinds and storms; then flash foods, floods, and landslides (2003). Flash floods and whirlwinds mostly affect the

midland and coastal areas. Most of the coastline of Vietnam is affected by erosion. Then many river deltas are continuously affected by salinity intrusion, particularly the Mekong river delta, Dong Nai River (ADPC, 2003). Furthermore, flooding expression in the coastal regions is mainly a result of high river flows, sea level rises during typhoons and weak dikes. Therefore, flooding is a serious challenge to economic and demographic development for almost coastal zones (Nguyen, 1996). In short, from the perspective of combining demographic, social, economic and environmental vulnerability, the most sensitive regions in Vietnam are on the Red river delta (where Thai Thuy and Thai Binh are located), Mekong river delta, and the central areas (Hue, Da Nang) (Nguyen, 1996).

In the coming decades, climate hazards are predicted to spread to all climate zones of Vietnam, including coastal areas. Possible effects of climate variability associated with sea level rise in Vietnam, based on the flood risk assessment carried out by ADPC, could be flooding of the Red river delta, Mekong river deltas, and low-lying coastal areas that can result in displacement of coastal dwellers and forced migration from coastal hinterlands (2003). Furthermore, increases in flooding and natural disasters by climate variability in coastal zones may lead to loss in local resident's life, and livelihoods based on natural resources. At the national level, natural disasters and effects of climate change will reduce rice production, threaten food security and Vietnam's economy that is highly dependent on agriculture and natural resources (Boateng, 2009).

Located on the fringe of the Red river delta in the north of Vietnam, with its 54km of coastline, Thai Binh Province has been greatly affected by climate change in recent years, and as such, Thai Binh province pays close attention to environmental protection associated with Vietnam's economic development goals. According to "Climate change, sea level rise scenarios for Vietnam" designed by the Ministry of Natural Resources and Environment, if sea level rise is 60-70 cm at the end of 21st century, 31% of Thai Binh's areas will be flooded, particularly in Tien Hai and Thai Thuy's coastal regions (Ministry of Natural Resources and Environment, 2009). Despite this prediction, the embankment system on the large river has not been properly invested in, and salinity of the field inside dikes, and other adverse factors, have seriously affected the lives and economic development of the residents of the two districts in Thai Binh Province.

Climate Change Adaptation

Adaptation to climate variability is not a new concept. According to the Intergovernmental Panel on Climate Change (IPCC): "Adaptation is the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harms or exploits beneficial opportunities" (IPCC, 2007, p.118). Another definition by the FAO articulates: "Adaptation is a process, by which strategies to moderate, cope with, and take advantage of the consequences of climate events are enhanced, developed and implemented" (2006, p.2). Then, adaptation measures can be driven by the individual households and/or guided by political decision makers to address specific impacts and vulnerabilities. So, to summarize, the ultimate goal of adaptation strategies is the reduction of vulnerability to negative impacts of climate change, in order to protect and improve the livelihoods of vulnerable people and communities.

There are many types of adaptation strategies depending on the classification criteria. FAO clarifies three types of adaptation as: "Autonomous adaptation is change that takes place separate from planning or outside involvement; Reactive adaptation is an emergency response to conditions; Planned anticipatory adaptation uses specific action to address environmental change" (2006, p.2). As such, the approach of adaptation strategies can be policy–oriented, managerial, technological, and/or behavioral. Depending on the length of adaptive time, adaptation measures can be divided as (i) coping (short-term coping strategies), (ii) medium–term, and (iii) long–term adaptation practices (WB, 2010). Furthermore, there are also other types of adaptation strategies, such as economic and social adaptation to climate change, depending on the nature of the measures. Overall, the adaptive capacity of individuals, households, or communities can be explained by different factors. At the household level, Shen reveals indicators influencing a household's adaptive capacity as being economic capacity, technology, skills, knowledge, infrastructure, social factors, and land use (2011).

Climate - related impacts in some developing countries show that natural resourses-based agriculture is the most vulnerable sector to the effect of climate variability, especially droughts, storms/typhoons, and floods. Many adaptation strategies have been successfully applied; including traditional and indigenous knowledge, and new technology-driven adjusments, in separately or integrated

ways. Divesification of livelihood activities to reduce risks of severe climate impacts is also a focus; a variety of alternative income sources have been introduced, such as craft, charcoal production, trading, and even migration. In many cases, migration is considered an important way to escape disaster and have more income. The migration of farmers in Bangladesh is a typical example: Most migrants are poor farmers from rural, vulnerable areas who move to urban areas for seasonal migration. As a consequence, seasonal migration is an effective way of maintaining livelihood security and coping with uninterrupted drought. Moreover, hosehold consumption is decreased when occupants have seasonally migrated (FAO, 2006). So, seasonal migration, in this case, brings double benefits for household security.

It cannot be denied that migration is one of the crucial ways to adapt to the impacts of climate change, and it can take on different forms in different social situations. In the situation of successive droughts in Mozambique, migration to South Africa and other urban areas to search for stable jobs increased. However, the problem is that women's workload has considerablely increased, both in productive and reproductive work. As a consequence, women spend more time on productive work, meanwhile they also have to take on reproductive work in the household. However, on a positive side, women's decision-making power is enhanced as a result of male migration (Starken and Wandeln, 2009). Thus, migration in this case causes not only the economic change but also gender and social change.

In short, climate change adaptation, particularly at the household level, often leads to diversity in forms based on the type of climate–related vulnerability, and varies from country to country. However, in general, there are three main groups of livelihood diversification activities, including farming, non-farm, and off-farm. In Vietnam, one of the most heavily impacted nations, there are also many adaptation strategies at the household level. For example, autonomous adaptation strategies in agriculture, includes altering cropping patterns, using a different combination of inputs, using different crop varieties, and finding new water sources in case of drought (WB, 2010). However, for an adaptation strategy to be sustainable, there needs to be a combination of autonomous adaptation (separate from planning), reactive adaptation (emergency response to risks), and planned anticipatory adaptation (use specific action to address climate variability).

Gender Issues in Climate Change Vulnerability and Adaptation

Climate Change and Gender: The Linkages

The gender dimension of climate change is reflected through two aspects. First, women are generally more vulnerable than men to impacts of climate change, particularly in developing countries; and second, women and men play different roles in coping with climate change, and women are often emphasized as active agents in some areas of adaptation and mitigation (Aboud, 2011).

To begin with, it is undeniable that climate change is a gender issue, in terms of both impact and adaption strategies. Many scholars indicate that climate change has affected men and women, rural and urban, majority and minority, differently in developing countries based on the specific contexts. Nelson, in his study "Gender and Climate Change", reveals that women have been affected by climate variability disproportionately compared to men, as a result of existing gender inequality in accessing material and non-material resources, roles, rights, time, and knowledge to cope with severe climate (2008). Furthermore, gender disparities interact with other types of inequalities such as class, ethnicity, and religion, shaping the way climate variation affects the strategies of specific communities (ibid). However, there is a limited discovery, including conceptual and empirical, on how gender relations shape climate change adaptation interventions.

In addition to this, Anh, also investigates the linkage between climate change and gender, suggesting that climate variability has certain gender characteristics (2008). Accordingly, women are affected by adverse impacts of climate change in different ways due to the social and cultural norms, discrimination, and inequality in households and the community. Secondly, the study reveals that women, in general, are underrepresented in decision making process as well as in adaptation and mitigation strategies, both in household and community levels. Thus, based on the present-day situation, the study suggests that women should be engaged in these strategies because their vulnerability, rights, perspectives and experiences may positively contribute to adaptation processes and strategies.

Gendered Vulnerability under Climate Change

As mentioned above, climate change is a gender issue, and climate change affects women and men disproportionately; in other words, their vulnerability to climate variability effects is different. Ribeiro and Chauque, in their study on gender and climate change in Mozambique, suggest that existing power relations and gender roles in certain communities are the major causes of gender differentiation in climate change vulnerability (2010). Furthermore, the effects of climate variability are associated with sectors that traditionally women are involved in, such as agriculture, crop cultivation, and fishing (Singh, 2011). For example, according to Singh, the adverse expressions of climate change, such as sea level rise, typhoons, and droughts, make fishing and water collection more difficult (2011). Moreover, during these climatic events, especially flooding, women's deaths are much more likely than men's, as a result of their inability to swim, run, or have enough physical strength to escape. In these situations, religion practices, and social and cultural norms are also considerable barriers to women's mobility.

Women are more vulnerable to climate change's effects in the developing world, due to an intersection of factors. A report by FAO indicates that women have less access to information, services, resources, and decision-making at household and community levels because of gender relations in the specific society that are dominated by an intersection of social norms, religion, ethnicity, age, class and region (2007). Moreover, the dynamics of gender relations vary from nation to nation, society to society, and are rapidly changing in some parts of the world, thus affecting women's and men's experiences. Nevertheless, women are frequently disadvantaged agents since they face heavier workloads, and have less assets and livelihood options (Nelson, 2011). For example, women in Mozambique are more vulnerable to environmental changes because of power relations at the household level that limit women's access and control over resources. Customary laws in some rural village in Mozambique state that women have to follow their husbands after marriage, which may involve leaving their own villages. Land and other assets are inherited by men. This traditional law fosters women's dependence on their partners and a lack of access to other services, for example property rights. Consequently, women in these communities are disadvantaged and have limited mobility in terms of performing livelihood adaptation strategies (Ribeiro and Chauque, 2010).

In less developed societies where the stereotypical woman is responsible for reproductive and care work, the effects of climate change add to their already

burdensome task as guarantors of family stability. For example, the burden of collecting water and fuel in Magondzwene village of Mozambique has increased in the past few years due to environmental degradation. Normally, the distance to the watershed is 4 km, and about 2 km for firewood collection by foot (Ribeiro and Chauque, 2010). In times of unusual drought, water and fuel become scarce and women have to travel greater distances to fetch water and fuel. Likewise, women in Tanzania also experience increasing workloads in farming activities, since they have to prepare the land to compensate for water insecurity. In addition, they have to spend more time on crop protection due to increasing diseases. In the same line of thought, Omari in "Gender and Climate Change in Botswana", indicates that women are the greater victims of environmental degradation and climate change because of the gender division of labor that usually results in more women involved in agriculture and informal sectors, which are more vulnerable to the effects of climate change (2008). Women are more represented in sectors that are traditionally associated with climate vulnerability, "climate therefore magnifies existing inequalities, reinforcing the disparity between women and men in their vulnerability to and capacity to cope with climate change" (Omari, 2008, p.9).

Vietnamese women also experience climate vulnerability disproportionately when compared to men, due to existing gender inequality in Vietnam's society (Le, 2008). Like other developing communities, Vietnamese women are over represented in agricultural and domestic spheres (62% of women versus 52% of men), so they face higher risks of losing their agricultural products to severe weather such as droughts, storms, and floods (Le, 2008). In addition, high dependency on natural resources for livelihood generation in rural areas makes women more vulnerable to climate change's effects. Le reveals that because more women than men are involved in informal business, as well as already facing time constraints for their reproductive tasks, they have reduced opportunity to engage in formal jobs and income generating activities (2008). Ultimately, this contributes to reducing women's status, as well as their decision-making power at household and community levels. Consequently, limited decision making, particularly in the household, is the biggest obstacle facing women when making livelihood strategies to adapt to adverse climatic conditions.

Gender relations have changed over time and vary from nation to nation based on the society's characteristics. Hence, the idea of women as the most

vulnerable victims of climate change's impacts is not true in all societies and contexts. Nelson provides an example of male fisher folk in Cameroon, who were significantly exposed to river blindness[1] as a result of climate variability (2011). Likewise, Arctic male hunters are also particularly hit by the increased difficulties and dangers they face from a shorter hunting season (Parbring, 2010 cited in Nelson, 2011). Moreover, the traditional male-breadwinner stereotype combined with men's inability to continue to supply food for the household, is likely a catalyst for social problems such as violence against women, as a means to reinforce men's power in society. Thus, the empirical correlation between adverse climate-related disasters resulting in conflict over scarce natural resources and the increase in domestic violence against women associated with the challenged ideology of a male breadwinner, illustrates the urgent need to pay more attention to gender – specific vulnerabilities. So, the comprehensive understanding of gendered forms of vulnerability is very important to identify how climate change interacts with other social characteristics, shaping the way women and men adapt to the impacts of climate variability.

> In general, around the world, women are poorer than men (...) women are disproportionately employed in unpaid, underpaid and non-formal sectors of economies. Inheritance laws and traditions, marriage arrangements, banking systems and social patterns that reinforce women's dependence on fathers, husbands and sons all contribute both to their unfavorable access to resources and their lack of power to change things. The health dangers that result from multiple births can contribute to interrupted work and low productivity. Traditional expectations and home-based responsibilities that limit women's mobility also limit their opportunities for political involvement, education, access to information, markets and a myriad of other resources, the lack of which reinforces the cycle of their vulnerability. (Cited in Enarson, 2000, p.5)

1 A tropical skin disease caused by a parasitic filarial worm, transmitted by the bite of black-flies that breed in fast-flowing rivers. The larvae of the parasite can migrate into the eye and cause blindness.

In short, the image of women as the primary victims of climate variability in the developing world is illustrated by many scholars and researchers. More women die in natural disasters related to climate change in many societies; they experience increasing workloads in agriculture and water and fuel collection, resulting in health problems; they are the first victims to suffer during food shortages; and they suffer from violence and harassment in resource conflicts in times of scarcity. All of these consequences also result in time poverty, due to the multiple roles women play in households and communities that make it impossible for them to engage in income generating activities and long-term investments for land quality improvement (BRIDGE, 2008). Men are also affected by the negative impacts of climate change in some situations, although the vulnerability of women is more widespread.

Gender and Climate Change Adaptation

As mentioned above, the adaptation process is the adjustments made by communities to reduce the negative effects of climate change. The fundamental goal of adaptation strategies is to decrease vulnerability due to climate variability; the protection and enhancement of livelihoods for poor and vulnerable people. In this sense, adaptation strategies are closely linked to livelihood assets, such as finances, natural resources, and physical, human, and social capitals. And, within the household sphere, this translates into access and control over resources like land, credit, and tools; decision making power, food security and household entitlement, and freedom from domestic violence (Lambrou and Piana, 2006). So, there are a variety of adaptation processes and strategies based on livelihood assets and social networks; and income diversification may be the most popular way for reducing dependency and vulnerability of members within the household, particularly for women and girl members (Adger, 1999).

Interestingly, many scholars reveal that the adaptive capacity of individuals in certain communities is closely linked to their vulnerability to climate change. Even if both men and women are affected by the negative impacts of climate change, women are more vulnerable than their male counterparts because of the gender-based division of labor making women responsible for agricultural and reproductive tasks. During recent years, a lot of researchers highlight women's increasing workload associated with the hazards of natural disasters.

Many scholars explore the link between the vulnerability of women to climate change's effects and their low adaptive capacity in the less developed world. Africa is a typical example for this case. The Third Assessment Report by IPCC indicates that the vulnerability presented in most of the vulnerable areas is closely correlated to the low adaptation strategies of local people, that intersect with extreme poverty and other kinds of inequalities affecting the majority of the population (2001). Women, in general, are less educated, more dependent on their partners, and have limited access to resources and climate information. As a consequence, adaptation options such as diversification of crops and livestock are not always available to the most disadvantaged women. Overall, female farmers in vulnerable communities contribute less to adaptation strategies in their households when compared with their male counterparts. Another investigation by Nelson reveals that women in developing countries are more reliant on "climate sensitive resources" and have less adaptive capacity because of unequal property rights, such as land and entitlements, that mostly belong to the male heads of households (2008).

Along the same line of thought, many studies explore economic insecurity as a gendered implication for climate change adaptation and mitigation strategies in both household and community levels, especially in the context of globalization processes making access to economic resources more difficult for women in poor communities. Accordingly, the scarcity of key economic resources due to climate change-induced events, significantly contributes to widening the gap between women and men in the household. In particular, extreme poverty, their secondary status in the labor force and high representation in the informal sector, combined with intensive domestic tasks in the household, work to decrease women's adaptive capacity to adverse impacts of climate variability (Lambrou and Piana, 2006). In short, women's capacity for recovery from economic losses is less than men's due to their lower socio-economic status in both household and community in almost all developing societies.

Women's lesser adaptive capacity is not always true since many authors argue that adaptation to climate vulnerability is dependent on many factors such as income, availability of resources and technology, access to information, and areas are major problems for women. According to Wedo, in this sense, women can be key agents of climate change adaptation because their responsibilities in the household and community are closely linked to natural resources (Wedo, 2007). The study also indicates that high dependence on

natural resources, including fisheries and agriculture; on the one hand, increase women's burdens and vulnerability in terms of negative impacts of climate change, but on the other hand promotes women's active engagement in livelihood strategy adaptation. Furthermore, Lambrou and Piana emphasize that "very poor and nomadic" women might have higher adaptive capacity because of their special knowledge of the environment and natural resources (2006). This statement is based on the fact that in developing communities, women use and manage natural resources along with men and other members in the household. As a result, experiences from using and managing natural resources and the environment, combined with women's responsibility in the household, contribute to make women active agents in diversifying livelihood strategies in the context of climate variability.

In Vietnam, like other developing communities, women are more susceptible to the negative effects of climate change since they have limited access to resources and credit for diversifying income, as well as limited capacity for recovery from economic loss. According to Le, women hold 19% of land tenure certificates, versus 66% of men as heads of households (2008). Because of lesser property rights, Vietnamese women face more difficulties in accessing economic resources. In addition, Vietnamese women have less access to extension services and the market, particularly poorer women, resulting in limited coping strategies in emergency situations. Le also explores the different coping strategies of women and men and found that more women engage in income diversification while men seek financial support as adaptation strategies (2008). However, Vietnamese women, in general, are more vulnerable to risk and have lesser adaptive capacity compared to their male counterparts.

In short, women and men face different levels of vulnerability and have different adaptive capacities due to gendered divisions of labor and gender relations in certain societies, as well as levels of access and control over resources. Generally, the level of vulnerabilities is linked to the adaptive capacity of a certain community. However, frequently, women are made more vulnerable by their lower status and education when compared to their male counterparts, so many argue that their adaptive capacities are lesser. Nevertheless, studies in many communities show that the vulnerable status of women is closely linked to their active adaptive capacity because their responsibilities in the household and community are closely linked to natural resources. For example, Tanzanian women are not only victims of climate

change, but they also have important knowledge, skills and experiences for shaping the adaptation process and the search for better and safer communities (Swai et al., 2012). Even though almost all studies on gender and climate change indicate the linkage between gender, particularly women, and climate change adaptation; findings about women's vulnerability and adaptive capacity are so general, they do little to differentiate the type of experience and adaptation strategy that women have. Thus, it is important to be specific about the impact of climate change on women and their adaptive capacity, as well.

Gender in Livelihood Change under Climate Change

The available literature on climate change adaptation shows that adaptation strategies include a series of decisions based on the multiple goals of men and women, as well as the roles they play in the household and community. At the household level, the fundamental goals of adaptation strategies are: securing livelihood, ensuring food security, reducing risks and increasing income (FAO, 2011). Therefore, adaptation to climate risks at the household level prioritizes the household's well-being and livelihood for both men and women, since adverse impacts of climate change affect not only cash crops and large livestock (areas that mainly men are responsible for), but also subsistence farming, water and fuel collection (tasks that women are responsible for). Due to the different roles, responsibilities and gender–based division of labor in certain societies, women and men have different knowledge, perspectives and experiences on strategies to minimize their vulnerability to climate change's effects. Hence, the participation of both men and women in adaptation processes, and strategies to secure livelihoods, must be encouraged.

Gender and Livelihood Diversification

Livelihood Diversification

Livelihood diversification is a strategic adaptation to the negative impacts of climate change, based on the availability of resources and social networks in the context of socio-economic trends and institutional relations (Swai et al., 2012). In rural areas, the livelihoods of farmer households include paid employment, but for poor people, in particular, "it includes the ability to farm and to exploit common property resources for livestock, fishing, gathering fuel wood and many other things" (International Institute for Sustainable

Development [IISD], 2003, p.221). Thus, access to "livelihood resources", including natural, financial, physical, human and social capitals, is fundamental for the livelihood diversification of poor people at risk of climate change events.

It cannot be denied that the livelihood strategy selection of households often depends on the livelihood assets and external factors such as seasons, weather, policy, and local institutions. In almost all coastal communities in Vietnam, fishery is the main livelihood activity, based on the rich seafood resources (Dat and Thu, 2012). In addition to this, other livelihood activities depend on fish-breeding such as fishery services, seafood processing and the fishery trade. Therefore, sustainable livelihoods for coastal communities depends largely on the protection and sustainable use of coastal resources. However, the development of the fishery sector has depressed since overfishing has caused the depletion of seafood resources and pollution of the marine environment (Dat and Thu, 2012). In this context, aquaculture has become an alternative livelihood strategy.

In Vietnam, livelihood diversification has taken place in a variety of forms. For example, farmers in many communities have changed their crop cycles and are farming alternative varieties to fight against droughts and floods. Growing new varieties, changing crop patterns, and adjusting seasonal crop calendars may reduce risks of climate variability in many vulnerable areas. In animal husbandry, selecting alternative breeds and finding new feed in times of food shortages are very important adaptation activities in remote areas, while growing fodder is a more popular adaptation practice in coastal areas (Anh, 2008). In general, "communities in coastal regions in Vietnam adopted a wider number of animal-husbandry strategies than in the mountainous regions" (Oxfam in Viet Nam et al. 2006, cited in Anh, 2008).

Gender/Women and Livelihood Diversification

From the gender perspective, due to the different levels of vulnerability of women and men, and their different knowledge and rights, women and men adapt their livelihoods to climate–related risks in different ways. Women are generally recognized as active agents in household adaptation measures and their roles are increasingly highlighted in the developing world, particularly in very poor societies. Generally, the gendered perception of adaptation strategies varies among groups of people in different regions. For example, the study on "gender and climate change in Vietnam" compared adaptation

strategies in coastal and mountainous areas and found that communities in both areas are more interested in financial support than other livelihood options to reduce their vulnerability to climate hazards (Anh, 2008). However, more women believe in income diversification rather than direct financial support from outsiders. Even though adaptation strategies vary from community to community, and household to household, based on the specific context; in terms of diversification of livelihoods for households in rural areas, the key sectors involving the participation of women are agriculture, food security, water, health, and the economy (FAO, 2006).

Regarding women's adaptive capacity, many scholars and researchers state that women can do, and already to do, a lot of things varying by sectors to respond to climate change. For example, the agricultural sector is often damaged by climate hazards, but still plays a very important role in the livelihood security of the less developed world. Frequently, women engage in agricultural activities for the food security of their household and this role is illustrated through a variety of activities, including the preparation of the farm, planting early and multiple varieties of crops, growing trees and making drainage systems around the farm to reserve water, and harvesting and saving seeds for upcoming seasons. These activities can be done by members in the family, however are primarily the responsibility of women. Furthermore, in many societies, women have the responsibility of securing food for the whole family, based on their role as home-keepers and caregivers. In Tanzania, these tasks are very clearly assigned to women because social norms assume women naturally know the family's food consumption requirements per day, per week, per month, and even per year. As a consequence, women have the responsibility of producing and collecting enough food, including storing and reserving food for the dry season when fruits and vegetables are not easily available.

In forest - related activities such as the collection of fruits, roots, and fuel collection, women's role has been extensively researched. Traditionally, firewood collection is assigned to women in many communities, while they also engage in tree growing and protection activities to restore the loss of trees to household consumption and climate hazards. In some cases, women use alternative sources of fuel, such as coal, or use fuel saving stoves to reduce the demand of firewood (Haile, 2008). On the one hand, these activities may contribute to the reduction of climate-related risk; however, on the other hand, they also increase the workload burden as women respond to climate

risks in collecting fuel. Collection of water for daily use is one example: In the case of water shortages due to drought, in many communities, women have to travel longer distances for fetching water since this is one of their key roles. In order to respond to water scarcity, women in many affected areas store water in tanks during the rainy season and reserve it for dry season, construct deep water wells, and as already mentioned, travel longer distances to fetch water to adapt to climate variability.

Women are not only responsible for reproductive tasks, but they are also responsible for productive income generating activities in the household. Women are more likely to engage in informal sectors and/or run small economic activities in the domestic sphere, in combination with domestic and care tasks. These activities vary from community to community, family to family, and include the sale of small stock, mushroom production, and fishing (Swai et al., 2012). Furthermore, a lot of informal works women are engaged in, such as helping in construction and cattle herding, are important for securing household income in times of weather variability.

Empirical evidences from a variety of studies suggest that women play an active role in livelihood adaptation to climate hazards by diversifying their livelihood activities in agriculture, food security, economy, and non–farm sectors. Furthermore, many scholars and researchers also believe that "women are full of strength and talents! People have to acknowledge that women are change agents and wherever women are, they should stand up, play their roles and change the climate today" (Swai et al., 2012, p.1).

Gender and Migration as Adaptation

Migration as Adaptation

Migration of an entire household or part of the household's labor force often results in remittances that may help to increase income, reduce dependency and enhance livelihood opportunities. In this sense, migration is one of the livelihood diversification activities that is generally undertaken for the purpose of earning a higher income (Adger, 1999). And, migration therefore affects household income and composition which has an implication on gender as well (Long, 2000). The study conducted by Long also indicates that migration, for the wealthier households, is to accumulate capital for larger investment; meanwhile for a poorer household, migration is simply to cover daily

consumption, pay off debts or pay for excess expenditures (2000). Consequently, migration affects household income level and composition, the position of women and men within the household, and in turn, their productive and reproductive tasks.

In Bangladesh, migration is considered as a crucial way to adapt to drought, and takes place in two forms; seasonal and urban migration. Seasonal migration is more popular and often undertaken in poor households for the purpose of achieving and maintaining livelihoods, as well as in response to climate hazards (FAO, 2006). Likewise, out migration is also a key coping strategy for environmental degradation due to climate variability in Vietnam (Le, 2008). The implication on gender, in this case, is that women's migration often results in less income then men's, and they have limited access to basic resources, due to their lower mobility and education. Meanwhile, men's migration, usually "worsens the situation for women and children left behind" because of the heavier tasks and increasing workloads the women have to bear in their absence (Le, 2008, p.9).

Male Migration Impact on Women left behind

General migration trends in recent years, in the context of adaptation to climate risks, have been increasing as people search for alterative livelihood opportunities. This trend may lead to a shift in the division of labor, as women's burdens increase as a consequence of male migration. For example, women may have to take on more care-giving tasks for members within the household. At the same time, they may also engage in new income generating activities to secure their livelihoods in parallel with income generated by male migration (FAO, 2011). By doing so, women's overall status in the household may be changed by increasing the number of female-headed households.

In many communities, male migration is more popular than women's migration. Women and children are often left behind. Thus, the burden of the workload which used to belong to the men is automatically transferred to the women, and "women become *de facto* heads of household, taking on men's roles in addition to their productive and reproductive activities" (Ribeiro and Chauque, 2010, p.28). Specifically, in terms of male out-migration to cities, the agricultural workload taken by women significantly increases. "The impact of environmental degradation in India" conducted by Viegas and Menon, provides an example of women's responsibility in diversifying livelihoods by shifting cultivation and

livestock, or settled agriculture that is often done by men (1989). Those who are unable to undertake this heavy task must take on alternative work to offset the income lost due to uncultivated land, such as wage labor, fishery related activities, and brewing and selling alcoholic drinks (Ribeiro and Chauque, 2010).

In a positive way, male out-migration due to climate risks may create the chance for women to exercise their decision-making power and control over resources related to livelihood diversification for the household. However, many argue that it puts more burdens on women's shoulders since males are often the heads of household and have their names on the land certificates. Women cannot access credit without land property rights. In this case, the absence of males causes women to have more difficulty in accessing credit and truly having control over their resources. Nevertheless, remittances from male migration may contribute to improving food security.

Women's Migration

Women's mobility is restricted by social and cultural norms; hence, women's ability to escape from danger during climatic catastrophes is limited by the dual role they play within the household as caregivers and income providers. Women's migration may be temporary or permanent, depending on climate variability's impact (Agriwomen, 2013). Accordingly, if the damage is irreversible in the long term, migration can be permanent; otherwise, it may take place in a short-term period, as a type of seasonal migration. A study conducted by Hunter and David indicates that contemporary or seasonal migration "has been feminized by the expansion of global markets and related socioeconomic transformation", in addition to the climate factor (2009). Nevertheless, female migration is an important means of household livelihood diversification, providing additional livelihood opportunities, and securing overall household livelihoods (McKay, 2005 cited in Hunter and David, 2009).

Environmental degradation is a push factor of migration, for both men and women. However, women's migration often takes place in women-headed households, where whole families depend on the woman's income. In times of resource scarcity, migration is the best way to escape the vulnerability of climate hazards and migration remittance is a crucial income for these vulnerable households (WB, 2007).

Women's migration has been an increasing pattern for decades. Even though both women and men migrate and experience similar difficulties in finding work, housing and social services, women are more likely to face gender-based discrimination on top of the existing challenges (Agriwomen, 2013). This added discrimination takes the form of wage difference, sexual harassment, heavier workloads, and sub-par living conditions. In addition to this, women in many situations get paid lower than what employers have promised. Thus, women in this case face a double burden of climate hazards and discrimination during migration for livelihood security.

Chapter 3

Study Site Profile

Thai Thuy is an agricultural district of Thai Binh province, on the fringe of the Red river delta in the North of Vietnam. Thai Thuy has 27 km of coastline, including six coastal communes: Thuy Truong, Thuy Xuan, Thuy Hai, Thai Thuong, Thai Do, and Diem Dien. With extensive coastline and weak physical infrastructure, the district is physically vulnerable to climate expressions, typically in the form of storms/typhoons associated with strong tides. Therefore, agricultural production and fisheries have been the most affected sectors in recent years. Furthermore, being an agricultural district, like other communities in Northern areas, gender relations in Thai Thuy-Thai Binh is marked by Confucius ideology; in which, women often play multiple roles in the household and the community. Consequently, women and men do not share an equal division of labor, decision-making power, or access to and control over resources. Because of these features, Thai Thuy was chosen as field site of this study. In addition, Thai Thuong and Thai Do, two coastal communes belonging to the coastal areas of Thai Thuy district that are more affected by impacts of storms/typhoons and sea level rise than other communes inside coastal areas.

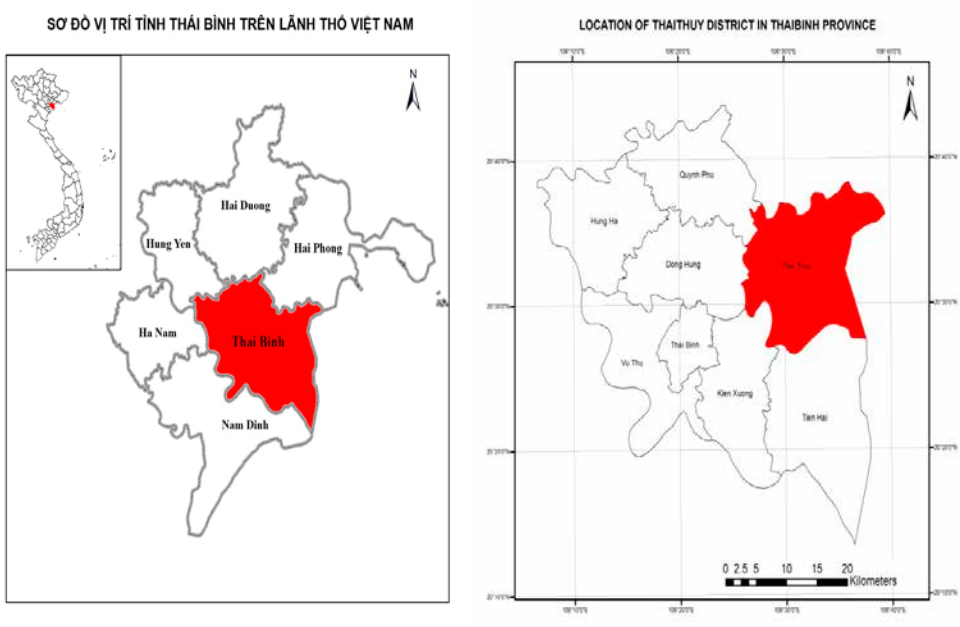

Figure 3.1: Map of Project site

(Source: Do, 2013)

Thai Thuong and Thai Do Profile

Thai Thuong and Thai Do are two coastal communes of Thai Thuy district. The population of Thai Do is 6,117 in 1572 households and Thai Thuong is 6,786 in 1556 households. The natural areas of the two communes are 1165 hectares (ha) and 1150 ha, respectively. In which, land for agricultural and aquaculture activities account for most of the area except for the residential land. Then, the main livelihoods of local residents in the two communes is crop cultivation, aquaculture nursery, and fishing.

Table 3.1: Land Use for Agricultural and Aquaculture Activities
(Unit: ha)

Commune	Cultivated land	Aquaculture land	Forest area
Thai Do	209.6	554.5	700.5
Thai Thuong	564.9	354.5	500.2
Total	774.5	909.0	1200.7

(Source: Statistic Division of Thai Thuong and Thai Do Communes, 2014)

Household Profile

General Information of the Selected Households

In order to investigate the vulnerability and adaptation strategy of households in the selected communes, 120 farmer households in two selected communes were chosen and classified into four groups based on livelihood resources and livelihood activities.

It can be clearly seen that men are more likely to be heads of household over women, especially in household groups 2 and 4, which might be a result of the traditional view of men "breadwinners" and women "caregivers". Not all of men from men-headed households (MHH) are respondents since they were often absent during the survey times. Hence, the percentage of male respondents is lower than MHHs in all household groups.

Table 3.2: Socio-economic Condition of the Respondents

Items	(1) Paddy land (n=24)	(2) Paddy land & Aquaculture land (n=60)	(3) Paddy land & Aquaculture land &fishing (n=24)	(4) No land (n=11)*
1. Head of household				
+ Male (%)	75.0	90.0	87.5	91.0
+ Female (%)	25.0	10.0	12.5	9.0
2. Respondent				
+ Male (%)	62.5	75.0	58.3	63.6
+ Female (%)	37.5	25.0	41.7	36.4
3. Land				
+ Agricultural land (sao*)	4.17	3.38	1.9	0
+ Aquaculture land (sao)	0	3.23	2.85	0
4. Number of working age members	2.04	2.47	2.46	2.18
5. Number of dependents	2.17	2.12	2.04	2.36
6. Type of housing				
+ Permanent (%)	70.8	61.7	83.3	72.7
+ Semi-permanent (%)	20.8	36.7	16.7	18.2
+ Non-permanent (%)	8.3	1.7	0.0	9.1
7. Source of water of consumption				
+ Number of bore well (well)	18	40	19	9
+ Number of dug well (well)	9	34	13	4
+ Rainfall (for drinking only)	24	60	23	10
8. Source of fuel for cooking				
+ Gas (%)	83.3	75.0	81.8	83.3
+ Coal (%)	37.5	20.0	54.5	37.5
+ NTFPs and straw (%)	100.0	30.0	63.6	100.0
9. Member of organization	24	60	24	11

Member of one organization (member)	83.3	95.0	100.0	83.3
Leader of organization (member)	0	3.3	0.0	0
10. Religion				
+ Christian (%)	16.7	8.3	25.0	18.2
+ Non – religion (%)	83.3	91.7	75.0	81.8

(Source: Household survey, 2013)

*Note: * One missing sample due to duplicate survey; **One "sao" = 360 m2*

Regarding livelihood resources, agricultural and aquaculture land are the most important means of production for farmers in rural areas. Interestingly, fishing household groups do not have cultivated land due to their geographic characteristics, so their livelihoods are absolutely based on marine resources and fishing. Group 2 and Group 3 have both agricultural and aquaculture land; in which Group 2, whose livelihood is based on agricultural farming and aquaculture nursery only, have more agricultural and aquaculture land than Group 3.

Table 3.3: Comparing Different Household Groups Based on Livelihood

	Group 1	**Group 2**	**Group 3**	**Group 4**
Livelihood asset	Paddy land only	Paddy land Aquaculture land	Paddy land Aquaculture land Fishing boat	No cultivated land Fishing boat only
Livelihood activity	Crop farming	Crop farming Aquaculture farming	Crop & Aquaculture farming Fishing	Fishing
Labor	Lower demand	Higher demand	Higher demand	Lower demand
Credit demand	Low demand	Medium demand	Higher demand	Higher demand
Food consumption	Food insecurity not very frequent	Food insecurity frequent	Food insecurity more frequent	No paddy land, food insecurity very frequent

(Source: Synthesis of household survey, in-depth interviews and FGDs, 2013)

Adaptive Capacity of the Households

Natural Resources

In the household sphere, natural resources, particularly agricultural and aquaculture land are the most important resources of farmers in rural areas. In Thai Thuong and Thai Do communes, the average cultivated land per capita is generally limited due to characteristics of coastal communities. Typically, the fishing groups in Dong Tien village of Thai Do commune do not have cultivated land, so their livelihoods are completely based on marine resources and fishing. Hence, in terms of climate-related risks (like storms), it is harder for the farmers in this area to diversify their livelihood activities based on natural resources.

For water resources, as cited above, drinking water and water for daily consumption is generally enough in quantity due to the combination of using water from the dug well, bore well, and rainfall. Water shortages in selected sites only happen with water for production, particularly water for winter crop cultivation and aquaculture nursery. Recently, in terms of weather variability, rainfall is uneven and irregularly distributed throughout the whole year, affecting water supply for agricultural production. The lack of water in certain times of crop cultivation happens more frequently, particularly in Tan Boi village of Thai Do commune, where water shortage went up to 40% in the drought period of 2009.[2]

Labor (people of working age)

For labor resources, interviewed households all have more than two laborers of working age, on average. Households in Group 2 and Group 3 were slightly above average compared to the other groups, due to having more livelihood activities, and more laborers available to stay at home to carry out these tasks without migration. Generally, with available livelihood resources, the existing labor force is enough for agricultural and aquaculture production, even leading to spare time outside of crop seasons. However, numbers of dependents outweighed laborers in general, particularly in the fishing group. Hence, the burden of dependents affects other income generating activities, especially in terms of recovery from climate risks.

2 Key informant interview and FGDs in Thai Do commune

Related to economic status, women all engage in productive and reproductive work, including crop farming, aquaculture nursery, and hired labor inside the village. Particularly, unmarried women participated more in productive work as hired laborers, than married and widowed women because they had no dependents. Women are absent in fishing work. The demographic information indicates that even though almost all married women are traditionally "dependent" agents within the household, their economic status is not really "dependent" since they actively engage in productive work.

Gender Division of Labor

In the household sphere, most of the women engage in both productive and reproductive work, and spend less time on recreation. As a consequence of gender stereotypes of "men's work" and "women's work", women are primarily responsible for housework and care work, although men sometimes help them in the domestic work. Partly due to the neighborhood and/or peer pressure, men think of themselves as superior to women and they are the recipient of deference from their wives. Results from the in-depth interviews indicate that 100% of married women and widows have responsibility for housework, as well as care tasks, including childcare, sick care, and eldercare. This cultural norm may prevent women from migrating to work in other places or engaging in new income generating activities when disaster hits.

Within the household sphere, both men and women are economic actors who engage in livelihood activities such as agriculture, aquaculture, animal husbandry, and hired labor. In which, men dominate some income generating activities, for example construction workers and local authority roles. Meanwhile, many women in selected villages do home-based work such as fabric knitting, running small businesses, and raising poultry for domestic consumption.

Regarding productive work, laborers (both men and women) now apply technology to production more regularly than before. Interestingly, men using technical equipment is more popular than their women counterparts since they are stronger and have faster access to high technology.[3] According to the results of the focus group discussion and in-depth interviews, married and widowed

3 FGDs in selected villages of Thai Thuong and Thai Do commune

women are over represented in labor-intensive tasks, typically harvesting, planting, animal husbandry, and bailing out of water from rice plots.

Infrastructure

In terms of the quality of shelter construction, the study classifies houses as three types: permanent, semi-permanent, and non-permanent. The permanent one is solid and has a flat roof; the semi-permanent house has a tiled roof; and the non-permanent one has a cottage roof.

Figure 3.2: Permanent house, semi-permanent house, non-permanent house [counter-clockwise from top left] *(source: author)*

According to the results from the household survey, most shelters are permanent ones, so less affected by climate-related damages, especially storms. Of selected households, around 20% of total are semi-permanent and non-permanent houses. In addition, the breeding facilities of these families are mostly in semi-permanent structures (around 60%). Thus, in the context of storm-related risks, there will be more of these types of houses/facilities damaged or destroyed.

Land Ownership

As a result of the household surveys, and in-depth interviewee's profiles, men are generally the heads of household, and thus have decision-making power over women in terms of production and large investments. Moreover, household heads also have land ownership and their name is placed on the ownership documents. As a result, access to commercial banking is easier for men than their women counterparts, particularly in times of credit shortages for consumption and productive investment. Nevertheless, in the study site, access to credit is more open for women than in the past due to the appearance of village funds (Fund of Women union and Farmer Association) associated with the support of Vietnam Bank for Social Policies. In the context of climate-related disasters, it is easier for local residents, including both men and women, to access credit to recover from losses.

Therefore, according to the results of the household survey and in-depth interview profile, men are generally heads of household; women are only heads of households if their husbands have passed away (widows). There are only two married women who are heads of households, since their husbands had been ill for an extended period of time.

There is a close link between heads of household and land ownership. The results illustrate that whoever is heading the household, their name is placed in a "red book", i.e. the land title, meaning that the majority of men have land tenure in selected communities. Consequently, access to credit from commercial banks is easier for them, than their dependents without land ownership. Generally, both men and women, or both household heads and dependents, can access credit from Vietnam Bank for Social Policies associated with women union and farmers' funds, as cited. The criterion is that borrowers must be members of a certain organization/union (women union or farmer association). Furthermore, in some case like access to finance from the agricultural bank, even though MHH are granted land property rights, they cannot completely access credit without their partners' signature. Therefore, heads of households, despite having land tenure, cannot automatically access to credit without their partners approval.

Vehicle Ownership

For selected households, means of transportation are mostly motorbikes and bicycles; 98% of households own a motorbike. In addition, some households work in the transportation sector, and thus own lorries; thus, their mobility is easier in times of severe weather, as well as in recovery phases.

Household Income and Financial Asset

Thai Thuy is an agricultural district, so local residents' income is mostly based on agriculture-related works, such as crop farming, aquaculture nursery, hired labor, and livestock rearing. Thus, most of the selected households are middle-income families and their income structure is unstable. Consequently, their vulnerability status and adaptive capacities may be affected during times of climate-related risks.

Table 3.4: Household Income Sources *(percentage)*

Items	Group 1 (n = 24)	Group 2 (n = 60)	Group 3 (n = 24)	Group 4 (n = 11)
+ Farming	100.0	100.0	100.0	-
+ Aquaculture nursery	-	100.0	100.0	-
+ Fishing	-	-	100.0	100.0
+ Livestock	75.0	83.3	66.7	63.6
+ Hired labor	75.0	33.3	16.7	63.6

(Source: Household survey, 2013) n =119

There is a close linkage between income sources and financial assets of the studied households. Specifically, the main income sources of households based on the household's livelihood assets. Accordingly, the main income of households in Group 1 is from crop farming; in Group 2, it is from crop farming and aquaculture nursery; in Group 3, it is from crop farming, aquaculture nursery and fishing; and in Group 4, it is from fishing only. So, households in Group 3 have various sources of income, based on their available productive resources, meaning that their financial assets are better than those in the other groups. For households who only have one income source in Groups 1 and 4, their financial assets are less. Moreover, in terms of damage due to climate variability, demand for credit tends to increase since unique income sources

are affected, and without credit these households have to find other work to diversify their income sources.

Food Consumption

From the household profiles, with an average of 3 saos of paddy land per household, the rice supply is not enough for 12 months of household consumption, particularly for households in Groups 3 and 4. Hence, food consumption is even more insecure in the context of storms, when many paddy farms have been destroyed or affected, followed by significantly decreased rice yields or even dead weight loss. Furthermore, it is difficult to have food in reserve, to mitigate the effects of storms and floods.

Technology

Technology plays an important role in adaptation to climate risks. Along with economic development, science and technology are rapid developments that considerably impacts to human lives. Communication is more convenient due to the appearance of various means such as mobile phones, land line telephones, Internet, Newspapers, TV, and radio.

Social Capital

From the adaptation aspect, social capital refers to organizations, self-help groups, association, and mutual help. In selected households, there is at least one household member who is a member of an organization or association in the community, mostly the head of household. They participate in community management and particularly, they actively engage in discussing common village issues in village meetings. Participation in meetings the village or commune level is not compulsory, however farmers, who are normally heading households, are often represented. One married women, aged 46, described:

I want to know the commune village/commune issues, of course including climate change and climate adaptation information through village/commune meetings. It is very useful for farmers like me, since I do not have access to available information on the internet or newspaper. (Married women, 46 years old, Group 3 in Thai Thuong commune)

Furthermore, there are some self-help groups in the field of agricultural production, aquaculture nursery and fishing. Members of these groups can benefit through sharing information and experience among the groups.

From the social side, 100% of respondents are members of at least one organization that supports members to understand political and social issues related to their organization. Nevertheless, being a member of a socio-political organization in community does not mean that his/her social status increases. The social status of women and men is illustrated by their representation in community meetings, as well as community work. Results from the household survey and in-depth interviews show that MHH are often over-represented in public areas (such as at village meetings) compared to their women counterparts because they are heads of household. According to some women respondents:

> Participation in the village meeting is considered a "men's task, not ours. If I go to the village meeting, who will bear the cleaning and cooking tasks? (Married women in FGD, Thai Do commune, 2013)

Noticeably, among women, the social and economic status of widowed women is generally less than married and unmarried women, because they bear the full responsibility of their household's survival, including household consumption and education of their children.

My husband passed way 10 years ago. I have to bear all housework and farm work alone because the children are of school ages. I am a widow, so anyone may ridicule me since there is no one protecting me anymore. My son and daughter are so young. Sometimes, I feel depressed and lonely in my house, but I still act as if there is no problem because I am a sole breadwinner now. (Widow, aged 37, Group 1 in Thai Do commune, 2013)

Skills and Knowledge

Skills and knowledge, particularly indigenous knowledge, are invaluable means for coping with climate variability. Traditional knowledge related to storms is a typical example: some decades ago, when mass media was not very popular in rural areas, local residents recognized storms based on their experience. Specifically, rain was associated with loud frogs. Sometimes, people would also predict storms by looking at the position of the stars or

changing wind directions. Therefore, based on traditional knowledge of storms, people were able to make appropriate plans to adapt to potential negative impacts of storm-related risks.

Access to Public Services

In the context of climate-related risks, access to public services is necessary. In the selected sites, people can access a variety of public services, such as electricity, health care, education, accommodation and financial support. Nevertheless, it is not easy for local residents to access these services because of their limited availability. For example, people felt it difficult to access accommodation and financial support services, since there is no funds for these services. There was only partial support associated with other programs supporting agricultural and aquaculture production, making it difficult for local residents to seek support from these funds in times of recovery from loss and damage.

Table 3.5: Access to Public Services for Help after Storm-related Damages of Respondents

Items	Easily		Fairly easily		Difficulty	
	Number	Percent	Number	Percent	Number	Percent
Education	15	12.6	50	42.0	54	45.4
Electricity	8	6.7	45	37.8	66	55.5
Healthcare	17	14.3	52	43.7	50	42.0
Accommodation	2	1.7	24	20.2	93	78.2
Financial support	3	2.5	31	26.1	85	71.4

(Source: Household survey in Thai Thuong and Thai Do commune, 2013)
n= 119

Similarly, in the context of climate-related risks, access to other services such as education, healthcare, and electricity is more difficult than usual because of physical damage to roads, and public offices/buildings such as schools and hospitals.

Existing resources, as well as the availability of public services, are closely linked to the adaptive capacity of households, including women and men.

Generally, these available resources and services do not meet the practical needs of the demand. In addition, there are some existing constraints on these resources and services that affect farmers' access to diversify their livelihoods.

Chapter 4

Vulnerability of Women Farmers to Climate Risks

This chapter investigates how women of different household conditions and marital statuses suffer climate-related risks, particularly storms in Thai Thuy district. This chapter focuses on women's vulnerability in different livelihood settings in relation to their socio-economic status within the household sphere.

Vulnerability

Vulnerability to climate risk is defined differently by researchers from various fields. For example, the United Nations defines vulnerability based on 'hazard' as "a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation" (2004). Moser and Stein define vulnerability as economic, political, social, and psychological, and can affect different groups, particularly women and children (2011). Generally, vulnerability can be classified as two types; "social vulnerability" and biophysical vulnerability, whereby the social and biophysical dimensions of vulnerability are independent.

In this study, vulnerability of climate risk is understood as being within the "socioeconomic domain" and/or "biophysical domain", in the context of both internal and external scales. The external scale is the district and

commune; whereas the internal scale is the household and the gender implication. As mentioned in the literature, vulnerability is gendered since the negative impacts of climate-related risks affect women and men differently due to the different responsibilities and roles they play within the household and community.

Hence, this chapter considers (1) different gender implications of vulnerability in the study site; (2) women's vulnerability in the fields that they are more represented in, such as reproduction, agricultural production, and recovery from damaged and losses; and (3) how vulnerable women access climate information and adaptation, credit, and livelihood resources.

Women's Vulnerability in Crop Cultivation Households

For households in Group 1, their livelihood asset is paddy land only, so their livelihood is mostly based on crop cultivation, including two rice crops (a Spring crop from January to May and the Summer crop from June to October) and one winter crop (from October to January the following year). In order to diversify income sources, the households in this group also engage in some off-farm and non-farm activities such as livestock rearing, working on other farms, helping in construction, and even migration for paid jobs.

Women's Vulnerability in Reproductive Work

As the division of labor is based on gender, the women in Group 1 engage in both productive and reproductive work within the household sphere, and they spend less time on recreation. As a consequence of gender stereotypes such as "men's work" and "women's work", women are primarily responsible for housework and care work, although men sometimes share or help them in the domestic work. Partly due to peer pressure and community practice, men think of themselves as superior to women. Results from the household survey and in-depth interviews during the data collection of this research indicate that all married and widowed women have housework responsibilities as well as care tasks, including childcare, sick care, and eldercare. Social and cultural norms of women as "care givers" result in more women being involved in reproductive work than men, including the collection of water, fuel, and food, as well as care tasks.

Water Collection

In Thai Thuong and Thai Do communes, drinking water and water for daily consumption are generally sufficient in quantity due to the combination of using water from the well, bore well, and rainfall. Water shortages only happen to water for production, in particularly, water for winter crop cultivation.

Specifically, water for production comes from two sources: flowing water and water pump. In normal conditions, the pump system provides enough water for production and water shortages only happen in winter. Recently, rainfall is uneven and irregularly distributed throughout the whole year, affecting the water supply for agricultural production. Lack of water in certain times of crop cultivation happens more frequently, particularly in Tan Boi village of Thai Do commune; water shortages have increased around 40% in the drought period since 2009. In addition, in Thai Thuong commune, the winter crop area is shrinking due to negative effects of storm; farmers tend to reduce the cultivated area because the cooperative did not pump enough water for these fields. Consequently, the lack of water for crop cultivation makes farmers in shortage areas have to invest more time in carrying water from the river to the field.

Women are mostly involved in this task within households in the study site, even though it is a heavy workload which involves heavy carrying across long distances. As a result of the gender division of labor within the household, both men and women participate in the water collection task, though women are more represented in this field: 80%[4] of female members of household engage in water collection compared to 50% of male family members. Hence, in times of water shortage, women in households who do crop farming are generally more vulnerable than men due to the heavy burden of water collection that they bear.

Food Collection

For food collection activities, including harvesting rice, maize and alternative foods, women in households who do crop farming are over represented, particularly women in households who do crop farming only. Women are the most active agents in food collection, with 90% of women

4 Household survey

engaging in harvest activities versus 43.3% of men (household survey). In the context of storms during the harvesting period, it is harder for women since they have to invest more time to collect food (including rice and maize) or have to promptly harvest to avoid the storm. Specifically, the result of in–depth interviews reveal that among women, those married or widowed are more vulnerable to increased food collection work because they are more representative in this task, particularly widowed women who have no support from their partners. Unmarried women mostly work as factory workers; some of them unofficially participate in reproductive and productive tasks in peak seasons, so they are less affected by the negative impact of storms in terms of food collection tasks.

Fuel Collection

Even though 79% of the total selected households use gas and coal for cooking, they also use non-timber forest products (NTFPs) and straw because of the high availability of both around the village/commune. Even if almost all households use gas and coal for cooking, they often combine these with the use of NTFPs and straw to reduce costs; particularly in the households that have crop cultivation activities. Based on the household survey and in–depth interview results, both males and females are involved in fuel collection; however, females (women and girls) are over represented in this task because they are traditionally recognized as housekeepers; especially married and widowed women; the males only do this type of work in certain circumstances, like when a tree has fallen. In terms of storm impact, fuel collection work takes place more frequently due to increases in fallen branches and leaves. It means that women's workload, especially for married and widowed women in households doing crop farming (Groups 1, 2, and 3), increases correspondingly.

Care Work

From the social perspective, climate change also impacts people's health, so the burden of caring for sick people increases significantly. It indirectly affects time use and mobility of other labors in the family, due to the increased burden of care work and recovery tasks, particularly affecting women as members of the household. From a gender perspective, care work is mostly considered as women's task based on the gendered division of labor in the household. The household survey showed that the percentage of respondents

who consider care work as exclusively a woman's task is 79.8%; meanwhile, the number of husbands sharing in care tasks is only 13.4%. So, within the household sphere, care work is predominantly recognized as the women's responsibility. Care work in this context includes childcare, eldercare, sick care, and daily care for household members. In the context of climate risks, common diseases related to climate hazards include headaches, sore throats, and colds. Children and elders are more easily affected by these symptoms/illnesses because of their low resistance and immunity. Hence, climate risks affect the health of local residents, especially children and elders, and in doing so, increase women's workload and time poverty.

There is a difference among women in taking care work: all studied married and widowed women have care responsibilities within their households, since they believe that care work is traditionally the women's task.

> I am 60 years old. The old should be entitled to care for the children, but I still have to take care of my parents-in-law, as they are old and ill. It is partly because my children live far from me; on the other hand, I am a woman in the family that plays two roles; mother and daughter-in-law, so I have the responsibility of taking care of the parents-in-law. (Married woman, aged 60 in household Group 1, Thai Do commune, 2013)

Even though more women are represented in care work, not all of them are vulnerable to increased care tasks as a consequence of storms; it is mainly only those who have elderly parents or small babies, since these people have low resistance. Furthermore, the vulnerability of care work in terms of climate risk is not similar among women. For example, some married women have the support of their husbands in care work, so the burden of dependents is lesser than that of widows. Another example is the married woman in the above case. She is the core laborer of her family because her husband is sick, so she has to take care of him and his parents, especially when their health is worsened during times of of climate variability. In addition, the woman cultivates six saos of paddy land, which is labor intensive work. In contrast, unmarried women are not tied by housework or childcare tasks.

Women's Vulnerability in Productive Work

Gender differentiated effects of climate risks in productive areas can be expected. Nevertheless, the effects vary from household to household, depending on the productive resources that farmers possess and the gender division of labor in the household.

In some villages of Thai Thuong and Thai Do communes, where crop cultivation and animal husbandry are the main sources of livelihoods (Groups 1, 2 and 3), women interacted with the environment more than the men since they were expected to maintain food security for the household as a whole. In terms of climate risks, like the storms and floods that occurred in 2012, crop practices are seriously affected, so women have to work harder or eat less to ensure food sufficiency for their family. In addition, in order to perform their responsibility, women in the study site have to engage in other income generating tasks such as hired labor in peak seasons (planting, harvesting) and/or home–based activities (knitting, small businesses at home). Women in general were thus more vulnerable to climate change than men in these groups since climate risks would affect their capacity to maintain food security.

When compared to married and widowed women, unmarried women have less responsibility for household survival, despite also participating in productive work in peak season and unofficial times. In contrast, widowed women have full responsibility for their family's survival due to their partners' absence, and are thus more impacted by climate risks in this context. For married women in household Group 1; they normally participate in all productive work activities, such as crop farming and livestock rearing; in which, they undertake tasks traditionally associated with women's roles like planting, weeding, harvesting and breeding. In terms of climate–related risks such as storms, crop farming can be heavily damaged or destroyed, so women primarily must engage in both productive and reproductive tasks such as crop replanting, plot recovery, and care of sick animals.

Women's Vulnerability in Financial Matters

As cited, storms cause heavy effects on "climate sensitive resources", as well as on the incomes of local residents in coastal communities. Remarkably, more than 80% of respondents of the household survey said that they lack income and credit for production, not only in the context of climate risks but

also in the normal situation. For farmers who consider accessing natural resources as the vital means to secure their livelihoods, negative effects of storms and floods make them more vulnerable to income shortages. The results from the household survey shows that although most selected households lack income and access to credit, those suffering the most from shortage are households who do aquaculture nursery and fishing belonging to Groups 2, 3 and 4.

For households that only do crop farming, the demand for credit is very low even though they said that they are lacking in credit both in terms of climate–related damages and where there is no damage. The reason is the credit shortage is not very high, so they can solve the shortage situation by borrowing from relatives and neighbors without interest. Some of them can access credit from preferential funds. For example, some farmers in crop farming households (Group 1) often access credit from the fund of Vietnam Bank for Social Policies, associated with Women and Farmer Union's Fund, with preferential interest (0.6 % per year). The duration of the loan is one year, and the amount can be between 3 to 10 million VND ($150 to $500). The criteria to access these funds includes being a member of the women union or farmer association, and there is no need to get the agreement of the partner. So, in these cases, the procedure is simple because the amount is small.

Noticeably, credit demand varies from household to household, woman to woman, depending on the specific context. For example, one married woman head of household (WHH), aged 46, has many dependents and lives in non-permanent shelter. Her credit demand to build a permanent house in order to adapt to irregular storms and ensure the safety of her family is very high.

> My family lives on four saos of paddy land only. My husband and three sons are sick the whole year, and the medicine cost is quite high. We all live in a non–permanent house since many years ago. It faced damage and destruction many times, but we do not have money to rebuild a new house or reinforce it since the existence of my household depends on me and our limited paddy land. (Married woman, aged 46 and in Group 1, Thai Thuong commune, 2013)

In this same situation, the poor-married woman in Thai Do commune might access to credit provided by Thai Do Women Union Fund associated

with the Bank for Social Policies, along with support of the border army to build a new house. In this case, the woman can access credit without a male representative because she is a member of the Women Union. Nevertheless, the problem for her is how to return the outstanding debt on time, when the climate is so unpredictable and the burden of her dependents is so high.

Figure 4.1: Old, non-permanent shelter; new, permanent house.
(Source: author)

Therefore, women in households that do crop farming are not really vulnerable to credit shortage since the credit demand of their households is not very high. Poorer women who have many dependents and limited income sources, are more vulnerable to credit shortage and the burden of debt, particularly widows and WHH (whose partners are sick or disabled).

Women's Vulnerability in the Context of Male Out-migration

In order to respond to climate risks such as storms and floods, migration to find a paid job in the urban areas is one sufficient adaptation measure used in selected areas. The results from the household survey and in–depth interviews show that both men and women migrate to cope with climate risks; nevertheless, men's migration is more popular than women's since they have less responsibility for housework, care work and dependents. In the study site, almost all male migrants were from households who do crop farming since their income and livelihood is mainly based on crop cultivation (Group 1). In contrast, aquaculture nursery and fishing activities require strong laborers, so the men in these households (Groups 2, 3 and 4) often stay inside the village to implement the physical tasks assigned to them.

In the context of male migration, women have to bear the responsibility of their husband's work, in addition to their existing tasks. As a result, they are more vulnerable if storms affect the fields and their workloads considerably increase, including care work, household chores, productive work, and even hired labor.

> My family has only three sao of paddy land, and has no land for aquaculture nursery. My husband migrated to find paid work in the city, and now he is working as a construction worker. Sometimes, he comes back to visit his family for two or three days, so I often stay alone with our two children. I bare all household chores and crop farming. In my time, I also work a paid job inside the village (knitting fabric). These income sources are only just enough for daily consumption; the school fees for my two children comes from my husband's salary. When storms set in, it is so difficult for me to recover the house and farm alone. Furthermore, I have to work harder to ensure the survival of my family when the crop farm is damaged by the negative impacts of storms. The storms happen more and more irregularly, and I feel it is getting harder to control all these tasks without my partner. (Married women, aged 41 in Thai Do commune, 2013)

Besides the existing workloads of women and their partner's workloads that have been left behind, the woman in this case has to bear increasing tasks as a result of climate change, such as new farming practices, recovery of damages and losses, and care of sick people. Moreover, due to the irregularity of storms in recent times, the woman is finding it harder to manage all of these tasks - her existing tasks and her added tasks - without the support of her husband. This situation is shared by all married women whose partners had migrated from the study site. In addition, the burden of too heavy a workload may force women into time poverty and create a situation of limited mobility for paid jobs outside the village/commune.

Women's Vulnerability in Recovery from Damages

On the physical side, irregular storms damage a range of property to farmer households in Thai Thuy district, including houses, breed facilities,

paddy plots, fishponds, and boats. Hence, all household groups were physically affected by these storms; of these, those who do aquaculture nursery are the most impacted by damages to fishponds and aquaculture output losses as well.

Table 4.1: Physical Vulnerability to Storms of Respondents (*Unit: Percent)*

Items	Group 1 (n=24)	Group 2 (n=60)	Group 3 (n=24)	Group 4 (n=11)
House damage by storms	33.3	36.7	29.2	36.4
Breed facility affected by storms	50.0	36.7	45.8	36.4
Damaged rice plot	77.0	68.3	79.2	-
Damaged fishpond	-	96.7	95.8	-
Damaged Boat	-	-	-	63.6

(Source: Household survey, 2013)

Similar to Thai Thuy district, selected households from Thai Thuong and Thai Do communes also have to bear the burdens of damage caused by climate risks and storms. The consequences are decreased rice productivity and aquaculture output loss, degradation of roads and irrigation systems, damage to houses and breeding facilities, and so on. More than 30% of shelters of interviewed households were affected by storms in October 2012, for example; most of these were semi-permanent and non-permanent structures from Groups 1 and 2. Hence, in terms of damaged shelters due to storms, households that have livelihood activities based on crop farming are more vulnerable. Furthermore, means of production were also damaged; many of them absolutely destroyed. In selected households, the same storm damaged around 50% of breeding facilities in Group 1, who already has more livestock than the remaining groups.

Figure 4.2: Semi-permanent house affected by storm; Non-permanent house *(Source: author)*

Climate variability in the study sites affect all fields that women engage in, including reproductive and productive areas. Women (particularly married and widowed women) of all statuses are represented in the sphere of reproduction related to climate-related damages like cleaning, washing, and collection of fallen branches and leaves. For productive tasks, as a result of the gender division of labor in the household, women are over-represented in some recovery tasks, for example, rice farm reparation, replanting, and collection of damaged crops; while men are over-represented in heavier work, particularly re-ploughing. Thus, women in households that do cop farming only generally suffer from multiple burdens since they are involved in many damage recovery tasks. According to marital status, widows are generally more disadvantaged than married and unmarried women because they have no, or very little, support from partners or family members. Nevertheless, women in this group only engage in recovering surroundings and crop farming, without aquaculture farming. Hence, they do not suffer from as many recovery tasks as women in households that do both crop and aquaculture farming (Groups 2 and 3).

Women's Access to Climate and Work Information

Local people access climate information from various sources, of which the popular sources are radio and TV (Household survey, 2013). Access to newspapers is rare for them; especially for married and widowed women who do not have much time for relaxation.

From a gender perspective, both men and women access climatic information from various sources, including radio, TV, newspaper, Internet, reports, and relatives. There is a difference in sources of information they get. Specifically, men often access climate information from various sources such as the radio, TV, newspapers, and even the internet; meanwhile women access climate information only from popular sources (such as radio, TV) and their neighbors. In addition, women who work in community management have more knowledge and skills to access climate information than others do. For example, Mrs. Loan is leader of the Women's Union in Dong Tien village, Thai Do commune. She gets climate information from various sources besides radio and TV. Her mobility required for her work helps her to get climate information more easily and accurately than other women.

> Climate change is not a new definition to me. I get climatic information from many sources such as radio, TV, reports, newspaper, and the Internet. As a leader of Women's Union in Dong Tien village, I often travel for work. Moreover, I have to understand the climate variability to explain to other members in the union. (Married woman, aged 52, leader of Women's Union in Dong Tien village, Thai Do commune)

In terms of job information, access to job channels not only depends on time use, burden of workloads, and education level, but also depends on the availability of information. In Thai Thuy district, job information is rare, particularly for farmers in rural areas. Moreover, it is difficult for farmers to access the available sources because job vacancies are often placed in newspapers or on the Internet, rather than on popular sources such as TV and radio. Therefore, in times of storms or severe weather, diversifying income sources by access to job information is harder for local people.

So, in terms of climate–related risks, women in selected villages, especially married and widowed women, try to diversify their livelihoods by combining housework, care work and hired labor such as planting, harvesting, and helping in. For unmarried women, job opportunities are more available for them because they can easily access job vacancy information, including at garment factories, from their friends and relatives.

Time Use and Mobility

Regarding the 'mobility' of women, this study classifies mobility into two types: mobility outside the village/commune (migration) and inside the village/commune. In terms of climate risks, particularly storms, time constraints limit women's mobility in searching for new income generating activities outside the village/commune.

Case: The Burden of Multiple Roles and Childcare

> Ms. Loan is leader of the Women's Union in Dong Tien village, Thai Do commune. She engages in various tasks including reproductive work, productive work, and community management. For productive work, besides farming on six saos of paddy land and aquaculture nursery, she is also involved in a part-time paid job in a power plant, 3 km from her house. Nevertheless, her mobility for multiple workloads is limited when she has taken care of her six-month-old granddaughter, whom she has cared for, for the past two months. Her son and daughter-in-law work outside the commune, so childcare is the new reproductive task that she bears. In her spare time, she asks her husband to look after their granddaughter so she can engage in part-time work to diversify their income generation activities. Generally, she does not have as much time and mobility as she did before. (Married woman, aged 52 years, leader of the Women's Union in Dong Tien village, Thai Do commune)

This case illustrates that the burden of added workloads - such as care work - limits women's mobility in searching for paid jobs, as well as daily tasks. The burden of care work and their multiple roles not only prevent women from migrating outside for paid jobs, but also affects women's mobility to do productive tasks inside their village.

Case: The Burden of Multiple Roles and Elder Care

> I am 60-years old. Frankly, I have no time to take a rest because of my multiple workloads and the burden of care work for my

> parents-in-law and my husband. My father-in-law is 92; my mother-in-law is 87. They are all sick, so they have not been able to do anything for themselves for the past two years. Furthermore, my husband is mentally ill and he drinks too much. He is head of the household but all housework and farming work lands on my shoulders. I was engaged in seasonal paid work around the village and commune when my parents-in-law were strong enough. Right now, I do not have time to work as a hired laborer anymore. I even stay up until 3am at night washing for my parents-in-law. I frequently sleep around two to three hours per day. It is so tiring to take on all of these tasks alone. Thus, I have no time for new income generating activities or relaxation. Furthermore, in times of storm–related damages, I have to take on new tasks such as cleaning, washing, collecting fallen branches, and farm recovery. It is more difficult for me to mobilize for new income generating sources, as I do all of these tasks by myself. (Married women, aged 60 years, in household Group 1 in Thai Do commune, 2013)

The poor and married woman with many dependents in this case is more vulnerable to climate risks due to her existing time poverty and limited mobility for new income generating activities. For married and unmarried women with less or no dependents, time constraints and limited mobility in terms of climate–related risks are not as serious as it is for the poorer women.

Furthermore, time poverty and limited mobility vary from woman to woman, and different household backgrounds. Accordingly, women in households that have two and more main livelihood activities (Groups 2 and 3) are busier than those who do only crop farming (Group 1) or those in the fishing community (Group 4) due to the increasing workloads they bear in the context of storms. Interestingly, among women who have only one main livelihood activity, women who do crop cultivation tend to face time constraints more than women in the fishing community because their recovery tasks after storms take longer time than those who do not have paddy land.

Even though women have limited mobility outside their village/commune because of the many burdens that they bear, it does not mean that internal village mobility is limited for them. Normally, women move around frequently to implement their daily tasks and productive work inside the village. In terms

of storm-related damages, the women move more frequently to recover damages, as well as to diversify livelihood activities in order to response to the climate risks.

There is a close link between time constraints of women and social-cultural norms in the study site. Most of the respondents in the FGDs assumed that their multiple roles or workloads, particularly housework and care work, were automatically their responsibilities. "Household chores and care work are women's work, not men's. It is similar to having a baby", said one male respondent from Thai Do commune.

Thus, the idea of women's work, as a traditional view, might affects women's time use, as well as their vulnerability to climate risks. Furthermore, the situation resulting from women's identities as being defined by cultural norms for being a good daughter, mother and wife, all of which mediate their efforts to be a wage earner and contribute to the household in that way.

In short, women are generally more disadvantaged than their male counterparts in terms of climate-related risks because of the traditional gender division of labor, as well as social and cultural norms. In addition, among women, those who are poor and who bear many burdens of housework and care work, are made more vulnerable by their time constraints. For women that have many livelihoods based on climate sensitive resources (those in household Groups 2 and 3), vulnerability to time poverty and limited mobility for a paid job outside the village/commune considerably increase; diversification of livelihood sources is much more difficult for them. As a consequence, the burden of ensuring household survival is increasing. Moreover, due to time poverty, these women do not have time for relaxation, which in turn affects their physical and mental health.

Chapter 5

Women Farmers' Adaptation to the Effects of Climate Change

This chapter specifies women's adaptation strategies to the negative impacts of climate-related risks, particularly storms in Thai Thuy district. In addition, the chapter considers how adaptation strategies change over time, and how women's adaptation strategies affect gender relations within the household. As quoted, change in gender relations is illustrated by changes in the gender division of labor, access to and control over resources, and decision-making power within household. These changes affect gender roles and responsibilities of women and men. Hence, the chapter investigates women's adaptation activities as affected by gender relations and the contrariwise effect of adaptation strategies on gender relations intra household.

The literature review on gender and climate change adaptation strategies indicated that because of the different vulnerabilities that women and men experience, and the different knowledge that they possess, they therefore adapt to climate risks in different ways. Additionally, even though women are generally more vulnerable than men to the negative impacts of climate variability, they are recognized as active agents in adaptation activities of the household, and their roles are increasingly highlighted by many authors/researchers. Therefore, this chapter focuses on women's adaptation activities outside of their household's adaptation strategies to explore how women diversify their livelihoods in times of climate change.

Analysis of Community Adaptation Behavior to Storms

Adaptation strategies to the damages of climate–related risks were taking place at both district and commune levels during the research period. Specifically, before a storm, officers at district level widely and continuously inform the commune and villages through radio, mobile phone, and telegraph. After a storm has landed, officers from the Agricultural Office come to examine and supervise the communes to urgently review the damages, and mobilize all resources to remedy the damage caused by the storms, focusing on: (i) Actively organizing the drainage and minimizing damages caused by heavy rainfall and floods, especially in the winter crop fields. In addition, they prepare expanding vegetable plantations and winter crops to replace damaged ones and restore aquaculture nursery and livestock rearing; (ii) directing and guiding the communes to urgently repair public buildings such as schools, clinics, and offices. And supporting local residents to repair damaged houses; (iii) clearing obstacles and repairing roads in order to ensure smooth traffic; (iv) advising the local residents and restoring the consequences of environmental pollution caused by storms. Additionally, timely provision of clean water for people and animals; (v) Preparation of materials and goods, particularly essential commodities for production and consumption and ensuring stable prices (goods and agricultural products) following the storms and; (vi) improving sea dikes and river dikes, along with upgrading the irrigation system to proactively irrigate in cases of flooding and drought.

Gender Implication of Adaptation Strategy to Climate Change

Within the household sphere, adaptation strategies consist of a range of activities that people make in order to maintain their living standards, increase household income, and even save for their children's education and their own old age. In the context of vulnerability to climate risks, local residents operate livelihood strategies under the influence of policies, institutions, and socio-economic trends. The adaptation strategies of selected households have taken place before, during and after storms and are reflected through the table below.

Generally, selected households have a variety of adaptation strategies in order to respond to storms and storm impacts. These adaptation activities take place before, during and after storms. Before and during storms, the households tend to reinforce the house and farm, store food and other necessaries, and/or

prepare to evacuate. On the productivity side, the households who have cultivated land (Groups 1,2, and 3) took on a range of adaptation activities, particularly in the context of farming practices and early harvesting (crop and aquaculture). After the storms, household income was impacted considerably; hence, in order to ensure household existence and secure income, household members tend to work more to diversify livelihood/income sources. This can be in the form of farming activities (diversifying agricultural production), off-farm activities (working on other farms), or non-farm activities.

From a gender perspective, adaptation to climate-related risks is gendered since women and men adapt to climate variability in different ways. This is illustrated through women's and men's adaptive activities within the household. Specifically, women engage in both reproductive and productive spheres, including during these adaptation strategies. In the productive area, women's tasks often involve recovery from damages and losses (cleaning, washing, collecting of water, fuel, and fallen branches); care of sick people; and storage of food, drinking water and other necessary items during storms. In the productive sphere, women's adaptive activities include the recovery of crop and aquaculture nursery farms, growing new crops, or working as hired laborers in many fields (working on other farms, helping in construction).[5]

For men, they are rarely engaged in the reproductive sphere because it is traditionally viewed as a women's field. However, there are some married men who help their wives in recovery tasks and childcare, since they do not believe that the reproductive work is only women's work. In this sense, the men are not affected by the traditional view of women's and men's roles:

> I do all tasks within thin household, including housework, care work and farming. My wife works in a knit factory. She only does these tasks outside official hours and on the weekends. I do not think housework and childcare is the woman's responsibilities. (Married man, aged 42 from Group 2, in Thai Do commune, 2013)

According to the results of the in-depth interviews and FGDs in selected areas, the men are popularly representative in adaptive productive works. This

5 FGDs and in-depth interview and FGDs in Thai Thuong and Thai Do communes, 2013

work can be the reparation of damaged farms and ponds, re-ploughing, new farming practices, diversifications of agriculture production, and even migration to the city for a paid job. Furthermore, men also work as hired laborers inside the village, often as construction workers. Even though women and men adapt to climate change, especially storms, in different ways, their different adaptive activities are not easy to distinguish: some tasks are done by only women or men, but some tasks are done by both of them. For example, both women and men can be involved in farm recovery, new farming practices, and work as hired laborers inside/outside commune. Within these fields, it is difficult to distinguish between women's and men's work, especially when all of them engage in new income generating activities after storms. The below case is a typical example:

Case: Gendered Division of Labor in a Fishing Community in Dong Tien Village, Thai Do Commune

Dong Tien village in Thai Do commune is located on the coastline, and does not have agricultural or aquaculture land. The livelihoods of local residents is mostly based on marine resources (near shore and offshore fishing) and fishing is completely dependent on the climatic conditions. If the weather is unfavorable, it will significantly affect fishing activities and the household income. In terms of new income generating activities due to climate-related risks, men do nothing, while women in the household often find seasonal jobs as hired laborers around villages/communes, such as mason coolie or off-farm work in other villages. This is due to the gendered division of labor within the household. Accordingly, most men in the village do fishing; women do housework and take care of the children. In some households where men are not fishing, family members do income generating activities such as hired laborer in and around the villages/communes, wage labor in knit factories, middlemen in the fish trade, and other paid jobs in city. Many households in the village rear livestock for household consumption and engage in small fish trade as well. (Source: Field observation in Dong Tien village, Thai Do commune)

This case shows that in the context of storms, men generally do nothing intra household, even though they do fishing when there is no storm effect. The situation changes in some households so that all family members, including

men and women, engage in income generating activities to secure the survival of their households.

Table 5.1: Household Adaptation Measures According to Male Respondents

Adaptation Option	Com-mon	Group 1	Group 2	Group 3	Group 4
1. Reinforce and repair house	99.1	100.0	98.3	100.0	100.0
2. Cut and trim trees near the house	96.4	95.8	95.0	100.0	100.0
3. Buy and store food and other necessaries	93.9	100.0	91.7	95.8	90.9
4. Move family members to safer place	15.4	16.7	18.3	12.5	0.0
5.Move livestock/ items to safer place	4.1	8.3	3.3	4.2	0.0
6. Prepare a means of evacuation	39.8	75.0	20.0	58.3	54.5
7.Plant tree along rivers/ gardens	12.6	12.5	13.3	16.7	0.0
8.Early harvesting (crops & aquaculture)	39.8	41.7	50.0	25.0	0.0
9.Change crop patterns, adjust crop calendar	46.1	54.2	46.7	58.3	0.0
10.Diversify agricultural production	38.7	66.7	38.3	29.2	0.0
11.Migrate to city for a paid job	15.2	0.0	18.3	29.2	0.0

(Source: Household survey, 2013) n=81

Table 5.2: Household Adaptation Measures According to Female Respondents

Adaptation Option	Com-mon	Group 1	Group 2	Group 3	Group 4
1. Reinforce and repair house	100.0	100.0	100.0	100.0	100.0
2. Cut and trim trees near the house	90.2	90.2	90.0	91.2	88.6
3. Buy and store food and other necessaries	98.6	100.0	97.0	99.0	100.0
4. Move family members to safer place	12.1	15.0	14.3	11.0	0.0
5.Move livestock/ items to safer place	3.5	8.2	2.0	3.0	0.0
6. Prepare a means of evacua-tion	44.9	67.0	23.0	56.0	50.0
7.Plant tree along rivers/gardens	12.1	13.0	12.0	15.0	3.0
8.Earlyharvesting (crops & aquaculture)	46.5	57.0	61.0	34.0	0.0
9.Change crop patterns, adjust crop calendar	100.0	67.0	53.0	65.0	0.0
10.Diversify agricultural production	90.2	69.0	43.0	37.0	0.0
11.Migrate to city for a paid job	98.6	0.0	12.0	20.0	0.0

(Source: Household survey, 2013) n=38

Adaptation to climate variability, particularly storms, is gendered because of the different adaptation strategies that women and men take on, based on their different roles and adaptive capacities. In the household context, adaptation strategies are not similar between households with women respondents and households with men respondents. This is due to women and men's perception of adaptation processes, affected by their existing roles and responsibilities within their households. For example, because women are traditionally recognized as home keepers and caregivers, they are over-represented in preparation tasks, particularly in storing food and drinking water, and other necessities. Women in the fishing community (Group 4) practiced food

preparation tasks more frequently, due to their responsibility for the food consumption of the household and in the absence of cultivated land. Men are expected to be the breadwinners, and hence they are active agents in heavy work, especially cutting and trimming trees, and preparing means of evacuation. Interestingly, the men in the households that have cultivated land (Groups 1, 2, and 3) are more like to practice these preparation tasks than those in the fishing community (Group 4) since the men in the fishing group have to berth in safer places before the storms land. Consequently, they are often not home enough to engage in preparation tasks.

Women's Adaptation Strategy to Storms

Women's Adaptation Strategy in the Reproductive Arena, before Storms

Recently, storms have been irregular, unpredictable, and caused adverse impacts to farmer households in Thai Thuy district. Based on their experiences in the past, households in the district took some measures to avoid negative impacts of storms, including reinforcing and repairing their houses (99.2% of families), and cutting and trimming trees near the house (96.6% of households) to prevent damage from falling branches. In addition, some households prepare a means of evacuation in times of strong storms. Families that have non-permanent shelters prepare to move family members, as well as livestock and family items, to safer places to minimize serious damage and destruction. Furthermore, households also store food, drinking water and other necessities to cope for the duration of storms associated with strong rainfall.[6]

The idea of men as breadwinners and women as caregivers or home keepers is persistent in Vietnamese society. It stems from the Vietnamese idioms of "men are breadwinners, women are fire keepers" or "men build the house, women build the home". And as such, the gendered division of labor is obviously shaped by the past. Accordingly, men often take on heavy tasks related to the responsibility of earning money; women, as housewives, have the responsibility of reproductive work, including housework and care work. Nowadays, the classification of women's and men's work is not very clear in delta areas of Northern Vietnam; husbands and wives help each other to ensure the survival

6 FGDs and in-depth-interview in selected communes, 2013

of their household and to increase income as well. Nevertheless, the representation of men in reproductive work in the study site is not popular since women primarily bear responsibility for reproductive work.

Noticeably, women of different marital statuses did not adapt before storms in the same ways. In fact, widowed WHH often take on adaptation activities alone, or with part support of family members. They do all of the activities themselves, including food preparation and house reinforcement, cutting and trimming trees near the house, and even preparations to move family members and belongings to safer places. Says the 37-year old widow below:

> My husband died 10 years ago. Any shocks or risks, I have to solve alone because the children are of school ages. For example, as a storm in 2012 landed, I took some preparation tasks to cope since my house was semi-structured. My son asked for help in cutting the trees but I did not agree. He was just 10 years old. This task was so hard for him. (Widowed woman, aged 37, from Group 1 in Thai Do commune, 2013)

For married women, they actively engage in preparation tasks alongside their partners, so the tasks they bear are not as many as widowed women. The married woman in household Group 2, shared as follows:

> My husband and I do some tasks to cope with storms together since our two children study in Hanoi. I often store food and other necessities. My husband does heavy work such as cutting and trimming tree/branches near the house in order to avoid damages to the house. After that, I collect fallen branches and clean. When we reinforce the house, I often buy steel wire and bamboo, and my husband fastens the door and breeding facility. In a few words, I am responsible for household chores and preparation of the surroundings, while my husband does heavy work requiring strong physical strength. (Married women, aged 45, belonging to Group 2 in Thai Thuong commune)

Adaptation Strategy of Women in Crop Cultivation Households

Women in crop cultivation households (Groups 1, 2 and 3) are vulnerable to water shortages, particularly water for production, due to the associated heavy carrying and long distances. Travelling long distances to fetch water for crop cultivation is one of the popular adaptation strategies to water shortage. Additionally, in order to adapt to water shortage, they also use a bailer to bail water from the gully into the farm, if water is available in the gully. As results of the household survey and in-depth interview indicate, although all family members of reproductive age participate in bailing water, including women and men, married and widowed women primarily engage in this task because they have responsibility for taking care of the farms. Furthermore, because of irregular rainfall distribution in recent times, all women in the selected sites also store drinking water in rainy season and serve for the dry season. This task was always done before, but has been paid more attention by women in recent years, in both rainy and dry seasons. When rainfall is not enough for consumption, residents may use water from wells. However, local people believe that rainwater is sweeter and better for their health, so they store rainwater whenever it rains:

Villagers used rainwater for drinking many years ago. We are familiar with it. In order to have drinking water for the whole year, we often store water in large jugs or petrol tanks. One decade ago, when the weather law was clear, we often stored water in the rainy season (from June to September). Nowadays, the rainfall distribution is unusual, even in rainy season there is often not heavy rain. Thus, I have to pay attention to store drinking water for the whole year. (Married woman, aged 34, Group 1 in Thai Do commune)

In addition, women are responsible for the food security of the family, so they have to collect and store food for household consumption during and after storms. For women in households that do crop farming only (Group 1), because they own more paddy land area, food insecurity only happens in some months, normally from February to May since the time from the second harvesting season to the first one of the next year is six months (October until May). The situation is the same for women in Group 2. Hence, food collection for household consumption during and after storms is one of the adaptation strategies to storms, but it does not waste so much time, money, or energy due to the availability of food in their households.

Adaptation Strategy of Women in Households that do Aquaculture Farming and Fishing

To minimize the adverse impact of storms, women in Thai Thuy district actively engage in reproductive work. Nevertheless, due to the difference in livelihood assets and livelihood activities, the adaptation strategies of women in different livelihood settings is not similar, especially regarding the productive field. For example, women in the fishing group do not engage in water collection for production since they do not have paddy land. Nevertheless, food collection and preservation were taking place more frequently by women in households having less or no paddy land (Groups 3 and 4). This task is primarily assigned to women since women know about the food consumption of the household.

In a few words, women do some adaptation activities before storms that are closely linked to their roles within the household; it is common to prepare food, drinking water and other necessities for household existence during and after storms. For those whose family live in semi-permanent or non-permanent houses, along with their husbands, they reinforce houses and other preparation tasks. For households living around the dyke, the women (along with their husbands) prepare a means of evacuation, in which the women's responsibility is to care of children, elders, and other family members during the evacuation process.

Being coastal communities with limited paddy land, food insecurity happens to most households in the selected areas. Thus, women often collect and reserve food from the market and relatives for household consumption during and after storms. For married and windowed women in households that do fishing, this task is performed more frequently.

Women Adaptation in Productive Work

In the productive field, farmers in the study site have their own adaptation strategy in response to climate-related risks, including the early harvesting of crop and aquaculture nursery, diversifying agricultural production by planting many types of trees, changing farming practices, and adjusting the crop calendar. The majority of farmers who do crop and aquaculture farming change the crop calendar to adapt to the climate variability. This can include early harvesting of crops and fishes, early plantation of the summer crop and late plantation of the spring crop to avoid storm-related risks and pests. For example, farmers in

Thai Thuong commune believe that rice should flower before the 15th September in order to avoid storms, but they have changed the crop calendar based on past experiences.

Based on experience, farmers alter the timing of farm activities to (i) avoid irregular expression of storms, (ii) create time and land for planting winter crops; and (iii) reduce the negative impacts of pests and severe cold. In other words, farmers change the crop calendar to suit climatic variations. Nevertheless, for households who do aquaculture nursery (Groups 2 and 3), it is difficult for farmers to adjust the calendar because the aquaculture-nursing calendar is very strict. Normally, farmers nurse aquaculture from March to June (the main crop), and from August to November (sub-crop) when the weather is warm and favorable. The period from March to November is the time that storms happen most frequently. Hence, aquaculture nursery is recently more in danger of climate-related risks than before when storms used to occur most commonly between April and August. Farmers cannot nurse earlier or later than the usual crop calendar because of the strict seasons of shrimp nursery. Additionally, weather variations have tended to increase in number, intensity and duration in recent times. Thus, for aquaculture nursery, no adaptation activity is better than the upgrade of the river dike to reduce the risk of tide flooding associated with storms.

Because storms happen irregularly in recent years, changing the crop calendar for crop farming households is one of the common measures minimizing the negative effects of storm-related risks, but which do not absolutely avoid these impacts. The slogan *"living together with storms and floods"* is repeated many times by respondents. Interestingly, it is considered as one of the adaptation strategies of local residents.

In addition, in order to reduce the adverse impacts of climate variability, farmers who do crop and aquaculture farming in the study site also change their farming practices, including changing crop and breeding patterns. This involves switching from traditional varieties to new ones. Specifically, traditional varieties that have low productivity and low resistance were replaced with new ones that have higher productivity, and which are resistant to insects, storms, floods and salt. In some communities, such as Cac Dong and Tan Boi villages, hybrid varieties with some advanced characteristics (short time, de-acidification, and solid body) are grown to replace existing crops in plots that are salt- and

water-logged. To support changes in crop patterns, changes in soil management is also applied in recent time by planting trees along rivers and around gardens to protect against wind and prevent soil erosion. Aquaculture nursery households whose land is heavily affected by salinity use various means, especially lime, for de-acidification, and salt wash.

In addition, changes in farming practices include various activities in agricultural and aquaculture farming. For example, crop cultivation farmers in Thai Thuy district changed their variety of rice, from sowing rice seed on low plots to hard base, to shortening the time/crop calendar in order to avoid storms damages. Another example is the farmers in Cac Dong village of Thai Thuong commune having to pump water up the field, and then rinsing the water out to wash the salt away in salinized plots - a task farmers did not practice before. In aquaculture nursery, some new practices are being applied such as water replacement, ponds repaired by using bamboo fencing, and making embankments around ponds. These adaptation activities are to cope with and adapt to the adverse impacts of climate-related risks in the study site. Besides changes in farming practices, new technology is also introduced to increase productivity, reduce time use for users, and minimize the risk of damages. Introduction of direct planting instead of replanting is a typical example of this change. By doing so, rice crops have better resistance to insects and severe weather such as storms, floods, and cold. Moreover, new techniques also shorten the growth period of rice and reduce labor-intensive investments as well.

Within the household, all family members may engage in the aforementioned adaptation strategies, but the women did it in a more effective way since they not only adapt well to storms in the reproductive work, but also actively engage in productive work to respond to the negative impacts of storms. Women in different livelihood settings adapt to storms in different ways in the productive sphere.

Women's Adaptation in Crop Cultivating Households

Women in crop farming households are primarily involved in changing farming practices, particularly changing crop calendars and crop varieties. Because women in these households interact more with the environment than their male counterparts, they know better how climate variability affects their crops. As a consequence, women who do crop farming are deciding to plant

later and later[7] and using varieties which grow in shorter time,[8] in order to: (i) increase productivity; (ii) increase resistance; and (iii) reduce the negative impacts of irregular storms. One 54-year-old married woman shared her experience below:

About ten years ago I planted the "Khang Dan" variety. Its length is 120 cm and the growing period is 145 days. However, the paddy was destroyed by storm-associated tidal flooding. Moreover, due to the long growing time, the harvesting season coincided with the storm season. I found that I needed to change varieties and alter the crop calendar. I discussed with my husband and asked him for a consultation. Fortunately, he responded that *"crop farming is your task. Ask the neighbor and do it in the same way as them"*. I, along with other farmers that cultivate rice in Thai Do commune, asked the leader of the agricultural cooperative for help. One year later, new varieties appeared in the fields. "BC15" and "Bac Thom" are typical varieties in Thai Thuy in recent times. Their characteristics are a shorter growing time, more-solid body and higher productivity. So, in terms of storms associated with strong winds and flooding, these varieties are coping better to climate- related risks. (Married woman doing crop farming in Thai Do commune, 2013)

Many women practice early harvesting in order to avoid storms. For example, farmers in Tan Boi village of Thai Do commune avoided a storm in 2012 by harvesting one week earlier. Interestingly, within the household, women make the decision to harvest earlier because they often worry more than men. According to Ms. Lien, aged 42 in Tan Boi village:

> When I heard the storm was coming, I was very worried. Farmers in Tan Boi village planted later than other villages in Thai Do commune, so at the time the storm landed, we had not harvested. My husband believed that the storm was not very strong, so he advised me not to harvest early. As you know the women are not as determined as men, and I was the same. I thought that if the storm is strong, we will loss it all. So, I decided to harvest before the storm came and my husband agreed with me. Luckily, our paddy field was not damaged or

7 Five years ago, farmers in selected areas planted before the lunar New Year. Recently, they have been planting two weeks after lunar New Year.

8 95 to 105 days instead of 120 to 125 days as before.

> lost by the storm, although the productivity was not as high as I expected.

Women's Adaptation in Households Practicing Aquaculture Farming

For women in households that nurse aquaculture, although they are vulnerable to storms, they do not practice adapting to storms as much, because men interact more frequently with the environment in this field. Typically, adaptation strategies (like pond reparation using bamboo fencing or embankments around ponds, and water replacement) are normally done by men because it requires some physical strength. However, in WHH (often widows), they have to do these tasks alone if their children are too small to help; or with the support of family members; or by asking neighbors/relatives for help in exchange for a small amount of cash.

In addition, households that nurse aquaculture also harvest early to avoid the negative effects of storms associated with tide flooding but they do not do this adaptation activity regularly because they hope that the storm is not strong, and that their preparation is good enough to cope with climate-related risks. In addition, if harvested early, shrimps and fish are not standard sizes, and the price therefore is low. Moreover, due to the threat of a storm coming, middleman often pay a lower productive cost, and thus fishermen do not want to harvest earlier. In fact, in some WHH (widows) and small-scale fisheries, they tend to harvest before a storm has landed in order to minimize the adverse impact of storms, like this widow, aged 45 in Group 2:

> I clearly remember when the storm landed on 29th October, 2012 since 4 saos of aquaculture farmland of my family was at risk of being dead weight, lost without early harvesting. Many households in the village did not harvest early at that time. At first, I tended to not harvest before storms, like them. However, I was worried about the risks and uncertainty. Ultimately, I decided to harvest before the storm landed even though the output and price were much lower. (Widow, aged 45, Group 2 in Thai Do commune, 2013)

Thus, WHHs actively make adaptation strategies in the aquaculture nursery field, including preparation tasks and making decisions regarding early

harvesting. For married women in the aquaculture farming group, their voice is not strong, since men often have the decision-making power, due to the fact that men interact with the environment more than women in the aquaculture field.

Women in Livelihood Diversification

Diversification of livelihood or income sources is an effective way to respond to income loss due to climate-related risks. Both men and women participate in livelihood diversification activities, however, women are over-represented in these activities since they are primarily responsible for household existence.

Women's Adaptation in Crop Cultivation Households

In order to maintain and increase income for households, local residents, particularly crop cultivation groups (Groups 1, 2 and 3) diversify their agricultural production by planting many types of trees. Typically, farmers in Thai Do commune grow a variety of crops (besides rice) at different times, to provide food, vegetables, and even added income for households in times of damage and loss due to storms and floods. Additionally, in some households, those which have limited cultivated land (Group 1) and less dependents, they migrate to the city to find paid jobs as a strategy to reduce risks, as well as to diversify their income sources. Interestingly, seasonal migration is more popular than long-term migration in the study site since many migrants have cultivated land which they can plant and harvest crops in during peak season. Seasonal migrants could lease their land to be able to work full-time in the city for a higher income, however, they do not do that because they want to keep the fields for food security and the sense of belonging. A 53-year-old woman in a family doing crop farming only (Group 1) shared:

> The farm is very important to me even though the farming is not very sufficient due to the risks of pests and weather variability. I do not want to leave the field for rent because I feel lost when I do that. I believe that many farmers in my village think like me since the farm is the most valuable property we have. (Married woman, aged 53, Group 1 in Thai Thuong commune, 2013)

As cited, women in the study site are actively involved in adaptation activities not only to maintain their livelihoods, but also to increase household income by diversification of income sources. Specifically, women in households that cultivate crops (Groups 1, 2 and 3) often grow many types of trees with high economic value such as corn and soybeans for consumption and feed in livestock rearing. All family members may engage in this work, but women directly participate and make the decisions on the time and type of tree.

Figure 5.1: Women harvesting cassaba melon *(Source: Quang An, tintuc.vn)*

For example, many households in Tan Boi village of Thai Do commune plant soybean and melon between summer and winter (instead of winter only as before), to provide alternative food sources and add income for the household. The field observation showed that most women were represented in the field during the harvesting season of these trees (September).

Women's Adaptation in Fishing Communities

Without cultivated land, women in fishing communities tend to diversify their income and livelihoods by rearing livestock, similar to women in other livelihood settings. Specifically, women expand into animal husbandry after storms, to increase income for their families and to compensate for any income

lost during the storms as well. Noticeably, women in the fishing community practice this activity more frequently than others since their families have no income assets during times of storms. The households often rear pigs, chickens, and ducks because these animals are easy to take care of, so farmers do not waste so much time collecting food. Married women do not engage in this work alone, but with the help of their partners. Generally, in nuclear families, the husband and wife help each other to care for livestock, but women interact with the animals more frequently because they are traditionally recognized as "home keepers" and "caregivers" within the household.

For WHH (in Groups 1, 2 and 3), they solely decide to rear livestock with little/no support from family members. In these cases, women make the decision on whether to raise cattle or not; how many of cattle should be reared; and how to care for them. Married women in fishing households also engage in livestock rearing, without any participation from their partners, since their husbands go fishing the whole year round, except during storms.

Women in Paid Jobs

In order to maintain living standard of the household and increase income at the same time, women participate in various income generating activities inside and outside of the home sphere during any spare time. The result from the household survey and in-depth interviews show that women in selected areas often work in knit factories, help in construction, work on other farms inside the village/commune, or even go to the forest to pick crabs and oysters. Specifically, for those who help in construction and collection in the mangrove forests, they are often stronger and younger, normally aged in their 20s or 30s, since these tasks require physical strength. Alarmingly, marine resources are scarcer than some decades ago due to overfishing, climate variability, and water pollution. As a result, it is harder for these women to collect marine resources and they have to spend more time on this work. For women who are weaker, they often work in knit factory or work on other farms for a smaller amount (1,500,000 VND [USD 75] / month) than collecting natural resources in the forest or helping with construction (3,000,000 VND [USD 150] / month). Conveniently, women can go to work at the knit factory during any free time because the factory provides two categories of work - one for those who work full time as factory workers, and one for seasonal laborers.

The work in the knit factory is product-orientated work rather than time-orientated work. For example, Ms. Hoa, aged 45, illustrated:

> I am 45 years old. My health is not good as teenagers, so I cannot join in construction or natural fishing. I often go to the neighboring commune to work in the knit factory (3 km from my home) for added income during my spare time. Whenever I am free, I go there to work to compensate income losses after storms. I used to do this work before, in the morning, afternoon, or whole day. In recent times, I go to work more frequently when I am available, even for only two hours at a time. (Married woman, 45 years old, Group 2 in Thai Thuong commune)

Working in the knit factory is very popular in the study site, and has many different implications for the women. Specifically, unmarried women can work fulltime as factory workers, although some of them might be absent occasionally to help their families in peak season. Married women with small babies can do this work in their spare time (while the baby is sleeping or at school). For women in the fishing group, they can do this work from 6 am to 11 am when their husbands go fishing.

As cited, women diversify their income sources in various ways, dependent on their adaptive capacity. Many of them develop home-based work, due to the burden of housework and care work around the home sphere. Some of them mobilize to the city to find paid jobs including as scrap irons or as maids. The second trend is not as popular in the study site. Migrants are those who have less agricultural and aquaculture land; hence, they leave for higher income and to minimize the financial risk of storms. They often migrate for two or three months at a time to work as scrap irons, normally after planting, and return home in harvesting season. Their income varies from 2 to 3 million VND (USD 100-150) per month, which is considerably higher than those who work in the knit factory. This can be considered as one adaptation strategy. Nevertheless, not all women can migrate because their responsibilities as home keepers and caregivers are very important.

> My family has six members: My husband and I, parents-in-law, and two children. My parents-in-law are 82 years old; and my two children are high school students. The monthly cost

> for household consumption is quite high, and my livelihood relies on 2 sao of rice farming and 4 sao of aquaculture nursery. If the weather is favorable, we can maintain our livelihood based on farming, aquaculture nursery and hired labor in our spare time. Nevertheless, the climate has changed irregularly in recent times, and storms have expressed more frequently and are much stronger, which heavily affects crop farming and aquaculture production. The total income of my family, therefore, reduces significantly. Meanwhile, the children are growing; my parents-in-law are getting older; education expenditure and daily consumption is thus very high. In this context, my husband decided to migrate for higher income generating activities to cover daily consumption and our children's education. My workload is increasing due to existing tasks and my husband's tasks that have been left behind. It is so tiring for me but we have no choice. I am a wife; my responsibilities is as a caregiver and to "keep the fire" for the household. Hence, I cannot migrate like him. (Married woman, aged 58, Group 2 in Thai Thuong commune, 2013)

Women's Adaptation Strategies in Households that do Crop Cultivation Only

If the men in the households in Group 1 tend to migrate to the city for seasonal migration, women in this group tend to stay at home, engaging in a range of paid jobs around the village/commune. Accordingly, some of them work as construction helpers inside the village; others work in the knit factory during any spare time; sometimes, they engage in collecting along the shoreline or in the mangrove forest (based on the tidal calendar). In addition, some women in this group find home-based jobs to combine housework and care work, including dress making and making rice wine. These jobs are not very popular, particularly dress making, because the clothes market has massively developed in Thai Thuy in recent years; demand for hand-made clothes is therefore not high as before. On the other hand, although not popular district-wide, making rice wine is an important income source for farmers practicing rice farming in Tan Boi village of Thai Do commune (including households in Groups 1, 2 and 3). Women in the village are over-represented in this work when compared with their male counterparts. Hence, within the home sphere,

they can simultaneously engage in income generating activities and do housework.

Women's Adaptation Strategies in Households that do Crop and Aquaculture Farming

Women in households that do crop and aquaculture farming tend to be more vulnerable to increasing workloads after storms; however, they are very active agents in diversifying their income sources. Women in this group participate in many paid jobs around the village/commune, like women in Group 1, including helping in construction, working on other farms (including aquaculture farming) and working in the knit factory. Additionally, many of them engage in home-based work, particularly rice wine making, and collecting in the forest or along the shoreline based on the tidal calendar (normally seven days a month).

From the livelihood setting, women in Group 2 tend to be more vulnerable to added workloads in times of storms. However, not all women in this group are vulnerable in the same way, so they adapt to storms in different ways. WHH (often widows) are more disadvantaged than those in couples and unmarried women, since they have to bear all the workload in crop farming and aquaculture nursery without any help from their partners. Hence, participation in paid jobs is more challenging for them.

Women's Adaptation Strategies in Households that do Crop and Aquaculture Farming, and Fishing

Although having many livelihood assets, households in Group 3 tend to be more vulnerable in the context of storms because all livelihood assets are "climate sensitive resources" that were heavily damaged due to storms. Hence, women in this group tend to work more to secure the livelihood of their family. As the results of the household survey and in-depth interviews indicate, there was no marked difference in adaptation strategies between women in this group and those in Groups 1 and 2. Evidently, they engage in all kinds of available paid jobs around the village/commune with the same frequency and duration.

> I do all kinds of paid jobs as other women in the village and commune also do. After storms, we are all poor, but we are poorer than those who do work with aquaculture land and

> fishing boats, due to the burden of debt and unreturnable capacity. (Married woman, aged 42, Group 3, in Thai Thuong commune, 2013)

Women's Adaptation Strategies in Fishing Communities

As cited, women in fishing communities are more vulnerable in financial matters during times of storms, so they tend to work harder to compensate the associated income loss. Moreover, their responsibility for food consumption is heavier than others, so the burden of maintaining the household's existence is harder for them. Consequently, besides engaging in all available paid jobs around the commune, women in the fishing communities also participate in trading by buying fish from fisherman and selling to middleman or markets in town.

In times of storms, the responsibility for household survival is increased for them since their husbands have nothing to do in the month before and after the storm. Fortunately, because they have no land to cultivate, women in the fishing communities more freely engage in income generating activities than those in the other groups. There is no marked difference among women of different marital statuses in this case, since the men's roles as breadwinners was not obvious during storm season. In addition, by engaging in various income generating activities, women's economic status considerably changes within the household sphere.

Reasons for Choice of Adaptation Measure

In the context of storms, households take on a variety of adaptation activities to minimize the negative impacts of risks, as well as to diversify their livelihood sources, mostly based on their experience and practicalities of their situation. In addition, adaptation strategies of households are partly based on recommendations of government and neighbors/experts in related fields. The households rarely follow examples from their elders, because their own practical situation is different from that of the past. The results from the household survey show that the adaptation strategy of women and men respondents is derived from their experience in the past and the factual context, rather than from the direction of the government and experts. This is due to the fact that support from the local government is quite poor, as they only guide people to prepare the means to evacuate.

Table 5.3: Reasons for Male Respondents Choosing Adaptation Measures

Adaptation measure	No. answer	Reasons			
		Reason 1	Reason 2	Reason 3	Reason 4
1. Reinforce and repair house	80	14.4	1.7	68.6	15.3
2. Prepare a means of evacuation	34	4.0	60.0	36.0	0.0
3.Plant tree along rivers/gardens	11	25.0	6.3	43.8	25.0
4. Cut and trim trees near the house	78	40.9	1.7	52.2	5.2
5. Move family members to safer place	12	33.3	38.9	27.8	0.0
6. Move livestock/items to safer place	3	40.0	0.0	40.0	20.0
7. Change crop patterns	37	36.4	20.0	41.8	1.8
8. Early harvesting (crops & aquaculture)	31	34.8	4.3	60.9	0.0
9. Diversify agricultural production	32	44.7	6.4	42.6	6.4
10. Migrate to city for a paid job	12	38.9	0.0	61.1	0.0
11. Buy and store food and other necessities	76	37.5	2.7	55.4	4.5

Reasons (1): Recommended by neighbors/experts; (2) Recommended by Government; (3) own experience; (4) Elders did it
(Source: Household survey, 2013) n = 81

Table 5.4: Reasons for Female Respondents Choosing Adaptation Measures

Adaptation measure	No. answer	Reasons			
		Reason 1	Reason 2	Reason 3	Reason 4
1. Reinforce and repair house	31	3.2	16.1	64.5	16.1
2. Prepare a mean of evacuation	16	18.8	18.8	50.0	12.5
3. Plant tree along rivers/gardens	5	20.0	0.0	60.0	20.0
4. Cut and trim trees near the house	37	16.2	18.9	51.4	13.5
5. Move family members to safer place	6	16.7	16.7	50.0	16.7
6. Move livestock/items to safer place	2	0.0	0.0	50.0	50.0
7. Change crop patterns	18	16.7	5.6	72.2	5.6
8. Early harvesting (crops & aquaculture)	15	13.3	13.3	66.7	6.7
9. Diversify of agricultural production	15	6.7	6.7	73.3	13.3
10. Migrate to city for a paid job	6	16.7	16.7	50.0	16.7
11. Buy and store food and other necessaries	36	8.3	5.6	80.6	5.6

(Source: Household survey, 2013) n= 38

Women's adaptation strategies are mostly derived from their own experience and daily interactions with the environment in the fields they are most highly represented in, such as crop farming and animal husbandry. Accordingly, women respondents believe that their adaptation strategies in the field of crop farming and household consumption are mostly derived from their own experiences rather than from the recommendations of government or experts because the role of local government in these fields is very limited. Importantly, women's adaptation strategies are also based on the gender division of labor intra household, women's roles, and their socio-economic status. For example, women adapt well in the reproductive sphere and in diversification of their income sources because they are recognized as caregivers and home keepers. In addition, women in households that have limited livelihood activities (Groups 1 and 4) and those whose livelihoods are absolutely based on natural resources (Group 4), tend to diversify income sources well in order to adapt to the negative impacts of climate variability.

Table 5.5: Household's Livelihood Diversification - before and after storms

Unit: Percentage (%)

Items	**Group 1**	**Group 2**	**Group 3**	**Group 4**
1. Before/no storm-related effects				
+ Farming	100.0	100.0	100.0	-
+ Nursing	-	100.0	100.0	-
+ Fishing	-	-	100.0	100.0
+ Livestock rearing	75.0	83.3	66.7	63.6
+ Hired labor	75.0	33.3	16.7	63.6
2. After/storm-related effects				
+ Farming	100.0	100.0	100.0	-
+ Nursing	-	100.0	100.0	-
+ Fishing	-	-	100.0	100.0
+ Livestock rearing	83.3	96.7	91.7	90.9
+ Hired labor	91.7	91.7	87.5	100.0

(Source: Household survey in Thai Thuong and Thai Do communes, 2013)

In terms of storm-related effects, four household groups continue doing their existing work, the same as in the context of no storms. Households in Group 1 still do crop farming; households in Group 2 do crop farming and aquaculture nursery; households in Group 3 do crop farming, aquaculture nursery and fishing; and households in Group 4 do fishing only. The idea of "living together with storms and floods" is consistent in selected areas. These families also diversify their livelihood activities to maintain household survival and to increase income. Diversification of household income sources was made through income generating activities of family members, including men and women. Specifically, livestock rearing for both household consumption and for sale had expanded considerably in all groups, particularly in Group 4, whose livelihood absolutely based on "climate sensitive resources. Remarkably, in vulnerable situations, livelihood diversification trends go up significantly in the four groups. In which, engaging in paid jobs around within the villages/ communes was most popular.

In a few words, in the context of storms-related risks, local people practice a variety of adaptation activities to maintain and increase their income, including existing livelihood activities and new income generating activities. Adaptation strategies of different household groups, and of male and female respondents, were different due to their differently adaptive capacity and livelihood assets (as also discussed in Chapter 4). Furthermore, adaptation strategies of the households are mostly based on local people's knowledge and the experiences they practiced in the past rather than orientation, suggestion or support from local government. Adaptation strategies are generally spontaneous, with the support of self-help groups and mutual help among farmers within the villages.

Women's Adaptation Strategies and Gender Relations within the Household

The gender division of labor intra household shows that women are involved in both reproductive and productive work in the study site, even though gender stereotypes of women's work and men's work is quite clear in the communities. Noticeably, women are primarily responsible for housework and care work. In addition, they are economic actors, along with their husbands, engaging in all income generating activities around the household sphere. In terms of damages due to storms, women actively participate in diversifying

income sources of the household, including existing and added tasks in their spare time. From the economic perspective, women's status is increasing considerably although they are finding it harder to bear additional tasks. Women's role as "home keepers" and "caregivers" is ongoing, but women as "economic actors" is increasingly recognized. Two cases below are typical examples for the changing gender relations within household in times of storms:

In my family, my husband is the main economic actor even though I engage in many income-generating activities: crop farming, livestock rearing, and some paid work in my leisure time, after harvesting. Normally, he earns much more than me since he freely engages in many paid jobs inside and outside the village. Nevertheless, the situation has slightly changed in times of storm effects. Due to damaged crops and housing facilities, I practice recovery tasks more frequently in crop farming and the surroundings. In addition, I also increasingly engage in paid jobs around the village/commune to compensate for the income loss due to storms. By doing these works, I feel more confident because my earning is considerably contributing to the household existence, despite it being harder on me. (Married woman in a crop farming only household in Thai Do commune, 2013)

If the weather is favorable, my family's survival is absolutely based on the income of my husband's fishing activities. I just stay at home as home maker and rarely engage in available paid jobs in my commune. Unfortunately, when storms have landed, the fishing activities are postponed for at least two weeks. Hence, my family does not have any income; and meanwhile our fishing boat has been slightly damaged. The burden of food consumption for all family members is mostly put on my shoulders. I have to do any available paid jobs around the village/commune. I have no choice since I do not cultivate land or have any other livelihood asset. In this circumstance, I am an economic actor although I was not an earner before. Moreover, I freely decide to participate in the paid jobs, as well as daily consumption within the household. Of course, I feel that this situation is harder than normal; however, I also feel happy because I can support my husband in the responsibility of earning income. (Married woman in a fishing community in Thai Thuong commune, 2013)

Women are normally dependents in coupled households. The husbands are supervisors who earn the required money for supporting the household's survival and schooling for children. Hence, the husbands often dominate the wives in decisions around productive investment and even daily consumption.

Nevertheless, in times of damages due to storms, the women in the above cases are increasingly engaging in income generating activities; so, their roles are not only as home keepers, but also economic actors.

However, women's economic status is often lower than their male counterparts because the stereotypical view is of women's responsibility for household survival, and earning money is the men's responsibility. On the contrary, after storm damages and losses, women often decide to replant in the short term or change crop varieties in the long term (women in household's that cultivate crops belong to Groups 1, 2 and 3), after having discussions with their partners, in order to minimize the negative effects of the storms. Consequently, women's decision-making power within their sphere is changed in a positive way since they are more representative in decision making in the fields they interact with before and after storms. Hence, women continue to do the tasks they often do, but in the context of damage their roles are more highlighted and recognized.

In a normal situation, women's economic status is often eclipsed by that of men since their responsibility is not considered very hard. Nevertheless, in times of climate-related risks, the responsibility for household survival is much more difficult because livelihoods based on natural resources are heavily affected. Women in selected sites have to work much harder in different ways, as cited, to ensure the food security for all household members. Naturally, their role as "economic actors" is increasing respectively, particularly for women in the fishing community, as a result of their partners not having income in times of storm. Therefore, the women in this group become the main economic actors, fully caring for the existence of their households by engaging in many paid jobs around the village/commune. Therefore, in this case, women's decision-making power is closely linked to their economic roles intra household.

In the households that husbands are absent from, women as heads of household take on decisions in all aspects of reproductive and productive works. During and after storms, they have to work harder to recover from losses and increase household income. They are economic actors before and after storms, however, their roles after storms is more obvious. Of course, it means that women in this situation bear the burdens of existing tasks and added tasks without the support of partners.

Both women and men access natural resources to fulfill their tasks; especially land, water, mangrove forest, and marine resources on the shoreline. For women, they increasingly access the forest and marine resources to secure family livelihoods in times of damage and loss due to storms, by more frequently engaging in collecting and small-scale fishing for added income. In addition, women in crop and aquaculture farming households (Groups 1, 2, and 3) also access cultivated land more frequently after storms to recover paddy plots and replant damaged crops, or even practice new crops for next season. Not all women increasingly access natural resources after climate risks since some women in the fishing community do not own cultivated land. Hence, they engage in non-farm, paid jobs such as in the knit factory and small fish trading, rather than natural resources-based jobs.

Constraints on Women's Adaptation

Women in the study site actively adapt to climate variability. Nevertheless, there are many constraints on their adaptation strategies, including challenges in resource use, increasing workloads, social norms, time constraints and limited mobility to diversify income sources.

Challenges in Resource Use

A picture of women's livelihood in selected areas shows that their livelihoods are mostly based on natural resources, both in times of no storm-related and storm-related impacts. Alarmingly, natural resources in these areas are decreasing significantly due to environmental pollution, overfishing and poor management. Hence, access to natural resources for added income has been more difficult in recent years. Specifically, saltwater intrusion, along with over fertilization, has led to poor quality of paddy soil. Many respondents said that they feel the soil quality is not as good as before, so they have to invest more time in de-acidification by using lame and organic fertilizer (specifically the women in household's that cultivate rice/crops). In addition, marine resources along the shoreline are scarcer as the result of overfishing in the last decade and local residents have to collect resource 5-10 meters further than before.

> We have gleaned marine creatures to have added income for the past 20 years. About 10 years ago, everything was easier because marine creatures were available. We remember that

> we could easily glean crabs and oysters near the shoreline. However, the situation is changing. We still gather marine creatures now but it is difficult to gather near the shoreline; we have to travel longer, often 5 to 10 meters further from the coastline to glean. Personally, I feel that it is due to environmental pollution that is causing marine creatures to die, and overfishing as well. (FGD of women in Thai Do commune, 2013)

Increasing Workloads

Diversifying income sources to adapt to climate variability is not easy for women. It becomes worse when they have to bear the burdens of increased workload, including existing workloads and added work as a result of storm damage. The burden of increased workload is highlighted in households where the husbands migrate long-term for paid jobs (normally in Group 1). In those times of male migration, women have to take care of all the husbands' tasks, in addition to her own tasks. As a result, women's workloads considerably increase, including childcare, eldercare, housework, productive work, and the husband's work left behind.

> After a strong storm, the income of my household increased significantly. As the "housekeeper" I wanted to engage in new income generating activities to compensate income lost, however, the burden of my workloads and my husband's tasks that were left behind prevent me from income diversification activities. (Married woman aged 58, Group 1 in Thai Thuong commune, 2013)

The situation is not the same for women in the fishing community (Group 4). In the context of storms, they have the chance to engage in various income generating activities. Because residents in the fishing group do not have cultivated land, the burden of farm recovery is not put on their shoulders, as it is with women from crop and aquaculture farming households. Furthermore, the males in this village mostly stay inside the village to do fishing, so the females do not have to bear their partners' tasks. Thus, women in the fishing community, even though they work harder to secure their household's survival,

they are able to engage in income generating activities more freely than women in crop and aquaculture farming households.

Time Constraints and Limitations in Mobility

Due to the burden of added workloads, women in the study site face time poverty and limited mobility more regularly, particularly before and after storms. Interestingly, there is a close link between women's workloads, their time use and mobility to maintain livelihoods, and increase income. Accordingly, women tend to work more, so they often face time poverty as the time for relaxation and entertainment decreases considerably. As a circular consequence, time poverty prevents women from mobilizing to diversify their income sources. Ms. Lan's case is a typical example for this circumstance.

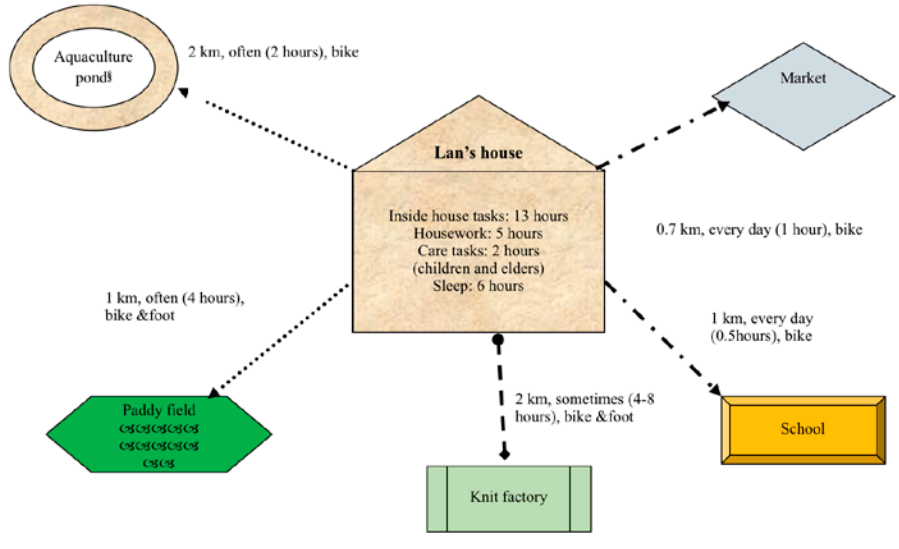

Figure 5.2: Lan's Daily Mobility before/no Storms

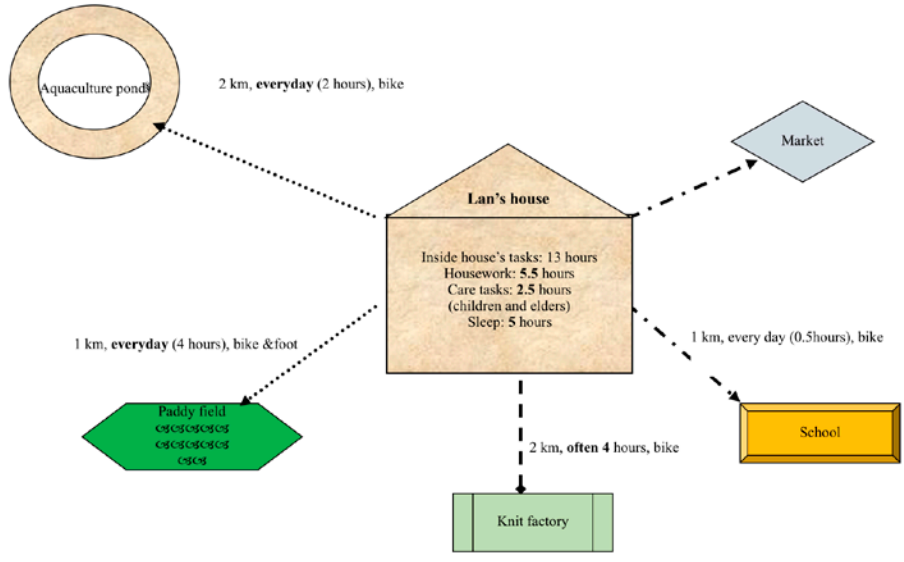

Figure 5.3: Lan's Daily Mobility after Storms

Ms. Lan aged 38, has two children: one is 14 and one is two years old. She lives with her parents-in-law, who are 68-years old. Her family practices crop and aquaculture farming (Group 2). Normally, Lan stays inside the home sphere for an average of 13 hours per day to do housework, care tasks, and entertainment. She spends one hour to go to the market for daily consumption, two hours on aquaculture farming, four hours in the paddy field, and a half hour to bring her children to school. In her spare time, she goes to the knit factory for a paid job.

Following storms, Ms. Lan still spends 13 hours inside the house but the time distribution for different activities has slightly changed. Specifically, the time for sleeping decreases by one hour since the time for housework and care work have both increases due to the negative effects of storms. In addition, Lan spends time on the farm (crop and aquaculture nursery farm) the same as before but she goes to the farm more frequently in order to repair damaged plots/ponds. Moreover, due to her family's income decreasing considerably after storms, she attends the paid job in the knit factory less. Lan said that she wants to spend more time at work in the knit factory (or any paid job around the village) but she did not have time for this work.

In this case, Lan's mobility has increased to perform existing and extra work. From the commune side, mobility to diversify livelihood activities can be limited or increased depending on the specific context. Those who have small babies may ask their parents for support in taking care of the children or they may consider sending their babies to a childcare center, even though it is costly for them (around 500,000VND/month [USD 25]). For those whose children are teenagers, the children may help them in cooking, housework, and taking care of the small babies. For widowed women and married women whose husbands migrate to the city and who have no support from their relatives, time poverty or time constrains affect their adaptive capacity and mobility.

Table 5.6: Women's Mobility Map

Situation	Destination	Reason	Frequency	Preference*
No storm	Market	Buy foods and items	Daily	3
	Rice farm	Peak season	Twice a day	1
		Take care of farm	2 days once	1
	Fishpond	Take care of farm	Daily	1
	Knit factory	Earn income	Spare time	1
	Mangrove forest Shoreline	Gleaning	Depend on tide calendar (7 times a month)	1
	Other farms	Earn income	Sometimes	1
Before storm	Market	Buy food and items to store during storm	Daily/twice a day	5
	Around home	Preparation tasks (reinforce the house)	All day	5

Situation	Destination	Reason	Frequency	Preference*
After storm	Market	Buy food and items		3
	Around home	Recovery damages/losses	All day	5
	Rice farm	Recovery damages/losses Restoration of damaged rice/crop	Twice a day	4
	Fishpond	Recovery from damages/losses	Twice a day	4
	Knit factory	Earn income	Any spare time	1
	Mangrove forest/ shoreline	Gleaning	Depend on tide calendar (7 times per month)	1
	Other farms	Earn income	Any spare time	1

(Source: FGDs in Thai Thuong and Thai Do communes, 2013)
Note: Preference: (1) really like; (2) fairly like; (3) so so; (4) fairly dislike; (5) dislike

The result of the FGDs in Thai Thuong and Thai Do communes on the "women's mobility" tool shows that, women, in general, travel for different purposes, during and after storms. Noticeably, women really like engaging in income generating activities both in times of no storms and times of storms. Because storms often cause serious effects on production and financial matters, women in all household groups dislike preparing tasks before and during storm (for example, going to the market or preparation tasks around the home). Generally, in terms of storms, women travel more frequently to (i) prepare for storms; (ii) recover and restore damages/losses (around the home sphere, on the rice farm, fishpond), and (iii) diversify income sources in order to compensate income losses (knit factory, other farms, mangrove forest/shoreline) after storms. Surprisingly, although increasing workloads push women into time poverty, they still travel more continuously and frequently to maintain and diversify income sources; it is only out-mobility that is limited for them due to their roles intra household.

Social and Cultural Norms

Vietnamese women are considerably affected by Confucian ideals and social norms. It might affect women's adaptation to climate variability in different ways. The married woman, aged 60, in Thai Do commune is a typical example. Reproductive work, housework, and care work are naturally understood as her responsibilities. The eldest daughter-in-law often takes care of sick parents-in-law, so she cannot engage in other income generating activities outside of her home. Another example is the married woman whose son migrates for paid work, but only enough for himself - he sends no remittances to his parents to ease their burden. Children think that the responsibility for household survival is automatically their parents' task, and so they work only enough to support themselves. As a consequence, care tasks and any work left behind are not thought of as their responsibility.

Besides social norms facing all women, widowed women are also affected by the traditional expectation of living alone and not remarrying. In this case, social norms that expect Vietnamese women to sacrifice for their children, push them into the burden of many workloads.

For one unmarried woman, similar to the case of the widowed WHH, the eldest son was involved in an accident and the eldest daughter voluntarily stopped studying to help her mother and take care her brother. Generally, daughters are more disadvantaged than sons, especially in poor households, due to traditional thinking which prioritizes sons. Hence, women and girls make many sacrifices so that their men can go out for finding jobs or so that they can take a rest. In this case, the daughter has sacrificed her study career for her brother's health. The underlying cause is an effect of the social norm to prefer sons and her action is tied in with this.

Chapter 6

Conclusion

Summary of Key Findings

Climate patterns, especially storms, have complicated expressions in Thai Thuy district of Vietnam, and coastal areas as well. The noticeable point is the irregular expression of storms in recent years, particularly in their increased frequency (14 storms in 2013), intensity (highest level is 14-15), and duration (storm season is now lasting from March through to November). These irregular expressions heavily affect the natural resources of coastal communities that have livelihoods that are based on "climate sensitive resources" such as crop farming, aquaculture nursery, and fishing are therefore significantly damaged. Specifically, the negative impacts of climate variability are decreased rice productivity and aquaculture output, degradation of roads and irrigation systems, and damage to houses and breeding facilities. When shelters are damaged due to storms, households whose livelihood activities are only based on crops (Group 1) are more vulnerable since their houses are more likely to be semi-permanent and non-permanent. In addition, means of production are also likely to be damaged; many of them destroyed. Noticeably, climate change, typically storms, cause not only physical impacts but also social vulnerabilities, including food insecurity, lack of income and resources and difficulty in accessing and diversifying alternative sources of income. In the same context of social vulnerability, all research respondents believed that climate variability

made it more difficult to access livelihood resources, as well as to diversify their livelihood activities. As a result, climate risks destabilize human life.

From the gender perspective, women in Thai Thuy district are particularly vulnerable to climate change due to the burden of increased workloads they bear, in addition to their existing tasks in the reproductive and productive spheres. These added tasks may not be as heavy as men's tasks; however, they push these women into time poverty and limit their mobility for diversifying income sources. Women in the selected areas are not vulnerable to climate risks in the same ways. In other words, women's vulnerability is linked to their socio-economic status and the adaptive capacity of their households. Generally, widowed and married women are more vulnerable than unmarried women, due to their responsibilities to maintain their household's survival after storms.

As result of the gender division of labor intra household in selected areas, housework, chores and care work are recognized as the women's responsibility. Therefore, women are over-represented in these tasks, even though all family members may be involved. In the context of storms, reproductive work increases considerably, so women have to take on more workloads, including recovering surrounding areas, taking care of sick people, collection of water and food, and recovering damaged farm plots. Women in the crop farming groups (Groups 1, 2 and 3) found it harder to fetch water for crop cultivation, as they had to during floods. In addition, women interacted more with the environment in the crop farming field: they are more vulnerable to the negative impacts of storms than their male counterparts because of the increased tasks that they bear, such as harvesting of damaged crops, reparation of damaged plots, and crop replanting. Thus, they have to invest more time and energy to implement these added tasks. Among women, widowed and other WHH are more vulnerable than unmarried and women as members of MHH since they have to take on these tasks alone or with little support from other family members.

Compared to women in households who do only crop farming (Group 1), women in households who do crop and aquaculture farming (Groups 2 and 3) are more at risk since aquaculture farming is the most vulnerable field to storms in the coastal community. Although women are not active agents in this field, they have the responsibility for rectifying household income loss, as well as the responsibility to obtain credit for the new nursery season, in company

with their partners. The burden of preparation (including fishpond reinforcement) and recovery tasks are put on the shoulders of widowed women and WHH without any help from partners. In this circumstance, these women have to spend more time, energy and money. Thus, it is much harder for women in these cases to manage all of the associated tasks. For women in the fishing community (Group 4), although they do not have cultivated land and they do not bear added tasks related to crop and aquaculture farming before and after storm-related risks, they are still vulnerable to storms. This is illustrated through their worries over debts they have and the unreturnable capacity when their boats are damaged or when there is no fishing activity due to storms. Women in the fishing group recognize that they are more vulnerable than women in households that do crop and aquaculture farming.

Due to the double-burdens of reproductive and productive tasks during storms, women in general face time constraints and limited mobility. The increased workload after storms restrict women from participating in new income generating activities, particularly those that have little or no support of partners or family members. Nevertheless, women in the study site were active agents in adaptation strategies both before and after storms landed. Specifically, before storms, women primarily prepared food, drinking water and other necessities for household consumption during and after storms, along with other family members. In households that do crop cultivation (Groups 1, 2 and 3); women often decided to harvest early, in order to avoid damage associated with heavy rain and floods. In households that practice aquaculture farming, WHH (including widowed women) perform some tasks that are often thought of as men's tasks, to minimize adverse impacts of storms, including fishpond improvements and installing meshing around the pond in order to prevent fish from escaping when the water overflows. When storms are over, women engage in recovery tasks on and around the farm, except for women in fishing community.

In the long term, women in Thai Thuy district adapt to irregular expression of storms in various ways according to the fields that they are more represented in. For example, women in households that do crop farming are actively engaged in changing farming practices by changing crop calendars and crop varieties. All family members may engage in this work but women primarily decide on the new practices. They apply this adaptation measure in order to increase productivity and resistance, and minimize negative effects of

irregular storms. Married women in households that nurse aquaculture did not do much in adaptation to climate-related risks since their male counterparts dominate in this field. Moreover, the recovery tasks and preparation for new culture require physical strength.

Women in Thai Thuy district actively engage in adaptation strategies not only to maintain their livelihoods, but also to increase household income by diversifying their sources. Among women in different livelihood settings, women in households that do crop farming only (Group 1) more freely engage in income generating activities around the village/commune since they don't have as much burden of increasing work as those in households that do both crop and aquaculture farming. Women in Group 2 actively engage in paid jobs to maintain their living standards and to earn a higher income. Although they bear more of a burden in terms of increasing workloads after storms, it is not accurate to say that they are more disadvantaged than women in Group 2 when diversifying their income sources. Actually, the men in Group 2 rarely migrate to cities for paid work, so they are available to support their women counterparts in crop farming and aquaculture nursery. Hence, in this case, it is only widows in Group 2 that are more obviously limited in engaging in paid work. For those in Group 3: they also engage in occasional paid work in the village/commune, and they should be considered as more disadvantaged than women in the remaining groups due to the burden of added workloads in both crop and aquaculture farming. They have to work harder and spend less time on recreation. Noticeably, women in the fishing community are more financially vulnerable during times of storms, so they tend to work harder to compensate for any income loss. Moreover, their responsibility for food consumption is heavier than others, so the burden of maintaining their household's existence is harder for them. Consequently, besides engagement in paid work around the commune, women in the fishing community also participate in small-scale fish trading. Moreover, with no land to cultivate, women in the fishing community more freely engage in income generating activities than those in the other groups. Interestingly, there is no marked difference among women of different marital statuses in this case since the men's role as breadwinner is not obvious during storms.

Therefore, in times of irregular storms, women in the selected areas are generally vulnerable to damage, loss, burdens of increased workload and debt. Fortunately, the vulnerabilities do not push them into desperate situations,

rather they promote them to take on a variety of measures in order to adapt to climate variability. By doing this, gender relations intra household have changed in positive ways. Women position as economic actors is reinforced, going beyond that of women as "home keepers" and "caregivers" only, especially for women in the fishing group. In addition, in coupled households, women's voices have been amplified though their decision making in both reproductive and productive fields. Normally, it is men who are the decision makers; women are money keepers and make decisions about food consumption. In times of damage and loss related to irregular storms, women primarily make decisions on crop farming and livestock rearing. For example, they decide to apply new farming practices and to cultivate new crop varieties in order to adapt to storms and climate variability (women in Groups 1, 2 and 3). Moreover, by performing these adaptation activities, women access natural resources more frequently, especially land, water, and marine resources. Hence, even though the associated increased workload makes women work harder, their role in the family becomes more important.

Conclusions

Climate variability, particularly irregular storm, causes serious impacts on Thai Thuy district and its local residents. Livelihoods based on "climate sensitive resources" were significantly affected. Some authors reveal that vulnerability in particular areas is closely correlated to the low adaptive capacity of local people, and intersects with extreme poverty and other types of inequalities (IPCC, 2001). On the same line of thinking, Nelson also recognizes that women in the developing world are more reliant on "climate sensitive resources", and thus have lesser adaptive capacity in general (2008). The results from the study also indicate that the vulnerability of women is closely linked to their adaptive capacity. Accordingly, women in the study site actively adapt to climate risks by taking on a range of adaptation strategies before and after storms. The livelihoods of women in coastal communities absolutely depends on natural and marine resources. In addition, they face the burden of increasing workloads associated with income losses, and tend to work harder, travel more frequently to implement their tasks during times of storms. For WHH, it is more difficult to diversify income sources since their roles and responsibilities intra household are heavier.

One interesting point is that after the climate risks have passed, women access natural resources more frequently and for longer, particularly those who own cultivated land. Evidently, they work on the damaged farm for longer and more frequently (twice per day) to recover crops and fishponds (women in Groups 1, 2 and 3). In addition, in cases of income loss, the women who are strong enough and of reproductive age tend to go to the mangrove forest or along the shoreline for gleaning crabs, shrimp and oysters. Noticeably, it does not mean that all women in the study site respond to income loss in the same way. The findings show that women of different socio-economic backgrounds take on different adaptation strategies. Specifically, for women in the fishing community and WHH: their adaptation activities are more diverse because their responsibility for household survival is more obvious than those women in MHH and crop farming households. This finding helps to clarify the theoretical and factual situation that the more vulnerable women are to climate risks, the more livelihood adaptation strategies they have; and the more responsibility they have for household survival, the more livelihood adaptation strategies women will make.

The remarkable result of the study is the illustration of the considerable change in gender relations intra household through women's adaptation process. The interesting change in gender relations is women as "economic actors" is increasingly recognized as a result of the many income generating activities they engage in after storms. Of which, the most obvious change is for women in the fishing community. Usually, they are purely home keepers; however, in the context of storm damage, women in the fishing group actively participate in a variety of income generating activities around the village/commune and become the main income earners in their family. Moreover, women are decision makers in the productive field and are gradually recognized through their adaptation strategies. Accordingly, women who do crop farming primarily make decisions regarding the types of varieties that should be replanted, early harvesting, and changes in the crop calendar. Additionally, women in the fishing community seem to have more decision-making power in terms of participating in income generating activities and household expenditures.

Regarding mobility in the context of disasters, women often travel to implement daily tasks, including reproductive and productive work. In the context of storms and climate risks, women also mobilize to perform these

workloads; however, they mobilize more frequently and for longer. This is due to women's roles having changed, increasing the responsibilities that they bear. When livelihood assets are threatened, the means to diversify livelihood activity is also affected; women have to spend more time or more effort to ensure the survival of the household. Women in the fishing community travel more frequently when there are no storms, since they have go to many places for income generating activities (such as the knit factory, local market, mangrove forest or shoreline). For women that do crop and aquaculture farming, besides travelling to diversify income sources, they also travel more frequently (two times per day) and for longer (6-8 hours on the farm) to restore/recover damaged rice plots and fishponds.

All in all, during extreme weather events such as storms and floods, women of different statuses and household conditions tend to work more, contributing to the livelihood security of their households. The women in the study site are disadvantaged and active in adaptation strategies in different ways, according to their different marital status and livelihood settings. Specifically, in the context of marriage status, widowed women and WHH are more vulnerable, but are also very active in adapting to climate risk compared to those who live in MHH, even if they have little or no support from their partners. Consequently, they are more disadvantaged than those who have support from male counterparts. In terms of adaptive capacity of the households, women in households that do fishing suffer from the burden of debt and income loss more than women in households that do crop and aquaculture farming since they are primarily saddled with the responsibility of the existence of the household. Furthermore, from the livelihood angle, women in households that have many livelihood activities (Groups 2 and 3) are more vulnerable to income loss and increasing workloads (recovery/restoration from damages and loss because both crop and aquaculture farms are damaged or destroyed) in times of storms. Furthermore, they also actively engage in seasonal paid jobs in any spare time that they have. Ultimately, however, women's roles in different household backgrounds are increasingly highlighted, particularly through adaptation strategies during times of climate-related risks.

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Index of Key Terms and Subjects

Women and Livelihood Adaptation to Climate Change

in the Coastal Areas of Thai Thuy District, Vietnam

Do Thi Diep

This volume examines the vulnerability and adaptation strategy of women of different marital statuses and livelihood settings in a coastal area of Thai Thuy district of Thai Binh province in the Red River Delta region of Vietnam. Women are often recognized as especially disadvantaged and vulnerable to climate-related risks. Over 100 farmer households and 30 women and men of different livelihood settings were chosen to test the vulnerability and adaptive capacity of women and men of different social and economic backgrounds. The first result of this research reveals the vulnerability of women in different marital status and livelihood settings. Accordingly, women in households that have livelihoods based on "climate sensitive resources" are more vulnerable to burdens of increasing workloads, credit shortages, and food insecurity. Among women of different marital statuses, widows and women-headed households are more disadvantaged than married and unmarried women due to the absolute responsibility for household survival that they bear. This research then identifies women's adaptation strategies according to their vulnerability. As a result, women in general adapt well to climate risks by actively engaging in a range of adaptation activities in order to maintain and increase their income. The results also show that women of different status adapt to climate variability in different ways.

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