

COPING WITH GOLDEN FORESTS AND BLUE REVOLUTIONS: LIVELIHOODS
VULNERABILITY IN THE MEKONG DELTA, VIETNAM

by

JESSIE KIMMEL FLY

(Under the Direction of Ted L Gragson)

ABSTRACT

When the Government of Vietnam initiated a series of reforms in 1986 to create a “socialist-oriented market economy,” its goals were rapid yet sustainable economic growth, national stability, and a decent standard of living for all its citizens. The most highly publicized outcomes of reform to date have been remarkable economic growth accompanied by dramatic decreases in national poverty rates. Less attention, however, has been given to the negative consequences of reform-era policies, particularly in marginalized regions of the country. This dissertation uses the Sustainable Livelihoods Framework to guide understanding of the creation of differential vulnerability in a small community on the eastern coast of the Mekong Delta. The dissertation traces that process from the policy changes that most affected the coastal region, the encouragement of shrimp aquaculture in the early 1990s and then retroactive mangrove forest conservation in the early 2000s, to household-level food insecurity. Coastal development has changed the distribution of resources in the area, created a local economy dependent on an unsustainable economic activity, and altered the ways in which households cope with stresses and strains on their resources. As households fall farther and farther into debt because of failing shrimp ponds and few other economic options and nearly an entire generation of young adults

migrates out of the village in search of better opportunities, certain types of households have become particularly vulnerable. This dissertation identifies households displaced and resettled by a coastal conservation project and elderly-only households as disproportionately vulnerable to economic stress, contributing to greater reliance on erosive coping strategies, decreased household incomes, and greater food insecurity. In a country that will almost certainly be severely affected by global climate change, it is important to identify vulnerable populations and understand the mechanisms that create that vulnerability.

INDEX WORDS: Vietnam, sustainable livelihoods, vulnerability, economic reform, food insecurity, shrimp aquaculture

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DEDICATION

I dedicate this dissertation to Ms. Lọt's youngest daughter, who taught me that you don't need much besides a scrap of paper, a pencil, and some curiosity about the world.

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CHAPTER 1

INTRODUCTION

Introduction

Near the end of my year of fieldwork in a small coastal community in the Mekong Delta region of Vietnam, I sat down with my research assistant for a formal interview. Thúy, a 24-year-old woman, who was born and raised in an inland, rice-growing village approximately 100 kilometers from where we now sat, had accompanied me that year on hundreds of interviews. I asked Thúy to compare life in her village to life in the village in which we had been living for the last ten months and to describe any differences that surprised her. She immediately exclaimed, “No choices!” and then elaborated:

I go home to my parents and I tell them that I can't believe how poor the people are on the coast. We are not so rich in Càng Long, but the life is not so hard. In Càng Long, there are many choices. People can raise cows or they have rice. They grow coconuts, which have a good price, and all kinds of fruit. Usually, when people have rice, they buy the fertilizer on credit. When they harvest, they pay the money back to the shop. But here, it seems that people have no choices. They just have aquaculture, and they borrow money from the bank for aquaculture. And the reason they continue to borrow more and more money is because they lose. They always lose with aquaculture. But in Càng Long, people can get a lot of money by rice. If not, they still get a little money. Seldom do people lose everything with rice.

In 1986, the government of Vietnam announced the beginning of *Đổi Mới* (literally, *new change*), an era of transition from a Soviet-style, centrally-planned economy to a market-based economy. Over the last 25 years, rapid and dramatic policy changes have resulted in the decentralization of Vietnam's economy, the dismantling of collective agriculture, and the

redistribution of farmland to individual households. Following this, the country has undergone an incredible turnaround, from one of the poorest countries in 1985 to one of the fastest growing economies in the world today. While Vietnam's successes have been heralded as "miraculous," Thúy's comment highlights the fact that not all segments of the population have benefited equally from the reforms and policy changes. In fact, in the coastal regions of Vietnam, it is the rush to develop, the retroactive pressure to conserve natural resources, and the conflict between these two actions that is preventing many from appreciating the benefits of the free market system.

In the 2002 film adaptation of Graham Greene's 1955 novel, *The Quiet American*, the voiceover during the initial scenes of 1950s, pre-war Saigon states, "They say you come to Vietnam and you understand a lot in a few minutes, but the rest has got to be lived." When I first arrived in Đông Hải Commune, a tiny dot on the map of the eastern coast of the Mekong Delta, there was a lot to understand within the first few minutes about Vietnam's recent explosive economic development and the extent of its reach into remote, rural areas (see Figure 1.1). The town center/market area of Đông Hải was choked with the diesel exhaust fumes of hundreds of newly-purchased, Chinese-manufactured motorbikes. Children's empty juice boxes and the plastic wrappers from all manner of pre-packaged food items littered the roadsides. Young adults sat in hastily-erected thatch shacks, peddling Mobifones and SIM cards. Vietnamese soap operas and advertisements for vacuum cleaners and skin-whitening creams blasted from inside concrete and *Nypa* palm houses alike. Rural government officials smiled broadly and pointed to concrete motorbike paths, power lines, and the new health center up the road and proclaimed, "The life is better now." Some citizens of Đông Hải, a fishing and shrimp-farming community of 5000 people, agreed.

However, for a year in 2007 and 2008, Thúy and I sat on low plastic stools and, over countless cups of weak green tea, listened to stories of disappointment over failed opportunities

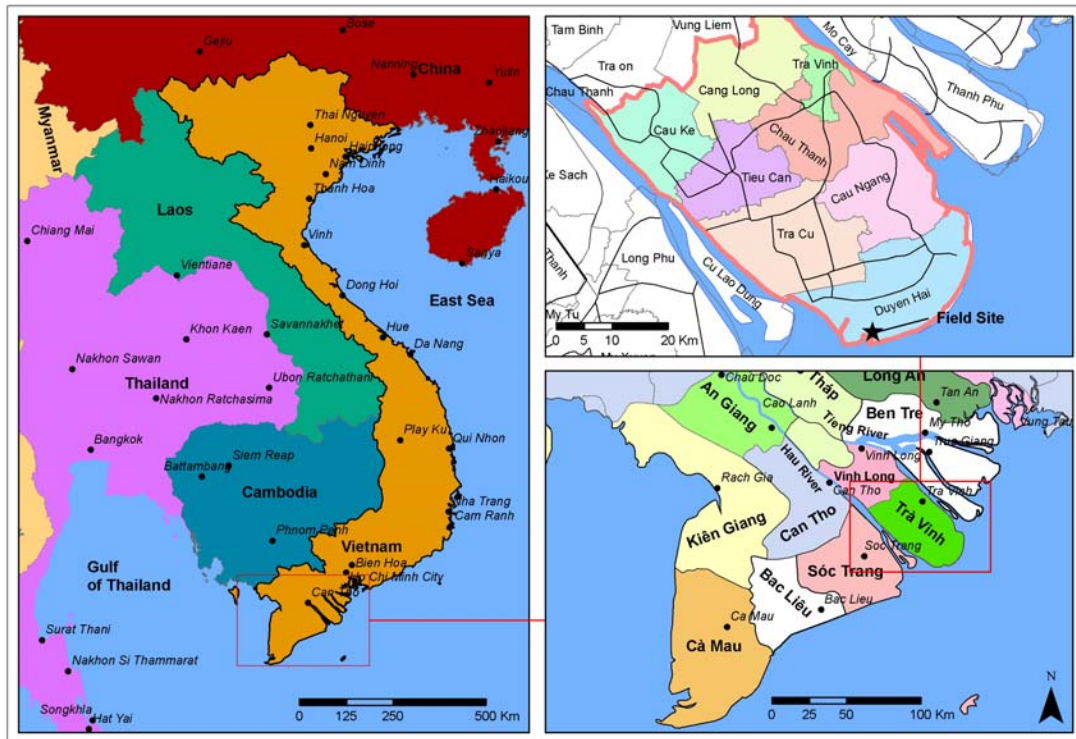


Figure 1.1 Map of fieldsite in Đông Hải Commune, Duyên Hải District, Trà Vinh Province, Vietnam

to make a better life, limited options for effecting change, and anxiety over an uncertain future. It took more than a few minutes in Đông Hải to see and understand the flipside of cell phones, motorized transport, and television sets – failing shrimp aquaculture ponds, unproductive soil, dangerously fluctuating market prices, and mounting debt. The same government policies that have ushered in a new age of growing wealth, integration into markets, and consumer goods

have also created livelihood vulnerability for certain segments of the population, particularly in geographically, environmentally, and economically marginal regions like Đông Hải. The main argument of this dissertation, therefore, will be that the economic and environmental legacy of development during the *Đổi Mới* era in Vietnam has constrained the choices necessary for households to construct viable and sustainable livelihoods in marginal areas.

A Brief History of Đổi Mới

Beresford (2003) and Hardy (2003) point out that the Sixth Party Congress' December 1986 announcement of economic renovation did not bring about an abrupt change for Vietnam and its people. Rather, the announcement was merely the Communist Party's acceptance and institutionalization of trends already sweeping the country. It was an acknowledgement of growing discontent as a result of the economic disasters set in motion by the country's previous economic reform in 1954. In that year, the Geneva Accords ended French colonial rule in northern Vietnam and granted the Democratic Republic of Vietnam (DRV) control over half of the country, north of the 17th parallel. From 1958 to 1960, the DRV worked to implement a Soviet-style socialist economy in North Vietnam and, in 1959, a Chinese-style cooperative model of agriculture. In 1960, the Third Party Congress met and proposed the country's First Five Year Plan to be implemented between 1961 and 1965. This mandate made private sector activity illegal and eliminated markets. At precisely this time in Vietnam's economic history, Beresford (2003) writes, the country also developed an "outside," second economy, or black market.

Cooperatives were successful at providing equitable social benefits, such as education and healthcare, evidenced by Vietnam's high rankings on many social indicators (e.g., life

expectancy, fertility and mortality rates, literacy) despite being one of the poorest countries in the world. However, “cooperative production stagnated in the long term and egalitarianism became a case of ‘shared poverty’ rather than rising overall living standards” (Beresford 2003:58).

Because market prices were higher than government-set prices under this regime, there was no incentive to increase output or productivity on collective farms and farmers devoted more effort to their household production plots than to their collective duties. The black market flourished and the country’s surpluses and food stocks declined, a situation that was only exacerbated by reunification in 1975, as Southerners were generally resistant to collectivization.

Hardy (2003) writes of reunification as a “turning point” in the economic history of Vietnam and the end of the war as a “military and political victory of the North” but an “ideological and commercial victory” for the South (116). The failings of collectivization and a centralized economy became more and more apparent. The Third Party Congress met again and implemented the Second Five Year Plan (1976-1980), which maintained or increased imports of investment goods and decreased imports of raw materials for domestic production. In 1979, a massive natural disaster caused Vietnam to more than double its imports of rice and other cereals and many citizens, particularly in the North, went hungry. Following this event and the resulting peasant revolts and general discontent, the Communist Party agreed to implement gradual reform. It began by partially decentralizing foreign trade and by permitting collectives to allocate some cooperative farmland to individual households and individuals to sell surplus on the free market (Beresford 2003). Farmers were still required, however, to meet production quotas set by cooperatives. Decree 10 (1981) attempted to increase agricultural output by implementing a contract system, in which cooperatives contracted rice and cash crop production to individual

households on a seasonal basis (Le & Sikor 1996). Kerkvliet (2005) adequately describes the outcome of Decree 10:

After a few years of the product contract arrangement, many villagers in the [Mekong] delta were frustrated. They had their own fields, which they had long sought, but they did not *really* have them. They wanted to farm those fields as their own, but they could not *really* do so. They and their fields were in an organization that they should have run but did not, an organization that was meant to help them farm but usually did not or could not. That organization, the collective cooperative, was not only often useless but cost them a significant proportion of what they produced. To some extent this quandary was their own making. Few did their collective work well, thereby contributing to the organization's problems and thwarting leaders who tried to make the product contract arrangement effective. But, people wondered, how could they work diligently when they could not rely on everyone else – including their own leaders – to do the same, when they received but a small fraction of the increases they produced, and when the cooperative and state agencies took sizable amounts but gave them little in return? (208; italics in original)

“In summary,” Kerkvliet concludes, “the situation ... by 1983-1985 was that, for most villagers, sticking to the product contract arrangement was not only undesirable but impossible” (2005:17).

In response to these economic disasters and popular discontent and through a series of new laws and reforms that placed a priority on producing agricultural surplus and on transferring decision-making power from collectives to households, “Vietnam transformed itself from an economic ‘basket case’ into one of the most successful countries in the world in terms of economic growth, poverty reduction, and increased household welfare” (Glewwe 2004:1). In 1987, the government enacted the Foreign Investment Law, which allowed 100 percent foreign ownership, tax holidays, and other incentives for foreign investment. Resolution 10 (1988) began the decollectivization of the countryside. Cooperative land was distributed to individual households, household contract periods were lengthened to 15 or 20 years, government quotas were abolished, and all agricultural output could be sold at market prices (Le & Sikor 1996). Finally, the 1993 Land Law guaranteed a bundle of property rights to individuals – exchange,

mortgage, transfer, rent, and inheritance – increasing crop production and enhancing tenure security.

Adger et al. (2001) write, “The basis of the [Vietnamese] government’s development strategy is to create an enabling environment of sustainable high economic growth, political, social, and economic stability, and equity (a decent minimum standard of living and equal opportunities for all), thereby helping the people to help themselves” (12). An international community of policy makers waits breathlessly to see if the country’s market transition will ultimately prove to be a success and if the country’s success to date will be sustainable. A number of aggregate statistics have been put forth to indicate Vietnam’s amazing achievements in fulfilling, or making strides towards fulfilling, these goals since the beginning of economic reform in 1986. For instance, Vietnam was one of the world’s five poorest countries, with a GDP per capita in 1985 of just \$130 per year and an inflation rate in 1986 of 487%. By 2000, however, per capita GDP had nearly doubled and the inflation rate was dramatically reduced to -1.6% (Glewwe 2004). In 1989, Vietnam transitioned from a net importer of rice, the country’s main staple food, to the third largest exporter of rice in the world¹, and as of 2005, the second largest exporter of *Robusta* coffee (D’haeze et al 2005). Rama (2008) claims that Vietnam has experienced “one of the fastest reductions in poverty ever documented” (9), with poverty rates² of approximately 75% in 1984 and 37.4% in 1998 (Glewwe 2004).

All scholars are not so quick to congratulate Vietnam and proclaim these numbers a triumph of capitalism. Rather, some researchers have looked beyond the aggregate statistics to identify those segments of Vietnam’s population not represented by the optimistic numbers.

¹ Today, Vietnam remains the third largest rice exporter after Thailand and India.

² Glewwe (2004) uses the following definition of poverty rate: “Consumption expenditures were insufficient to purchase a basket of food items that meet minimal caloric requirements (after allowing for purchase of nonessential food items)” (6).

Justino and Litchfield (2002) use data from the 1992-93 and 1997-98 Vietnam Living Standards Survey to argue that the reductions in poverty brought about by the economic transition have not benefited all equally. This study indicates that transition policies led to benefits for households with members employed in the main export sectors (seafood, food processing, textiles, footwear), but the benefits were significantly less for households engaged solely in rice production. Additionally, despite the drastic decrease in Vietnam's poverty rate cited above, Justino and Litchfield note that "the economic reforms have not prevented some households from falling into poverty" (2002:31). According to the results of their study, those households most likely to have fallen into poverty between 1992-93 and 1997-98 were households in remote areas, ethnic minorities, large households, households with low levels of education, and whose main source of income came from the agricultural sector. Similarly, with the recent move toward privatization of education and healthcare, the quality of the "free" services has declined and the availability of these services in rural and poor areas of the country has been reduced (Tran & To n.d., Bryant 1998).

Some attention has been given to nutrition in Vietnam, with a number of researchers noting that persistently high levels of child malnutrition are inconsistent with the country's falling poverty rate and other positive social indicators, such as high life expectancy, high literacy rates, high education levels, growing GDP, and falling fertility (Baulch & Masset 2002, Haughton & Haughton 1997). Although 30% of all children in developing countries younger than five years old were stunted (low height for age; a sign of chronic malnutrition) and 39% of all children in the "least developed" countries younger than five years old were stunted, in 1993, 50% of Vietnamese children younger than five years old were stunted (Glewwe et al 2004). That study further shows that household income growth accounted for only a small proportion of

improvement in child nutrition. Thang and Popkin (2003) report that children from rural households have a 17.6% greater prevalence of malnutrition than children from urban households; children from poor households have a 10.9% greater prevalence of malnutrition than children from non-poor households; and children from ethnic minority households have a 14.1% greater prevalence of malnutrition than children from Kinh (the ethnic Vietnamese majority population) households. Furthermore, these researchers report that, “in 1997, the prevalence of stunting among children from 0-5 years old from the poorest quintile was about 250 percent higher than among those from the richest quintile” and “the rate of decline between 1992 and 1997 in stunting has been the greatest among households in the richest quintile, and amounts to more than double of that observed in households in the poorest quintile” (Thang & Popkin 2003:408-409). Finally, Thang and Popkin (2004) show that, while the total nutrient intake for all Vietnamese increased between 1992-93 and 1997-98, the increase was significantly slower for poor, rural, and ethnic minority populations, and those populations consumed significantly fewer calories from protein sources than wealthy, urban, and Kinh populations. These dissenting voices point out that, despite the awe-inspiring aggregate statistics, vulnerability in Vietnam is socially differentiated. The likelihood of an individual or household suffering because of a livelihood stress is variable across space and time, and much of this differential vulnerability has been created by policies and processes related to economic reform.

Vulnerability and Sustainable Livelihoods

Much of the literature on vulnerability has grown out of the practical need to effectively identify and target populations or individuals within populations that are most vulnerable to hazards and other livelihood stressors. Watts and Bohle (1993), for instance, presented a model

to identify the causal structure of hunger and famine. While poverty is linked to vulnerability, not all poor people are equally vulnerable. Vulnerability, these authors argue, involves the risk of exposure to stress, the risk of inadequate coping mechanisms, and a risk of a limited capacity for recovery. A tripartite structure, combining entitlement (command over food; Sen 1981), empowerment (state-public relations), and political economy (historical class relations), creates the “space of vulnerability” and provides a theoretical framework for understanding the differential vulnerability found among the world’s poor.

Blaikie et al. (1994) developed a model for understanding disasters, situations in which natural hazards (e.g., floods, droughts, earthquakes) produce human suffering. These authors argue that disasters occur because of increasing pressure on people from their own vulnerability and from the physical threat of hazards. They outline a chain of explanation for the creation of vulnerability, from root causes, which reflect the distribution of power and resources in society, through dynamic pressures, which translate the effects of root causes, to unsafe conditions, how vulnerability is expressed in space and time. Dynamic pressures, mediating between root causes and unsafe conditions, include population growth, rapid urbanization, international financial pressures, land degradation, global environmental change, and war.

While the recognition of the structural causes of differential vulnerability has been crucial to designing more effective aid interventions, the shortcoming of these models is that human agency often vanishes from the analysis (Oliver-Smith 2007). In an effort to both identify differentially vulnerable individuals and households within a community and to understand the mechanisms at play in creating that vulnerability, linking structure and agency, I use the Sustainable Livelihoods Approach (SLA)³ as a guiding framework for my analysis of the effects

³ The SLA is widely attributed to Chambers (1987) and Chambers and Conway (1992), those papers heavily influenced by Sen’s (1985) idea of “capitals and capabilities.”

of *Đôi Mỏi* in Đông Hải Commune. By focusing on “what the poor have rather than what they do not have” (Moser 1998:1), this approach allows me to analyze vulnerability according to the choices available to people to meet their needs and to examine the constraints on those choices at various scales.

Figure 1.2 is a reproduction of Allison and Horemans’ (2006) graphic representation of the Sustainable Rural Livelihoods Framework, adapted from similar depictions of the framework in Chambers and Conway (1992), Scoones (1998), and Carney (2002). This framework demonstrates that an individual’s or a household’s livelihood “portfolio,” a specific and constantly-changing group of activities pursued in order to make a living, is the product of a number of mutually influential endogenous and exogenous factors and that, in turn, the portfolio itself influences the very factors that created it. To construct this portfolio of livelihood activities, individuals or households (depending on the level of analysis) begin with a range of assets available to them – “what the poor have” (#2 in Figure 1.2). These assets include: (1) natural capital, or natural resources; (2) physical capital, the basic infrastructure and equipment people need to pursue various activities; (3) human capital, the skills and knowledge people need to have in order to pursue various activities; (4) financial capital, money or easily liquefiable possessions, such as livestock or jewelry; and (5) social capital, the social networks and relationships people can draw upon to pursue various activities and cope with hard times. (For further discussion of types of capital, see Bebbington 1999, Ellis 2000, or Igoe 2006.)

Access to these different types of capital is helped or constrained by “policies, institutions, and processes” (#3 in Figure 1.2). Giddens (1979) defines institutions as “regularised practices (or patterns of behavior) structured by rules and norms of society which have persistent and widespread use,” and these might include national or local laws, religious

customs, gender inequality, development programs, market liberalization, etc. Concurrently, an individual's or household's possession of certain types and amounts of capital will influence the person's or family's experience of policies, institutions, and processes, and those structural factors shape the "vulnerability context" in which individuals and households operate (#1 in

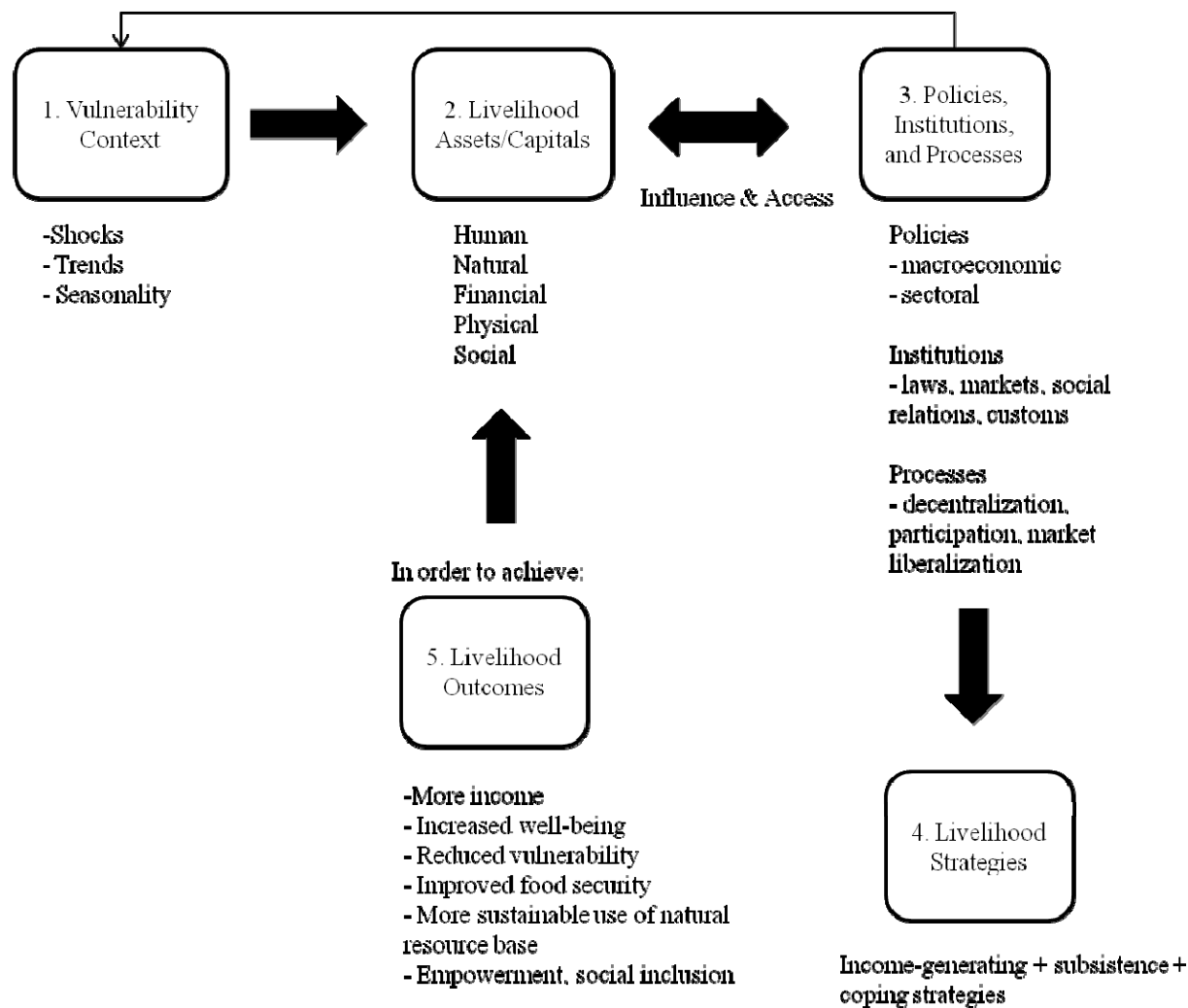


Figure 1.2 Rural Livelihoods Framework (Allison & Horemans 2006:759)

Figure 1.2). The vulnerability context is composed of "external factors ... comprising cycles (e.g. seasonality), trends and shocks that are beyond the household's control" and change access

to capital assets, thereby placing stress on the sustainability of the livelihood portfolio (Allison & Horemans 2006:759).

The particular combination of strategies that makes up a livelihood portfolio (#4 in Figure 1.2) at any one time is meant to generate an adequate standard of living and to fulfill other goals of the individual or household (Ahmed et al. 2008). An important point for development researchers is that livelihood strategies provide not just the fulfillment of short-term goals – immediate increase of income or satisfaction of caloric requirements – but long-lasting security and reduction of vulnerability to seasonal/cyclical livelihood stress and unexpected shocks. Allison and Horemans (2006) write, “A livelihood is sustainable if people are able to maintain or improve their standard of living related to well-being and income or other human development goals, reduce their vulnerability to external shocks and trends, and ensure their activities are compatible with maintaining the natural resource base” (759). Therefore, these authors suggest potentially measurable outcomes of a sustainable livelihood: more income, increased well-being, reduced vulnerability, improved food security, more sustainable use of the natural resource base, and empowerment and social inclusion (#5 in Figure 1.2). Similarly, in his version of the rural livelihoods framework, Ellis (2000) breaks the outcomes of livelihood strategies into two categories: livelihood security and environmental sustainability. In other words, a sustainable livelihood portfolio should provide resilience in the face of livelihood stress (either resistance to the stressors involved in the vulnerability context or the ability to recover quickly and with no lasting damage) and should use natural resources in such a way as to not diminish their availability for future generations.

I contend that the vulnerability of a household is contained within its livelihood portfolio and represents the risk that the various components of the portfolio will fail to fulfill the goals of

the household when faced with stress or shocks, thereby resulting in undesirable livelihood outcomes. There are three main categories of strategies, activities, and behaviors that make up livelihood portfolios: income-, or cash-, generating activities; subsistence activities, in which people provide themselves and household members directly with food and other necessities; and coping strategies, short-term responses to immediate crises (Lambert 1994). To thoroughly analyze differential vulnerability in a community, one must assess the viability and sustainability of the range of activities and behaviors contained in these portfolios, which is shaped by structures, institutions, and processes and personal choices and priorities.

The income-generating and subsistence strategies in which the members of a household engage should be sufficient to meet the household's goals under "normal" circumstances. When livelihood stress (e.g., unfavorable climatic conditions for a main income-generating strategy, illness of a family member, rise in the price of a food staple) assaults the household and the portfolio is vulnerable to that stress, household members must resort to coping strategies to continue to meet needs and goals. At times, coping strategies are very difficult for researchers and even the household members themselves to identify, either because "normal" circumstances have shifted or because coping strategies are merely intensifications of activities in the portfolio already. These are some of the critiques of using coping strategies to monitor food security (Lambert 1994).

However, many researchers have demonstrated that individuals and/or households resort to coping strategies in a predictable order once exposed to livelihood stress and it is the severity of the coping strategy that allows for assessment of the vulnerability of the portfolio (Bukusuba et al. 2007, Hadley et al. 2004, Lambert 1994, Maxwell 1996, Maxwell et al. 1999). For example, Corbett (1988) proposes a three-stage sequence of coping strategies that she observed

during severe food shortages or famines in Nigeria, Sudan, and Ethiopia. The first stage involves drawing upon “insurance mechanisms” in order to ride out difficult times. Examples of this type of coping are gathering wild food products, altering food and other consumption patterns, and intensifying other “normal” income-generating or subsistence activities. The second stage involves disposing of productive assets and other activities that reduce the capacity for effectively coping in the future, such as selling livestock or other possessions or borrowing money at high interest rates. Finally, Corbett’s third stage of coping is destitution, resulting in permanent household changes.

This idea of identifiable and predictable sequences of coping strategies illustrates Chambers’ (1989) concept of the “ratchet effect.” Strategies in the first category can be resorted to again and again without damaging the household’s or individual’s ability to cope with the next stress or shock. However, if the household or individual is forced by the severity or duration of the stress or limited first-stage coping strategies to resort to strategies in the second category, then the household or individual may deplete the resources necessary for fully recovering from the shock or coping with the next one. Getting caught in this cycle, then, leaves people vulnerable to “destitution,” changes in the household structure, and undesirable livelihood outcomes, such as decreased income or decreased food security.

The Vietnamese government’s stated goals, mentioned earlier, for its *Đổi Mới* era policies are economic sustainability and equity. By examining the case of Đông Hải Commune within the Sustainable Rural Livelihoods Framework and evaluating the vulnerability of livelihood portfolios and livelihood outcomes for different subsections of the commune’s population, I can comment on the success of economic reform in reaching those goals. I consider both the effects of economic development in a marginal region and subsequent attempts to

ameliorate the environmental and economic damage created by that development.

Acknowledging the complexity and various components of truly sustainable livelihoods has relevance not only for Vietnam as it continues this process of development but for all countries with “developing” economies.

Outline of Dissertation

The title of this dissertation reflects two major structural issues that are directly related to Vietnam’s economic development and have very specific consequences for the residents of Đông Hải Commune: the advent of shrimp aquaculture and mangrove forest conservation. While people have been engaged in “natural” shrimp and fish farming along the Vietnamese coastline for decades, wherein people support the growth of naturally-occurring species with little input and therefore low risk, two factors have promoted the move to capital-intensive, high-risk shrimp farming. First, aquaculture became a high development priority in the mid-1990s, for its potential as a lucrative livelihood strategy and its ability to attract foreign currency into the country. Thus, the government encouraged thousands of households to relocate from the inland, rice-growing regions of the country to the sparsely-populated, mangrove-entangled coast by providing loans for pond construction and system inputs and tax incentives. The second factor driving change in aquaculture practice was the sharp decline in naturally-occurring fish and shrimp larvae in the early 2000s due to lax environmental regulations regarding the large commercial fisheries and the mass destruction of mangrove habitat upon the coastal population influx and aquaculture boom.

Mangrove conservation has become a particularly hot topic of conversation in international conservation circles in the last 15 to 20 years, as habitats once conceived as

swampy wastelands were discovered to provide critical environmental services to human and marine animal populations. As a nation working to integrate itself into the global marketplace, Vietnam has experienced pressure to clean up its natural environment, particularly after a decade or more of nearly unrestrained economic growth. In the coastal region of the Mekong Delta, the Vietnamese government, in partnership with the World Bank and the Danish International Development Agency (DANIDA), implemented the Coastal Wetlands Protection and Development Project (CWPDP), in response to that pressure. The main goal of this project, which was ultimately enacted in four provinces, was to “re-establish the coastal mangrove wetland ecosystems and protect sustainably their aquatic nurturing and coastal protection functions” (World Bank 2008:vi). To that end, in Đông Hải and surrounding communes, the Forest Department established a mangrove rehabilitation and protection program that involved displacing hundreds of families and regulating use of “private” land.

To build an argument for the creation of differential vulnerability in coastal Vietnam, prompted by these two major processes related to economic reform, my dissertation will be organized as follows. Chapter Two begins with a description of my original research goals and how they changed upon my arrival in Vietnam in October 2007. Economic reform has involved many top-down government interventions in the name of local economic development and habitat conservation. My personal struggles as a researcher in southern Vietnam provide an illustration of the functioning of different levels of government in the country. The chapter then details the revised goals of this research project more specifically and the research methods used to meet those goals. This includes an explanation of research participant selection, how I developed my survey instruments, and the calculation of key variables.

Chapter Three examines Đông Hải in its broader environmental and economic context, as a frontier region for practically the entire history of Vietnam. The chapter begins with a description of the “southward march,” when the Vietnamese people began to colonize lands south of the Red River Delta in the tenth century c.e. Next, it details the attempts of French colonists, beginning around 1860, to “civilize” the Mekong Delta and ecologically transform the interior landscape into the largest rice-producing region in the country. Next, the chapter follows the fate of the mangrove forests of Vietnam’s southern coast, from natural abundance to the ecological devastation wrought by the American-Vietnamese War to the near annihilation by coastal development in the early 1990s. The chapter describes the history of the Blue Revolution, the sweeping popularity of aquaculture and then its rapid decline, around the world, in Vietnam, and in my field site, specifically. Finally, I address the evolution of the international mangrove conservation movement and its manifestation in southern Vietnam as the CWPDP.

Chapter Four describes the livelihood portfolio choices available in Đông Hải Commune. I divide these livelihood strategies into three categories to examine the ways in which individuals and households strive to fulfill immediate and longer-term goals: income-generating activities, subsistence activities, and coping strategies. Income-generating activities provide the individual or household with cash, necessary for purchasing food and other items at the market, paying children’s school fees, making payments on loans, etc. Subsistence activities generate food for the individual or household directly. Examples of subsistence activities include fishing, tending a homegarden, and collecting wild edible plants. I assess the viability and sustainability of these livelihood choices, given personal experiences in Đông Hải and the larger forces at play in the region and in Vietnam as a whole. I also present the results of cluster analyses I conducted to

understand how the different types of strategies grouped together within household livelihood portfolios.

Chapters Five and Six present case studies of two segments of the coastal community that were particularly affected by the two main *Đổi Mới* era changes, aquaculture and mangrove conservation. Figures 1.3 and 1.4 present the creation of differential vulnerability in these two cases using the Sustainable Livelihoods Framework. Chapter Five describes the plight of elderly-only households, those containing only elderly adults or elderly adults and young children, a

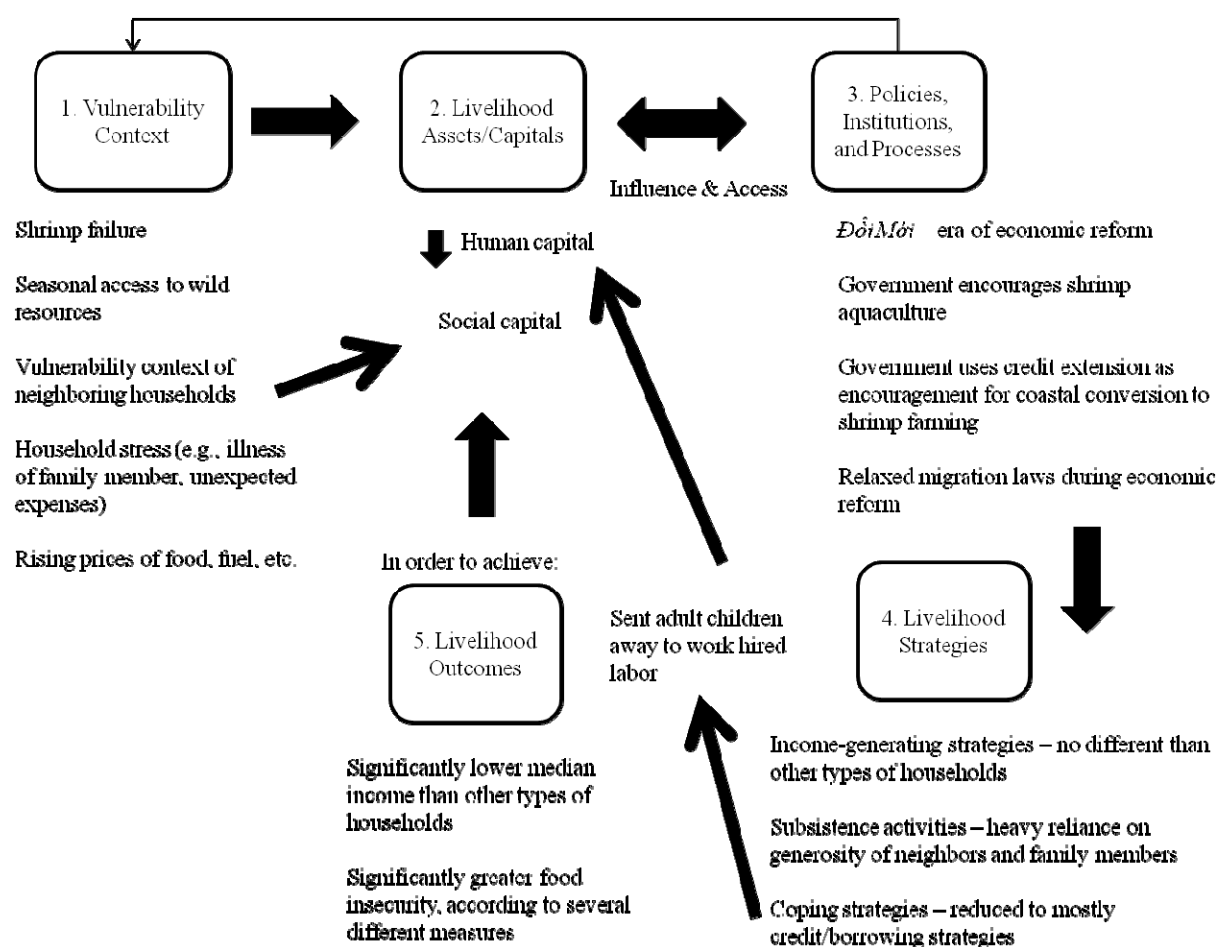


Figure 1.3 Livelihood vulnerability among elderly-only households (Sustainable Livelihoods Framework adapted from Allison & Horemans 2006:759)

household type that was relatively new but quickly increasing in prevalence in rural Vietnam. This type of household, in many cases, resulted from families feeling they had no other choice but to send their adult children out of the village to work hired labor elsewhere, with or without the grandchildren. The necessity of such an extreme coping strategy resulted from failing shrimp farms in the marginal environment of Đông Hải and mounting debt on the loans extended to encourage people to begin farming shrimp in the first place. While members of elderly-only households seemed to have the same livelihood choices as members of other types of households, these older people were no longer as productive as they once were and did not have their able-bodied children at home to support them. Relying more on social relationships to continue meeting their needs, the hard times of all households became the hard times of the elderly.

Chapter Six describes the displacement and resettlement component of the CWPDP. I argue that the livelihoods of households displaced from the designated Full Protection Zone in Hồ Tàu Hamlet and resettled in the Buffer Zone in Phước Thiện Hamlet in 2001 became more vulnerable as a result. Upon resettlement, displaced households experienced reduced access to various assets, such as social and natural capital. This severely constrained the income-generating, subsistence, and coping choices available to these households. Accordingly, a significantly greater percentage of displaced families sent their adult children away to work hired labor to cope with failing shrimp ponds and mounting debt, the same pattern of events that had been taking place in the wider region over several decades. These changes in the livelihood portfolios of displaced households also resulted in undesirable outcomes.

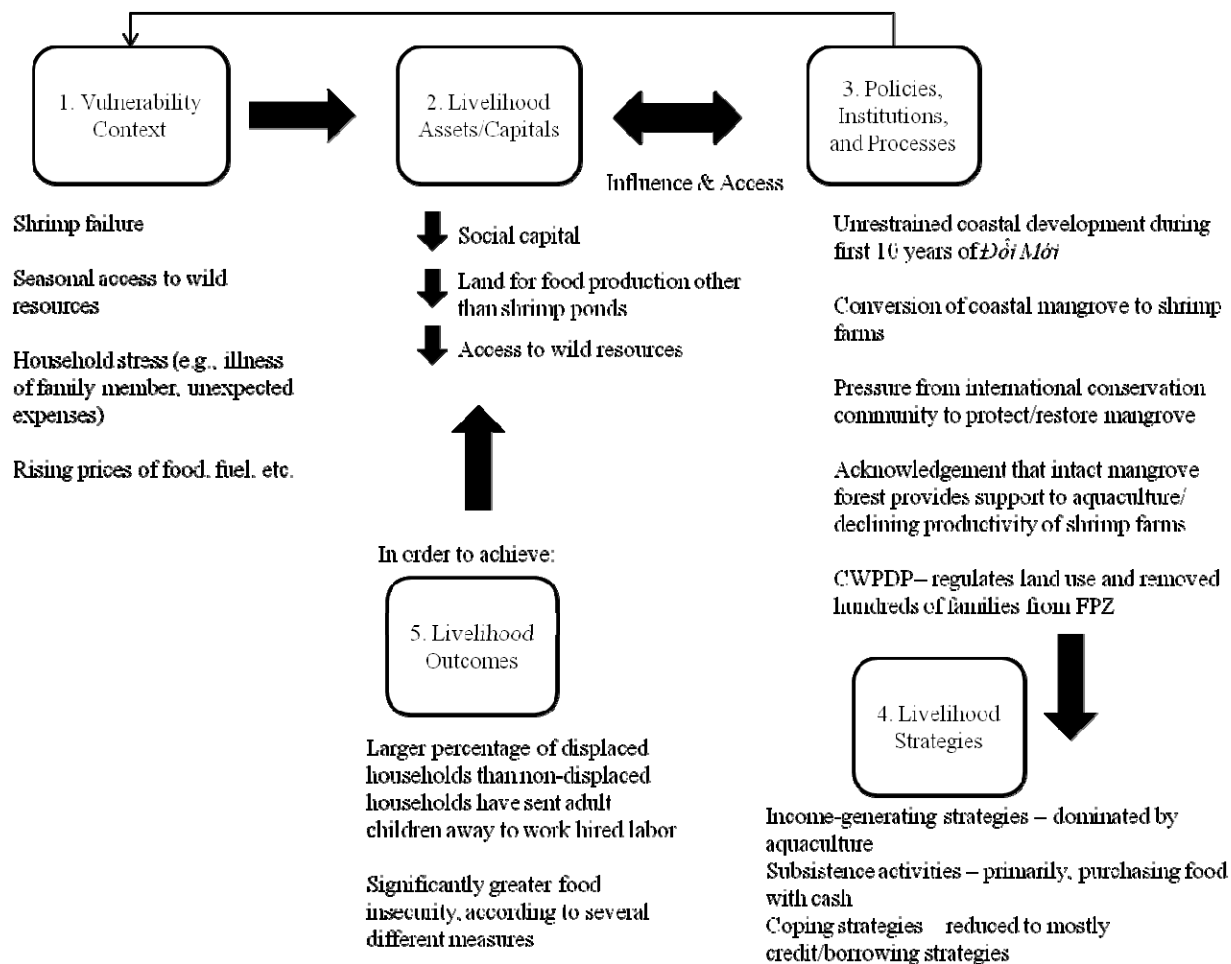


Figure 1.4 Livelihood vulnerability among households displaced by the Coastal Wetlands Protection and Development Project (Sustainable Livelihoods Framework adapted from Allison & Horemans 2006:759)

CHAPTER 2
WHERE THERE ARE NO MANGROVES:
THE EVOLUTION OF RESEARCH GOALS AND METHODS

Introduction

Perched on the back of Thúy's Chinese-manufactured motorbike, GPS unit in hand, speeding along the paved roads of Duyên Hải District, I felt satisfied that I was finally "in the field," finally getting to work. I spent nearly the first two months of my allotted year in Vietnam, waiting in various grim hotel rooms in Ho Chi Minh City, suffering from one respiratory infection after another in the diesel-scented city. Although my sponsoring institution implied, via email, that it would arrange for all necessary permission documents before I arrived in the country, my research and I had apparently slipped through the cracks.

Administratively, Vietnam is divided into a hierarchy of four levels – largest to smallest, province (*tỉnh*), district (*huyện*), commune or village (*xã*), and hamlet (*ấp*). My research visa gave me clearance at the country level of administration, but that hardly mattered to the province- and district-level administrators. Two weeks after my arrival, my appointed supervisor at my sponsoring institution called me into his overly air-conditioned office (a special privilege for Vietnam's elite) and asked me what provinces I intended to work in and for a letter of intent and research schedule translated into Vietnamese. I figured there would be no use in pointing out that I had sent him all this information months ago and repeated – Bến Tre and Trà Vinh

Provinces. He scratched his head and frowned. “We have no relationship with the people in those districts. You should work in Sóc Trăng or Cà Mau. We know the people there.”

Now it was my turn to frown and scratch my head. I wanted to be as accommodating as possible and also knew that doing things his way would speed up this permission-gathering process considerably. But I had chosen my research sites very carefully, albeit from the other side of the world, and I was not prepared to budge on the location of my research.

“I’m sure she chose those provinces for a reason. That’s where we should get permission,” said my supervisor’s underling, who was resentfully beginning to take charge of my case. I felt relief that their professional tension seemed to be working in my favor.

That night in my spare hotel room, listening to the wails of sick children echoing through the tiled corridors (this guest house was attached to a children’s health clinic, the cracked and uneven sidewalk outside littered with the blood-spotted cotton balls of hundreds of inoculations), I edited my research statement and schedule and ensured that my Vietnamese translation was as good as I could get it. I lay back on the polyester-covered mattress that smelled faintly of urine, tucked the mosquito net in around me, and fantasized about finally starting the study that had by now been occupying my mind for years.

I intended to study the long-term effects of defoliation by Agent Orange on rural households’ abilities to cope with natural disasters. I would accomplish this by attending to two main research questions: (1) How had the ecological legacy of defoliation by Agent Orange affected rural farming household members’ access to wild mangrove plant species? and (2) How did sequences of coping strategies differ between individuals with and without access to these wild plant species and what were the consequences? Drawing upon the proposed relationship between ecological and social resilience (e.g., Adger 2000), the capacity of a system to return to

its initial conditions after a disturbance event (Holling & Gunderson 2003), I wanted to examine the process by which the transformation of an ecological system translates into changes in social systems. I hypothesized that mangrove forests that were chemically defoliated between 1962 and 1971 during the American-Vietnamese War would differ in species composition from forests that had not been defoliated. I also hypothesized that this changed composition would limit human communities' access to forest resources traditionally used to offset the damage to livelihoods wrought by natural hazards. Ultimately, it was my contention that households dependent on damaged mangrove forests would be more vulnerable to the deleterious effects of natural hazards, such as floods, droughts, or windstorms.

This research project, funded by Fulbright-Hays, the Wenner-Gren Foundation, and the National Science Foundation, was dependent on three conditions:

- (1) *There is an area of mangrove forest that was not sprayed with herbicides during the American-Vietnamese War to compare to an area that was sprayed.* I sent the map coordinates of mangroves in the Mekong Delta (based on maps in Smith & Watkins 1981) to Dr. Steven Spellman at Columbia University. Dr. Spellman ran these coordinates through a geographic information system (GIS) that assesses historical herbicide exposure for $0.01^\circ \times 0.01^\circ$ grid cells (Spellman et al. 2003). The information I received from the GIS allowed me to choose ecologically comparable areas of mangrove forest, one "sprayed" area in Bến Tre Province and one "unsprayed" area in Trà Vinh Province.
- (2) *There are people engaged in agriculture.* Today, Vietnam is the world's third largest exporter of rice, and the vast majority of that rice is grown in the Mekong Delta (Glewwe 2004). This condition was crucial to my idea that, when household crops are damaged by natural hazards, the members of the households must begin moving through a series of

coping strategies, including the harvest of wild mangrove resources, to deal with the livelihood stress.

- (3) *There are discrete natural disasters with which local people must contend.* Research participants must be able to answer questions about specific measures taken to cope with actual and hypothetical natural hazards. Vietnam is one of the top 15 “natural disaster hotspots” in the world and, therefore, its citizens have been subjected to periodic droughts, floods, and violent storms for millennia and have developed strategies to cope with the resulting livelihood stress (Dilley et al. 2005, Kelly et al. 2001).

For weeks and weeks after my supervisor had supposedly mailed letters to the Bến Tre and Trà Vinh People’s Committees requesting research permission for me, I loitered around empty offices and called unanswered cell phones, wondering what kind of surreptitious research I could conduct in the city. Finally, one night, I received a call from my supervisor’s colleague, asking me if I could be ready to drive down to Trà Vinh Province the next morning at 5:30 a.m. Because the People’s Committees were not responding to the letters, he said, we would have to visit them in person.

Still dark and yet as hot and humid as ever, I met him in front of his office with all my earthly belongings, feeling optimistic that I would be able to settle into one of my research sites after this trip. We drove through rushing water that came to the tops of the wheel wells of our vehicle in the outskirts of Ho Chi Minh City. The confluence of unusually high tides and torrential rains had proved too much for the city’s storm drains, and I watched behind windows closed tight against the stench of raw sewage as people pushed motorbikes through waist-deep torrents and street-level shopkeepers pushed standing water out with brooms. Outside the city, we passed high-walled industrial complexes – foreign-owned factories with massive dormitories

for the workers right next door. Finally, two hours after leaving the office, we were in the “countryside.”

The Mekong Delta is composed of a complex web of large and small waterways and is impossibly flat. One’s view of the horizon is only ever obstructed by planted fruit trees – bananas, coconuts, jackfruits, mangos. With no trees in the way, the verdant rice paddies stretch for miles under the blazing tropical sun. On our way to Trà Vinh, we passed men pedaling bicycles, carrying 100-kilo sacks of rice, 25 dazed chickens hanging from their feet, or a queen-sized bed frame; wispy clouds of schoolgirls in white *áo dài*; and women wearing the iconic conical hat and shuffling with two pails of water appended to either side of shoulder yokes. Wherever we stopped for a rest or at a point of interest, people stared and pointed and whispered. I arrogantly assumed they were giggling at me, considering we had strayed far from the tourist track, until my escort informed me that he was a “television star,” having hosted a number of environmental education programs that apparently most people in Vietnam have seen.

Six hours later, the celebrity and I arrived in Trà Vinh Town, the capital city of the province of the same name and, after asking around for directions, headed straight for the provincial Forest Department. We arrived at a moldering, decaying complex of buildings – Chi cục Kiểm lâm tỉnh Trà Vinh, the Trà Vinh Provincial Forest Bureau – just outside of town. He went in ahead of me and, after an interminable wait, gestured for me to come inside. I walked in the stifling, stale-smelling conference room, shook hands with and smiled nervously at each member of the assembled panel of Forest Department officials, and handed each one a bilingual business card, hot off the Ho Chi Minh City presses. In return, I only got dour and fairly uninterested looks from the olive-uniformed men.

My escort translated my explanation of my research goals, as I tried not to be distracted by the small man chain-smoking cheap cigarettes in the closed room and grinding the butts into the tile floor with the toe of his shoe. There was a lot of conversation among the officials then, which I had a hard time following, Southern-accented Vietnamese sounding like an entirely different language than the Northern dialect I had learned in the classroom. Finally, my escort turned to me and declared, “You will work in Đông Hải. There is the most mangrove there.” I opened my mouth to protest this decision being made for me before I had a chance to explore the area, but looking at their hard, unflinching faces and considering I had already lost two months, I realized this was as good as it was going to get.

“They are concerned about where you will live,” he explained. “There is a forest station in Đông Hải, but the conditions are simple.” I very desperately desired to live in the village in which I would conduct the research and I knew that would be difficult considering, by Vietnamese law, foreigners are not allowed to live with local people. I tried to convey, with blasé body language and dismissive flaps of my hands, that “simple conditions” were just fine by me. For the first time, Mr. Son, the spokesman for the group, directed his comments to me, looking deeply skeptical. “Hard bed, bare light bulb, very hot, many mosquitoes.” In a moment of inspiration, I said, “Em sống ở châu Phi. I have lived in Africa.” Finally, some smiles cracked, as they discussed among themselves what I had just said. “Then you will be fine in the forest station,” Mr. Son said. One more handshake, with left hand clutched tightly to right elbow as a sign of enthusiasm and respectful formality, sealed the deal. Perhaps we would have such good luck in Bến Tre the next day.

Another 5:00 a.m. wake-up call and we were off to Bến Tre Province, not far from Trà Vinh as the crow flies, but because the province is separated on all sides from the mainland by

rivers, we had the bottleneck of a ferry to contend with at some point. My escort identified a shortcut on a map and insisted we take it. We drove for about an hour through Trà Vinh Province, past endless rice paddies, flanked by rows of coconut palms swaying gently in the rosy morning light. The ferry crossing over the wide, silty Cỏ Chiên River was clearly not heavily traveled and the boat only made the journey once every two hours. We arrived just as the boat began chugging to the other side and so settled in for a long wait.

Once on the other side, BẾN Tre immediately fulfilled my American daydreams of what the Mekong Delta would look like – wood and thatch houses nestled in the dappled shade of towering tropical trees; black-and-white pot-bellied pigs, wallowing in muddy ditches; narrow dirt tracks, wide enough only for passing motorbikes, on which our driver had to do some fancy maneuvering. On the way to the BẾN Tre People’s Committee, my escort explained to me that this province was the seat of the most vehement anti-American sentiment during the war and that people here were still a bit leery of a Western face. Therefore, he advised me to wait in the vehicle while he pleaded my case with the provincial government. I dozed in the blazing midday heat for nearly an hour before he emerged from the intimidating, Soviet-style building with no better news than that we needed to talk to the Forest Department before any permission would be granted. Fortunately, the BẾN Tre Forest Department official we found at the compound that morning was an old friend of his.

Mr. Bé was immediately friendlier than any government official I had encountered to that point and even tried his hand at a couple English phrases: “Hello! How ah you?” and “America! Numbah one!” He poured us steaming cups of green tea, another unexpected welcoming gesture, while he joked with my escort about “old times.” The three of us sipped our tea and chatted casually about the nature of my research and what I hoped to accomplish in BẾN Tre. Mr. Bé

expressed wholehearted enthusiasm for my project and said that he was beginning to think of the most suitable sites. Because I planned to work in Trà Vinh for three months before moving over to Bến Tre, I told Mr. Bé I would fax him a research schedule, and he said he would begin work on my permission papers immediately. As we drove back to Trà Vinh and waited for the ferry amongst a crowd of drunken wedding revelers late that afternoon, I felt more positive than I had in months.

His mission accomplished, my escort left me in Trà Vinh that evening and drove back to Ho Chi Minh City. It was still two weeks of living in a tiny hotel room before the Trà Vinh Forest Department completed my permission documents, a one-page letter – half a page of letterhead, five lines of text, and the all-important blood-red stamp. In the meantime, I bought my own Chinese-manufactured motorbike and hired a research assistant with relative ease from Trà Vinh University. Thúy and I drank *cà phê sữa đá* (Vietnamese coffee, roasted with butter and fish sauce, served over sweetened condensed milk and ice) and painstakingly translated consent documents and interview questions. I was determined to be ready to begin research immediately upon arrival in Đông Hải.

And the day finally arrived. I sent my luggage on the daily bus between Trà Vinh and Đông Hải. On the two-hour motorbike ride to the village, I watched the landscape undergo fairly dramatic changes – from miles of rice paddies, interrupted occasionally by patches of lush tropical forest preserved around Khmer pagodas, to land clear-cut for large, high-tech fish ponds around the district capital, Duyên Hải, to increasingly low-tech ponds, surrounded by shrubby, stunted growth or parched, barren, cracked earth, usually with one lone mangrove tree emerging from the center of the pond. There was salt in the air and sand billowing over the road by the time we arrived in Đông Hải, a tiny, foul-smelling, but nevertheless energetic, trading center. I

hired a man with a cart to transport my luggage the last mile or so down the path to the forest station. We were grunted at by the young male forest rangers, sitting in the common room, watching Chinese soap operas at an absurd volume, under the amicable gaze of no less than three portraits of Hồ Chí Minh. Thúy and I took off to find the “unsprayed” area of mangrove forest so crucial to my research.

This is how I found myself, clutching my GPS unit in despair, standing on the mud embankment between two murky shrimp aquaculture ponds with nothing but a few sickly-looking, newly-planted mangrove trees as far as the eye could see.

(1) *There is an area of mangrove forest that was not sprayed with herbicides during the American-Vietnamese War to compare to an area that was sprayed.* In addition to the fact that my “unsprayed” area had been entirely converted to farms for shrimp that would be frozen and sold to Japan, Mr. Bé was not responding to my faxes or answering my phone calls. Thúy eventually got through to him and returned from the conversation with tears in her eyes. Mr. Bé expressed to Thúy, in no uncertain terms, that arranging for my research would greatly inconvenience him and he had no intention of helping me obtain permission papers. While my sponsoring institution sent several additional letters to the Bến Tre People’s Committee, I never heard another word from that province. No “unsprayed” mangrove forest, no comparison village.

(2) *There are people engaged in agriculture.* I quickly observed that there was only one crop growing in Đông Hải on a large scale, *cây thuốc cá (Derris elliptica)*, the roots of which were used as insecticide and piscicide for preparing ponds for shrimp aquaculture. While most people grew a few herbs, chiles, and fruit trees around their houses, they cited the

salty, sandy soil and the lack of freshwater as reasons for not cultivating more extensive gardens.

(3) *There are discrete natural disasters with which local people must contend.* Despite the disintegration of my first two criteria for a successful research project, I reasoned that people in Đông Hải still had livelihoods that could be disrupted by natural hazards. Furthermore, they would have to employ coping strategies to deal with those livelihood disruptions, and surely I could salvage some part of my original research project. During my first two months in Vietnam, the newspapers were full of tales of destruction due to natural disasters – floods in Hue and Ho Chi Minh City, cyclones in the Northeast, and landslides in the Northwest. When I asked about natural disasters in Đông Hải, I received blank stares. One man lit up when he finally realized what I was asking about. “Yes! Yes!” he said excitedly. “About ten years ago, there was a big storm. It was terrible – destroyed houses, ruined fish ponds.” He was referring to Typhoon Linda, which caused millions of dollars of damage and claimed nearly 3000 lives along the southern coast. I asked if that was the only extreme event he could remember. It was, and the same held true for the rest of the people I interviewed.

At this point, all three conditions *not* true for the village in which I was allowed to work, I realized I would really have to give up on my original research. While I certainly had my moments of dismay and distress, I ultimately let go and allowed the kind, generous, and exceedingly open people of Đông Hải to dictate the direction of my research. The first thing I did, then, was to simply sit with people, over tiny glasses of lukewarm tea, and listen to whatever they wanted to talk about. I sat in various homes in a long row of government-built houses, constructed for families displaced by the World Bank conservation project in 2001. There, Mr.

Em sadly explained that neither his wife nor his children lived with him any longer, even though his health was poor; they had all moved to a province north of Ho Chi Minh City to find work when the family's aquaculture ponds failed. Ms. Nghĩa chuckled resignedly about the absurdity of the marine protection laws. She had recently had her small-mesh fishing nets confiscated, worth over 1 million VND (Việt Nam Đồng)⁴ in a village in which the median yearly household income in 2007 was 15 million VND. Fish of an allowable size no longer reached the shallow waters just off Đông Hải's coast, where Ms. Nghĩa and her family members fished, because of too-lax regulation of the commercial fishing industry operating further out at sea. In other parts of the village, I listened as Mr. Quyết reasoned through whether or not he should harvest his *cây thuốc cá* now, even though its market price had plummeted, and replace it with sweet potatoes, a more labor-intensive crop with an equally low price but a much shorter planting-to-harvesting interval. Ms. Hồng swung her baby in a hammock at the back of the small dry goods store she inherited from her sister, who had just moved to Ho Chi Minh City. Every time I asked how business was, she sighed and reminded me that, when her neighbors' aquaculture ponds failed, they had no money to buy goods from her. Therefore, business was always bad.

During this exploratory phase of my research, and throughout the next ten months that I lived in Đông Hải, the most common emotion I sensed in my research participants was bewilderment. In 2008, Vietnam was a country of great optimism – a booming economy, thriving urban areas, light-speed rural development. Many people living in Đông Hải had moved there in the 1990s, abandoning the life of an inland rice farmer, lured by the promises of coastal development and the riches available in shrimp farming. However, after only a few years of unrestrained growth and unsustainable profits, the long-term promise of life on the coast failed to materialize. Ms. Lý, my neighbor, cook, and friend, said, “Many people came from other

⁴ In 2007/2008, 1 million VND was roughly equivalent to \$62.50 (16,000 VND ≈ 1USD).

provinces to Đông Hải expecting life to be better, but it is still the same. People are still poor. It used to be easy for poor people to make money here, but everything has changed. There used to be a lot of natural shrimp and fish to catch at sea and aquaculture was a profitable way of making a living. But then the sea catch disappeared and aquaculture began failing.” When I asked people what they planned to do next, considering the failure of their primary livelihood strategy and mounting debt, a surprising number answered in the exact same way: “There is nothing left to do but hope and pray.”

In addition to these observations of lived experience, the disintegration of my original research project was instructive. The absence of naturally-occurring mangrove forest and the presence of some replanted mangrove species indicated two important facts about Đông Hải. First, since the end of the American-Vietnamese War, the coastline of the country had undergone rapid and drastic economic and environmental change. Second, in recent years, there had been some attempt to ameliorate the ecological damage wrought by explosive economic development. Both of these aspects of Đông Hải’s history certainly had a profound impact on the livelihoods of the local people. Additionally, many people transitioned from an agricultural to an aquacultural livelihood upon moving to Đông Hải. It would be important to compare and contrast the stability, reliability, and perceived sustainability of these two ways of making a living, one of which the Vietnamese government so enthusiastically encouraged as part of the country’s development strategy. Finally, the citizens of Đông Hải did not often have to contend with dramatic and discrete natural disasters, but they did experience seasonal and unexpected stresses on and threats to their livelihoods all the time. I would have to develop a method of capturing these less dramatic threats, people’s range of responses to them, and the consequences of those responses or the inability to respond.

Revised Research Goals and Methods

In order to explore livelihoods vulnerability under these unanticipated research conditions, I altered the general goals of my research. These now included:

- (a) Understanding the economic and environmental histories of the coastal region of Duyên Hải District, Trà Vinh Province.
- (b) Documenting the events that occurred over the course of a year that disrupted a household's ability to provide food and other necessities for itself and placing those events within a broader history.
- (c) Understanding the relatively recent change in household livelihood activities upon the advent of shrimp aquaculture and collecting information about the viability and sustainability of those activities.
- (d) Collecting data that allowed me to assess differential vulnerability in the community, both in terms of the probability of undesirable outcomes emerging in response to a future stress and in terms of the current expression of undesirable outcomes relative to other members of the community.

After those two months of negotiating bureaucracy in Ho Chi Minh City and Trà Vinh, I lived in Phước Thiện Hamlet, one of the five hamlets that made up Đông Hải Commune, from December 2007 through September 2008. With my research assistant, who translated all interviews and written documents, I lived in the local Forest Department station for the first half of my stay and in the local Communist Party meeting room for the second half. The unstructured part of my fieldwork included dodging the policeman hired by the People's Committee to monitor my work, learning to sleep, eat, keep cool, and not be devoured by mosquitoes in a former mangrove swamp, shopping at the market, zipping around on an overloaded motorcycle,

sharing meals, gossiping with neighbors, attending birthday parties, drinking parties, funerals, and death anniversaries, fishing, holding babies, and waiting out brief but riotous rain showers on strangers' front porches. The structured part of my research involved the following components:

- (a) I conducted eight interviews with members of the Trà Vinh Provincial Forest Bureau, the Duyên Hải Forest Department, and the Đông Hải Forest Station to discuss changes in the structure and composition of the mangrove forest over the last 50 years, with special attention given to the major causes of forest fragmentation and conservation plans and implementation in Đông Hải Commune.
- (b) I conducted five interviews with members of the Planning and Finance Department for the Trà Vinh Aquaculture Department, the Bureau of Fisheries and Aquaculture Protection, and the Duyên Hải Agriculture and Rural Development Department to discuss changes in ocean fish populations over the last 50 years, the beginning of shrimp aquaculture in Duyên Hải District, the success of shrimp aquaculture and the reasons for its failure in certain parts of the district, and the educational programs and extension services available to local people.
- (c) I conducted an interview with the Vice President of the Vietnam Bank for Agriculture and Rural Development in Duyên Hải to understand government policy concerning small loan extension.
- (d) I conducted in-depth interviews with the heads of 50 households in Phước Thiện Hamlet. These interviews covered basic household information, a brief life history of the research participant, a discussion of environmental history if the participant lived in the area for more than 30 years, a list of household income and food sources, a list and discussion of

coping strategies during food shortages, and a discussion of the household's bank debt, if applicable.

- (e) I conducted 117 Livelihoods Surveys in three hamlets in Đông Hải Commune. These surveys were composed from the information gathered during the in-depth interviews described above. With these surveys, I collected basic household information, responses to exhaustive checklists of income-generating and subsistence activities, lists of coping strategies, and information about household debt.
- (f) I conducted 15 oral history interviews with those research participants who had lived in Đông Hải for more than 30 years. During these interviews, we discussed perceived changes in the landscape, livelihood strategies, migration patterns, family relationships, children's contributions to the family, community health, relationships among neighbors, and reliance on the government. Almost all of the above interviews were tape recorded and later transcribed by my research assistant and me. I took extensive field notes during and after each interview.
- (g) For 35 weeks, I conducted weekly Food Frequency Surveys with 46 households. The purpose of these surveys was to document dietary quality and strategies for obtaining food, both as they varied among households and as they changed across the seasons of the year and other events within the same household. I also collected ethnobotanical data during these surveys by asking what wild plants the participant collected each week for food, medicine, firewood, and animal feed.
- (h) I obtained annual fishery reports from the Trà Vinh Aquaculture Department for 1992 to 2007 and annual forestry reports from the Duyên Hải Forest Department for 1997 to 2007. These reports presented information about forest cover and composition and ocean

fisheries and aquaculture productivity according to the government. They also discussed governmental conservation plans and implementation.

Survey Participant Selection

With the help of the heads of three hamlets in Đông Hải – Phước Thiện, Hồ Thùng, and Hồ Tàu – I compiled household lists for each. For Phước Thiện, working from three different “official” lists, I was able to compile a list of 269 households (although the “official” household count was 349). This list contained only the names of household heads and their dates of birth, so I met with the hamlet heads and the Secretary of the local Communist Party to determine household composition for each name on the list. Because individuals are members of households at different generational stages and I expected to find differential vulnerability among individuals based on the characteristics of their households, I then divided all households on the list into four “family cycle” categories, using Chayanov’s (1986) ideas about dependency ratios within the household. My family cycle categories were elderly-only households (any couple or individual, old enough to have adult children living elsewhere, living alone or with young children), individual young couples (any couple or individual, too young to have adult children living elsewhere, living alone), nuclear households (one set of adults with young children), and multigenerational households (households containing at least two sets of adults).

Out of the 269 households in Phước Thiện Hamlet, 134 (49.8%) were categorized as nuclear households, 95 (35.3%) were categorized as multigenerational households, 32 (11.9%) were categorized as elderly-only households, and 8 (3.0%) were categorized as single young couples. In the rural areas of Vietnam, newly-married couples often lived with either the husband’s or wife’s parents until they had children and set up their own households.

Additionally, most of the single, young men in the hamlet, if not residing with their parents, had moved to either urban areas or other rural areas to find work. Therefore, the number of households classified as single young couples was particularly small.

The household list I obtained from the head of Hồ Thùng Hamlet was well-organized and complete, with each household's composition updated regularly. I was able to classify the households directly from the list. Of the 293 households in Hồ Thùng, 107 (36.5%) were categorized as nuclear households, 163 (55.6%) were categorized as multigenerational households, 10 (3.4%) were classified as elderly-only households, and 13 (4.4%) were classified as single young couples.

I assigned each household a random number and then selected 10 households randomly from each family cycle category. I chose five men and five women from the 10 households (the household head or his wife) in each of the categories. I also randomly selected 10 female household heads from all female-headed households. My research assistant, a member of the local People's Committee⁵, and I visited every randomly-selected household and introduced the project to the male or female household head, described his or her potential role in the project, distributed written material about the project, and asked permission to conduct the Livelihoods Survey. When a prospective participant refused to participate, had moved to a different village, was found to be in the hospital for an extended period of time, etc., I randomly chose another participant from that family cycle category to replace him or her.

⁵ The Đông Hải People's Committee President insisted that a member of the Committee be present during all of my interviews. I suggested that a member of the Committee escort me to each household initially while introducing the project and asking permission to conduct future interviews. The President acquiesced. I found the People's Committee escort helpful, as many households, seeing that the project was sanctioned by the government, were happy to participate. On the other hand, the few households that I visited alone were much more wary and hesitant to get involved.

The household list I obtained from Hồ Tàu Hamlet contained only the names of the heads of household and I was not able to obtain any additional information. For that hamlet, therefore, I chose 50 households at random without regard for household type. Due to difficulties with government bureaucracy, I did not receive permission to conduct research in Hồ Thùng or Hồ Tàu Hamlets until late July, after I had been living and working in Phước Thiện for eight months. I knew I would not be able to conduct the Livelihoods Survey with all 100 participants in my short time remaining the village. Thus, every day, I randomly chose five participants from the participant lists I made in order to avoid selectively interviewing people from the most physically or geographically accessible households. All in all, I conducted the Livelihoods Survey with 50 people in Phước Thiện, 45 people in Hồ Thùng, and 22 people in Hồ Tàu – a total of 117 research participants.

I asked all 50 Livelihoods Survey participants in Phước Thiện to also participate in a Food Frequency Survey, during which I would ask them a series of questions each week. Because of the time intensive nature of this survey, I chose to limit the number of participants and the distance I would have to travel to their houses each week. This is the reason I did not include all Livelihoods Survey participants. Forty-five Phước Thiện Livelihoods Survey participants agreed to be involved in the Food Frequency Survey.

Livelihoods Survey

The purpose of the Livelihoods Survey was to gain a thorough understanding of the range of activities and strategies that made up the livelihood portfolios of the research participants and their households and to gather crucial household information. These livelihood strategies are the focal point of the Rural Livelihoods Framework (Figure 1.2). It is this constantly-changing set of

activities, strategies, and behaviors, unique to each individual and household, that is helped or hindered by policies, institutions, and processes, that draws upon capital assets, and that is responsive to the vulnerability context. Most importantly, an individual's or household's specific set of livelihood strategies, or livelihood portfolio, results in desirable or undesirable livelihood outcomes. Livelihood outcomes depend on the viability and sustainability of the livelihood portfolio, its vulnerability to shocks and stresses.

The Livelihoods Survey was composed of both structured and semi-structured questions and covered a range of topics – basic household information, a brief life history of the participant, a discussion of environmental history if the participant had lived in the area for more than 30 years, and a discussion of the household's debt, if applicable. Additionally, I divided my inquiries about a household's livelihood portfolio into three categories – income-generating activities, subsistence activities, and coping strategies. Because this is a market-based society, most people's daily activities were in pursuit of cash income, whether they were paid immediately for services performed or in a year after harvesting a crop they had planted. I compiled a list of 28 income-generating activities that I observed in Đông Hải and went through that list with every survey participant, asking if any household member participated in each of the activities.

I then asked about ten subsistence activities, an exhaustive list of the activities in which individuals engaged to provide food for themselves and other household members directly. Finally, I also wanted to elicit the specific strategies people employed during times of food insecurity. Hadley et al. (2004) define food insecurity as “the uncertain availability of culturally appropriate foods” (544). In this definition, food insecurity is not necessarily characterized by an absolute lack of sufficient nutrients but the individual's or household's perception that things are

not normal, that there is stress on preferred eating habits. It is this perception that causes changes in behavior – coping. I elicited coping strategies by appealing to a fairly common problem in a region that cannot support cultivation of the main staple food, rice. Because rice is a crucial component of every meal and because the people of Đông Hải could not produce it themselves, I asked about coping with food insecurity using the question, “What do you do when you do not have enough money to buy rice?” This question gets at a common problem that all respondents were motivated to solve. Each of these interviews lasted from 30 minutes to 2 hours, depending on the detail of the participant’s answers. I returned to many of the participants with follow-up questions at a later date, particularly those who had lived in the area for many decades or possessed special knowledge about topics such as shrimp farming, wild plants, or conservation.

Food Frequency Survey

Because so much (although certainly not all) livelihood behavior, whether working to generate income or coping with economic stress, is focused on obtaining food for oneself and the members of one’s household, I conducted a weekly survey to collect detailed information about dietary composition and food procurement behaviors from a subset of the survey sample. Collecting this data over the course of eight months allowed me to look for differences on both outcome variables and the suites of behaviors used by various people in different types of households. I was also able to look for changes over time, with changing seasons and in relationship to major economic events, such as a spike in the price of food and other necessities during the 2008 Global Food Crisis. As with the Livelihoods Survey, this Food Frequency Survey resulted in both comparable outcome measures and combinations of food procurement behaviors that I could analyze for their potential to produce desirable or undesirable outcomes.

In order to compose the survey, I conducted 44 24-hour food recalls during my first or second interview with participants. I asked them to list the food they had eaten in the last 24 hours, how they procured each component of the meals, and other information relevant to diet and eating. From the results, I developed the Food Frequency Survey (Figure 2.1). The survey was designed to capture as much information as possible about a person's diet and food procurement behaviors over the preceding week in just a few minutes.

Phước Thiện Hamlet, where all Food Frequency Survey participants lived, is divided by the Phước Thiện River, each half of the hamlet accessible to the other only by a ferry boat with unpredictable crossing times. I visited 24 survey participants, who lived on the same side of the river as I did, every week for 35 weeks, from mid-January to mid-September 2008. I trained an additional research assistant, who lived on the other side of the river, to conduct the survey with the other 21 participants. We generally made three attempts (road conditions permitting) to find each participant in a week. If, after three tries, we were not able to find the participant at home, I recorded missing data for that person for the week. Each visit lasted between approximately 15 minutes and over an hour, depending on the participant's talkativeness that day and whether or not I had additional questions I wanted to discuss with him or her.

Assessing Vulnerability

As described in Chapter One, the vulnerability of a household is tied up in its livelihood portfolio. Bebbington (1999) elegantly describes how the strategies that make up these portfolios fit within the larger context of the livelihood framework: "Livelihood strategies are attempts, from existing and often severe constraints, at a continuous management and modification of the substitutions, tradeoffs, and draw downs on different capital assets. How these tradeoffs are

In the last seven days, have you...

- 1a. Eaten three meals per day?
- 1b. Eaten two meals per day?
- 1c. Eaten one meal per day?

2. Eaten a meal outside of your home?
 - a. Eaten a meal at the house of a family member?
 - b. Eaten a meal at the house of a neighbor?
 - c. Eaten a meal at a restaurant?

- 3a. Eaten rice that you bought with cash?
- 3b. Eaten rice that you bought on credit?
- 3c. Eaten rice that was given to you by a family member, neighbor, or organization?

- 4a. Eaten vegetables that you bought?
- 4b. Eaten wild vegetables?
- 4c. Eaten home-grown vegetables?
- 4d. Eaten vegetables that were given to you by a family member, neighbor, or organization?

- 5a. Eaten fish (or other seafood) that you bought?
- 5b. Eaten fish (or other seafood) that you caught from your own aquaculture pond?
- 5c. Eaten fish (or other seafood) that you caught in the ocean or river?
- 5d. Eaten fish (or other seafood) that was given to you by a family member, neighbor, or organization?

- 6a. Eaten meat (e.g., chicken, duck, beef, pork) that you bought?
- 6b. Eaten meat from an animal that you raised at home?
- 6c. Eaten meat that was given to you by a family member, neighbor, or organization?

- 7a. Eaten eggs that you bought?
- 7b. Eaten eggs from chickens or ducks that you raised at home?
- 7c. Eaten eggs that were given to you by a family member, neighbor, or organization?

- 8a. Eaten fruit that you bought?
- 8b. Eaten wild fruit?
- 8c. Eaten home-grown fruit?
- 8d. Eaten fruit that was given to you by a family member, neighbor or organization?

9. Eaten instant noodles or instant *cháo* (rice porridge)?

- 10a. Eaten sweets (e.g., cake, candy, *chè*) that you bought?
- 10b. Eaten sweets that were given to you by a family member, neighbor, or organization?

- 11a. Attended a wedding?
- 11b. Attended a death anniversary?
- 11c. Attended a funeral?
- 11d. Attended a drinking party?

Figure 2.1 Food Frequency Survey

made, and which ones preferred, vary across the lifecycle, and also across the short term. At certain points, the resulting strategy may seem suitable, at other points not” (2033). The purpose of this constantly-shifting collection of activities is to provide household members with a sufficient standard of living and to meet other household goals. When livelihood stress exposes the vulnerability of a portfolio (because of structural reasons, lack of capital assets, or severity of stress), household members must enact coping strategies to continue to meet household goals. When coping strategies fail, usually because individuals have resorted to unsustainable strategies that increase vulnerability to future stress, undesirable livelihood outcomes result. Thus, there are three main components to my assessment of differential vulnerability in Đông Hải: suites of livelihood strategies, sequences of coping strategies, and livelihood outcome variables.

While the activities and behaviors that make up the livelihood portfolio are constantly shifting, I was able to capture the range of strategies at each household’s disposal during the Livelihoods Survey. I was also able to record the variations in individuals’ food procurement behavior over the course of eight months during the weekly Food Frequency Survey. I then performed cluster analyses on each set of data – income-generating strategies, subsistence activities, and food procurement behaviors – to understand how the different activities grouped together and what individual or household characteristics were associated with those clusters. Information gathered during interviews with government officials, extended interviews with local people, and participant observation allowed me to assess the viability and sustainability and, thus, vulnerability of the portfolio components.

Coping strategies, short-term responses to stress, occupy an interesting space in the overall livelihood framework. They represent an important part of a household’s livelihood portfolio, as they are undertaken in an effort to continue to meet the household’s goals and they

can be more or less vulnerable to livelihood stress. A household resorting to a coping strategy, particularly a more “severe” strategy located further along its list of resort, can also be considered an undesirable outcome. Under “normal” circumstances, household members do not engage in these activities because they are not desirable (e.g., eating less-preferred foods, selling possessions, sending adult children out of the village to work hired labor). My analysis of differential vulnerability will consider coping strategies both as part of the livelihood portfolio and as livelihood outcomes.

An individual’s or household’s livelihood portfolio interacts with the vulnerability context and livelihood outcomes result. Just as household goals can be specific to each family, depending on the priorities, interests, and experiences of the members, making a distinction between “desirable” and “undesirable” livelihood outcomes could be considered an arbitrary distinction. I have chosen outcome variables that resulted from the data collected during the Livelihoods and Food Frequency Surveys. These variables represent outcomes that were considered desirable or undesirable by the majority of people in Đông Hải. In the description of these variables, I include discussion of circumstances in which the variable may not be representative of the expression of vulnerability in the livelihood portfolio.

I included three different kinds of outcome variables in this analysis: continuous variables, in which desirable or undesirable outcomes are relative (coping frequency, *copingfreq*; 2007 income, *inc2007*; dietary diversity score, *dds*); dichotomous variables, in which one state is preferable, or desirable, compared to the other state (consumption of no animal products, *nomeat*; consumption of no vegetables, *novveg*); and dichotomous variables that represent coping strategies, the use of which indicates some vulnerability in the livelihood portfolio in the sense that “normal” income-generating and subsistence strategies were not sufficient in the face of

livelihood stress to provide an adequate standard of living and to meet the household's goals (consumed one meal in a day, *meals1*; purchased rice on credit, *credrice*; sent children away to work hired labor, *childawayhl*). *copingfreq*, *inc2007*, and *childawayhl* are all derived from the Livelihoods Survey, during which I asked one household head from each household (male or female) each question. As each research participant was a member of a certain type of household and my analysis generally relates to the household, the unit of analysis for these three variables is the household. On the other hand, *dds*, *nomeat*, *noveg*, *meals1*, and *credrice* are derived from the Food Frequency Survey, which was conducted every week. Thus, the unit of analysis for those five variables is the visit. Table 2.1 provides a summary of this information.

Table 2.1 Description of outcome variables

variable	description	type	unit of analysis	<i>n</i>
<i>copingfreq</i>	how often a household lacks money to buy rice	continuous	household	116
<i>inc2007</i>	a household's total income for 2007	continuous	household	98
<i>childawayhl</i>	household had adult member living outside of the village working hired labor	dichotomous	household	111
<i>dds</i>	weekly dietary diversity score	continuous	visit	1111
<i>nomeat</i>	participant consumed no animal products in a day during prior week	dichotomous	visit	1111
<i>noveg</i>	participant consumed no vegetables in a day during prior week	dichotomous	visit	1111
<i>meals1</i>	participant consumed only one meal in a day during prior week	dichotomous	visit	1111
<i>credrice</i>	participant consumed rice purchased on credit during prior week	dichotomous	visit	1111

The continuous variable *copingfreq* is 116 participants' responses to the question, "How often do you experience times when you do not have enough money to buy rice?" Respondents

had a choice of “never” (0), “seldom” (1), “sometimes” (2), and “frequently” (3). I asked this question as a way of assessing food security, appealing to a problem obtaining the most culturally-important and often-consumed type of food. This problem appears to be very common. Among my randomly-selected Livelihoods Survey sample, 81% (94 out of 116) reported not having enough money to buy rice with at least seldom frequency (a response of 1 through 3). “A lot” was the most common response, with 34.5% of respondents reporting not having enough money to buy rice with the greatest frequency. Only 19% of the sample reported never being food insecure in this way. It was desirable to have a lower score for this variable; a lower score indicates greater food security.

The variable *inc2007* is the participants’ self-reported household incomes for 2007. During the Livelihoods Survey, I went through the checklist of 28 income-generating activities with each participant and then asked, “Considering all of these things that you or someone else in your household did to make money in 2007, what was your household’s total income in 2007?” I received a variety of responses to this question. Some, mostly men, were able to answer without hesitation. Many people said, “I don’t know. We make enough money to live every day.” I was able to elicit from some participants who answered in this way how much money they needed to live every day and then calculate an income for the year that was agreeable to the respondent. For others, we never got past that first statement and I recorded missing data for them. Others could not answer the question at all. I am missing income data for 20 participants. Particularly in a place where cash was increasingly necessary to meet household needs, having a higher income was preferable to having a lower income.

The median *inc2007* is 15 million VND (~\$938). The median per capita income (*inc2007* divided by the number of household members) is 4.67 million VND (~\$292). This means that the

“middle” person in the Livelihoods Survey sample lived on about 80 cents per day. Like most income data, this data is right-skewed, with a mean of 28.4 million VND (~\$1,775) for *inc2007* and a standard deviation that is much larger than the mean. One of the consequences of market integration often cited in the literature is rising income inequality (Adger 1999, Adger & Kelly 2001, Adger & Luttrell 2000, Benjamin & Brandt 2004, Beresford 2003, Tran & To n.d.). While this widening income gap was much less noticeable in Đông Hải Commune in 2008 than it was in Ho Chi Minh City, for example, income inequality certainly was becoming an issue. One man told me, “We all used to be the same. Now, the rich people hate us. They think poor people are lazy.” An angry rumor spread among those in the village, who did not understand my random sampling technique, that I “only wanted to talk to rich people.” The wealthiest people in the village were those who acted as middlemen, usually in the seafood trade. They bought fish, shrimp, and other seafood from the fishers and aquaculturalists and sold the seafood inland. Four participants (out of 98) reported a 2007 household income of over 100 million VND (~\$6,250). The wealthiest household in my sample made 500 million VND (~\$31,250) in 2007.

The variable *dds* is a dietary diversity score that I calculated for each weekly visit with each Food Frequency Survey participant. The survey was divided into eight different categories of food (see above) – rice, vegetables, fish, meat, eggs, fruit, instant foods, and sweets. While some categories (fish and meat, for instance) may seem to be nutritionally equivalent and some categories (vegetables, for example) better divided into more specific categories, I employed the categories that research participants used to describe their meals during 24-hour food recalls. I calculated *dds* for each participant each week by simply counting the number of different food groups consumed in the last seven days regardless of how many sources a type of food came from (Hatloy et al. 2000). In a week, a participant could receive a *dds* ranging from 0 (if s/he ate

nothing) to 8 (if s/he consumed food from all eight categories). This range is in line with other food frequency surveys (Arimond & Ruel 2004 [7], Bukusuba et al. 2007 [12], Gittelsohn et al. 1998 [8], Khan et al. 2009 [5], Lake et al. 2006 [5], Leroy et al. 2008 [9], Moursi et al. [8], Mpontshane et al. 2008 [8], Savy et al. 2008 [7]).

Using *dds* as a measure of livelihood outcomes is particularly relative. There is no score (like a poverty line) that indicates desirable vs. undesirable outcome, food secure vs. food insecure, or vulnerable vs. not vulnerable. Every time I administered the Food Frequency Survey, a woman told me that she preferred to eat simple meals so that she could live comfortably with a fairly meager income. Thus, variation in this score could reflect idiosyncratic values and priorities rather than variation in food security and vulnerability. However, there is evidence that dietary diversity is an appropriate measure of vulnerability. Researchers have documented a strong correlation between the diversity of a person's diet and the adequacy of his or her nutrient intake (calories, protein, micronutrients) (Arimond & Ruel 2004, Hatloy et al. 1998, Mishra & Ray 2009, Moursi et al. 2008, Ogle et al. 2001). Failing to consume the appropriate quantity or quality of food to meet physiological needs because of inadequate dietary diversity results from vulnerability in the livelihood portfolio and contributes to further vulnerability by providing new stresses, such as increasing health care costs and loss of work days.

The dichotomous variable *nomeat* represents whether or not a participant reported consuming no animal products (no fish, meat, or eggs) in the last week during the Food Frequency Survey. Some nutritionists operationalize food security using this presence or absence of animal products in the diet and suggest nutritional interventions based on this measure (Allen 2003, Le 2003). Unlike inland areas, people living in the coastal region had relatively easy

access to an important source of protein, seafood, either in the ocean or river or in their own aquaculture ponds. The results of the survey reflect this availability. Out of 1,111 weekly visits, in only five did a participant report consuming no animal products in the previous seven days. Clearly, this is the more undesirable outcome.

Another dichotomous variable *novveg* represents whether or not a participant reported consuming no vegetables in the last week during the Food Frequency Survey. Whether purchased at the market, collected wild, or homegrown, vegetables are an important source of micronutrients, and a diet without vegetables is more likely insufficient. Again, this was not a very common occurrence among my survey participants. Out of 1,111 weekly visits, there were 120 occurrences of a person reporting no vegetable consumption in the previous seven days.

The variable *meals1* represents a potential coping strategy, reducing the number of meals consumed in a day. In this case, an affirmative response indicates that the Food Frequency Survey participant ate only one meal in a day at least once in the previous seven days. This type of consumption smoothing, which might also include eating less at each meal, eating less preferred foods, and maternal buffering, is often found to be a coping strategy of first resort (Kinsey et al. 1998, Lambert et al. 1994, Maxwell et al. 1999). These behaviors are strategies that can be used when the “regular” suite of livelihood strategies fails to continue to meet household goals. This type of coping strategy is often resorted to first because it is relatively sustainable, or “non-erosive,” and does not usually increase an individual’s or household’s vulnerability to future stresses or shocks unless the altered diet is so poor or eating behavior changed for so long that nutrition is affected. Regardless, whether resorted to over the short or long term, it is a less desirable livelihood outcome to have to employ a coping strategy, such as

meal reduction. Out of 1,111 weekly visits, there were 80 occurrences of a participant reporting this behavior.

The variable *credrice* represents another coping strategy, consuming rice that was purchased on credit in the previous seven days. When I asked, “What do you do when you do not have enough money to buy rice?” buying rice on credit was the most popular response. Out of 1,111 visits, there were 278 occurrences of a participant reporting this behavior. While most people’s attitudes towards purchasing rice on credit were nonchalant – it was a very common thing to do – it was a less desirable livelihood outcome than simply being able to purchase the household’s supply of rice for the week with cash.

Finally, *childawayhl* is a dichotomous variable, representing whether or not the research participant had adult children away working hired labor. For many families in Đông Hải, sending adult children, male and female, to other rural areas and, increasingly commonly, Ho Chi Minh City to work hired labor was the last strategy of resort in a long line of erosive and unsustainable strategies, akin to Corbett’s (1988) third stage of coping. While many adult children moved out of their parents’ home when they married or had children of their own, these young adults usually lived near their elderly parents and continued to support them with labor, food, or money. For many parents, the least desirable livelihood outcome of all was breaking up the family to send children away to earn cash elsewhere, far from home and with few opportunities to return to the village. They told me that they felt they no longer had any choice in the matter; they had exhausted all other coping strategies. Of the 111 Livelihoods Survey participants for whom I have the information, 38.7% had children away working hired labor. Of the 49 research participants older than 50, 57.1% had children away working hired labor.

This overall assessment of some of these outcome variables and the region's recent history of economic and environmental exploitation, covered in the next chapter, indicate the vulnerability of Đông Hải as a whole. Income is the only outcome variable that is directly comparable to a standardized measure in Vietnam. The national poverty line in 2008 was around 300,000 VND per person per month (~\$18.75) in rural areas. Of the 90 Livelihoods Survey participants for whom I have income data, 48.9% fall below this poverty line. That percentage is much higher than the rate for the country as a whole, about 17.5%, a figure published with much pride because of its rapid decline since the start of economic reform. Unfortunately, the poverty rate of Đông Hải during my field research matched national rates from the late 1980s and early 1990s. Additionally, the fact that 81% of research participants claimed experiencing at least some times when they did not have enough money to buy rice indicates that food security is a widespread and incredibly common problem in Đông Hải. While the remainder of this dissertation will attend to the marginalization of the southern coast of Vietnam to some degree, I am primarily interested in what the above three components say about differential vulnerability within a coastal community.

CHAPTER 3

BLUE REVOLUTIONS AND GOLDEN FORESTS

Introduction

In 2008, 20 years after the beginning of *Đổi Mới*, an uneasy relationship had been forged between two strong forces in modern-day Vietnam: development and conservation. The landscape of Đông Hải Commune reflected this struggle. Made up of five hamlets (the smallest administrative unit in Vietnam) – Phước Thiện, Hồ Thùng, Hồ Tàu, Động Cao, and Định An – Đông Hải is fairly isolated, approximately 70 kilometers from the provincial capital, Trà Vinh (population 1,036,800 in 2008), and about 275 kilometers from the commercial center of Vietnam, Ho Chi Minh City. Despite this isolation, the village represents well the legacy of rapid, unrestrained economic development and then retroactive, top-down conservation policies that have created the landscapes of much of rural, coastal Vietnam since the early 1990s.

Đông Hải Commune is centered on a crowded, chaotic market center and is bisected by the Phước Thiện River. Just around the market are the half-built remnants of wealth that often characterize frontier towns, where the boom and bust occur in fairly quick succession. Radiating out from there is a patchwork of shrimp ponds, barren salt pans, the scraggly remnants of naturally-occurring mangrove forest, once the only inhabitant of this region, and artificial, single-species rows of reconstituted mangrove forest. Among these principle components of the landscape lived about 5000 people and 1118 households in 2007, according to the President of the Đông Hải People's Committee. While I was not able to obtain census data for the past, this is

a dramatic increase over the population estimates given by an official from the district-level Forest Department and local people, all of whom agreed that there were about 40 families living in the area until the 1980s.

Living in the bunker-style quarters of the commune-level Forest Department for five months and then squatting in the community's meeting room for an additional five months, it was easy to imagine how inhospitable this area would have been before the whole-scale conversion of the landscape during economic reform. The area has two main seasons – a rainy season (May through November; 1860.1 mm of rain in 2007⁶), characterized by flash floods, gusting winds, and mosquito swarms, and a dry season (December through April; 163.8 mm of rain in 2007), characterized by brutal heat and a shortage of freshwater. The sandy, saltwater-inundated soils, ideal for the growth of mangrove species and their associates, cannot support rice agriculture or large-scale production of most food crops. Nevertheless, over the last 20 years, people moved to this area in large numbers both because of rumors of riches contained in the sea and government incentives to carve aquaculture ponds out of the forest and farm shrimp. This chapter traces the long history of frontier expansion in Vietnam, its culmination in the “pink gold rush” to the coast, the consequences for the coastal environment, and the reaction to those consequences on a national and international level.

⁶ Rainfall data from the Trà Vinh University Meterological Office.

The Mekong Delta⁷: A Perpetual Frontier

A crab, seeking revenge for the hole pecked in its head by a kite, created a flood of the sea that enveloped the land and killed every living being except for a brother and sister, who gathered two of every kind of animal into a great chest. When the waters receded, the sister and brother walked out on dry land and wondered how they were to live, as they had eaten all the rice in the chest. An ant then brought them two grains of rice, which they planted. The next morning, a rich crop of rice covered the land. So goes the origin myth of the Bahnar minority group, currently living in the Central Highlands of Vietnam. Oppenheimer (1998) argues that the existence of this myth, developed long before the Judeo-Christian myth of Noah's Ark, provides evidence for the beginning of rice cultivation in Southeast Asia along the coast. Higham (1989) agrees that rice cultivation in Vietnam probably originated among sedentary coastal communities in the North at least 7000 years ago.

De Koninck (2000), in an article analyzing different histories of frontier development around the world, states that "Vietnam's history is that of a nation having established its territorial domain through agricultural expansion" (13). Material and non-material evidence suggest that this expansion proceeded from the coast inland, into the Red River Delta of northern Vietnam. In the modern era, that expansion has reversed direction, from inland regions back to the sea. While the motivation for agricultural expansion has often been population and political pressure and, in recent years, state-sponsored territorial expansion, this movement has almost

⁷ The French, who colonized southern Vietnam from 1859 to 1930, borrowed the Thai word (*Mekong*) for the river that originates on the Tibetan Plateau and runs through Burma, Laos, Thailand, Cambodia, and out through southern Vietnam to the South China Sea to name the delta region through which the river and all its distributaries run. The Khmer word for the lower basin and largest branch of this river is *Bassac*. The Vietnamese word for the delta region is *Cửu Long* (Nine Dragons) and for the main branch of the river is *Hậu Giang*. I will refer to the river and delta region as Mekong.

always proceeded from more hospitable to less hospitable environs and has involved dramatic ecological alterations in order to convert the new environments to economic usefulness.

Thousands of years ago, growing coastal communities probably encouraged inland migrations into the floodplains of the Red River and subsequently the expansion of rice cultivation. As people moved farther and farther from the coast, the climatic conditions became more and more challenging compared to the ideal maritime environment with its seemingly limitless resources. Higham (1989) attributes most of the major archaeological finds from this period of expansion to the challenge of coping with these “marginal zones” (185). Large amounts of marine shells, used as ornaments and tools and from edible shellfish, have been recovered from the interior of the country. Therefore, there appears to have been heavy reliance on trade between the frontiersmen and the remaining coastal communities. Additionally, material evidence of interior settlement sites shows a marked preference for marshland, where rice grew wild and could be easily domesticated. Rice was a particularly advantageous crop for frontier expansion because it could be quickly preserved for consumption during dry periods.

“Pressed from the north by the Chinese, Vietnamese have looked in the opposite direction, to the south, for expansion” (Burling 1965:106). The Chinese empire extended its southern frontier and took over North Vietnam, including the Red River Delta, in the second century b.c.e.⁸ Only 1000 years later did the Vietnamese regain their independence in 939 c.e., with most aspects of their indigenous identity intact, for while a colonial province of China, the Vietnamese retained their culture and local leadership (Jamieson 1993). Experiencing political pressure in the North and determined to have their own land and country, native Vietnamese

⁸ The sinicized name for the country, *Việt Nam*, means “southern country,” belying both its geographical and political relationship to China.

(*Kinh*) began a concerted effort to colonize the land to the South in the tenth century c.e. – the “southward march” (*nam tiến*).

At the time the Vietnamese began spreading southward, what is now Central Vietnam was occupied by the Cham Kingdom, descendants of Indian merchants, who came to Southeast Asia to trade as early as the first century c.e. Trade between India and Southeast Asia grew quickly in the first centuries, as Southeast Asia was along the spice route. India and Europe desired sandalwood and other aromatic woods from the Asian tropics, while Indian traders brought cloth and religion (Buddhism) to Southeast Asia (Burling 1965). The Cham controlled the territory between the city of Hue and the Mekong Delta from 192 to 1697. O’Connor (1995) offers an interesting analysis of the dissolution of this kingdom by the southward-marching Vietnamese. He argues that wet rice agriculture, the signature economic strategy of the Vietnamese, displaced the house gardening and supplemental rice farming favored by the Cham. In the late 17th century, the Vietnamese had reached the South and colonized the Mekong Delta, setting up levees and developing the floodplain. The garden-farming Cham were now flanked by wet rice specialists. Wet rice cultivation proved to be a more successful economic strategy, especially as the world rice market developed, and the Vietnamese eventually engulfed the Cham Kingdom. Thus, O’Connor (1995) explains the great “ethnic shift” that finally united Vietnam culturally (984).

The Mekong Delta, before the 17th century, was a swampy and largely uninhabitable expanse of land and saltwater. Most of the land is below two meters above sea level in elevation (Brocheux 1995). French explorers described the Mekong Delta as a sponge, sucking saltwater in from the ocean on three sides during the dry season and expelling that brackish water several kilometers out into the sea during the rainy season (Brocheux 1995). The delta was then sparsely

populated by Khmer communities, particularly in the mountains that rose in the West, on the contemporary border between Vietnam and Cambodia, and on the sandy ridges that built up along the river due to the large amount of sediment flowing through the area.

These original inhabitants of the Mekong Delta were probably fishers and hunter-gatherers, collecting honey, wax, fruit, and meat from the mangrove forest that covered 1.9 million hectares of the western portion of the delta, according to an early forest survey in 1890 (Brocheux 1995). Brocheux (1995) writes that the monsoon climate and soil were particularly suited to rain-fed wet rice agriculture, “but [large-scale] settlement is only possible if water is controlled” (9). Thus, under Nguyen imperial rule in the early 19th century, the Vietnamese attempted to “conquer and pacify” the unpredictable river and the uncivilized land by digging canals and founding military settlements (Brocheux 1995). The Nguyen dynasty provided incentives for migrating from the heavily-populated North to the “empty” and “untamed” South. For every five people persuaded to move to the South, the landlord received buffalo for plowing and other heavy labor, farm tools, six months’ worth of food, and money to build a house. Landlords were required to “donate” two-thirds of the land they cleared back to the state and one-third could remain private property, while all forests and other uncultivated land belonged to the emperor (McElwee 2003).

Nguyen et al. (1998) describe the diversified livelihoods of these early Vietnamese settlers, who colonized levees and the banks of rivers and canals. They farmed two short-duration wet rice crops per year; mung beans, soybeans, sesame, and corn in upland areas; fruit trees on lowlands not planted with rice; and *Melaleuca*, *Eucalyptus*, *Acacia*, cashews, pineapples, sugarcane, kenaf (a fibrous plant), jute, and yams on acid sulphate soils, those formed under waterlogged conditions. The settlers also raised shrimp, fish, and ducks. This type

of livelihood, however, could only be carried out to its fullest extent on land that had a constant supply of freshwater and was not inundated by saltwater, a small region of the western Mekong Delta. An intermediate zone in the upland area, where the river washed away the salt that was sucked into the soil during the dry season, was suitable for irregular rice cultivation. A good portion of the land bordering the vast coastline was, and still is, constantly inundated with saltwater and therefore not suitable for rice cultivation of any kind (Brocheux 1995). A large portion of the new Vietnamese frontier remained nearly uninhabitable.

When French colonists arrived around 1860, they began a series of projects that would alter the landscape of the Mekong Delta forever. The French touted their Public Works projects as “progress” and “development” for “backwards” people in a “backwater” land, but Biggs (2003) argues that French colonial technology was merely an adaptation to a harsh and difficult environment – thick mangrove forest, six months of flooding and six months of drought per year, saltwater inundation, and canals constantly choked by fast-growing aquatic plants and accumulating silt. From 1900 to 1930, French Public Works engineers created a network of canals and invented the *casier*, an irrigation grid with large pumping stations that made intensive rice agriculture possible in the Mekong Delta. The spider web of canals spreading across the delta facilitated land clearance in formerly impenetrable areas. Forests were quickly converted to paddies, and rapid population growth followed this deforestation and soil drainage (Biggs 2003). Between 1886 and 1930, the French drained 1,425,000 hectares of land, paid for by land sales and rice export (Brocheux 1995).

“As rice land was cleared, the forest was delivered to fire and machetes without restriction from 1862 to 1912” (Brocheux 1995:84). Embracing the true spirit of the frontier, where land and resources seem inexhaustible, expendable, and abusable, the French

administration and Vietnamese settlers decimated the inland forests of the Mekong Delta, both directly and indirectly. They cut trees to make room for settlements and arable land (rice paddies). They felled wood for construction material and charcoal. The draining of the land by the canal system also lowered the water table, causing an increase in the frequency and intensity of forest fires⁹ (Biggs 2005). Additionally, while the canal system was meant to tame the hydrological regime of the Mekong River, it actually exacerbated flooding in some areas and drought in others (Biggs 2003, Brocheux 1995). The French administration formed a forestry service in 1912, but it was largely ineffective due to too few and corrupt rangers. According to someone recording the events of the time, “the forest was ‘strewn with corpses’” (Brocheux 1995:85).

The growth of Vietnam’s territorial domain through agricultural expansion did not stop in the early 20th century. After 1954 and the beginning of Communist rule in North Vietnam, Ngo Dinh Diem, the first president of South Vietnam, set up “land development centers” in sparsely-populated regions for North Vietnamese refugees, while in the North, people moved into New Economic Zones in the mountains to alleviate population pressure in the Red River Delta (De Koninck 2000). Hardy (2003) argues that the northern government’s vision of socialist economic development was an equitable distribution of production, and this vision led to policies that the government used to manipulate population movement. For instance, the government instituted a household registration policy in 1955 and only approved transfers of a household’s registration location if people moved in state-approved directions – urban to rural and lowlands to highlands.

Particularly after reunification of North and South Vietnam in 1975, the government encouraged Kinh (ethnic Vietnamese) population movement into the Central Highlands, an area

⁹ This legacy of the French administration’s environmental degradation still haunts the inhabitants of the Mekong Delta. In 2002, disastrous forest fires ripped through the U Minh Hạ and U Minh Thượng National Parks in Cà Mau and Kiên Giang Provinces.

containing the majority of the country's over 50 ethnic minority groups, and other border areas. Hardy (2003) writes that the goals of this post-unification migration policy were threefold: (1) to reduce population pressure in the Red River Delta and the central coastal plains; (2) to restrain population growth in urban areas; and (3) to serve the country's security and defense interests against foreign countries (namely, China, Laos, and Cambodia) and ethnic minorities within Vietnam's borders. These may have been the real reasons behind the government's attempts to spread Kinh households throughout the countryside, but the "public transcript" (Scott 1990) of migration policy was to promote economic equality between the highlands and the plains, between the borderlands and the rest of the country, and between ethnic minorities and Kinh (Hardy 2003). With *Đổi Mới* and the policies that accompanied Vietnam's economic transition, specific restrictions on individual and household movement within the country relaxed considerably, but the government's power to "encourage" (*khuyến khích*) its citizens to act in ways that further its interests was hardly lessened. The country's transition from centrally-planned economy to market-based economy provided the government with many more interests to pursue and frontiers to expand, particularly in pursuit of foreign currency.

Đông Hải: A Final Frontier

According to interviews with Trà Vinh and Duyên Hải Forest Department officials and local residents of the area, Đông Hải Commune was very sparsely populated before the start of the American-Vietnamese War, roughly 1959. The area was covered by dense mangrove forest and the few people who lived there were primarily fishers, using nets to catch fish from shore or small boats for near-shore fishing, and planted sweet potatoes and cassava inland in natural forest clearings. The coastal region was a site of particularly heavy fighting between the southern

Vietnamese army and their American allies and the North Vietnamese army in the 1960s and first half of the 1970s. A 65-year-old man, one of only four research participants to have been born in Phước Thiện Hamlet, explained that the majority of the area's small population moved away during the war because it was too dangerous to carry on with everyday life due to the number of bombs being dropped. Additionally, several people who lived in Đông Hải or close by during that time mentioned the Americans' use of Agent Orange, either directly ("dioxin" or "*chất độc màu da cam*") or indirectly ("There were no leaves and no branches left on the mangrove trees," or "The chemicals from the airplanes came down like rain").

Herbicidal warfare is an important component of the history of the mangrove forest in Đông Hải. It is estimated that, by 1971, over 72 million liters of chemical herbicides were sprayed over ten percent of the forests and food crops of South and Central Vietnam during the U.S. Military's Operation Ranch Hand (1962-1971; Dwernychuk et al. 2002). Nguyen et al. (2001) report that the chemicals damaged or destroyed 36% of southern Vietnam's mangrove forest. Herbicides were used by United States and South Vietnamese forces to facilitate movement through the dense tropical forests, to detect enemy camps and trails, and to destroy the crops in an effort to weaken enemy troops. The stated intention for the use of the defoliating agents (Agent Orange was the principle mixture employed) was to cause temporary defoliation, with no permanent damage to the Vietnamese ecosystems (Blackman et al. 1974). Tests were conducted to demonstrate the efficacy and relatively innocuous nature of widespread herbicide application (Darrow et al. 1996). However, recent reexamination of military archives indicates that those test conditions did not resemble field conditions. The total volume sprayed during each mission far exceeded the recommended amount, forested and agricultural areas were often

sprayed more than once, and dioxin contamination levels were much higher than in mixtures used for testing (Stellman et al. 2003).

The American Association for the Advancement of Science (AAAS) and the U.S. Government commissioned assessments of the ecological effects of herbicide use in Vietnam during the operation's tenure and immediately upon its cessation (Boffey 1971, Orians & Pfeiffer 1970, Tschirley 1969). Reports resulting from these studies came to similar conclusions about the impact on mangrove forests, although the authors differed in their evaluations of the overall worth of Operation Ranch Hand. Mangroves were found to be particularly susceptible to herbicides. Almost all species in these ecosystems were killed outright by single applications of the chemicals. Most authors postulated that the mangroves would regenerate in approximately 20 years but also put forth reasons why regeneration might be hindered, such as unfavorable soil conditions for herbicide decomposition and difficult seed dispersal (Orians & Pfeiffer 1970). Years later, Dinh (1984) found that 0.06% of the defoliated mangrove in southern Vietnam had undergone natural succession while 88% remained bare. In a similar study, Bearden (1984) studied Landsat image data from 1965 to 1979 and concluded that land stripped bare by herbicides in the lower Cà Mau Peninsula (the southern tip of Vietnam) showed signs of reclamation by green vegetation in 1979, but it was not possible to detect whether the land was being reclaimed by the same species that inhabited the area before the war.

Although there is some disagreement about the post-war environmental history of Đông Hải, there is general consensus among those research participants, who lived in the area at the time, that the American military sprayed herbicides on this area of the Trà Vinh coast and that the chemicals caused serious damage to the mangrove forests. Mr. Giàu, who fought with the Southern Vietnamese army and, thus, with the United States forces, said that the Đông Hải area

contained a thick forest cover and was good for hiding during combat. Therefore, many bombs were dropped and there was a lot of fighting in the area. Likewise, an official from the Duyên Hải Forest Department claimed that bombs and Agent Orange destroyed most of the forest in Duyên Hải District, especially along the coast. Fighting was more intense along the coastline of Trà Vinh Province, he said, because the area harbored many Việt Cộng. Just as the assessments commissioned by the AAAS and the U.S. Government concluded, the mangrove forest seems to have been the most seriously damaged by chemical warfare. When asked about the visible effects of the war in Phước Thiện in 1976, where he moved to dig government-run aquaculture ponds, one research participant described the landscape as being pockmarked by bomb craters



Figure 3.1 A mangrove forest defoliated by Agent Orange (1970)
(http://museum.icp.org/museum/exhibitions/vietnam/images/AV08agent_orange.jpg)

and haunted by the skeletons of *cây mắm*, dead but still-standing mangrove trees. A woman, who had lived in Phước Thiện all her life, commented that there were huge *cây mắm* in the hamlet when she was a child. Those trees were destroyed by Agent Orange.

The uncertainty about the environmental history of Đông Hải concerns when aquaculture ponds became the dominant feature of the landscape. Was there time between the conclusion of Operation Ranch Hand (1971) or the cessation of the most serious combat in the region (1973) and the onset of aquaculture pond construction for the forests to regenerate naturally? Many claim that there was time for some natural regeneration. One man told me that the forest trees reached four or five meters tall before local people leveled them to install fish and shrimp ponds. There was also discussion of government-encouraged tree replanting after the war, primarily *cây đước* (*Rhizophora conjugata*) and *cây mắm*. A Duyên Hải Forest Department official made the point that the creation and destruction of forest over time has been more dynamic than a simplified notion of history would indicate. During the war, when Agent Orange and other chemicals rained from the sky and killed mangrove trees, people involved in the fighting planted trees in order to hide themselves from enemies and Vietnamese civilians planted trees to protect themselves from the war. After the war, the official said, local people planted trees for firewood and construction materials. Some planted trees to claim land and some cleared land to claim it. Whatever the fluctuations in forest cover directly following the American-Vietnamese War, the southern coast of Vietnam was a relatively inhospitable and, therefore, sparsely populated area until the government's pursuit of foreign currency pushed development into one of the last frontier areas remaining in the country.

After reunification in 1975, the Vietnamese government set up communal extensive aquaculture ponds that raised wild-caught shrimp and fish with no manufactured inputs. The

vice-director of the Aquaculture Protection Department explained that these state-organized ponds were unsuccessful and, around 1988 (two years after the beginning of *Đổi Mới*), the government divided the land among the locals, “to weed out the lazy people” – those who worked hard would be successful and those who were “lazy” would fail. Later, when I asked the vice-director why aquaculture was encouraged along the coastal areas of Vietnam, he replied that the ocean used to be full of shrimp and fish, but those populations were over-harvested. The government encouraged aquaculture because it wanted to produce lots of shrimp and crab and, he added, to provide an alternative livelihood for fisherpeople.

The Blue Revolution at the Margins

By the mid-1970s, due to increasingly mechanized and sophisticated methods of capture and the rapidly increasing global demand for seafood, the world’s oceans were overexploited and fisheries were unable to keep up with demand (Neiland et al. 2001). Aquaculture, the intentional farming of aquatic organisms, such as fish, shrimp, crab, seaweed, etc., was a promising way to continue to increase production of seafood and a good way for countries to transform unproductive coastal land into a site for lucrative industry. Ecuador was one of the first adopters of large-scale, intensive aquaculture, particularly the cultivation of black tiger shrimp (*Penaeus monodon*). In only a few years, by the end of the 1970s, Ecuador had become the western hemisphere’s leading producer of shrimp and experienced incredible financial success (Stonich & Bort 1997). Ecuador’s experience led development agencies and private investors to encourage and support intensified shrimp production in other countries, particularly developing countries, often touted as economic development and poverty alleviation projects in marginalized

areas (Bailey 1988). Today, 90% of global aquaculture production occurs in developing countries, a dramatic result of the so-called Blue Revolution.

Not surprisingly, there has been a great deal of support for the development of the aquaculture industry in developing countries. For instance, Hishamunda et al. (2008) contend that aquaculture provides benefits to both the host country and local people. The government benefits from increased tax revenue and by earning foreign exchange. Local people benefit from new sources of rural employment and income, and the food security of the poor increases because of aquaculture's ready source of protein. Aquaculture even benefits regional economies, these authors note, by improving economic efficiencies and competitiveness. However, Bailey (1988), in one of the first papers to express concern about the negative social consequences of industrialized aquaculture, and others since argue that the Blue Revolution, much like the Green Revolution of the 1960s and 1970s, has actually done the poor more harm than good.

Bailey (1988), echoed by others citing case studies in Sri Lanka (Gunawardena & Rowan 2005), Sri Lanka and the Philippines (Bergquist 2007), and Central America (Stonich & Bort 1997), lays out several reasons that local people do not always benefit from aquaculture development projects. First, large-scale, rather than small-scale, aquaculture projects are most often supported by national governments and international development agencies. Small-scale production for local consumption does not generate the taxes and foreign currency that attract governments to aquaculture. Second, Bailey writes, when aquaculture is pushed as part of an economic development scheme, local elites are often in an advantageous position. With more education and wealth, locally powerful people are more likely to successfully adopt new technologies and have access to institutional resources (e.g., credit, government subsidies, permits, etc.) that are not available to others in a community. Third, the communities that most

often depend on coastal resources (e.g., near-shore fishing, harvesting mangrove products, collecting wild crustaceans or bivalves, etc.) are politically and economically marginal. Fourth, many times, the development of shrimp aquaculture transforms “a multi-use/multi-user coastal resource into a privately owned single-purpose resource” (37). Bailey’s final concern is that the development of shrimp aquaculture raises land values and lowers the amount of labor needed to work the land. Thus, while the goals of coastal aquaculture development often include local poverty alleviation and increasing local food security, the powerless people in targeted communities either do not reap these benefits or end up worse off than before the project started.

Additional concerns about aquaculture development are environmental ones, concerns that degradation has serious consequences for the vulnerability of marginal people in marginal environments. While, theoretically, aquaculture should be an economically and ecologically sustainable enterprise because it makes efficient use of the environment’s source and sink functions and redirects energy flows into the cultivated species (Kautsky et al. 1997), Le and Scott (2008) name aquaculture’s overreliance on smaller, less valuable fish as one of the many socioeconomic problems related to its development. Beveridge et al. (1994) write that, to produce 180,000 tonnes of farmed salmon, 585,000 tonnes of fishmeal are needed. Thus, industrial aquaculture is often focused on the “production of luxury export food instead of food for the poor” (Le & Scott 2008). Furthermore, Bergquist (2007) argues that destruction of mangrove forest, a common casualty during shrimp pond construction, can lead to household displacement and loss of livelihood opportunities. Intact mangrove, the only forest type that exists at the interface between land and sea, supports commercial fisheries. Ronnback (1999) placed the annual market value of fisheries supported by mangroves at US\$750-\$16,750 per hectare. Many researchers name mangrove’s function as nursery ground for fish and shellfish as

its most important environmental service (Abuodha & Kairo 2001, Barbier & Strand 1998, de Graaf & Xuan 1998, Naylor et al. 2000, Ronnback 1999). Another oft-cited indirect benefit of mangrove forest is its environmental sink function, or its ability to assimilate waste products. Because the primary production of these forests is so high, mangrove plant species have a high capacity to tolerate and use dissolved nutrients (Alongi 2002). Abuodha and Kairo (2001) also cite this ecosystem as a trap for pollutants. In this way, mangroves, ironically, play a role in sustaining aquaculture. Unfortunately, semi-intensive shrimp farms require mangrove areas 35 to 190 times the surface area of the pond for ecosystem support, a ratio nearly impossible to maintain as governments and other organizations support nearly unregulated pond construction (Kautsky et al. 1997). Not only has aquaculture development degraded natural resources that support alternative livelihood strategies, such as ocean fishing and the collection of forest products, it has also degraded the natural resources necessary for its own long-term success.

The Rise and Fall of Shrimp Aquaculture in Vietnam

Often, researchers must wait many years, even generations, for unambiguous data supporting their claims that a certain practice is environmentally unsustainable. It did not take long with shrimp aquaculture. Black tiger shrimp monoculture took off in the 1980s in the Philippines with the introduction of hatchery-produced fry and artificial feed but experienced a near total collapse in 1989 due to disease outbreaks (Bergquist 2007). In just one year, between 1993 and 1994, shrimp exports from Honduras to the United States fell from 7300 to 2300 metric tons because of an uncontrolled virus (Stonich & Bort 1997). In the mid-1980s and early 1990s, there was widespread intensification of shrimp aquaculture in Thailand, which first introduced some extensive aquaculture in 1935. Thailand became the world's leading producer of black

tiger shrimp in 1991. However, since 1995, Thailand's yields have been steadily decreasing, due to problems with disease (Huitric et al. 2002). In large part, these rampant disease outbreaks were the result of self-pollution, again due to unregulated pond construction. Despite these early warning signs, Vietnam followed suit after its announcement of economic reform in 1986 and began its push into the final frontier, coastal wetlands, in a race to convert unproductive land into productive land and earn foreign currency. Today, Vietnam is one of the world's top shrimp exporters, with 90% of brackish shrimp farming taking place in the Mekong Delta (Pham et al. 2010). Unfortunately, in the midst of this "pink gold rush" in the early 1990s, the lessons from other countries were not learned and land conversion took place with few regulations.

Five to 80% of the mangrove forest in each country that possesses this type of forest has been lost and mangroves are disappearing at a rate of 2% to 8% per year (Adeel & Pomeroy 2002). Vietnam is certainly no exception, with an estimated loss of 32% of mangrove acreage between 1965 and 2001 (Tong et al. 2004). This loss can be attributed to a number of anthropogenic factors, not just conversion to shrimp aquaculture ponds – herbicidal warfare, urban sprawl, fuelwood collection, etc. – but 95% of aquaculture ponds are constructed in mangrove habitat and, thus, shrimp farming is the main culprit (Primavera 2000). Adger and Luttrell (2000) list three reasons that wetlands, including mangroves, have been undervalued and quickly converted for other uses. First, information about the ecological goods and services provided by wetland ecosystems has not been adequately and effectively disseminated. Second, communities and/or local governments incur high opportunity costs maintaining wetlands because of the high market price of other goods that could be produced in those sites. Third, the costs and benefits of wetland conversion are differentially distributed, usually with marginalized people bearing the costs. With these factors in play in Vietnam, the government enacted a

number of policies in the last 20 years that have allowed for the rapid conversion of mangrove forests.

One of the most famous pieces of legislation to emerge from the beginning of the country's economic overhaul was the 1993 Land Law, which allowed individual households to lease plots of land for 20 years (annual crops and aquaculture) or 50 years (perennial crops and forestry) and retain a bundle of property rights associated with that land – rights to exchange, transfer, lease, inherit, and mortgage. In this way, a system of quasi-private property was established in Vietnam. Other decrees and resolutions were passed that are not so well known but more specific to the issue of mangrove conversion and aquaculture. National Decree 773-TTg was passed on December 21, 1994 and specified that “open” coastal areas and waterfronts could be used for shrimp and crab farming. The “uncultivated land encroachment” movement promised households that cleared mangroves for shrimp ponds would be exempt from paying taxes for the first five years of their tenure on that land (Le & Scott 2008). Further, Resolution No. 09/2000/NQ-CP allowed for the conversion of “unproductive” land and “low-production” rice fields and Resolution No. 03/2000/NQ-CP encouraged the development of larger aquaculture farms with tax breaks and credit policies (Vu 2006). Thus, Vietnam's state-sponsored agricultural expansion continued.

In the early 1990s, aquaculture production in Vietnam exhibited “spectacular growth” (Adger 1999:111). Between 1976 and 1992, shrimp aquaculture production, most often geared toward the production of a luxury food item exported to industrialized countries, increased by an astounding 3500% (de Graaf & Xuan 1998). (Figures 3.2 and 3.3 show Vietnam's export markets and products structures for 2007.) While aggregate statistics for Vietnam's fisheries as a whole show a steady increase in production over the years (see, for instance, USDA 2007), this

unflagging success does not characterize the experience of the people of Đông Hải or of other small communities engaged in semi-intensive shrimp farming in other parts of Vietnam (e.g., Le & Scott 2008, Luttrell 2006, Vu 2006). Most of the shrimp farmers with whom I spoke in the three hamlets in Đông Hải claimed that their shrimp ponds made a profit for two or three years in the late 1990s and early 2000s. Everyone reported their largest profit in 2001 and, since then, “failure” – making just enough money to “live every day,” breaking even, or losing money. Luttrell (2006) reports the very same sequence of events from a commune in Cà Mau Province, as do Le and Scott (2008) from a commune in Central Vietnam.

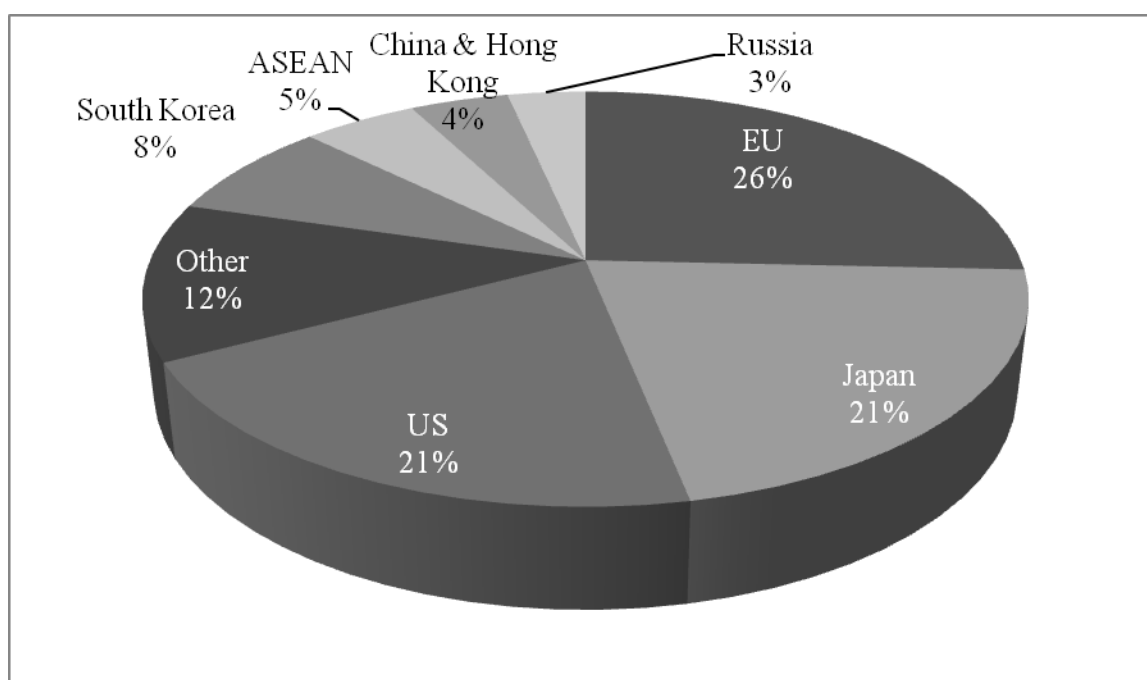


Figure 3.2 Vietnam’s aquaculture export markets structure in 2007 (by value) (from Nguyen 2008)

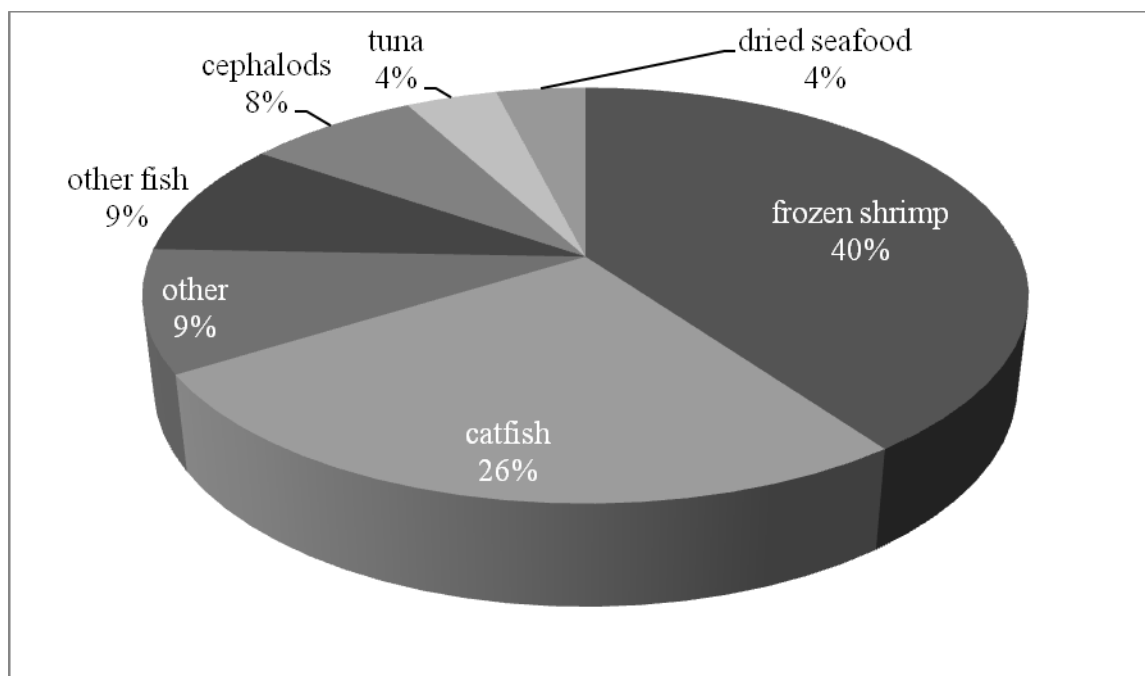


Figure 3.3 Vietnam's aquaculture export products structure (by value) (from Nguyen 2008)

Shrimp Farming in Đông Hải

The population movement within my field site reflects Vietnam's history of frontier expansion and aquaculture development. The average number of years of residence (in 2008) of research participants in Hồ Thùng Hamlet was 38.2 years (31 out of 45 were born there) and, for Hồ Tàu Hamlet, 32.3 years (13 out of 22 were born there). These two hamlets have more inland, arable land than Phước Thiện, the youngest hamlet, both physically and in terms of population movement. The average number of years of residence of research participants in Phước Thiện was 16.6 years, with only four out of 50 participants having been born there. In other words, the average Phước Thiện citizen moved to the hamlet in 1991, around the beginning of Vietnam's Blue Revolution. Thirty out of 45 individuals moved from other hamlets within Duyên Hải District, nine participants moved to Phước Thiện from other districts within Trà Vinh Province, and six participants moved from areas outside the province. Three individuals moved all the way

from Hanoi, the capital city of Vietnam, located in the North, in search of cheap land. Many of these individuals spoke of the benefits they received from the government for “improving” the land, converting “unproductive” mangrove to “productive” aquaculture farms.

Encouraged by land availability, tax exemptions, and offers of loans from government banks, people from crowded, rice-growing regions moved to the mangrove-entangled coastline and began digging out ponds. In 2008, most people in Đông Hải practiced semi-intensive aquaculture. They dredged their ponds by hand after each harvest and they stocked their ponds with black tiger shrimp and sometimes mud crab (*Scylla serrata*) larvae from hatcheries or sold by fisherpeople. Many farmers also welcomed volunteer fish and shrimp species that entered their ponds from the ocean during water exchange, while others used the root of *cây thuốc cá* to kill all the fish in the pond before adding shrimp larvae. Most farmers added manufactured food and fertilizer to their ponds only when they had extra money, which was not often, and none could afford antibiotics to treat their shrimp for the diseases that often killed an entire season’s shrimp in days.

Although Trà Vinh’s 2001 Fisheries Report mellifluously describes the province’s fisheries performance as “running smooth as water,” the reports in the years after begin attributing lower profits and production to bad weather and “unfavorable climate,” inadequate credit availability, and the failure of farmers to keep up with technological advancements and to follow shrimp cultivation procedures (as laid out by the extension officers). For instance, the 2003 Trà Vinh Fisheries Report reads, “Some farmers made haste to raise shrimp without following the proper schedule, environmental factors, and drainage system; accordingly, they suffered a big loss.” The vice-director of the Aquaculture Protection Department listed the reasons for poor shrimp production: extreme temperature fluctuations, inappropriate water pH,



Figure 3.4 An advertisement for commercial shrimp larvae, hanging in the Đông Hải Market (The woman says, “Oh my, your shrimp are so long!” And the man replies, “Not only long, but healthy!” Photograph by author)

dramatic and sudden shifts between the wet and dry seasons, and larvae carrying disease from the hatcheries. I asked him why communities closer to the district capital had continuing success with shrimp aquaculture, while farmers in Đông Hải experienced disappointment with almost

every harvest. He answered, first, that people in the successful communes had more technical skills than farmers in Đông Hải. Additionally, the vice-director said, salinity fluctuations in successful (often larger) ponds were not as dramatic, and therefore damaging, as those in Đông Hải. I asked why people in Đông Hải are lacking technical skills. He replied that the commune is too far from extension centers. Successful communities are wealthier communities with better roads and more literate citizens.

Local aquaculturalists cited four main reasons for the continuing failure of their ponds related to their position on the margins, both literally and figuratively: (1) water pollution, (2) the waning availability of wild fry and natural food sources, (3) poor-quality shrimp larvae from the hatcheries, and (4) lack of technical knowledge. Two sources of water pollution were acknowledged: external and internal. Đông Hải is positioned at the very end of a huge watershed and is, therefore, downstream of thousands of kilometers of Southeast Asian economic development. People also talked about a communal self-pollution. All ponds in the area are essentially interconnected, especially during times of flooding. Because of the density of farms, during pond water exchange, one farmer's wastewater became another farmer's "fresh" water. Some farmers illegally disposed of their bottom sludge in the river. Disease and non-optimal water conditions passed easily from one farm to the next in these circumstances.

Despite Trà Vinh Fisheries laws, put into effect in 2008, restricting the use of small-mesh nets and thus preventing local fishers from catching wild shrimp and crab larvae, natural recruitment of marketable species into aquaculture ponds had become nearly nonexistent. "I think the fish are afraid to live here," said one aquaculturalist, who noticed a sharp decline in seafood populations off the coast of Đông Hải in the early 1990s. He explained that too many people began fishing offshore with large boats and big nets. De Graaf and Xuan (1998) agree

that, after 1989, when Vietnam's fishing industry was de-collectivized, the catch per unit effort (CPUE) in the country's waters declined rapidly due to mostly unregulated harvesting. These days, along the shore, hardly anything remained for local fishers without open sea-worthy boats or to naturally stock aquaculture ponds in Đông Hải. Aquaculturalists, to an ever increasing extent, had to rely on hatchery-produced fry.

The most common diseases affecting Vietnamese shrimp production systems are Monodon Baculo Virus, Yellow Head Disease, and White Spot Disease Virus. These diseases can be brought into an aquaculture pond by infected larvae from a hatchery or transmitted from one pond to another as described above. Hao (1999) reports that between 58% and 62% of shrimp fry imported from hatcheries to Duyên Hải District were infected with White Spot Disease Virus. Oanh and Phuong (2005) write that the larvae most commonly purchased by farmers in the Mekong Delta are imported from Central Vietnam and are often in very poor condition by the time they reach the southern provinces. Further, several of my research participants mentioned that they usually bought their "baby shrimp" on credit, having no cash available at the start of the season. They claimed that, when they bought the fry on credit, the merchant gave them poorer quality organisms than if they had paid cash.

As for the aquaculturalists' professed lack of technical knowledge, it is clear that this stemmed from living on the margins of society. When asked, all of my research participants said that they would have preferred to attend more aquaculture workshops than were offered. Most said they attended several meetings, headed by officials from the Aquaculture Encouragement Department (who refused to speak with me) and engineers from Cần Thơ University, when they started their ponds, but few have been offered since. A couple people even mentioned being excluded from workshops because their operations were not large enough. Furthermore, although

I did not quantify literacy among my research participants, many (probably the majority) were functionally illiterate. Pens and pencils were distributed at the workshops, as were how-to manuals, meant to be followed closely and to fill in the gaps of the meeting. One young woman told me that she went to the workshops in her husband's stead even though she rarely worked with the household's ponds. Her husband refused to go to the meetings because he was ashamed of not being able to read and write.

Bergquist (2007) blames, in part, the failure of semi-intensive black tiger shrimp farms in Sri Lanka on "poor access to accurate information and technology" (795). Vu (2005) lists some problems with extension services in Duyên Hải District: the number of extension officers is small and they generally lack a broad range of experience and extension meetings are usually geared toward commercial, large-scale shrimp farming. Quoted earlier, the official from the Aquaculture Protection Department said that better educated farmers in less remote areas than Đông Hải received better extension services. Thus, while strongly encouraged to move to the coast and help develop and "civilize" some of the last forested areas in Vietnam, poor farmers continued to fail because of a degraded environment, lack of money, and neglect by governmental extension services.

Retroactive Conservation

The first major international recognition of the ecological importance of wetlands was the Ramsar Convention (The Convention on Wetlands of International Importance), developed and signed by participating countries in 1971. Today, 1,896 sites and 185,467,049 hectares have been designated as "Wetlands of International Importance" (Ramsar 2000). Vietnam joined the convention in 1989, at the beginning of economic reform and the country's integration in the

world economy, and currently has two designated Ramsar sites, covering 25,759 hectares. One site encompasses a freshwater lake and strives to protect Vietnam's last lowland semi-evergreen forests, 50 IUCN red-listed mammal, bird, and reptile species, and 131 endemic fish species. The other site protects coastal mangrove and mudflat ecosystems in the Red River Delta, a particularly crucial area for migratory water- and shorebirds (Ramsar 2000).

Despite these protective activities, many of Vietnam's mangrove forests have been left vulnerable to economic development along the coast. Both true mangrove species, those that are confined to salt or brackish water, and their associates, plants that occur both inland and with mangroves, require the same conditions as shrimp, such as warm year-round temperatures and salt water. Because of the anaerobic and salinized condition of the soil in mangrove areas, rice, the Mekong and Red River Deltas' major crop, cannot be grown there. Fruits and vegetables can only be grown in small quantities, not on a commercial scale. Therefore, to force these areas into production, governments around the world encouraged the conversion of mangrove forest to shrimp ponds. A study of land use change in northern Vietnam, using remote sensing data, shows that 63% of 1986 mangrove areas were partially or entirely replaced by aquaculture in 2001 (Beland et al. 2006). At minimum, these authors write, 45% of the aquaculture ponds present in 2001 in this area were built in previous mangrove habitat. Further, Seto and Fragkias (2007), using satellite imagery to evaluate the success of the Ramsar Convention on Wetlands in the Red River Delta, report that the existence of the treaty did not slow aquaculture development in the region between 1986 and 2002. However, total mangrove area remained relatively constant during that time period due to replanting efforts. Unfortunately, they argue, replanted mangroves are increasingly fragmented and survival rates are poor.

In response to growing pressure from the international conservation community and funded by the World Bank and the Danish International Development Agency (DANIDA), in cooperation with the Government of Vietnam, the Coastal Wetlands Protection and Development Project (CWDP) was carried out in four provinces in southern Vietnam – Trà Vinh, Sóc Trăng, Bạc Liêu, and Cà Mau Provinces. The main objectives of the project are outlined in the pre-appraisal study document (World Bank 1996:5):

1. “Improve the economic use of formerly forested and newly formed coastal wetlands areas through rehabilitation or establishment and protection of coastal forest protection belts in the Mekong Delta;
2. “Revitalize and improve the protection of important wetland ecosystems that contain valuable biological diversity and provide nurturing functions for fisheries;
3. “Improve the sustainability of shrimp ponds situated in areas adjacent to the protection belts and nature conservation areas;
4. “Strengthen the provision of support services for the mangrove forestry and aquaculture subsectors in the protection [of] wetlands and key surrounding buffer areas.”

These goals were intended to be met through the seven components of the project: mangrove planting, rehabilitation, and protection; agricultural technology development and transfer; a social support program; policy and institutional development; the resettlement of full protection zone occupants; monitoring and evaluation; and project coordination and management (World Bank 2004).

The authors of the 1996 pre-appraisal report cited six causal factors of the environmental degradation that the project attempted to ameliorate (World Bank 1996). First, they blamed the national fisheries policies, which operated as if no productivity limits existed. Second, settlement practices during the “pink gold rush” in the early 1990s were “chaotic and unregulated” (16). Third, the Vietnam Bank for Agriculture and Rural Development (VBARD) began small household loan extension in the early 1990s, which allowed for more rapid land conversion. Fourth, rural extension services, especially related to aquaculture, were severely limited in

Vietnam because of lack of training, money, equipment, transportation, and coordination among the goals of various extension officers. Fifth, most small-scale shrimp farmers input low-quality, diseased shrimp larvae into their ponds. The resultant poor yield causes those households to have to seek additional income sources, leading to more land conversion. Finally, these authors argue that the overall natural resource management framework in Vietnam is unsustainable.

Ultimately, the authors of the pre-appraisal report claim that the expansion of shrimp aquaculture in the early 1990s is to blame for most of the environmental degradation in the project area, the southeastern coast of Vietnam, and the project sought to “halt and reverse” that degradation.

The total area protected by the CWPDP in the four provinces was 50,736 ha, with 27,028 ha demarcated as Full Protection Zone (FPZ) and 23,708 ha intended as Buffer Zone (BZ). In Đông Hải Commune, one of the main sites of project implementation, 1,282 ha were allocated for the FPZ, 1,068 ha were allocated for the BZ, and full economic activities were allowed in 320 ha (the Economic Zone, EZ). According to the 1999 report and in accordance with signage posted in Hồ Thùng, Hồ Tàu, and Phước Thiện Hamlets, activities permitted in the FPZ included reforestation, forest patrolling, and forest management; ecotourism development; scientific research; collection of marine products in foreshore areas; collection of small marine products, such as snails, small crabs, mud skippers, and shellfish, but no fish or shrimp/larvae; collecting dead wood; and agricultural activities in areas not suitable for mangrove planting. Prohibited activities included destroying live vegetation; soil mining; settlements; aquaculture; commercial fishing with nets or traps; harvesting fish or shrimp/shrimp larvae; and hunting wild animals. Activities permitted in the BZ included forest management, protection, and reforestation; silvicultural treatment; harvesting of forest byproducts and dead wood; breeding of bees and animals; allocation of forest/land lots to households; recreation, scientific research, and

ecotourism; and settlements. Additionally, the goal for the BZ was to be composed of 70% forested land and 30% full economic activities. Within those parameters, all land used for aquaculture was required to be 60% planted with mangrove trees and 40% open pond. Prohibited activities within the BZ included forest destruction; illegal settlements and encroachment on forested land; and hunting and trapping of wild animals.

The three hamlets in which I conducted my research, Phước Thiện, Hồ Tàu, and Hồ Thùng, were all designated BZ within the CWPDP. Restrictions on economic activities were at the forefront of many people's minds. Shrimp farmers had to devote 60% of their total land area to mangrove restoration and claimed to be reaping little benefit from the added physical protection and increased water quality that conserved forest was supposed to afford the shrimp farms. The landless, who depended more heavily on wild resources (e.g., ocean fishing, collecting wild plant foods and medicines) for income generation and subsistence, were severely limited in their activities by conservation policies (e.g., fishing net mesh size restrictions, prohibitions on wild plant harvesting and the sale of firewood). All inhabitants of the BZ had to formally request permission of the Đông Hải Forest Department and People's Committee to make changes to their shrimp ponds, clear land for salt making, fell trees for house construction, or even to sell a dead tree as firewood.

Conclusion

Thus, the economic and environmental marginalization of the southeastern coast of the Mekong Delta has been proceeding fairly rapidly since the beginning of economic reform and has roots in a much longer history of frontier expansion in Vietnam. This coastal region, as a whole, is a vulnerable region in the country because of its distance from major markets,

compromised ecological support systems, neglect by extension services, and lack of economic options because of poor soil and conservation restrictions. Only a very few inhabitants of Đông Hải were reaping benefits from economic reform on par with the rest of the country. In addition, certain segments of the community found themselves in ever greater vulnerable positions because of some of the consequences of widespread shrimp aquaculture and the conservation and development program enacted in the region. The remaining chapters will address this differential vulnerability.

CHAPTER 4

LIVELIHOOD PORTFOLIOS IN ĐÔNG HẢI

Introduction

In his dark, smoky kitchen, Mr. Văn recalled his first years living in Phước Thiện Hamlet in the early 1980s after marrying his wife. “When I first met my wife,” he said, “we had no pot to cook in, and yet we were able to feed our children and live a better life than now.” I asked Mr. Văn what he felt were the barriers to a good life in Phước Thiện. He replied that there were three main difficulties – (1) people had no land; (2) if a person wanted to catch fish, he had no boat; and (3) aquaculture farms in the area were not successful, so it was difficult to find work. Mr. Văn was speaking from the perspective of a man who owned no land, having moved from the interior of the province long before people rushed to the coast to farm shrimp. In those days, fishing from shore was an easy and lucrative way to make a living. When the Vietnamese government began redistributing state-owned land to individual households in the late 1980s, Mr. Văn said he could not afford to purchase any land and assumed that the sea would continue to provide. Additionally, he explained, there were many choices then for making a living. The mangrove forest was thick and full of animals for hunting and edible plants for collecting. People could easily collect and sell firewood, which seemed in limitless supply at the time. With the transformation of the coast to shrimp farms in the 1990s, many of those livelihood options disappeared, as did the abundance of fish and shrimp near the shore.

It was not only the landless who suffered from the complete transformation of the coastline. The majority of the shrimp farmers, themselves, some long-term residents of the commune but many relatively recent immigrants, found themselves locked into an unsustainable way of life. One aquaculturalist complained that all the development in the area had just created the necessity to spend more money. In the past, he said, a person could work one day fishing and have enough food to feed his family for a month. Now, people must work all the time to pay the bills and feed their families. Before, he needed only a fishing net, not even a boat, to provide for his household. Now, despite his shrimp ponds, he felt poorer. Another woman, who had always lived in Phước Thiện, told me that life was easier in the past, even during the war. During times of food insecurity, she explained, she and her husband could easily go to the ocean and catch fish to make extra money. Now, one needed a boat to catch any fish in the ocean and the shrimp ponds continued to fail.

Mr. Văn's and others' comments underscore the fact that Đông Hải had always been in an economically and environmentally marginalized region. Its inhabitants had been relatively isolated from markets and consumer goods, the terrain was inhospitable, and the soil could not support many families. Yet, people said, it was "easy to live," easy to obtain food and other household necessities, and easy to cope with and overcome the external pressures on the household. With the advent of aquaculture in the region and the effects of other *Đổi Mới* era policies, livelihood choices diminished and additional stresses and shocks became threats. Many of my research participants agreed that they felt more vulnerable in the present than before economic reform. This chapter describes the livelihood choices – income-generating strategies, subsistence activities, and food procurement behaviors – available in Đông Hải. These activities and behaviors make up the livelihood portfolios of households. Furthermore, it is the range

available to each household and the viability of each component in a time and a place that, I argue, determines a household's vulnerability to stress or shocks and its resulting livelihood outcomes. On the whole, livelihood opportunities were limited in Đông Hải by environmental degradation, conservation policies, and lack of financial resources, but the next three chapters will demonstrate that the choices of some types of households were more constrained than others.

Livelihoods Survey Participants

All of the information concerning livelihood portfolio choices was elicited from the 117 Livelihoods Survey participants. Table 4.1 shows the main characteristics of those participants, divided into individual and household characteristics. The sample contained 56 males and 61 females. The average age of the participants in 2008 was about 49 years; the youngest participant was 23 and the oldest was 82. Out of 109 participants, who answered a question about the highest grade they had completed in school, the average was third grade. Twenty-two participants (10.2%) received no formal education and three participants (2.6%) received a tenth-grade education or higher.

Forty-three participants (36.8%) were members of nuclear households; 26 (22.2%) were members of elderly-only households; and 48 (41.0%) were members of multigenerational households. Ninety-two of 117 participants (78.6%) were members of male-headed households, while 25 (21.4%) were members of female-headed households. The average number of household members in this sample was 3.82, with a minimum of 1 and a maximum of 10 members. Eighty-nine participants (76.1%) belonged to households that owned land, and 28 participants were landless. The average number of income-generating activities in which the

Table 4.1 Characteristics of Livelihoods Survey sample ($n = 117$)

Individual Characteristics	
Gender	
male	56 (47.9%)
female	61 (52.1%)
Age	
mean	49.15 (std. dev. 15.014)
min	23
max	82
Education (highest grade completed; $n = 109$)	
Average	3 rd grade
Min	No education
Max	13 th grade
Household Characteristics	
Hamlet	
Phước Thiện	50 (42.7%)
Hồ Thùng	45 (38.5%)
Hồ Tàu	22 (18.8%)
Family Cycle Category	
nuclear households	43 (36.8%)
elderly-only households	26 (22.2%)
multigenerational households	48 (41.0%)
Head of Household	
male	92 (78.6%)
female	25 (21.4%)
Household Number	
mean	3.82 (std. dev. 1.805)
min	1
max	10
Landownership	
own land	89 (76.1%)
landless	28 (23.9%)
Livelihood Diversity	
mean	5.05 (std. dev. 2.012)
min	1
max	11
Participation in Aquaculture	
have ponds	71 (60.7%)
do not have ponds	46 (39.3%)
2007 Household Income ($n = 99$)	
median	15 million VND (~\$938)
min	1 million VND (~\$188)
max	500 million VND (~\$31,250)
2007 Per Capita Income ($n = 99$)	
median	4.7 million VND (~\$294)
min	500,000 VND (~\$31)
max	125 million VND (~\$7,813)
Displacement Status	
displaced	37 (31.6%)
not displaced	80 (68.4%)

members of these households engaged was about 5, with a minimum of 1 and a maximum of 11 activities. The households of 71 of these participants (60.7%) had aquaculture ponds, while 46 (39.3%) did not participate in aquaculture. I was able to collect household income data from 99 individuals. The median household income for 2007 among these households was 15 million VND (~\$938), with a minimum of 1 million VND (~\$188) and a maximum of 500 million VND (~\$31,250). The median per capita income (household income divided by the number of household members) for 2007 was 4.7 million VND (~\$294), with a minimum of 500,000 VND (~\$31) and a maximum of 125 million VND (~\$7,813). Finally, 37 of the 117 households involved in the study (31.6%) were displaced by the Coastal Wetlands Protection and Development Project (CWDP) in 2001.

Income-Generating Strategies

I asked each research participant to name his or her main income-generating strategy. Figure 4.1 shows the number of participants (out of 117) to name each strategy. Seven strategies – aquaculture, agriculture, fishing, hired labor, merchant, growing *cây thuốc cá*, and wild plant collection – were named by more than one person. Ten individuals told me they were retired in response to my question about their main income-generating strategy, and six women named themselves as homemakers. The “other” category includes one person each reporting forest conservation, raising cows, collecting firewood, collecting plastic, raising clams, and making wine as his or her main occupation. Figure 4.2, on the other hand, shows the results of the review of 28 income-generating strategies with each participant. The chart displays the percentage of 117 research participants reporting the household’s involvement in each of the activities.

Hired Labor

Working (generally unskilled) hired labor was the most common income-generating activity, with 82 of 117 research participants (70.1%) reporting that at least one household member was involved in this type of work. Landless households generally had at least one member out working for hire as often as there was work available, while the members of landowning households, particularly those with aquaculture ponds, worked as hired laborers more sporadically, when they had free time or when they needed money quickly. The most common tasks that hired laborers performed were digging out aquaculture ponds and weeding

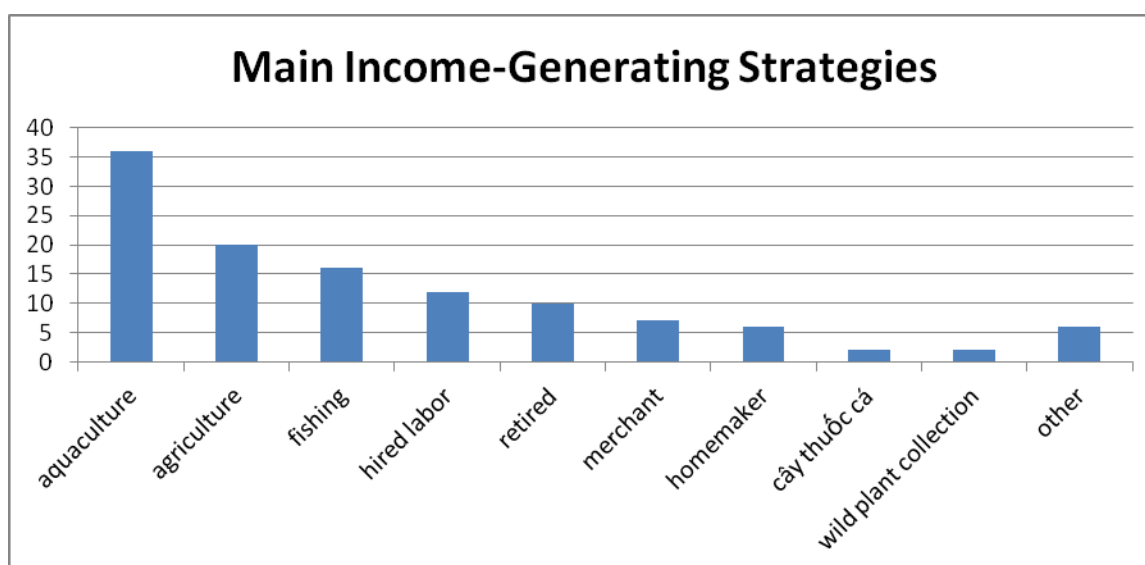


Figure 4.1 Number of Livelihoods Survey participants reporting main income-generating strategy

and harvesting *cây thuốc cá*. People usually received between 30,000 and 60,000 VND (~\$1.88-\$3.75) per day and a midday meal for this kind of work. Many people worried to me that there was much less hired labor work available compared to the past because the creation and dredging of aquaculture ponds was becoming mechanized and, with the price of *cây thuốc cá* (see below)

plummeting, people were choosing to leave the plant in the ground rather than pay others to help them harvest it. Additionally, in 2008, many households were choosing to replace their fields of *cây thuốc cá* with sweet potatoes and other crops that were much less labor intensive.

Aquaculture

Discussed in Chapter Three, aquaculture is the most visible livelihood strategy in Đông Hải. The landscape is segmented by murky square ponds. Seventy-one out of 117 survey participants (60.7%) owned ponds in which they raised shrimp, fish, or crabs or a combination of edible aquatic species. Nearly all the aquaculturalists I talked to in the village, many of whom moved to Đông Hải specifically to farm shrimp, complained that their ponds' productivity peaked in 2001 and, since then, they were able only to break even or lose money on their ponds every year. The reasons for the failure of shrimp ponds in Đông Hải were multiple and included ineffective and discriminatory extension services, water pollution, and diseased shrimp stock. Several people commented that, if there were another option for making a living in the village, they would change immediately but, for now, there were no other choices.

Cây Thuốc Cá

Cây thuốc cá (*Derris elliptica*) was the most common crop in the Đông Hải landscape and one of the only commercially important plants that seemed to thrive in the salty, sandy soil. Rotenone is extracted from the roots of the plant and used to kill the fish in a new aquaculture pond in order to make way for the addition of shrimp fry (1 gram of roots for 10 cubic meters of water, according to one cultivator). A man explained to me that *cây thuốc cá* only kills animals

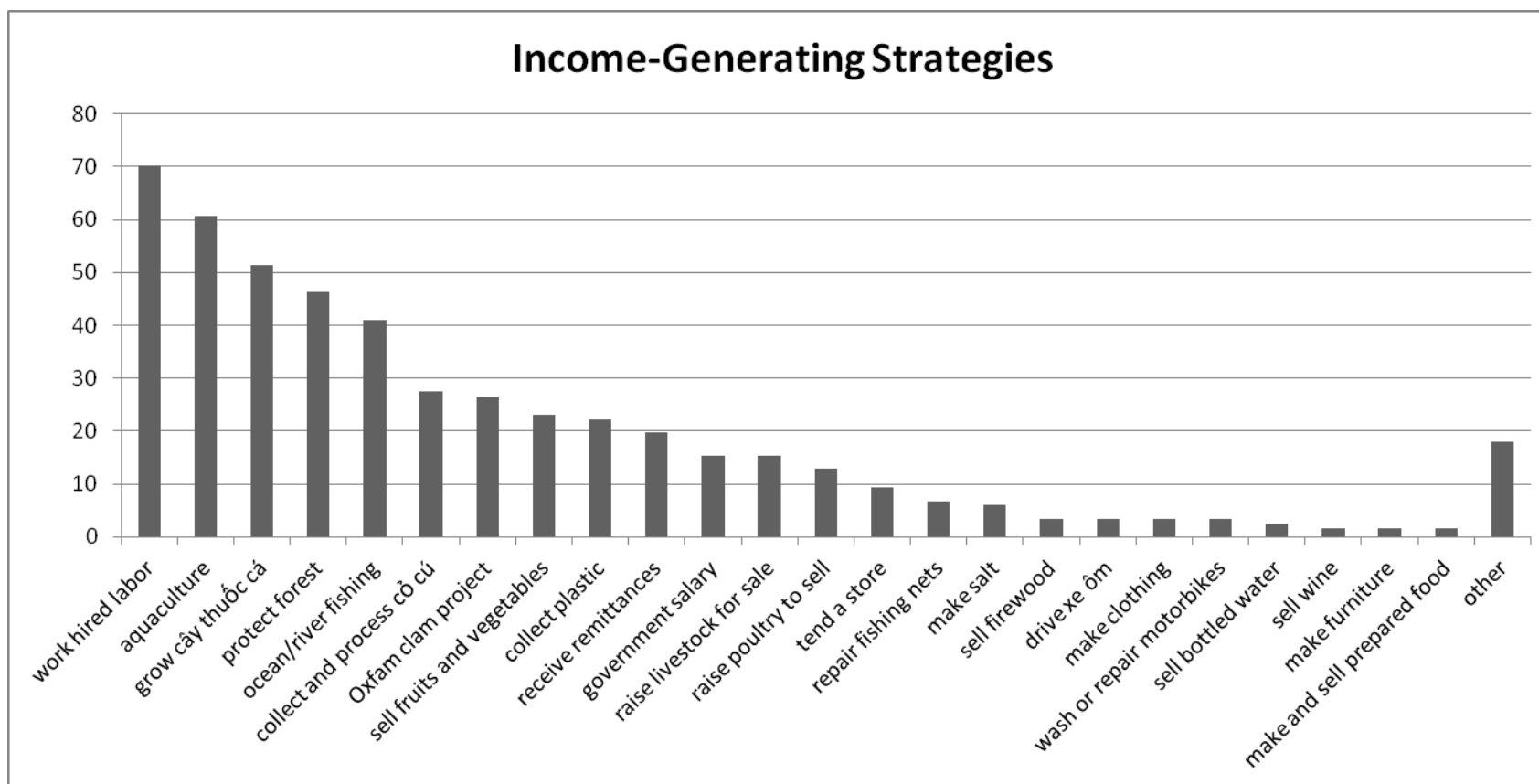


Figure 4.2 Percentage of households in which at least one member was involved in each income-generating strategy

with red blood, like fish, not white blood, like shrimp; therefore, the poison is deadly to humans. The Vietnamese government also purchased the plant roots for use as insecticide and pesticide. People had been growing *cây thuốc cá* in Đông Hải for at least ten years. It was the third most common income-generating strategy among the households in the Livelihoods Survey sample, with 60 out of 117 participating households cultivating the crop. The plant was easy to propagate and was quite profitable for some years, coinciding with the brief success of aquaculture in the region. In recent years, however, the price of the crop had begun to plummet, and by April 2008, there was grave concern among the villagers about what to do with acres and acres of *cây thuốc cá*. While the price then had not dropped to the lowest it had ever been (7000 VND/kg in April 2008), the prices of inputs (fertilizer, gasoline to run water pumps, and hired labor to harvest the roots) and food were higher than ever. A man in Hồ Thùng Hamlet explained, perhaps with some hyperbole but nevertheless adequately expressing the fear felt by many, “A few years ago, five or six kilograms of *cây thuốc cá* would buy one bag of rice. Today [July 2008], 100 kilograms of *cây thuốc cá* buys one bag of rice.”

Around April 2008, I began to notice fields of *cây thuốc cá* disappearing, replaced by old, reliable, low-priced crops, such as sweet potatoes and cassava, and new-to-the-region, experimental crops, such as peanuts and corn. Many of my research participants seemed relieved to have returned to sweet potatoes because, compared to *cây thuốc cá*, sweet potatoes required less fertilizer, were easier to harvest and did not require hired labor, and could be harvested just three or four months after planting (*cây thuốc cá* must stay in the ground 12 to 18 months after planting). However, some simply could not afford to harvest their *cây thuốc cá* fields, as they would spend more money on the harvest than they would receive upon selling it. Therefore, many fields were rendered useless by the plant. In May 2008, I found an elderly man, disabled in

the American-Vietnamese War, laboriously digging up the small *cây thuốc cá* field in front of his house by himself. He told me that he was forced to sell his crop because of the rising price of food. The following week, he said the 500,000 to 600,000 VND (~\$31-\$38) he received for his harvest was not enough to buy food for the coming year.

Forest Protection

While all of my research participants lived within the Buffer Zone of the CWPDP, 54 out of 117 reported being directly involved in the forest conservation project (i.e., receiving a yearly salary from the Forest Department). According to the action plan for the CWPDP, individual plots of land were supposed to have 60% forest cover and 40% aquaculture ponds, and local people were to be paid to patrol and protect replanted or remaining mangrove forest. Usually, landowners were paid to “protect” the forest on their own property, between 28,000 and 600,000 VND (~\$1.45-\$38) per year, depending on the size of the land and, it seemed, a person’s relationship to the Forest Department. Forest protection involved planting mangrove tree species, patrolling the area and reporting illegal activities, and collecting dead branches that could pose a fire threat. In 2008, the Đông Hải Forest Department had also recruited landless households living on the beach to help protect the *cây dương* (*Casuarina equisetifolia*) forest planted along the coast as a windbreak and shore stabilizer. Despite this nod to the importance of community involvement in conservation projects, one man chuckled, “The government pays me 20,000 VND [~\$1.25] to protect this forest. That’s not enough to make a phone call if something goes wrong and I must report to them.”

Ocean/River Fishing

Fishing off the coast of Đông Hải in the South China Sea or in the Phước Thiện River was the traditional livelihood strategy in the village. In 2008, 48 of 117 research participants (41.0%) reported fishing in the ocean or river for species to sell. However, only 16 survey participants named fishing as their primary occupation. While many families were lured to the coast by the promise of the bountiful sea, in recent years, “the fish are afraid to live here,” said a man, who traded his fishing nets for shrimp ponds in the mid-1990s. The reasons for sharp declines in fish populations in the early 1990s include: (1) the dramatic population boom in coastal Vietnam, which caused an increase in near-shore fishing for subsistence and income generation; (2) the rising number of “natural” aquaculture ponds constructed along the coast that recruit naturally-occurring fish, shrimp, and crab larvae from the ocean; (3) the large-scale destruction of mangrove forests along the coast to make room for the increased population and aquaculture ponds; and (4) unrestrained offshore fishing by national institutions and para-statal enterprises.

Interestingly, while lack of appropriate regulation seemed to characterize offshore fishing operations, local regulation of nearshore fishing was relatively highly regulated, to the detriment of local livelihoods, according to some of my research participants. The main local fishing regulation is of net mesh size. People may not fish in the ocean or river with nets below a certain mesh size. Members of the local People’s Committee or the Forest Department, the two regulatory bodies, confiscated the illegal nets of first-time offenders and fined multiple offenders between 200,000 and 500,000 VND (~\$13-\$31). One woman, whose aquaculture ponds had caused her family to go 30 million VND (~\$1875) into debt, spent over 1 million VND (~\$63) on small-mesh nets because she hoped that fishing would be more profitable than hired labor.

Her nets were confiscated soon after. She told me that she had borrowed money from her neighbors at a low interest rate to purchase the nets, and now she was only able to keep up with the interest payments and not pay back any of the principle. I asked her why she did not buy nets with a legal mesh size, and she replied that there was nothing large to catch anymore. The most profitable products of the sea that could be harvested from shore or in a small boat these days were *ruốc*, small shrimp and other sea trash that people dry and then sell for fertilizer or livestock feed, and crab and *cá kẻo* larvae that fishers sold to aquaculturalists. In August and September 2008, at the end of my time in Đông Hải, a law specifically prohibiting the capture of crab larvae was enforced (at least among some fishers; two politically-important men I talked to continued fishing for crab larvae and claimed that there was no new law). As I began to hear rumors of this new law, I also started to see more and more unused fishing nets stacked forlornly against the walls of people's houses. One woman complained that, if she could catch baby crabs, she could buy rice for her family.

Cỏ Cú

Thirty-two out of 117 participants (27.4%) processed and sold *cỏ cú* (*Cyperus rotundus*), a sedge that grows naturally on the beach. The plant must be burned and the charred tubers bundled and sold for medicinal use. The natural habitat of *cỏ cú* was being replaced by the great swathes of *cây dương* (*Casuarina equisetifolia*; Australian pine) planted along the beach for coastal stabilization and as a windbreak. Entering the *cây dương* forest to collect *cỏ cú*, especially if *cây dương* seedlings were harmed in the process, was illegal, but many people risked prosecution. At the time of my research, people sold the medicinal plant for 6000 VND

(~\$0.38) per kilogram. While no one I asked knew the medicinal use of the plant, it is used in Traditional Chinese Medicine and therefore sold to practitioners.

Clam Projects

Thirty-one of 117 research participants (26.5%) were involved in clam-raising community development projects. The president of the clam project in Phước Thiện told me that the project began in 2003 when Oxfam donated 290 million VND (~\$18,125) to get the clam beds started off the coast. Anyone in the community could invest in the project each year, and the profit after harvest (if there was a profit) was divided proportionately among the investors, depending on how much capital they invested. Part of the money donated by Oxfam (7 million VND, according to the Phước Thiện president) was given to families bearing poverty certificates¹⁰ to invest in the project. In 2007, he said, 53 poor families were supported by the project and 138 other community members invested their own money. Only 11 of 51 survey participants from Phước Thiện Hamlet reported involvement in the clam project. Most of those that I was aware of being currently involved in the project were the more socially-connected, and usually wealthier, men in the hamlet. The house built on the beach specifically for clam project business seemed to have become a year-round clubhouse of sorts for the men involved in the project. On many occasions, weary wives told me their husbands were off at a drinking party at the clam house (again). Others in the hamlet, when asked about the project, complained that it made a profit in its first couple years of operation but was now losing money because of water pollution, low-quality starter seed, storms, or too many people involved.

¹⁰ Households bearing poverty certificates in Vietnam receive education and health benefits, are eligible for subsidized loans, and receive periodic gifts from the local government, among other benefits. Households are ranked and screened to determine eligibility for the certificates by the provincial government. Each province has its own classification system.

Conversely, 18 of 21 survey participants from Hồ Tàu Hamlet were involved in a clam project, nearly all displaced from the coast during the implementation of the CWPDP. One of the Hồ Tàu Hamlet heads explained that, around 2000, the World Bank helped start the clam-raising project to foster income diversification. In 2002, 50 households were involved, and all borrowed 5 million VND from the World Bank at low interest rates and profited 15 million VND after the first harvest. The project was then put on hold for a few years, the hamlet head said, and restarted in 2007. Again, people borrowed money from the World Bank but storms caused the clams to die. The total loss of capital was around 1 billion VND, and all the households involved in the unsuccessful project must repay the World Bank. As I conducted the Livelihoods Survey among the displaced families in Hồ Tàu and asked about bank debt, I found that most of these former fisherpeople had never borrowed money formally (from a financial institution) before getting involved in the clam project. They all concurred that the project was profitable in its first year but lost money last year.

Selling Fruits and Vegetables

The soil in Đông Hải, particularly along the coastline, was too salty and sandy to support anything but small-scale fruit and vegetable production. People also complained of a lack of freshwater and that they, therefore, could only support gardens during the rainy season. While 57.3% of participants grew fruit and/or vegetables for home consumption, only 23.1% sold those products. During the year I lived there, however, as aquaculture ponds failed to produce and the price of *cây thuốc cá* dropped lower and lower, people began planting fields of sweet potatoes, corn, and cassava, crops with low prices but with lower fertilizer demands and shorter growing cycles than *cây thuốc cá*. For instance, sweet potatoes can be harvested every three months of so,

while *cây thuốc cá* takes one year to mature. Additionally, people had begun to experiment with seeds from other parts of the country, such as peanuts and various fruit trees. I found an elderly woman on the path one afternoon, lugging a 30 kg bag of peanuts home from the market. She bought the peanuts on credit, at 8000 VND (~\$0.50) per kilogram, and she was required to repay the merchant in ten days. She planned to sell one of her goats to pay for the peanuts. She said she wanted to do something new and that peanuts would have a higher price than sweet potatoes or cassava. Thus, the number of people involved in fruit and vegetable production for sale has probably increased since 2008.

Collecting Plastic

Twenty-six out of 117 survey participants (22.2%) were involved in the collection of plastic as an income-generating strategy. Some households merely retained their own plastic waste and sold it to a middleman for a very small amount of money. Members of other households collected the plastic refuse that washed up on the shore. People that I frequently saw wheeling carts of dirty plastic around on the beach told me they received 2000 VND (~\$0.13) for 1 kilogram. Finally, in other households, children collected plastic from the beach (and snails and crabs) to contribute to their school costs and to provide them with pocket money. One of my research participants was a middleman in this plastic recycling business in order to compensate for his unprofitable aquaculture ponds. He bought the plastic from the people who collected it on the beach and sold it to a man in another commune. That man, he said, sold the plastic in Trà Vinh, the provincial capital. He made 40,000 to 50,000 VND (~\$2.50-\$3.13) in a day buying and selling plastic.

Remittances

Twenty-three out of 117 survey participants (19.7%) received remittances from adult children living elsewhere. Many young adults from Đông Hải had moved to other rural areas or to Ho Chi Minh City in search of work. Many were employed in factories, restaurants, or private homes as housekeepers. A few research participants told me that the remittances they received from their children made their lives more comfortable and enabled them to buy food every day. More often, however, people said that they had sent their children away to work with the hope that the children could then support the family and pay off the household's debts, but the children discovered that living in the city was expensive and so could not send much money home. This topic will be discussed further in the next two chapters.

Government Salary

Eighteen out of 117 survey participants (15.4%) received a monthly salary from the Vietnamese government. This included school teachers and hamlet- or commune-level officials, but the majority of the 18 recipients were elderly people, who received a government pension because they were either injured in the American-Vietnamese War or a family member was killed while "protecting Vietnam." I was led to believe that those who fought on the American/South Vietnamese side did not receive this pension. Additionally, the money seemed to be inconsistently allotted. One elderly man told me that he had sent a document to the government, describing his activities during the war, in the hopes of getting some compensation, but he had been waiting for months with no reply.

Raising Livestock

Eighteen out of 117 participants raised livestock for sale – goats, cows, or pigs or a combination. Several years earlier, the Vietnamese government encouraged the raising of goats and cows for livelihood diversification by offering bank loans towards their purchase. While goats were easier to raise in this environment than cows, as goats eat the leaves of *cây đước* and *cây mắm*, two common mangrove forest trees, and there was very little suitable grazing land for cattle in Đông Hải, most goat owners grumbled that they wished they had sold their goats years ago. The price of goats had plummeted since they bought the animals and there was no hope of it coming back up. One man bought his goats for 5 to 8 million VND apiece and now could only sell them for 8000 VND per kilogram. (A large goat weighs about 35 kilograms.) Similarly, another man explained that, in the past, one could get 4 to 5 million VND for one goat but now could only get 12,000 VND per kilogram of female goat and 20,000 VND per kilogram of male goat.

As for cows, not only had the price dropped since the government encouraged investment in them, but people had to cultivate grass specifically for the animals' consumption, a costly input. An elderly widow borrowed money from the bank for the first time, 6 million VND (~\$375), in order to raise cows, but her animals quickly contracted hoof-and-mouth disease and died. Because she then was unable to repay her loan and had few other sources of income with which to make interest payments, her 18-year-old son moved to Ho Chi Minh City to find a job to help her. Another man also took advantage of these loans and bought cows and goats, but the price of both types of livestock plummeted almost immediately. He bought four cows in 2006 for 10 million VND (~\$625) and, as of January 2008, they were only worth 5 million VND (~\$313).

Finally, local opinion about raising pigs was varied. One woman said that she sold one of her pigs every three or four months and seemed satisfied with this activity as a component of her livelihood portfolio. For a 60-kilogram pig, she received 2.5 to 3 million VND (~\$156-\$188). Some people raised pigs in the past but lost money on them, and some expressed a desire to raise pigs and other livestock but did not have appropriate land on which to raise them.

Raising Poultry

Fifteen out of 117 participants (12.8%) raised poultry for sale – chickens, ducks, or both. Many families who raised poultry viewed the birds as a type of insurance – relatively easy to rear and easy to sell when the household required fast cash. I met a woman on the path on her way to the market to sell two chickens in order to purchase antibiotics for her husband, who had cut himself working in his aquaculture pond. However, more families raised chickens and ducks for home consumption than for sale. They were usually slaughtered and fed to guests on special occasions – Tết, death anniversaries, weddings, and funerals.

Tending a Store

Eleven out of 117 participants (9.4%) tended a small store, usually the front room of their houses but sometimes a separate structure. Women generally tended these stores, making early morning trips to the Đông Hải market to purchase rice, instant noodles, tea, sugar, cigarettes, individual-sized packets of shampoo, etc., which they then sold at a slightly higher price. Those with electricity produced large blocks of ice for sale, popular items in the intense heat of the Mekong Delta, but the sporadic electricity supply created problems. Two young women, who tended their families' stores (one in Phước Thiện Hamlet and one on the beach in Hồ Thùng),

complained that, when their neighbors' aquaculture ponds failed to produce or the ocean catch was poor, no one patronized their stores. With no extra money, their neighbors traded convenience for price and made the journey to the Đông Hải market to purchase necessary items.

Repairing Fishing Nets

Eight out of 117 research participants (6.3%) repaired their neighbors' fishing nets for cash. This was a sporadic and supplemental source of income; for most, it could be considered a coping strategy. Those in need of cash asked their neighbors for work. It was generally a charitable act for a neighbor to produce nets for the financially-stressed to fix, as people usually repaired their own nets.

Making Salt

Seven out of 117 participants (6.0%) made and sold salt. Salt can only be produced during the dry season and requires a large amount of cleared land, on which a thin layer of salt water can evaporate in the sun. Many expressed a desire to make salt but complained that they did not have enough land to do so. I talked to a young woman outside the Đông Hải Forest Station, who was awaiting her punishment for illegally felling trees in the Buffer Zone in order to build a salt pan. Ultimately, the Forest Department allowed the woman to keep her salt pan but required that she plant the same number of trees she felled elsewhere in the Buffer Zone. A mud-spattered man, who I talked to while he pushed a heavy roller over a salt pan to flatten it, told me that salt-making was not as lucrative as shrimp aquaculture. While the price of shrimp has remained stable over the years, he explained, the price of salt has fluctuated wildly. Some years, he received only 16,000 VND (\$1) for one *gia* (1 *gia* = 20 kg), but other years, he could get

30,000 VND (\$1.88) for the same amount of salt. Each salt pan produced about 30 *gia* and it was harvested once a year.

Selling Firewood

Four out of 117 research participants (3.4%) collected firewood to sell. This was a much more common income-generating strategy before forest protection laws were put into place by the Forest Department in the late 1990s. In the Buffer Zone, people were only allowed to collect firewood from their own properties and then only for household use. The few who did sell firewood seemed to have received special dispensation from the Forest Department. In fact, the Forest Department hired one of my research participants, who lived on the beach and was displaced multiple times by the planting of the *cây dương* windbreak along the coast, to “clean” the forest – remove dead branches. She was paid by the square meter and was also free to sell or use the wood she collected.

Driving Xe Ôm

Meaning literally *hug vehicle*, a *xe ôm* is a motorcycle taxi on which the passenger must hold onto the driver from behind. Four out of 117 survey participants (3.4%) had a *xe ôm* driver in the household. Among those who could afford a motorcycle, this was an increasingly popular way for young men to support their families.

Making or Repairing Clothing

Four out of 117 participants (3.4%) had a household member who sewed clothing for money. This activity was exclusively carried out by women. Families needing repairs made to

their clothing would also bring them to these women, who possessed pedal-driven sewing machines.

Washing or Repairing Motorbikes

While the widespread ownership of motorbikes was a relatively new phenomenon in rural Vietnam, hundreds of makeshift thatch shacks had popped up along the main roads, ready to repair or wash the ever-increasing number of vehicles. As I came to learn the hard way, I was never more than a quarter mile from someone who would patch my blown tire over an open fire with a bit of paper from a cigarette pack for the equivalent of three cents. Four out of 117 research participants (3.4%) had a household member who repaired or washed motorbikes.

Selling Bottled Water

Because there was little naturally-occurring potable water in the area, many people purchased 5-gallon jugs of filtered water either from the market area for delivery or from a neighbor. (Other households collected rain water for drinking.) Three research participants sold these bottles of water out of their homes even though they did not have shops or sell any other goods.

Selling Wine

Only two survey participants, both single older women, made wine (*ruot*) to sell. Both did a brisk business, as most men in the village consumed a large quantity of the stuff every day, usually in the context of “drinking parties” (*tiêc ruot*), in which men socialized, established relationships, and conducted political and business transactions. To be more exact, this “wine” is

actually distilled rice beer. My next-door neighbor, one of the two women who made alcohol for a living, woke at 3:00 a.m. every morning to start a new batch fermenting. She allowed the rice to ferment for five days before distilling the alcohol, bottled it in recycled soda, water, or cooking oil bottles, and then sold it. She sold one-liter bottles of the “wine” for 6500 VND (~\$0.41) and produced about 10 liters in a day.

Making Furniture

The husbands of only two of my research participants made wooden furniture (tables, beds, chairs, etc.) for sale. All work was on commission. One of the women told me that, while the daily wage for such work was good (60,000 VND [~\$3.75]), her husband was only commissioned to do the work for a total of one month per year.

Selling Prepared Food

Two female research participants (1.7%) prepared foods, such as cakes or *chè* (sweetened mung bean pudding), to sell at the Đông Hải market or directly to neighbors.

Other

While the list of livelihood activities I went through with each participant was fairly exhaustive, there were a few other activities that came up during these interviews. For instance, one family had converted the front room of its house to a barber shop and several participants acted as middlemen, buying and selling seafood or *cây thuốc cá*.

Clustering Income-Generating Strategies

Because livelihood portfolios are composed not of isolated activities but combinations of strategies in which the members of each household engage, I was interested in how the different types of livelihood strategies clustered within household portfolios. I performed a series of cluster analyses to look for the typical groupings of activities in my data. Because cluster analysis is a data description technique and not a means of testing preexisting hypotheses, the researcher experiments with different clustering methods until identifiable patterns within the data are uncovered (Everitt et al. 2001, Torrance et al. 1994). The clustering method that revealed identifiable patterns within all three types of livelihood strategies for which I had this kind of data – income-generating strategies, subsistence activities, and food procurement behavior – was a Kmedians cluster analysis, using the Euclidean distance as the dissimilarity measure, breaking the data into three groups.

Thus, after clustering the income-generating strategy data into three groups in this way, I performed a series of likelihood ratio chi-square tests to look for significant differences in the percentages of members of each group participating in each income-generating strategy (Figure 4.3). The strategies that showed significant differences were aquaculture ($X^2 = 41.6132, p < .001$), vegetable cultivation ($X^2 = 13.5633, p < .01$), fishing in the ocean or river ($X^2 = 35.5942, p < .001$), involvement in the clam projects ($X^2 = 25.2815, p < .001$), plastic collection ($X^2 = 7.7516, p < .05$), *cây thuốc cá* cultivation ($X^2 = 77.7072, p < .001$), involvement in the forest conservation project ($X^2 = 57.2069, p < .001$), receiving remittances ($X^2 = 9.9005, p < .01$), and raising livestock ($X^2 = 7.4916, p < .05$). The analysis broke the sample into a fishing group (Group 1; 71.1% of this group fished in the river or ocean), an aquaculture group (Group 2; 96.4% of this group participated in aquaculture), and an agriculture group (Group 3; 97.7% of

this group cultivated *cây thuốc cá* and 40.9% of this group cultivated vegetables). The fishing group also contains the largest percentage of research participants involved in the clam projects (51.1%) and the largest percentage of plastic collectors (35.6%). The aquaculture group also contains the largest percentage of research participants involved in the forest conservation project (100%) and the largest percentage of remittance receivers (35.7%). The agriculture group contains the largest percentage of participants who raised livestock (27.3%).

The influence of coastal development is evident in these three clusters. Groups 2 and 3 are dominated by two income-generating strategies, seafood farming and *cây thuốc cá* cultivation, basically introduced during the early 1990s. Interestingly, clam cultivation, a more recent development strategy, clusters with fishing, the most traditional livelihood strategy on the coast. Furthermore, the aim of the CWPDP to engage the local people thought to be most responsible for the destruction of mangrove forest is clear, as 100% of participants clustered in the aquaculture group were involved in the forest conservation project. These groups also cluster by geographical region of this coastal zone. Group 1, the fishers, primarily lived on or near the beach. This was also the most convenient location for those involved in the clam projects and for plastic collectors, as most of the plastic refuse washed up on the beach. Group 2, the aquaculturalists, primarily lived in an intermediate zone between the beach and inland, usually the newly-colonized areas mentioned in Chapter Three. Many aquaculture ponds continued to use tidal water exchange and were, therefore, located close to the ocean. This geographical band would have also been prime mangrove habitat and was, thus, where mangrove replanting efforts were focused. Group 3, the agriculturalists, primarily lived in the areas further inland and longer settled. There was more land there suited to cultivating plant crops and grazing animals.

Clustered this way, these three groups do not differ significantly on any of the outcome variables.

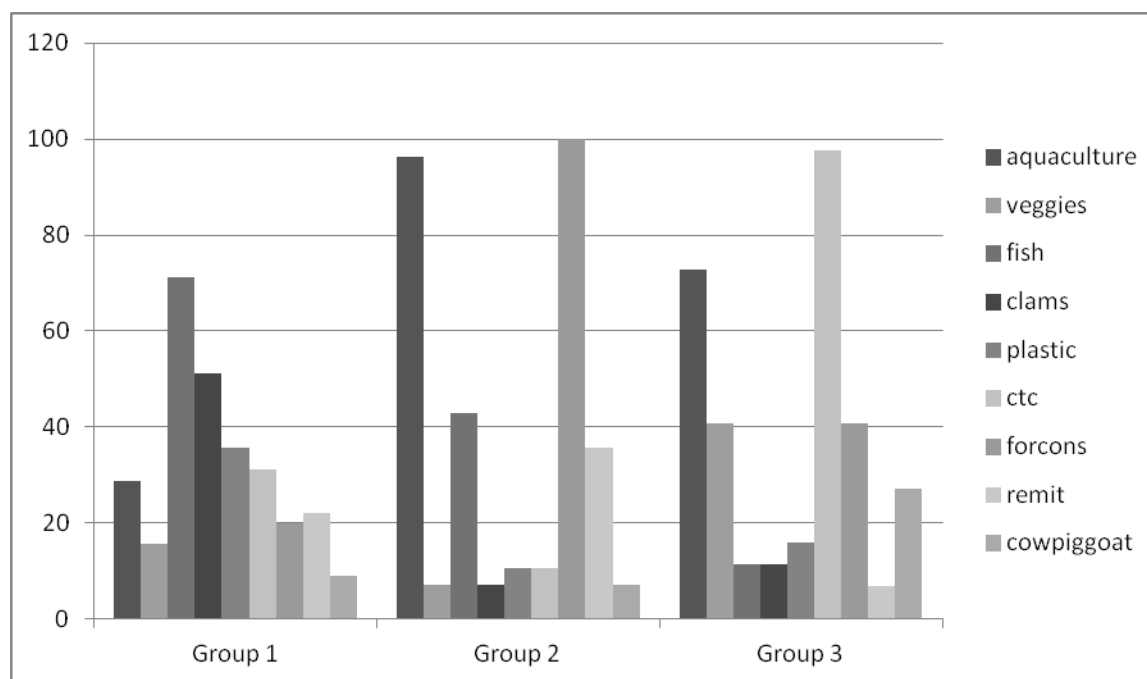


Figure 4.3 Percentage of research participants, clustered into income-generating strategy groups, involved in different strategies

Subsistence Activities

Figure 4.4 shows the percentage of survey participants who reported engaging in various subsistence activities to procure food directly for themselves and family members. The most commonly-reported activity, aside from purchasing food at the market (100% of participants), was collecting wild plants for food (75.2% of participants). On the other hand, 57 participants (48.7%) collected wild plants for medicine. People in Đông Hải collected a wide variety of wild plants that often served more than one function, as food, medicine, firewood, and/or animal feed (noted also in Etkin 2006 and Ogle et al. 2003). Appendix A contains information on 84 plants people reported collecting.

Seventy-five participants (64.1%) reported fishing from aquaculture ponds for food. Most of those who did not do so were landless and did not have ponds of their own, although some said they had access to relatives' or neighbors' ponds. Almost all people possessing aquaculture ponds reported procuring food from them for their families. Only a few of the more successful pond owners said they preferred not to disturb their shrimp until the appropriate harvesting time and so purchased fish and crustaceans for consumption at the market. Others refrained from fishing from their ponds during certain times of the aquacultural cycle. Fifty-five participants (47.0%) reported fishing for wild fish and crustaceans in the ocean and/or river for food. Appendix B contains the common names of 75 fish and crustacean species people in Đông Hải reported catching in their aquaculture ponds or from the ocean or the Phước Thiện River.

Appendix C lists the plants cultivated in Đông Hải, reported in response to my questions, “Do you grow any plants? What plants do you grow?” Sixty-seven out of 117 participants (67.3%) responded affirmatively to this question. With the poor soil along the coast and general lack of access to freshwater, people usually only cultivated homegardens during the rainy season (May to November) and then grew edible and medicinal species only for home consumption or very limited market sale. The most common plants people grew around their homes were herbs and spices, such as chiles (*ớt*), lemongrass (*xả*), and basil (*quế*). People also reported growing trees for the forest conservation project, such as common mangrove species (*cây đước* and *cây mắm*).

People in these three hamlets raised five kinds of livestock – chickens, ducks, goats, pigs, and cows. Chickens and ducks were more often kept for home consumption than for sale (46.2% and 19.7% of participants, respectively), while goats, pigs, and cows were raised almost exclusively for sale. Only one woman reported eating goat meat from the animals she raised.

While pork and beef play a role in Vietnamese cuisine, none of my research participants slaughtered the animals themselves. Additionally, milk products are not a traditional component of the Vietnamese diet (although milk boxes and yogurt were becoming popular). I asked a few people if they ever thought about milking their cows or goats. Most looked at me blankly and one man said, “I wouldn’t even know how.”

Clustering Subsistence Activities

Again, I used a Kmedians cluster analysis to cluster the above subsistence activities into three groups to examine how the various activities clustered within livelihood portfolios. I then performed a series of likelihood ratio chi-square tests to look for significant differences in the percentages of members of each group participating in each subsistence activity (Figure 4.4).

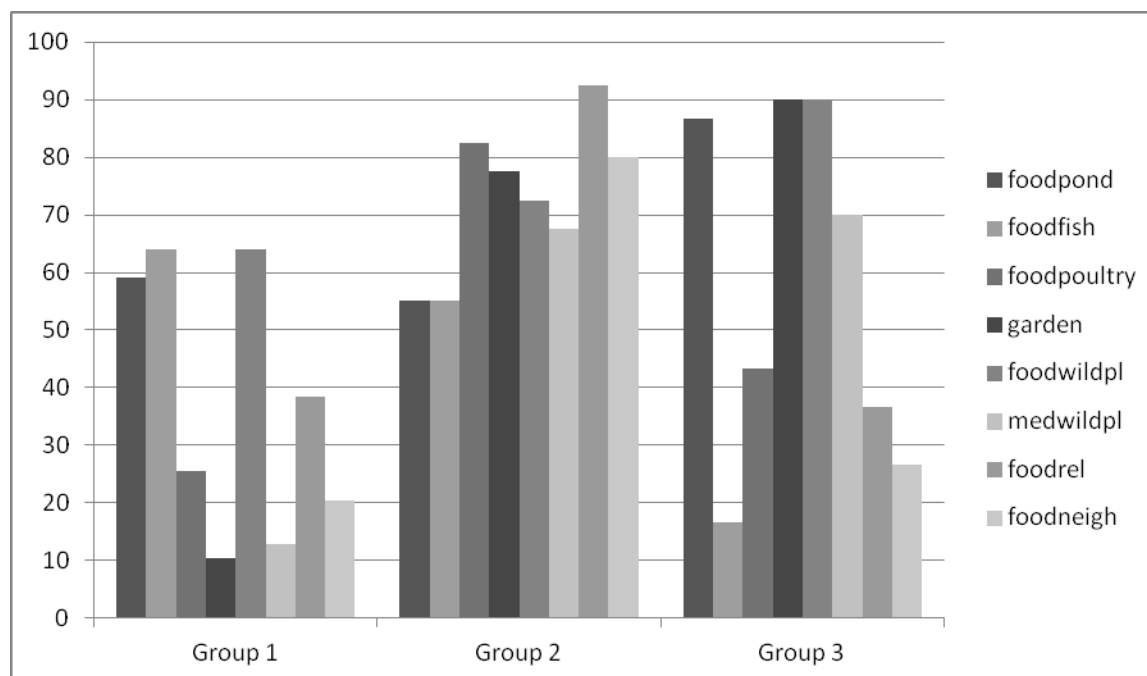


Figure 4.4 Percentage of research participants, clustered in subsistence activity groups, involved in different activities

The activities that showed significant differences were fishing in aquaculture ponds ($X^2 = 9.5429, p < .01$), fishing in the river/ocean ($X^2 = 17.817, p < .001$), raising poultry for home consumption ($X^2 = 28.4685, p < .001$), tending a homegarden ($X^2 = 61.0841, p < .001$), collecting wild food plants ($X^2 = 6.7307, p < .05$), collecting wild medicinal plants ($X^2 = 34.0543, p < .001$), receiving food from relatives ($X^2 = 35.7339, p < .001$), and receiving food from neighbors ($X^2 = 35.1453, p < .001$). This cluster analysis broke the sample into three distinct groups. Group 1 contains the highest percentage of participants who fished in the ocean or river for food (64.1%) and the lowest percentage who engaged in most of the other subsistence activities. Group 2 contains the highest percentage of participants who reported receiving food from relatives (92.5%) and neighbors (80.0%). This group also contains the highest percentage of people reporting raising poultry for home consumption (82.5%). Group 3 contains the highest percentage of participants who reported fishing from their aquaculture ponds for home consumption (86.7%), tending a homegarden (90.0%), collecting wild edible plants (90.0%), and collecting wild medicinal plants (70.0%). Clustered this way, these three groups differ significantly on only one outcome variable, *childawayhl*. Group 1 contains the highest percentage of participants who had adult children working hired labor outside of the village (51.4%), and Group 2 contains the lowest percentage (23.7%).

Food Procurement Behavior

While the Livelihoods Survey asked research participants to report if they ever procured food for themselves and their family members by engaging in the above activities, I got closer to recording actual behavior through the Food Frequency Survey. As described in Chapter Two, every week, I asked survey participants if they had procured different types of food in different

ways. I then used a Kmedians cluster analysis to cluster the data gathered in 1,111 visits into three groups. These clusters, then, differ from the above clusters in that they are groupings of Food Frequency Survey visits, rather than groupings of participating households. A household could fall into any of the three clusters over the 35 weeks that I conducted the Food Frequency Survey, depending on the research participant's food procurement behavior that week. The three groups differed significantly on all variables, except for *givemeat* (the percentage of visits in which the respondent reported consuming donated meat in the previous seven days), *groweggs* (the percentage of visits in which the respondent reported consuming homegrown eggs in the previous seven days), and *givesweet* (the percentage of visits in which the respondent reported consuming donated sweets in the previous seven days).

Figures 4.5 through 4.10 show the differences among these three groups according to their procurement of six different food groups. Group 3 differs most obviously from Groups 1 and 2, containing the smallest percentage of visits in which a respondent reported purchasing any type of food and the largest percentage of visits in which respondents reported procuring all types of foods in alternative ways (e.g., collecting wild food, receiving donated food). The figures also show that Group 3 contains the lowest percentage of visits in which respondents reported consuming any luxury goods (e.g., meats, processed foods), no matter how procured. Groups 1 and 2, on the other hand, contain the highest percentages of visits in which the respondents reported consuming purchased foods and homegrown fish. The salient difference between these two groups is that Group 2 contains the highest percentage of visits in which the respondents reported consuming luxury foods.

Unlike the clusters of income-generating and subsistence strategies, these groupings differ significantly on all livelihood outcome variables. According to a Kruskal-Wallis test, all

groups differ on their median *copingfreq* score ($X^2 = 61.795, p < .001$). Members of Group 3, those with the most “alternative” food procurement habits, experienced times when they did not have enough money to buy rice most frequently (median = 3, mean = 2.33). Members of Group 2, those who purchased most of their food and consumed luxury foods, experienced these times of food insecurity least frequently (median = 2, mean = 1.60). Group 3 had a significantly lower median household income than Groups 1 and 2 ($X^2 = 25.174, p < .001$). All three groups differ significantly on dietary diversity score ($X^2 = 539.539, p < .001$). Group 3 had the lowest median score of 4 food groups, and Group 2 had the highest median score of 7 food groups.

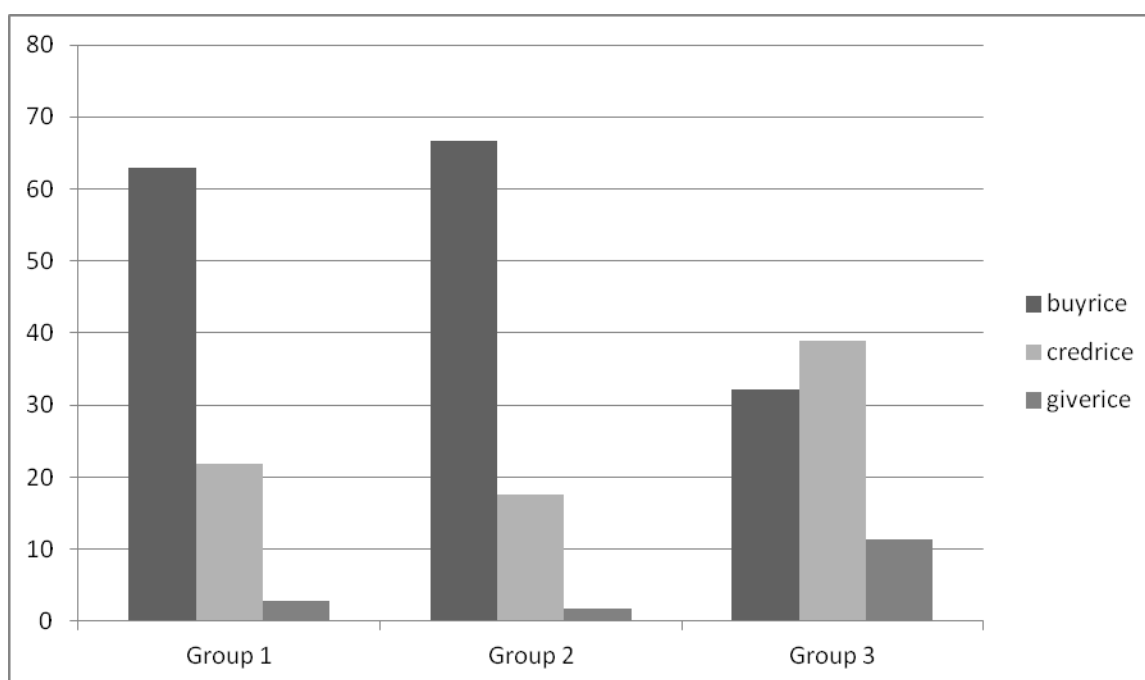


Figure 4.5 Percentage of Food Frequency Survey visits in which the participants reported obtaining rice in the above ways

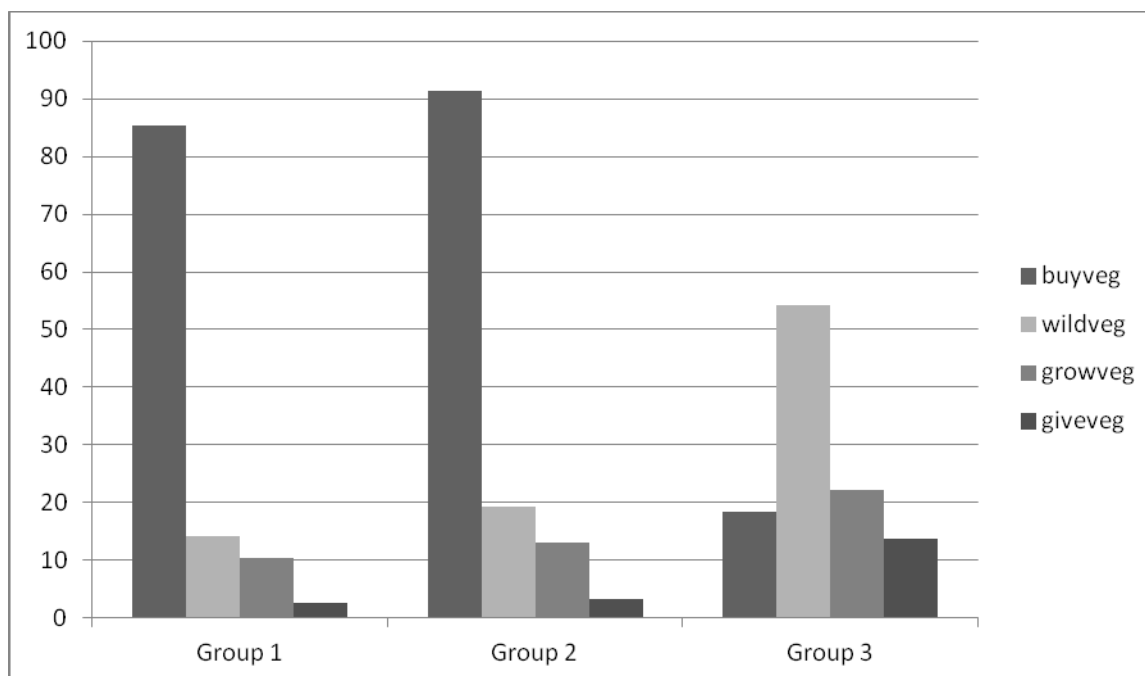


Figure 4.6 Percentage of Food Frequency Survey visits in which the participants reported obtaining vegetables in the above ways

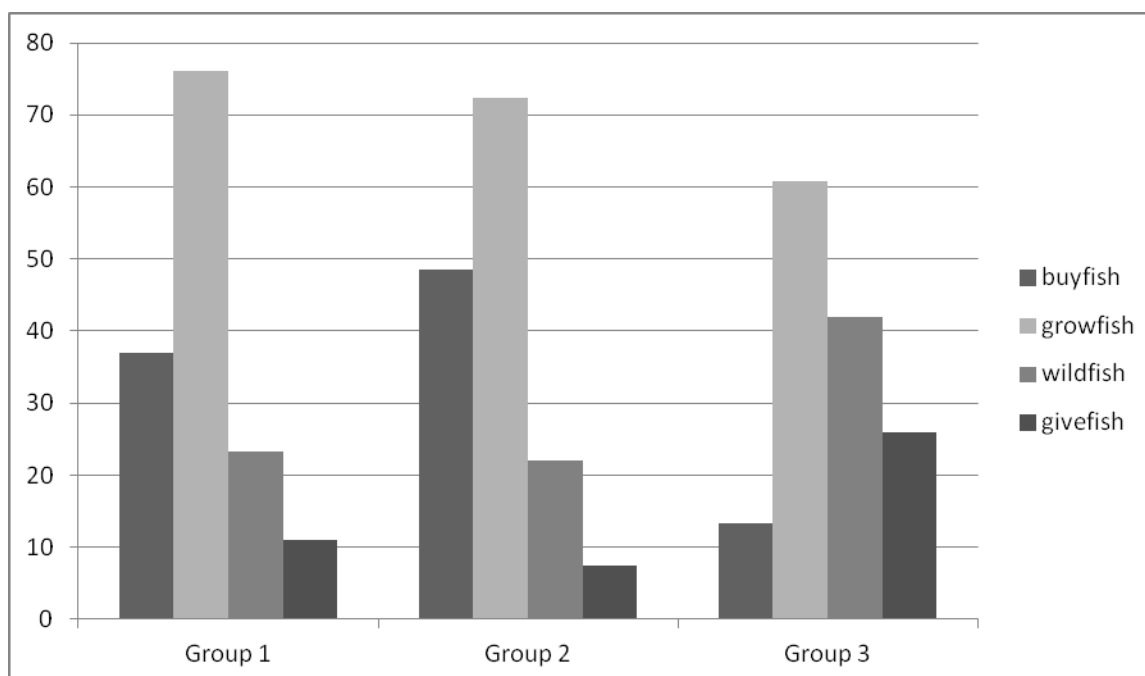


Figure 4.7 Percentage of Food Frequency Survey visits in which the participants reported obtaining fish in the above ways

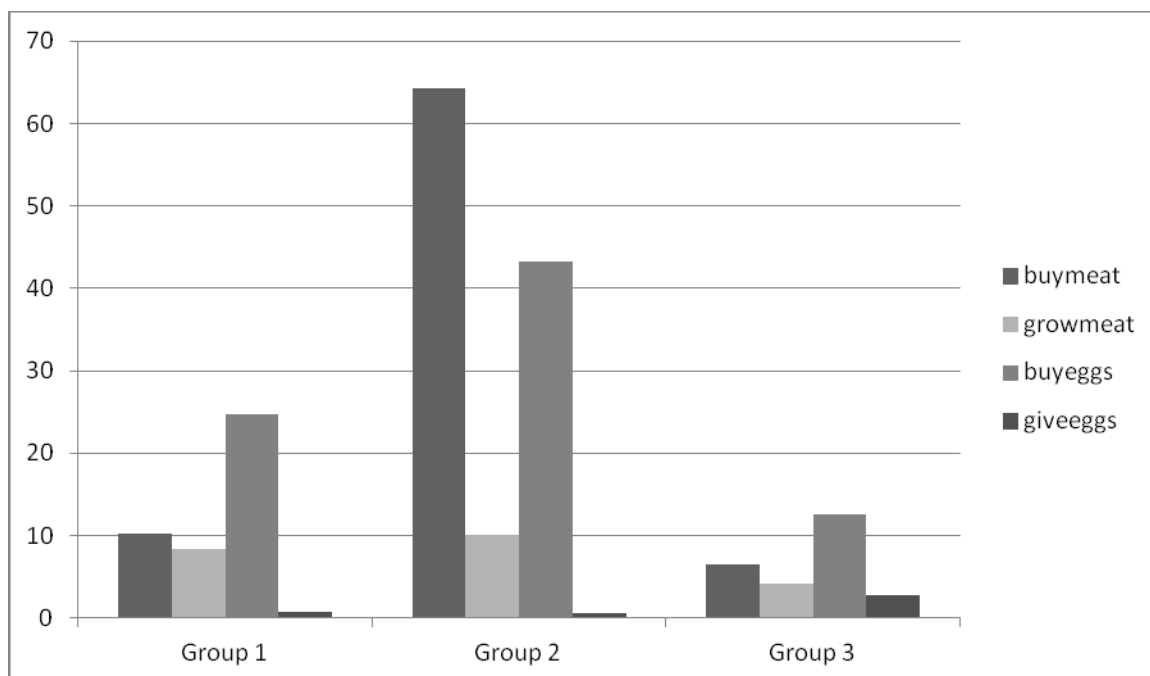


Figure 4.8 Percentage of Food Frequency Survey visits in which the participants reported obtaining meat and eggs in the above ways

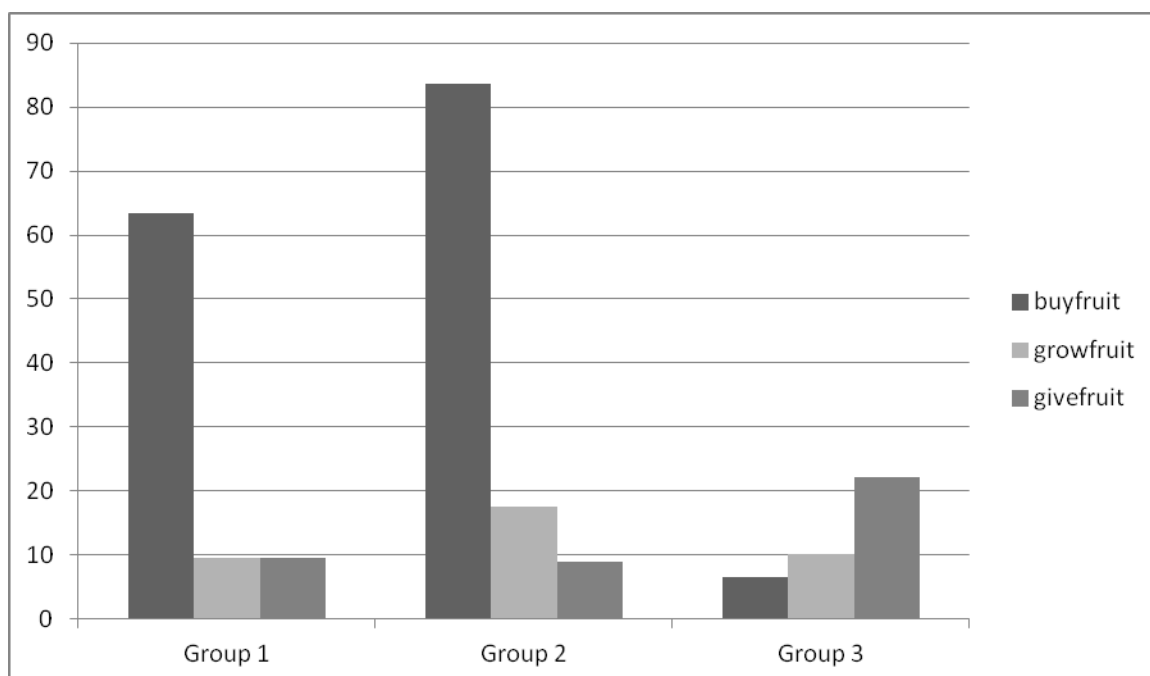


Figure 4.9 Percentage of Food Frequency Survey visits in which the participants reported obtaining fruit in the above ways

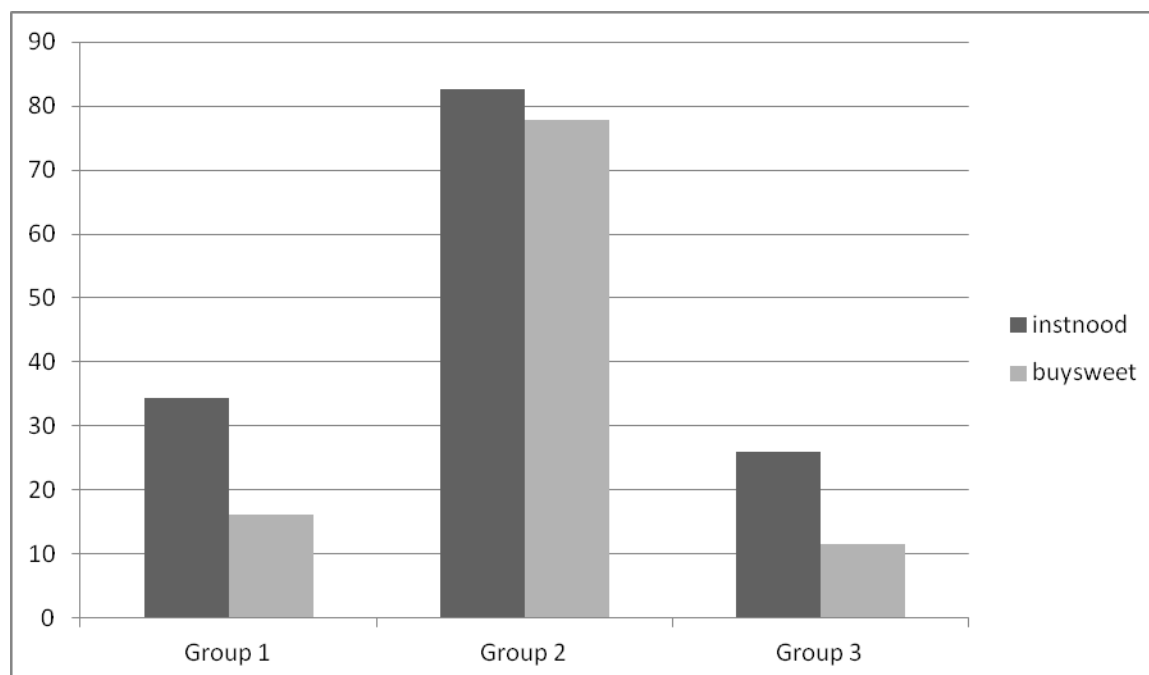


Figure 4.10 Percentage of Food Frequency Survey visits in which the participants reported obtaining processed foods in the above ways

Further, the percentage of visits in Group 3 (1.4%) in which the participant reported consuming no animal products in a day at least once in the previous seven days (*nomeat*) is significantly higher than Groups 1 (0.2%) and 2 (0.0%) ($X^2 = 7.3633, p < .05$). Additionally, in 25.6% of the Group 3 visits, the participant reported eating no vegetables in a day at least once in the last seven days (*novveg*). This is significantly higher than Groups 1 (7.9%) and 2 (2.1%) ($X^2 = 93.3135, p < .001$).

Finally, Group 3 also shows a significantly higher use of the coping strategies considered in the analysis. In 12.3% of the Group 3 visits, respondents reported consuming only one meal in a day at least once in the previous seven days (*meals1*). This is significantly higher than Groups 1 (6.4%) and 2 (3.9%) ($X^2 = 16.5775, p < .001$). In 38.9% of Group 3 visits, respondents reported consuming rice they had purchased on credit in the last seven days (*credrice*). This is

significantly higher than Groups 1 (21.8%) and 2 (17.6%) ($X^2 = 40.8767, p < .001$). Eighty-one percent of Group 3 visits were with a respondent who had adult children living outside the village working hired labor (*childawayhl*), compared to 69.9% of Group 1 visits and 60.7% of Group 2 visits ($X^2 = 31.1550, p < .001$).

Conclusion

In summary, I have clustered three different types of livelihood portfolio data to look for patterns of combinations of these three elements. I examined income-generating strategies and subsistence activities from the Livelihoods Survey and food procurement behaviors from the Food Frequency Survey. I clustered each data set into three groups. In the first analysis, the sample divided into fishers, who also raised clams and collected plastic, aquaculturalists, who also participated in the forest conservation project and received remittances, and *cây thuốc cá* cultivators, who also grew vegetables for sale and raised livestock. These groups do not differ on any of the livelihood outcome variables. All three portfolio types contain a potentially lucrative strategy (fishing, aquaculture, *cây thuốc cá*), strategies that had been relatively unproductive or unprofitable in recent years because of a depletion of natural resources, market trends, or other reasons (fishing, clam raising, aquaculture, *cây thuốc cá*, livestock), and strategies that earned very little cash (plastic collection, forest protection, some vegetable cultivation). Without the startup capital and other skills necessary to become involved in the buying and selling of various commodities, by far the most lucrative livelihood strategy in the village, it was difficult to build a livelihood portfolio in Đông Hải that was not dominated by vulnerable, unsustainable, and unprofitable strategies.

In the second analysis, of reported subsistence activities, the sample divided into those who fished in the ocean or river for their food, those who received food from relatives and neighbors and raised poultry for their own consumption, and those who fished in their aquaculture ponds for food, tended homegardens, and collected edible and medicinal wild plants. These three clusters differ significantly on only one livelihood outcome variable, the number of respondents who have adult children living outside of the village working hired labor. The group that seemed to have the fewest alternative means of obtaining food, Group 1, had the highest number of participants who had resorted to this coping strategy, while the group that seemed to be able to rely on social relationships to obtain food had the lowest number of participants with adult children away working hired labor.

In the third analysis, of food procurement behavior, the cluster analysis broke the Food Frequency Survey visits into three groups. Groups 1 and 2 contained visits in which participants primarily consumed food they had purchased. Group 2 contained visits in which the participants reported consuming luxury foods (e.g., meat, processed foods), while Group 1 contained much fewer visits in which participants consumed luxury foods. The visits contained by Group 3 differed markedly from the others. In those visits, respondents reported consuming non-luxury foods (e.g., rice, vegetables, fish) that they had obtained in a wider variety of ways (e.g., collected wild vegetables, fished in the river, received rice from a neighbor). On all livelihood outcome variables, research participants whose visits were clustered into Group 3 fared the worst – had the lowest incomes, were the most food insecure, and enacted coping strategies most frequently. The cluster of food procurement behaviors found in Group 3 visits was most likely an adjusted strategy for provisioning vulnerable households, those that had already suffered undesirable livelihood outcomes (e.g., decreased income, increased food insecurity).

That the clusters of income-generating strategies and subsistence activities do not differ significantly by livelihood outcomes underscores the importance of the “livelihood assets/capitals” component of the Sustainable Livelihoods Framework (Figure 1.2). Many households in Đông Hải perform similar combinations of strategies, activities, and behaviors to attempt to meet the needs of their members, but these combinations alone are not sufficient to predict livelihood outcomes. Desirable or undesirable livelihood outcomes emerge from the assets and capitals at a household’s disposal, used to fuel the various components of the livelihood portfolio, in the context of the existent stresses and strains on a household and the broader political and economic environments. The next two chapters will illustrate this mechanism by examining two segments of the village population most likely affected by the economic and environmental legacy of economic reform – families displaced and resettled by the CWPDP and elderly people living alone or with young grandchildren. I will analyze livelihood vulnerability among these two groups by determining how these households fit in the above clusters. I will also look for differences on outcome variables between displaced and non-displaced households and among elderly-only, multigenerational, and nuclear households.

CHAPTER 5

LEFT BEHIND: HOUSEHOLD TRANSFORMATION AND DIFFERENTIAL VULNERABILITY IN THE WAKE OF RURAL-URBAN MIGRATION

Có con nhờ con, có cửa nhờ cửa. (If you have wealth, you depend on your wealth in times of need; if you have children, you depend on your children in times of need.)

-- Vietnamese proverb

Introduction

Ms. Liên, a very slight 61-year-old woman, lived alone with her 15-month-old grandson in a sparsely-furnished thatch house planted in the mud overlooking her neighbors' shrimp aquaculture ponds. She and her husband, who passed away eight years earlier, moved to Phước Thiện in 1984, drawn by rumors of the good life on the coast. It was easy to make money there, people said, because the ocean was full of fish and shrimp. For a few years, Ms. Liên said, looking fondly at the photograph of her husband on the family's ancestral altar, life was good. Unfortunately, day by day, it became more difficult to make a living because so many families were attracted to the region for the same reasons.

When her husband died in 2000 and her adult son died just a few months later of cancer, Ms. Liên could not continue to fish on her own. Her three daughters got married and moved away and she was left with only her teenage son. She borrowed 6 million VND (~\$375) from the Vietnam Bank for Social Policies in order to raise cows to make a living, but the cows all quickly contracted hoof-and-mouth disease and died. Owning only eight square meters of land and having sold her boat and fishing nets to pay for her late husband's and son's medical

treatment, she had no choices for paying off her loan or supporting herself. Her young son, then, decided to stop going to school and move to Ho Chi Minh City to help his mother pay her debts. Meanwhile, one of Ms. Liên's daughters divorced her husband, left her infant son in Ms. Liên's care, and also moved to Ho Chi Minh City.

When I began visiting Ms. Liên in December 2007, her son sent her enough money from his job in a restaurant in the city to buy 50 kilograms of rice every month. She was also experimenting with a fruit and vegetable garden in the mud outside of her house. Other than that, she depended on the generosity of her neighbors to feed herself and her grandson ("My neighbors love me so much"). She explained that she could not even buy rice on credit at the market because the vendors refused to loan to a person so poor. Ms. Liên struggled to stretch the rice between her son's remittances by reducing the number of meals she ate in a day and watering her rice down by making porridge. She suffered from debilitating headaches and, in April, when she stopped by my house and I gave her some food, I remember thinking that I had never seen a truly hungry person eat before then.

How quickly things can change. In May, one of her daughters, her son-in-law, and two grandchildren moved to Phước Thiện to live with her. The young adults worked as hired laborers and her son-in-law purchased a boat to fish. Ms. Liên happily told me that there was a lot more money coming into the household now that her daughter had moved home. She could eat three meals in a day and have a bowl of rice with every meal. Additionally, her headaches had disappeared. However, the last time I visited Ms. Liên in September 2008, she told me that her daughter and son-in-law were going to move to Ho Chi Minh City the next day. They had accrued too much debt during their four months in Phước Thiện. They left their two young

children in the care of the son-in-law's parents. As quickly as they came, they left, and Ms. Liên would again be alone with her grandson.

Traditionally, as much due to Confucian values as to lack of other alternatives, people in Vietnam continued to live with their adult children as they aged. More elderly people lived with their married sons than married daughters, although this difference was less pronounced in the South (Hirschmann & Vu 1994). Thus, until recent years, the typical Vietnamese household cycled through a multigenerational phase, when older people, their adult children (usually a son and daughter-in-law), and their grandchildren all lived together. If the elderly became incapacitated, the able-bodied adults would generate income and provide food for the household. Older people in Vietnam were rarely left to fend for themselves. This situation is changing in Vietnam and the numbers of elderly-only households and households containing only elderly people and young children are on the rise. Giang and Pfau (2007) attribute this change in household structure to the fact that elderly populations are growing both in absolute numbers and as a percentage of the population because of decreasing mortality, decreasing fertility, and increasing life expectancy. These authors also allow, as do Mason (1992) and Schwarz (2003), that increasing rural-urban migration may weaken the traditional household structure that has been important for the care and support of the elderly. Giang and Pfau (2007) argue, however, that, despite intensifying migration, family relations have remained strong and children continue to support their elderly parents.

The above contention that adult children have continued to effectively support their aging parents despite increasing out-migration is based on remittances – that migrants send remittances, usually in the form of cash, back to their home villages and that those remittances either compensate or over-compensate for the economic benefits to the elderly lost when their

children moved away. The issues of both rural-urban migration and remittances are controversial in the literature. On the one hand, some scholars argue that out-migration (often called “distress migration”) is a household’s last resort, the end of a sequence of strategies for coping with livelihood shocks and stresses (Corbett 1988, de Sherbinin et al. 2008). Some also argue that the remittances that migrants send back to the source community are unhelpful and only serve to undermine the resilience of rural households (Campbell 2009, Lipton 1980). On the other hand, some scholars contend that out-migration of certain family members is a viable livelihood diversification strategy and that remittances are a strengthening source of income for rural households (Adams & Cuecuecha 2010, Adger et al. 2002, Mosse et al. 2002, Niimi et al. 2009, Taylor 1999).

This chapter addresses the issue of out-migration in Đông Hải. Influenced by a number of *Đổi Mới* era policy changes, including the relaxation of restrictions on population movement and the debt incurred by many families because of the boom and bust of shrimp aquaculture, many young adults moved from Đông Hải to urban and peri-urban areas in search of employment. This mass migration was the result of both lack of economic opportunities and mounting debt in the village (“push migration”) and the allure of relatively high-paying, low-skill jobs, such as factory work or housekeeping, available in the city (“pull migration”). While this research did not focus on the experience of the migrants, I was interested in the impact of out-migration on the livelihoods of the elderly left behind.

The results of this year of data collection indicate that the various components of elderly-only households’ livelihood portfolios, particularly income-generating strategies, did not change when adult children moved away. However, with this loss of human capital – extra hands, physical strength, oftentimes, more education – elderly-only households were less productive,

which was reflected in undesirable livelihood outcomes. Additionally, elderly Vietnamese traditionally relied on their children, either those living in the same household or nearby in their own nuclear households, in times of need. Without that recourse, members of elderly-only households in Đông Hải relied heavily on neighbors and other relatives to meet household needs. Thus, the vulnerability context of elderly-only households expanded to include the vulnerability context of all households in their social networks. During times of economic stress in the community, donations to elderly neighbors were curtailed. Thus, for most elderly-only households, sending adult children away to work hired labor, while intended as a strategy to cope with debt and a fragile local economy, increased the vulnerability of the elderly.

Policies, Institutions, and Processes

One landless older man, when asked to describe differences he observed in the village between the past and present, explained that, in the past, people moved to the village in droves because they wanted to live near the ocean where catching fish was an easy way to make money. Now, he said, many more people moved away than moved into the village. Most young people, including his children, moved to Ho Chi Minh City and surrounding areas. In the past, he said, children stayed with their families. Similarly, an old woman told me that almost the entire younger generation of Phước Thiện Hamlet had moved away to find work. I asked if it had always been this way, and she replied that, in the past, families were able to stay together. At that time, members of the family, particularly young men, worked hired labor nearby and everyone slept in the same house at night. I asked what caused families to begin to disintegrate in Phước Thiện. She said the dissolution began when the fish and shrimp stocks in the sea were depleted,

and the failure of aquaculture exacerbated the breaking up of families. Only the old remain, she said, waiting for their children to send money home.

It was not only the depletion of ocean resources and general failure of shrimp aquaculture that limited rural economic opportunities and pushed young people to the city in search of jobs. Elderly parents and migrant adult children (when they returned to the village to visit) gave another major reason for the move: the debt that most households incurred upon transitioning from their former occupations to shrimp farming. The migrants hoped to make enough money in the city to pay off their parents', and sometimes their own, distressingly high levels of debt. Mentioned earlier, one of the main strategies employed by the Vietnamese government to encourage the movement of households to the mangrove-covered coast and the start of shrimp farms in those areas was the extension of small loans. Beginning in the early to mid-1990s, when shrimp aquaculture became a high development priority, the Vietnam Bank for Agriculture and Rural Development (VBARD) began to give out three-year loans for pond construction and one-year loans for aquaculture inputs, such as shrimp feed and antibiotics. Also mentioned earlier, this support, in the form of credit extension, has not been matched by effective technical support, particularly for small-scale aquaculturalists. This lack of technical knowledge, combined with environmental pollution and diseased stock, has caused plummeting profits since the early 2000s among shrimp farmers. People's struggles to service their debts were the most popular topic of conversation in Đông Hải.

The availability of small, individual loans and market integration catalyzed substantial changes in the way people coped with hard times. Before the introduction of intensive aquaculture and credit extension, my research participants told me that they relied more heavily on a wide variety of coping strategies, most notably, subsistence-related strategies (e.g., eating

less-preferred foods, fishing in the ocean, etc.). During economic reform, coping strategies became oriented toward the pursuit of cash, both to keep up with interest payments on loans and to continue to meet household needs. In fact, when I attempted to elicit sequences of coping strategies from participants (see Chapter Two), my failure to get sequences in accordance with the literature on coping was illuminating. When asked what s/he does to cope with a real or hypothetical threat to the household, the person will usually make a list in order of resort, from most sustainable to least sustainable (e.g., Chambers 1989, Corbett 1988). In response, to my inquiries, however, out of 96 participants, 30 participants listed only one strategy. Of those who listed only one strategy, 19 strategies involved credit and borrowing (see Appendix D). Furthermore, for the 66 participants who listed more than one strategy, 40 listed a first strategy that involved credit and borrowing. Because coping strategies that involve credit and borrowing are generally unsustainable or vulnerability enhancing, as they require interest payments and/or strain on social relationships, the results of this coping strategy elicitation exercise were not expected. This orientation toward borrowing was evident in the astounding amount of debt possessed by the households in the survey sample.

Out of the 117 research participants in Đông Hải, 84 (71.8%) were in debt to either VBARD or the Vietnam Bank for the Poor (VBP, now called the Vietnam Bank for Social Policies, a branch of VBARD established in 1995 to focus on poverty alleviation). Fifty-five percent of the sample had outstanding formal and informal loans in 2007, 19% had formal loans only, 18% had informal loans only, and only 8% of the sample had no debt at all. The average year that people first borrowed money from a formal lending institution was 2003. There was a first wave in 1997, when the government first began offering small individual loans after the destruction caused by Typhoon Linda. There was a second wave as fishers displaced by the

CWPDP were moved to Phước Thiện, “encouraged” to farm shrimp, and given priority lending. There was a third wave around 2007 when fishers in Hồ Tàu were encouraged to participate in the clam-raising project, which involved borrowing money from the bank. Participants’ debt ranged from 2 million VND (~\$125) to 300 million VND (~\$18,750), with a median of 15 million VND (~\$938). Furthermore, the interest that each household paid on its bank loans in 2007 ranged from 0 VND (some household members told me that they could not afford to make their interest payments and so did not) to 40 million VND (~\$2,500), with a median payment of 1.5 million VND (~\$94). For the 87 participants who reported both their 2007 household income and the amount of interest they paid to the bank in the same year, I calculated the percentage of the household’s income spent on interest (interest/income). This ranged from 0% of the household’s income to 300% of the household’s income, with an average of nearly 30% of the household’s income. Many households also made additional interest payments to informal moneylenders. In fact, people often told me that they were caught in a cycle of borrowing money from neighbors to pay the bank and borrowing more money from the bank to pay off the neighbors and on and on. Most local moneylenders charged such an exorbitant interest rate that, in just a few days, people owed twice what they borrowed. For some families in Đông Hải, sending young adults to the city was a last-ditch effort to extricate themselves from this downward spiral.

Although not mentioned during interviews, the Vietnamese government’s relaxation of migration policies certainly also contributed to the rapid intensification of rural-urban migration. After reunification in 1975 and before the beginning of *Đổi Mới* in 1986, those young people probably would not have been allowed to move. Household registration transfers were only allowed if people moved in a state-approved direction, urban to rural or lowlands to highlands,

thus ensuring the “rational distribution of the productive force” (Hardy 2003:109). In the new era, households and individuals were required to continue to seek state approval if they wished to move, but requests were more readily approved, as land decollectivization and market integration necessitated a relaxation of those restrictions on the population’s movement.

Survey Sample

As described in Chapter Two, I used a stratified sampling technique, based on family cycle category, to choose Livelihood Survey participants. Ultimately, of the 117 survey participants, 43 were members of nuclear households (one set of adults with young children), 48 were members of multigenerational households (households containing at least two sets of adults), and 26 were members of elderly-only households (any couple or individual, old enough to have adult children living elsewhere, living alone or with young children). Table 5.1 shows individual- and household-level characteristics of survey participants by family cycle category. The table also indicates statistically significant differences among individuals in the three categories, according to likelihood ratio chi-square tests for categorical variables and Kruskal-Wallis tests for continuous variables.

There was no difference in gender composition among the three groups. Because I sought to include equal numbers of male and female household heads, their numbers were about equal in the subgroups. Not surprisingly, as the three groups contained household heads of families at different lifecycle stages, members of multigenerational and elderly-only households were significantly older than members of nuclear households ($X^2 = 59.172, p < .001$). Additionally, members of nuclear households were significantly better educated than members of

multigenerational households ($X^2 = 11.121, p < .01$), but members of elderly-only households did not differ from either group on education level.

Table 5.1 Characteristics of Livelihoods Survey sample relating to family cycle category ($n = 117$)

	Nuclear Households ($n = 43$)	Multigenerational Households ($n = 48$)	Elderly-Only Households ($n = 26$)
Individual Characteristics			
Gender			
male	23 (53.5%)	19 (39.6%)	14 (53.8%)
female	20 (46.5%)	29 (60.4%)	12 (46.2%)
Age			
mean	35.6 (SD = 7.73)	56.6 (SD = 13.50)	58.8 (SD = 10.22)
min	23	26	39
max	55	82	79
Education (highest grade completed; $n = 109$)			
Average	4 th grade	2 nd grade	3 rd grade
Min	No education	No education	No education
Max	13 th grade	9 th grade	10 th grade
Household Characteristics			
Displacement Status			
displaced	11 (25.6%)	21 (43.8%)	6 (23.1%)
not displaced	32 (74.4%)	27 (56.3%)	20 (76.9%)
Head of Household^{***}			
male	42 (97.7%)	30 (62.5%)	21 (80.8%)
female	1 (2.3%)	18 (37.5%)	5 (19.2%)
Household Number			
mean	3.9 (SD = 0.99)	4.7 (SD = 1.85)	1.9 (SD = 1.32)
min	2	2	1
max	7	10	8
Landownership			
own land	33 (76.7%)	35 (72.9%)	21 (80.8%)
landless	10 (23.3%)	13 (27.1%)	5 (19.2%)
Bank Debt[*]			
with bank debt	25 (58.1%)	41 (85.4%)	18 (69.2%)
without bank debt	18 (41.9%)	7 (14.6%)	8 (30.8%)
Amount of Bank Debt			
median	5 million VND	10 million VND	7 million VND
min	0	0	0
max	300 million VND	300 million VND	40 million VND

* $p < .05$, according to a likelihood-ratio chi-square test

*** $p < .001$, according to a likelihood-ratio chi-square test

^{||} $p < .01$, according to a Kruskal-Wallis test

^{|||} $p < .001$, according to a Kruskal-Wallis test

The three groups did not differ on the number of households displaced by the CWPDP or the number of landless households. About a quarter of each group was displaced and about a quarter of each group was landless. All three groups differed on the number of female household heads ($X^2 = 21.4807, p < .001$). Because most women became household head because of the



Figure 5.1 Households at different life cycle stages (A) A nuclear household; (B) a multigenerational household; and (C) an elderly-only household (photographs by author)

death of their husbands, this was more common in older households. Thus, nuclear households had the smallest number of female-headed households. Multigenerational households, on the other hand, had the highest number. When a woman was widowed, her adult children were more

likely to stay with her or move back in with her than move away to work. Also not surprisingly, all three groups differed by household number ($X^2 = 50.492, p < .001$), with multigenerational households being the largest and elderly-only households being the smallest. Finally, there was a difference in the number of households with bank debt ($X^2 = 8.7597, p < .05$), although the amount of debt did not differ among the three groups. Significantly fewer nuclear households had formal debt (58%) than multigenerational households (85%). With two or more sets of adults, multigenerational households had multiple eligibilities to receive credit extension.

Livelihood Portfolios

Returning to the clusters of income-generating strategies and subsistence activities discussed in Chapter Four, I performed livelihood-ratio chi-square tests to determine if the three clusters of both types of activities differed in their composition by family cycle category. Both analyses were non-significant. In other words, the reported livelihood portfolios of elderly-only households included the same range of activities as the portfolios of other household types. When adult children moved away, the parents left behind did not necessarily change their livelihood activities, particularly income-generating strategies.

However, the results of the Food Frequency Survey indicate that members of elderly-only households engaged in different food procurement behavior over the course of the survey. There was a significant difference in the composition of the three food procurement behavior clusters by family cycle category ($X^2 = 87.5422, p < .001$). The first group (visits in which participants reported purchasing most of their food and consuming few luxury foods) was composed of 17.8% visits with members of nuclear households, 56.0% visits with members of multigenerational households, and 26.1% visits with members of elderly-only households. The

second group (visits in which participants reported purchasing most of their food and consuming many luxury foods) was composed of 37.2% visits with members of nuclear households, 46.7% visits with members of multigenerational households, and 16.1% visits with members of elderly-only households. Finally, the third group (visits in which participants reported using the most alternative methods to procure food) was composed of 12.3% visits with members of nuclear households, 47.1% visits with members of multigenerational households, and 40.6% visits with members of elderly-only households. Thus, Group 3 contains the highest percentage of visits with elderly-only households.

This finding was consistent with my observations as I conducted the weekly survey. Generally, the same number of elderly-only households had shrimp ponds or *cây thuốc cá* fields or fishing nets as multigenerational or nuclear households, but they were less productive. With less cash available for buying rice and other types of food at the market, members of elderly-only households more frequently collected wild edible plants, depended on the generosity of their neighbors for rice and fish, and used other alternative means to procure food. This dependence on others and natural resources left the livelihood portfolios of elderly-only households vulnerable.

Vulnerability Context

An individual's or household's vulnerability context (#1 in Figure 1.2) is composed of unexpected shocks, reoccurring seasonal factors, and gradual trends (e.g., decline of natural seafood populations or rise of fertilizer prices), all of which have the potential to create economic stress. Because elderly-only households' livelihood portfolios were composed of similar strategies to the portfolios of other household types, they were exposed to the same reoccurring

seasonal factors and trends that threatened the productivity of others engaged in the same activities. The onset of the dry season causing dangerous salinity fluctuations in shrimp ponds or the sharp decline of the market price of *cây thuốc cá* are examples of this. Distributed throughout the Buffer Zone in Đông Hải, elderly-only households were also exposed to the same physical threats from natural hazards.

Because members of many elderly-only households depended on alternative food procurement behaviors, the vulnerability contexts of these households included some threats to their food supply to which those that bought most of their food at the market were not exposed. These threats included a dearth of homegarden produce and edible wild plants during the dry season and various conservation policies regulating fishing and plant collection. Because members of elderly-only households were so dependent on the generosity of their neighbors for cash, rice, fish, vegetables, or sugar and tea, their neighbors' vulnerability contexts, in a sense, became their own. When a neighbor's shrimp harvest yielded little or the price of rice spiked or a family member became ill, s/he would often have to withdraw support from the elderly neighbor in order to continue to meet his or her own household's needs.

Livelihood Assets/Capitals

The second component of the Sustainable Livelihoods Framework, Livelihoods Assets/Capitals (#2 in Figure 1.2), contains five types of capital that households need to construct their livelihood portfolios. Human and social capital were the two types of capital that were differentially available to members of elderly-only households because of the confluence of vulnerability context and the policies, institutions, and processes of a place, which, in turn, affected livelihood portfolios and outcomes. The main contention of this chapter is that those

people living in elderly-only households in Vietnam, a rapidly increasing number of people in response to some of the economic and social changes during the era of economic reform, lost human capital that was important for maintaining the sustainability and resilience of their livelihoods in the face of reoccurring or unexpected economic stresses. When young adults moved away from their parents, most with every intention of improving the economic situation of the household, they took with them not only their often-superior physical abilities to produce cash income and food items but also their skills and knowledge.

Additionally, as mentioned earlier, social capital was extremely important to members of elderly-only households, who did not have adult children nearby to support them. When I first asked these research participants – a widower living alone, an elderly couple, an old woman taking care of her young grandson – about how they fed themselves and the other members of their households, they often replied, “My neighbors love me. My neighbors take care of me so carefully.” There was a sense of responsibility for elderly neighbors in the village. I talked with one man as he painstakingly wove a crab net for an old woman who lived down the road. As he did so, he clucked disapprovingly that her children did not take care of her. When a family held a death anniversary or a wedding party and cooked more food than their guests could consume, a family usually gave the leftovers to an elderly neighbor. However, this support, according to my elderly respondents, dried up around April, when the 2008 World Food Crisis caused the price of food items, gasoline, and agricultural inputs to spike.

According to participants, 2008 was an unfortunate year for almost everyone in Đông Hải. Households were already beginning to feel the effects of the Food Crisis, which many blamed on rising energy prices, a rising demand for more varied foods in developed and developing countries, and poor weather conditions in major staple-growing regions (von Braum

2008), long before the dramatic spike in April. It was at that point that my cook ran into my house to tell me frantically that rice vendors in the market were closing their doors because the price was too high, but there had been a general sense of people tightening their belts before that. One of the first coping strategies of many of the households that usually supported their elderly neighbors was to cut down on or discontinue this support entirely. The results of the Food Frequency Survey show that the only food item members of elderly-only households continued to receive more often than other research participants after April was fish, something that most families expended few resources to obtain. Beginning around March, when I conducted the survey each week and asked about the consumption of donated foods, many of my elderly participants chuckled sadly and replied, “Rice is too expensive to share now” or “My neighbors can’t even give me vegetables because food is too expensive to share.” This vulnerability in the livelihood portfolios of elderly-only households resulted in undesirable livelihood outcomes, particularly food insecurity.

Livelihood Outcomes

Not all elderly-only households in Đông Hải were the result of the out-migration of adult children, pushed by the vulnerability of the family’s livelihood portfolio. A few elderly couples were childless and, in a few cases, all of a couple’s children moved away to marry and, oftentimes, lived near their parents in a separate household. In Đông Hải, however, these were exceptional cases. Many elderly-only households (68%) were created by the out-migration of at least one child. Thus, while I cannot assume that all of these households were the end result of extreme coping strategies, they do represent a rapidly-increasing family cycle category in Vietnam, facing many of the same difficulties, such as loss of productivity with age and reliance

on social capital to continue to meet the households' needs. Table 5.2 shows a comparison of the three different household lifecycle categories on the various livelihood outcome variables.

Significantly more elderly-only households had adult children living away from the village working hired labor. The number of nuclear households and multigenerational

Table 5.2 Comparison of livelihood outcomes by family cycle category

	Comparison	Nuclear Households (<i>n</i> = 43)	Multigenerational Households (<i>n</i> = 48)	Elderly-Only Households (<i>n</i> = 26)
Coping Strategies				
<i>meals1</i>	$X^2 = 67.6397$ $p < .001$	0.8%	4.4%	17.7%
<i>credrice</i>	$X^2 = 10.5970$ $p < .01$	23.5%	28.8%	19.1%
<i>childawayhl</i>	$X^2 = 15.0224$ $p < .01$	20.9%	39.5%	68.0%
Continuous Outcome Variables				
<i>copingfreq</i>	NS			
<i>inc2007</i>	$X^2 = 9.650$ $p < .01$	16 million VND	16 million VND	10 million VND
<i>dds</i>	$X^2 = 77.732$ $p < .001$	median = 6 mean = 5.40	median = 5 mean = 5.07	median = 4 mean = 4.33
Dichotomous Outcome Variables				
<i>nomeat</i>	NS			
<i>noveg</i>	NS			

households did not differ on this variable. Regarding the other two coping strategies examined, members of elderly-only households resorted to eating just one meal in a day to conserve food more often than members of the other two household types, while members of multigenerational households consumed rice that they bought on credit more often than nuclear or elderly-only households. I suspect that, while consumption modification was a coping strategy choice available to anyone, buying rice on credit was not an option for everyone. Vendors often would not sell rice (or any other good) on credit to people perceived as too poor and with no reliable

source of income. In other words, if a customer seemed unlikely to repay the vendor in a timely manner, s/he would not sell to the customer on credit. Unfortunately, many members of elderly-only households were in this position. One elderly woman told me that her neighbors occasionally bought rice on credit for her because the shopkeeper regarded her as too poor to buy on credit. Thus, the fact that only 19.1% of my weekly visits with members of elderly-only households resulted in a recording of consuming rice purchased on credit does not necessarily signify a desirable livelihood outcome compared to the higher frequency of visits with multigenerational households. Rather, it was a matter of availability.

There was no significant difference among the three household types on reported frequency of coping with no money to buy rice. However, members of elderly-only households had the most undesirable livelihood outcomes relating to household income and dietary diversity. Elderly-only households had significantly lower incomes (median: 10 million VND, ~\$625) in 2007 than the other two household types (median for both: 16 million VND, ~\$1000). Additionally, the median weekly dietary diversity score for members of elderly-only households (4) was significantly lower than the median weekly score for members of multigenerational households (5) and nuclear households (6; Table 5.2). A lower score indicates greater food insecurity. There were no significant differences among the household types, however, on the frequency of reporting the consumption of no animal products and the consumption of no vegetables.

To further test my conjecture that sending adult children away to work hired labor, in most cases, was a desperate strategy used to cope with a vulnerable livelihood portfolio, I compared these outcome variables between members of elderly-only households with children away working and those without children away working. I would expect those elderly

participants, who did not use this coping strategy because they either had no children or had children that all moved away for marriage, to have more desirable livelihood outcomes. On three variables, that is what I found. Table 5.3 shows the results of that analysis.

While there was no difference in the frequency with which these two types of elderly research participants resorted to the meal reduction coping strategy over the 8.5 months of the

Table 5.3 Comparison of elderly-only household livelihood outcomes

	Comparison	Elderly-Only with Children away Working Hired Labor (<i>n</i> = 17)	Elderly-Only without Children away Working Hired Labor (<i>n</i> = 8)
Coping Strategies			
<i>meals1</i>	NS		
<i>credrice</i>	$X^2 = 6.7819$ $p < .01$	21.3%	6.5%
Continuous Outcome Variables			
<i>copingfreq</i>	$z = -2.416$ $p < .05$	median = 3 mean = 2.24	median = 1 mean = 1.25
<i>inc2007</i>	NS		
<i>dds</i>	$X^2 = 14.346$ $P < .001$	median = 4 mean = 4.21	median = 5 mean = 5.02
Dichotomous Outcome Variables			
<i>nomeat</i>	NS		
<i>noveg</i>	NS		

Food Frequency Survey, participants with children away working hired labor reported consuming rice that they had purchased on credit (21.3% of visits) more frequently than participants without children away working hired labor (6.5% of visits). Additionally, there was no significant difference in household income between the two groups. However, there were differences between them on two measures of food insecurity. The median response of elderly participants with adult children away to the question, “How often do you find that you do not have enough money to buy rice?” was 3, or “frequently.” The median response of elderly

participants without children away, on the other hand, was 1, or “seldom.” This indicates more food security and, clearly, a more desirable livelihood outcome. A significant difference in median dietary diversity signifies the same conclusion. The median dietary diversity score calculated from visits with participants without children away working (5) was higher than that of participants with children away working (4). Again, the former score indicates more food security and a more desirable outcome.

These results may indicate the more vulnerable, less desirable position of the latter household type prior to sending the young adults away. Weaver and Hadley (2009) write, “Food insecurity is a broader concept that encompasses not only lack of food, but also situations in which individuals feel that their future food supply may be threatened and, in the face of this recognition, alter their dietary intake or their behaviors” (265). These authors point out that food insecurity may result from the anxiety created by the anticipation of food shortage rather than the actual occurrence of a food shortage and, nevertheless, that anxiety can set an individual’s or household’s coping strategies in motion. It is often the performance of coping strategies, in response to or in anticipation of food shortage, that renders a household more vulnerable to future stress. On both a measure of perceived food insecurity (*copingfreq*) and actual food insecurity (*dds*), participants living in elderly-only households with children away working hired labor, a coping strategy, scored more food insecure than others who had not used that coping strategy. Data of this kind would have to be collected over a longer period of time to truly understand the cause-and-effect relationships here.

Most families said that they sent one or more adult children away to work hired labor in order to benefit from the remittances sent back to them from the migrant family members. This data can also contribute to the questions: Does the money sent to the household left behind in the

village compensate for the loss of a productive family member? Is the receipt of remittances a viable alternative livelihood strategy? While lamenting the dissolution of their families, several older women said that they felt more “comfortable” knowing that, every few months, they would receive money from a child working elsewhere. For some, soliciting and receiving remittances was an important coping strategy. However, the data indicates that remittances may not have been a sufficient substitute for the adult child living and working at home (Table 5.4).

Table 5.4 Comparison of livelihood outcomes by receipt of remittances across all household types

	Comparison	Participants Receiving Remittances (n = 94)	Participants Not Receiving Remittances (n = 23)
Coping Strategies			
<i>meals1</i>	$X^2 = 7.8904$ $p < .01$	4.8%	9.2%
<i>credrice</i>	NS		
Continuous Outcome Variables			
<i>copingfreq</i>	NS		
<i>inc2007</i>	NS		
<i>dds</i>	$X^2 = 19.736$ $p < .001$	median = 5 mean = 4.65	median = 5 mean = 5.12
Dichotomous Outcome Variables			
<i>nomeat</i>	NS		
<i>noveg</i>	$X^2 = 6.0516$ $p < .05$	13.9%	9.1%

Over the course of the Food Frequency Survey, participants who did not receive remittances reported eating only one meal in a day more frequently (9.2% of visits) than those who received remittances (4.8% of visits). However, on two measures of food insecurity, remittance receivers were more food insecure. Visits with remittance receivers scored lower average dietary diversity (4.65 vs. 5.12). Additionally, in a higher percentage of visits did remittance receivers report consuming no vegetables in the previous seven days (13.9% vs. 9.1%

of visits). Again, though, it is difficult to say whether this greater food insecurity among remittance receivers was the reason these families sent members away or the result of the loss of able-bodied household members. Either way, it seemed that remittances were not helping most families substantially.

There are at least two possible explanations for these results. First, in some cases, remittances were too small and infrequently sent to compensate for the loss of a productive family member, particularly because many remittance receivers were incapacitated by illness and struggled to produce their own food and to generate cash to buy food from the market. Second, as other researchers have argued, cash remittances were often not used for essentials, such as food, housing, or school fees (see Connell & Conway 2000). Instead, they were used to purchase television sets, cellular phones, vehicles, or Western-style clothing. In Phước Thiện, I observed that most cash remittances were spent on loan interest payments and not often on everyday necessities. Many people, when discussing the enormity of their debt, could say only that they hoped their children would be successful in the city so that they could repay the bank. The 18-year-old daughter of one of my research participants, a 45-year-old widow suffering from heart disease, migrated to Ho Chi Minh City the year before to work as a housekeeper. When she returned to her mother's thatch house out on the beach for a visit, I interviewed her about her experiences working in the city. I asked her if she thought that the money she sent home was useful to her mother. She replied quietly, "My mother only uses the money to pay the interest on her debts, so, no, I do not think the money is helpful."

Conclusion

Rural households in Vietnam are increasingly cycling through a once-rare lifecycle stage – elderly-only households. This relatively new household type is, in large part, the product of rural-urban migration. In economically and environmentally marginalized areas, like Đông Hải, much of this out-migration is due to a lack of local economic opportunities and the accumulation of household debt when available economic opportunities fail. Traditionally, the elderly in Vietnam depended on their co-habiting adult children to maintain the household's livelihood (i.e., continue to provide the household with food, cash, and other items necessary) and to cope during times of economic stress. My data indicates that, while elderly-only households were engaged in similar income-generating as other household types, they were generally not as productive. With less income, the livelihood portfolios of elderly-only households were more vulnerable. Additionally, elderly people living alone depended on their neighbors (especially for food), a food procurement behavior and coping strategy that was particularly vulnerable to the vicissitudes of the local economy. When those neighbors experienced hard times, they often had to withdraw support from the elderly. Thus, national-level economic reform policy changes translated into the fragile livelihoods of the elderly.

CHAPTER 6

EXCHANGING VULNERABILITIES: TRADE-OFFS IN COASTAL VIETNAM

“The forest is gold. If we know how to conserve and manage it well, it will be very valuable.”
Ho Chi Minh, at the dedication of Cúc Phương National Park (1963)

Introduction

Ms. Năm and her family moved to Phước Thiện from Hồ Tàu Hamlet in 2000, at the same time as hundreds of fishing households along Vietnam’s southern coastline were relocated inland by the Coastal Wetlands Protection and Development Project (CWDP). When I first interviewed Ms. Năm, she had recently returned to Phước Thiện from Ho Chi Minh City, where she and her four adult children moved the year before to work as hired laborers. In their absence, her husband lived alone in the group settlement provided by the Vietnamese government for the relocated families and tended the household’s shrimp aquaculture ponds, also provided by the government as compensation. He was now sick and needed his wife’s help to manage the household.

When I asked Ms. Năm to compare her life in the two hamlets, before and after resettlement, her ambiguous answer mirrored the mixed feelings of all those ordered to move from their homes on the coast and reflected the trade-offs involved in the implementation of the conservation project. She explained that, in Hồ Tàu, she was not in debt, but in Phước Thiện, where the government gave her family 10,000 m² of land to farm shrimp, she was 25 million VND in debt with constantly compounding interest. In Hồ Tàu, she caught fish and shrimp in the

ocean and collected wild plants to eat; she did not have to spend money on food. Here, in Phước Thiện, she said, groceries were expensive and her shrimp were few and often died. In Hồ Tàu, Năm had enough food and money to live every day, but no extras. In Phước Thiện, she was in debt because she had to pay cash for so many things. The year before, the situation had finally broken her family apart. She and her children had to move away to find work that would generate cash because her family's shrimp ponds failed to pay for themselves. Yet, despite all these hardships since relocation, Ms. Năm insisted, "The government takes care of my family carefully."

In November 1997, during the most active tropical cyclone season ever recorded, Typhoon Linda took an odd turn over the South China Sea and unexpectedly slammed into southern Vietnam, an area with a relatively placid climate. The typhoon destroyed 80,000 homes, including Ms. Năm's house, and damaged 140,000 others, flooded huge areas of agricultural land, and killed an unprecedented 1,292 people, most of whom drowned (Kelly et al. 2001). While the plans for the CWPDP, including the household displacement component of the project (see World Bank 1996), were already well underway by the time the storm hit, the event helped gain approval for the project among the people it would affect most drastically. Ms. Năm told me that she had to move from Hồ Tàu because her home was exposed to violent storms and flooding. When she moved to Phước Thiện, the government gave her a solid house, land for shrimp aquaculture, some money, and six months' worth of rice. Regardless of her family's debt and lack of subsistence options, she was happy to have her own piece of land and a safe house.

Ms. Năm and her family members are only six of the 10 million people that Cernea (1997) estimates are displaced each year by development projects. While it is very difficult to determine how many have been displaced by conservation projects specifically, the proportion of

that 10 million is not insignificant (Brockington & Igoe 2006). The anthropological study of development-forced displacement and resettlement began in the 1950s with Colson and Scudder's long-term research on the consequences of resettlement for the Gwembe Tonga by the Kariba Dam in contemporary Zambia (e.g., Scudder & Colson 1982). Since then, the topic has become a fruitful line of inquiry among social scientists interested in issues of development, social structure, and risk and vulnerability. (For a review of this literature, see Oliver-Smith 2009). One of the benefits of this research and anthropologists' engagement with development practitioners has been the development of standards concerning displacement and resettlement by the major funding organizations. Michael Cernea, an anthropologist, authored the World Bank Operational Directive 4.30 on Involuntary Resettlement, which calls for minimal resettlement; improvement or restoration of living standards, earning capacity, and production levels of local people; resettler participation in project activities; a resettlement plan; and valuation of and compensation for assets lost (World Bank 1990).

Similar policies have since been adopted by the major funding organizations, including the 25 member countries of the Organization of Economic Cooperation and Development, the African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, and 35 transnational private sector banks (Cernea & Schmidt-Soltau 2006). Given this adoption of standards based on anthropological research of the consequences of unplanned or poorly-planned displacement and resettlement, one might expect that the welfare of populations displaced by development projects would have significantly improved in recent years. Unfortunately, this does not seem to be the case. The World Bank's Operations Evaluations Department conducted a study of five major bank-funded dam projects and concluded that, while better resettlement planning occurred, income restoration strategies

and other aspects of the projects continued to be unsuccessful (Picciotto et al. 2001). These authors also concluded that increased well-being for displaced populations will only occur when the borrowing country and public agencies carrying out the resettlement are genuinely committed to the resettlement as a development priority. Thus, displaced and resettled people are faring better on paper these days, but human rights and the effectiveness of standards are easily lost during interpretation and implementation by the borrowing country.

Cernea and Schmidt-Soltau (2006) write, “Current standards define development-caused displacement as the compulsory removal process initiated when a project’s need for ‘right of way’ is deemed to override the ‘right of stay’ of the inhabiting populations” (1810). Relating specifically to conservation-related displacement and the resultant “environmental refugees” (Geisler & de Sousa 2001), an important question must be asked of the project: Do the environmental benefits of the conservation project sufficiently outweigh the consequences of displacement and resettlement? This is an especially difficult question to answer, most times, because the answer depends on the competing perspectives of different stakeholders. Those whose lives are disrupted by displacement are usually the most marginalized, the most powerless, and the most silenced stakeholders involved. Therefore, the perspectives of the displaced are often not given a fair weight in cost-benefit considerations. Additionally, as McElwee (2006) points out in her case study of the relocation of ethnic minority populations during national park construction in Vietnam, removal of people does not necessarily improve the biological integrity of a landscape. Either the threats posed by the relocated populations are replaced by other threats or resettlement is “targeted at the weakest people, not the ones with the biggest conservation impact” (McElwee 2006:401-402). External economic and political threats to healthy ecosystems, this author argues, must be scrutinized.

Another important question to ask during the evaluation of development-forced displacement and resettlement projects is: Even if the World Bank's standards for involuntary resettlement are carried out perfectly and even if the project improves the biological integrity of the targeted landscape, can a resettlement project compensate the displaced population for everything lost? Considering the complexity of the maintenance of sustainable livelihoods, the answer to that question is probably not. Although Michael Cernea wrote the World Bank's guidelines for involuntary resettlement, he later calls for a "discontinuation" of forced displacements, "given their impoverishing and overall destructive effects" (Cernea & Schmidt-Soltau 2006:1809). The aim of part of this dissertation is to use the Sustainable Rural Livelihoods Framework to analyze displacement as a "totalizing phenomenon" (Oliver-Smith 2009), a structural event/process that affects nearly every aspect of the life of a household or individual, and to examine the impact of the resettlement component of the CWPDP on the viability and sustainability of displaced individuals' and households' livelihoods. This chapter describes the suites of activities that made up the livelihood portfolios of members of the resettled communities. I examine how those portfolios changed due to the resettlement event and assess the vulnerability of different combinations of activities. I also compare the livelihood outcomes of displaced and non-displaced households and individuals. I conclude that displacement and resettlement involved trade-offs in household and individual vulnerability. This event/process changed the vulnerability context for resettled families. It also altered the availability of different kinds of capital, which, in turn, changed the suites of behaviors households used to meet their goals.

Policies, Institutions, and Processes: CWPDP Displacement and Resettlement

One of the main components of the CWPDP (in fact, the only portion of the original project that was 100% complete by the final assessment [World Bank 2008]) was the relocation and resettlement of households from land that was designated Full Protection Zone (FPZ). The Vietnamese government borrowed money from the World Bank and the Danish International Development Agency (DANIDA) to remove 2,149 households in four provinces (Trà Vinh, Sóc Trăng, Bạc Liêu, and Cà Mau) from coastal areas intended for mangrove restoration and other ecosystem rehabilitation. In a December 1999 report, written less than two years before the displacement occurred, the project set itself apart from other development-related displacements:

The resettlement component differs from other resettlement activities in that the focus in CWPDP is on rehabilitation and protecting mangrove forest and on improving the livelihood of BZ inhabitants. Where in other projects PAH (project-affected households) are relocated to make way for infrastructure or other works, the CWPDP aims to find a balance between social and environmental development by a long-term rehabilitation program for people and forests at the same time. (World Bank 1999a:xii)

Indeed, displaced households were compensated for the move, and the 1999 report assures that 92% of households expressed a willingness to relocate *in the presence of a hamlet leader*.

Additionally, I heard over and over again, “The government takes good care of us,” and “The government loves us,” from resettled people. However, observations of life in the resettlement areas in Đông Hải Commune and in-depth interviews with their inhabitants beg the question: Are relocated families and, furthermore, the coastal ecosystem better off for the CWPDP?

Two hundred sixty-eight families were resettled within Trà Vinh Province – 27 households in Hiệp Thạnh Commune, 30 households in Dân Thanh Commune, and 211 households in Đông Hải Commune. Of the 38 displaced families (out of 117 Livelihoods Survey participants), all claimed to have been fishers, from shore or offshore with a boat, before the

move. Many of these families may have been described as market opportunists before relocation, not entirely dependent on markets to meet the households' needs. They fished for shrimp or fish in the ocean and/or river, collected crustaceans from the remaining mangrove forests, foraged for wild edible and medicinal plants, and collected firewood, all for home consumption or sale when necessary. This way of life was dramatically altered upon resettlement.

I visited three resettlement areas in Đông Hải in 2007 and 2008, one in each of the three hamlets that comprised my study site. These areas consisted of long rows of identical houses (standard type 4 housing, in accordance with the World Bank's policy on Involuntary Resettlement [OD 4.30] – 50 m², wood frame, galvanized roof, cement floor, *Nypa* leaf walls), provided with concrete motorbike paths in front and electricity. Each row of housing was associated with a new primary school and several pumps providing freshwater. The 1999 report indicates that a medical station would also be associated with each group settlement. To my knowledge, however, only one new medical clinic was built in Phước Thiện, several kilometers and a ferry crossing away from the Hồ Tàu and Phước Thiện group settlements, but nevertheless an improvement over the nearest hospital in Duyên Hải District with 21 doctors and 11 hospital beds per 10,000 people (World Bank 1996). In addition to this housing and related infrastructure, displaced households also received 1 million VND (~\$62.50) for transportation costs, 1 million VND as a "relocation incentive" for moving in accordance with the project's schedule, and 30 kilograms of rice per household member for six months. Those households relocated from Hồ Tàu to the group settlement in Phước Thiện, with whom I spent the most time, also received land for shrimp aquaculture – in most cases, about 10,000 to 12,000 m². One of the Phước Thiện Hamlet heads, also relocated from Hồ Tàu in 2001, told me that the government divided an abandoned, state-run aquaculture farm from the 1980s to give to the resettled families.

Primavera (2000) notes that there lies a great irony in the relationship between mangrove conversion and mangrove conservation – mangrove destruction, by way of conversion to aquaculture ponds, and mangrove restoration are often funded by the same multinational development agencies. In the case of the CWPDP, conversion and conservation were essentially encouraged by the same project. Households that were primarily engaged in subsistence activities (fishing and wild plant collection) in Hồ Tàu were relocated to Phước Thiện and given land specifically for shrimp aquaculture. When I asked a relocated man, whose project-supplied shrimp ponds were failing and causing his family to fall further and further into debt, if he had the right to make a living on the land any way he wished, he replied, “I just do aquaculture now, and there is no need to think about rights.” The CWPDP report’s assessment of the culpability of those households in terms of mangrove destruction is curious, considering these households made the largest sacrifices for mangrove rehabilitation and were then given few other choices but to reorient their livelihoods towards shrimp aquaculture:

Families have settled in the FPZ for valid reasons.... The degradation of mangrove forests cannot be solely attributed to the families living in the FPZ. Greatest harm to the forests has been caused by defoliation [during the American-Vietnamese War], indiscriminant cutting of timber by Forest Enterprises, illegal cutting by itinerant gangs from outside the region and, more recently, deforestation to enable the GOV [Government of Vietnam] promoted shrimp production. (World Bank 1999a:1)

If this were the case, why did the CWPDP not focus more of its efforts on sustainable community forestry projects and encouraging regulation of the offshore industrialized fisheries that have rendered from-shore artisanal fisheries unproductive and unprofitable? Why encourage the economic activity that has been blamed, time and again, for the mass destruction of mangrove forest around the world, both through land provision and preferential low-interest loans? Subsistence and small-scale market activities do not help the government generate foreign currency to pay back the loan for the project.

Survey Sample

Because I conducted the Livelihoods Survey in Phước Thiện, Hồ Thùng, and Hồ Tàu Hamlets, my sample includes households that were affected differently by the CWPDP. Households that were not displaced by the project and that did not own aquaculture ponds were usually not directly affected by the project. Households in my sample that were not displaced but did own aquaculture ponds were located in the Buffer Zone of the project area and were, therefore, subject to the regulations placed on shrimp farmers. Households displaced by the CWPDP fell into two categories: those with and without aquaculture ponds. To some extent, families living in the FPZ had a choice between being resettled in Phước Thiện and given aquaculture ponds and being resettled within Hồ Tàu and allowed to continue fishing. Some families were allowed to continue living on areas of the beach in Phước Thiện and Hồ Thùng Hamlets considered to be “zones of accretion,” or areas where the coast was not eroding but expanding due to the deposition of sand. Table 6.1 shows the individual- and household-level characteristics of these four segments of the Livelihoods Survey sample and significant differences among them according to likelihood chi-square tests for categorical variables and Kruskal-Wallis tests for continuous variables.

The four different types of research participants did not differ from each other on any of the individual-level characteristics. They did differ, however, on all household-level characteristics except for number of female-headed households. The four categories differed significantly by household structure ($X^2 = 28.9626, p < .001$). Non-displaced non-aquaculturalists differed from non-displaced aquaculturalists ($X^2 = 13.5791, p < .01$ and displaced non-aquaculturalists ($X^2 = 20.5017, p < .001$). The first category had a much higher

Table 6.1 Characteristics of Livelihoods Survey sample relating to displacement and shrimp aquaculture ($n = 117$)

	Not displaced/ No aquaculture ($n = 25$)	Not displaced/ Aquaculture ($n = 54$)	Displaced/ No aquaculture ($n = 20$)	Displaced/ Aquaculture ($n = 18$)
Individual Characteristics				
Gender				
male	11 (44.0%)	26 (48.1%)	10 (50.0%)	9 (50.0%)
female	14 (56.0%)	28 (51.9%)	10 (50.0%)	9 (50.0%)
Age				
mean	55 (SD = 16.58)	47.4 (SD = 15.19)	44.7 (SD = 13.41)	52.3 (SD = 12.41)
min	26	23	26	33
max	79	82	72	76
Education (highest grade completed; $n = 109$)				
Average	2 nd grade	4 th grade	3 rd grade	3 rd grade
Min	No education	No education	No education	No education
Max	6 th grade	13 th grade	5 th grade	5 th grade
Household Characteristics				
Family Cycle Category***				
nuclear	7 (28.0%)	25 (46.3%)	8 (40.0%)	3 (16.7%)
elderly-only	13 (52.0%)	7 (13.0%)	0 (0.0%)	6 (33.3%)
multigenerational	5 (20.0%)	22 (40.7%)	12 (60.0%)	9 (50.0%)
Head of Household				
male	19 (76.0%)	45 (83.3%)	14 (70.0%)	15 (83.3%)
female	6 (24.0%)	9 (16.7%)	6 (30.0%)	3 (16.7%)
Household Number [†]				
mean	3.0 (SD = 1.72)	3.9 (SD = 1.84)	4.7 (SD = 1.72)	3.7 (SD = 1.53)
min	1	1	2	1
max	8	10	10	6
Landownership***				
own land	21 (84.0%)	51 (94.4%)	0 (0.0%)	17 (94.4%)
landless	4 (16.0%)	3 (5.6%)	20 (100.0%)	1 (5.6%)
Bank Debt**				
with bank debt	12 (48.0%)	41 (75.9%)	14 (70.0%)	17 (94.4%)
without bank debt	13 (52.0%)	13 (24.1%)	6 (30.0%)	1 (5.6%)
Amount of Bank Debt ^{‡‡‡}				
median	0	12.5 million VND	6.5 million VND	25 million VND
min	0	0	0	0
max	5 million VND	300 million VND	15 million VND	40 million VND

** $p < .01$, according to a likelihood-ratio chi-square test

*** $p < .001$, according to a likelihood-ratio chi-square test

[†] $p < .05$, according to a Kruskal-Wallis test

^{‡‡‡} $p < .001$, according to a Kruskal-Wallis test

proportion of elderly-only households. Non-displaced and displaced aquaculturalists also

differed ($X^2 = 6.5099$, $p < .05$), the former containing a higher percentage of nuclear households

and the latter containing a higher percentage of elderly-only households. Finally, displaced aquaculturalists and non-aquaculturalists differed ($X^2 = 11.008, p < .01$), the latter containing a much higher percentage of nuclear households and no elderly-only households at all.

Related to the above differences, the four characteristics differed by household number ($X^2 = 11.228, p < .05$). Non-displaced non-aquaculturalists had smaller household sizes than non-displaced aquaculturalists ($z = -2.277, p < .05$) and displaced non-aquaculturalists ($z = -3.231, p < .01$), while non-displaced aquaculturalists also had smaller household sizes than displaced non-aquaculturalists ($z = -2.032, p < .05$). Displaced non-aquaculturalists had the largest average household size (4.7 people), which is consistent with the fact that this group contained the highest percentage of multigenerational households, the most populous household type. Three of these groups had the same composition of landowners and landless. Almost all households owned land¹¹. Displaced non-aquaculturalists, those either resettled in Hò Tầu or continuing to live on the beach, did not own any land.

Finally, the four groups differed by number of households with bank debt ($X^2 = 12.8172, p < .01$) and by the amount of bank debt ($X^2 = 21.683, p < .001$). The results indicate that households involved in aquaculture were more often in debt with formal lending institutions and had significantly more debt. A smaller percentage of non-displaced non-aquaculturalists were in debt than both non-displaced aquaculturalists ($X^2 = 5.8748, p < .05$) and displaced aquaculturalists ($X^2 = 11.9250, p < .01$), but not displaced non-aquaculturalists. A smaller percentage of displaced non-aquaculturalists were in debt than displaced aquaculturalists ($X^2 = 4.1479, p < .05$). The same trend is apparent in the amount of bank debt possessed by the different kinds of households. Non-displaced non-aquaculturalists had less bank debt than both

¹¹ As stated in Chapter Three, the 1993 Land Law stipulates that households do not actually own land but lease it from the government for 20 or 50 years.

non-displaced aquaculturalists ($z = -3.166, p < .01$) and displaced aquaculturalists ($z = -4.093, p < .001$), but not less than displaced non-aquaculturalists. Both non-displaced aquaculturalists ($z = 2.412, p < .05$) and displaced aquaculturalists ($z = 4.049, p < .001$) had more bank debt than displaced non-aquaculturalists.

Vulnerability Context

The displacement and resettlement event/process involved trade-offs in terms of the vulnerability context of the households. Many displaced research participants mentioned that they felt physically safer in the resettlement communities, living in more solidly constructed houses and physically protected from storms at sea. Indeed, families that continued to live on the beach in the accretion zones complained to me of their houses being continually flooded or otherwise damaged during stormy weather. Thus, resettlement eliminated that particular threat for the newly-formed communities.

In some respects, the vulnerability context did not change for displaced households. Unexpected losses of household productivity, due to illness, injury, holiday/event celebration, etc. were no more likely to occur in one type of household than another. At the height of the dry season (March and April), for instance, when there was a shortage of fresh drinking water, members of both displaced and non-displaced households complained of increased cases of diarrhea, preventing productive family members from working and diverting the energy of the healthy from working to caretaking.

Displacement and resettlement also contributed to the vulnerability context, particularly of households resettled in Phước Thiện Hamlet with shrimp aquaculture ponds. These households were relatively newly exposed to market price fluctuations and the seasonality of

shrimp farming. Market price fluctuations affected both the price at which people could sell their aquacultural and agricultural products (primarily, shrimp, crab, fish, and *cây thuốc cá*) and the price of household necessities and aquacultural inputs, such as food, gasoline, and fertilizer. While almost always incrementally on the rise, these prices began rising rapidly around March 2008 and peaked in April. Additionally, accustomed to fairly steady year-round subsistence, fishers-turned-shrimp farmers had difficulty adjusting to the seasonality of shrimp farming, its potential to generate income only at certain times of year. Most shrimp ponds in the Mekong Delta are harvested twice a year, once in the dry season and once in the rainy season. I found that the dry and rainy seasons posed particular threats to farmers lacking technical knowledge and capital, like many of the shrimp farmers in Đông Hải, because of the careful calibrations in salinity and pH that must be made during the climatic extremes. Thus, the uncertainty of cash generation was exacerbated by the fact that many potential harvests were lost. The vulnerability contexts of displaced and non-displaced shrimp farmers, then, were essentially the same. I argue, however, that the loss of certain types of capital assets and the restriction of displaced households' income-generating activities to little else but aquaculture narrowed these households' abilities to subsist and cope with economic stresses and shocks.

Livelihood Assets/Capitals

Access to the five types of capital (shown in Figure 1.2) is important not only for income generation, but also for subsistence and coping. This is also where some of the major disparities occurred, resulting from the event/process of displacement, with consequences for the vulnerability of livelihood portfolios.

Human Capital

Human capital involves the skills and knowledge people need to have in order to pursue various activities. While both groups reported a critical lack of aquacultural extension services, non-displaced participants and their household members may have been able to gain more knowledge from the infrequent workshops held in Đông Hải than displaced participants because of a difference in formal education. While I found no significant difference in the median number of years of schooling obtained by displaced and non-displaced research participants, I observed more illiteracy among the displaced communities. Another difference in human capital assets between the two groups was the number of family members who had moved away to find work elsewhere, usually young adults, taking both their labor power and better education away from the household. A generally patrilocal or neolocal society, most households lost adult children to marriage but these children tended to reside nearby. The migration of adult children to other provinces and to Ho Chi Minh City to find work became more and more common, especially among displaced households, perhaps because displacement and resettlement had already disrupted their family structures and because of the particular lack of livelihood options in the group settlement in Phước Thiện. This issue will be discussed further as a Livelihood Outcome.

Natural Capital

Natural capital includes the natural resources upon which people draw to feed themselves and their families and to generate income. Indirectly, natural capital, such as a healthy ecosystem, provides environmental goods and services that support livelihood activities as well. One of the main goals of the CWPDP was to “revitalize and improve the protection of important

wetland ecosystems that contain valuable biological diversity and provide nurturing functions for fisheries” (World Bank 1996:5). Indeed, coastal fishing families were displaced from their homes in order to make room for these revitalized ecosystems – monocrops of *Rhizophora apiculata* and *Casuarina equisetifolia* (see Figure 5.1) – a “right of way” that apparently overrode the “right of stay” (Cernea & Schmidt-Soltau 2006:1810). Many researchers argue that mangrove restoration efforts are effective in terms of recreating the degraded ecosystems. Vovides et al. (2011) compared nitrogen fixation in preserved, reforested, naturally-regenerated, and degraded mangrove habitat and found that nitrogen fixation was only impaired in the degraded forests. Based on studies in China, Luo et al. (2010) found that replanted mangroves can be functionally similar to natural mangroves. Similarly, Bosire et al. (2008) argue that mangrove restoration usually restores full function to the habitat, including the return of sensitive faunal species. On the other hand, Kamali and Hashim (2011) and Lewis and Gilmore (2007) contend that mangrove restoration projects often fail because the reasons for habitat degradation have not been removed; planting is not all that is required to rebuild a functioning ecosystem. Additionally, Samson and Rollon (2008) found that many restoration projects in the Philippines were unsuccessful because mangrove monocultures were planted in areas that were never mangrove habitat originally. Reports from other areas in Vietnam indicate that the type of mixed shrimp farm-mangrove forestry scheme that was enforced in Đông Hải’s Buffer Zone is very low yielding (Binh et al. 1997, Johnston et al. 2000). Time will tell whether these replanted forests can be considered natural capital gain for the people of Đông Hải.



Figure 6.1 A rehabilitated mangrove forest in Hồ Tàu (photograph by author)

In this situation, both BZ and FPZ populations were subject to what the World Bank now describes as another form of involuntary displacement – restricted access and restricted use rights in a protected area (World Bank OP 4.12). Thus, the re-settlers in Phước Thiện experienced a kind of double displacement. Because of the set-up and location of the resettlement area, many displaced participants felt that they had reduced opportunities to grow or forage for vegetables. Displaced people in Phước Thiện had very little land around their houses to use for homegardens, while the group settlement in Hồ Tàu had more arable land in front of the houses. In 2008, this land was planted with fruit trees, cucurbit vines, hot chiles, herbs, and some rows of corn. Displaced participants in Phước Thiện also said they had been separated from their preferred wild foods. The displaced community in Hồ Tàu remained closer to

preferred wild plant habitat, but this habitat was either off limits or being replaced by rehabilitated forest. Thus, while it was not clear whether the new forest planted in the FPZ provided environmental benefits to relocated participants, the displaced community in Phước Thiện lost some natural capital important for fruit and vegetable procurement. The consequences of this are evident in the comparison of livelihood portfolios below.

Financial Capital

On average, displaced and non-displaced households had about the same access to financial capital – cash, easily liquefiable possessions, and credit. A higher, although not significantly so, percentage of displaced shrimp farmers (94.4%) were in debt than non-displaced shrimp farmers (74.1%). The percentage of displaced shrimp farmers in debt was significantly higher than displaced fishers (70.0%). One of the components of the CWPDP was to loan money to the governmental banks in Vietnam to extend preferential, low-interest loans to PAHs. Those living in the group settlement were clearly encouraged to take advantage of this opportunity, and many had no choice, requiring capital to begin farming shrimp and having no savings. The average amount of bank debt, however, was also not significantly different between displaced and non-displaced shrimp farmers (see Table 6.1). People living in the group settlement in Hồ Tàu were just recently encouraged to invest in a clam-raising project funded by Oxfam. This also involved borrowing money from state-owned banks. Thus, a fairly large percentage of displaced fishers had debt but a significantly lower amount than displaced shrimp farmers.

Physical Capital

Physical capital is the basic infrastructure and equipment people need to pursue various activities. Mentioned earlier, the CWPDP provided displaced and resettled communities with important, basic infrastructure – electricity, roads, schools, a health clinic, and land for aquaculture. Unfortunately, that infrastructure did not provide additional income-generating sources for the displaced communities. While there is no significant difference in the Livelihoods Survey sample, among participants in the Food Frequency Survey, non-displaced shrimp farmers engaged in an average of 6.5 income-generating activities, while displaced shrimp farmers engaged in an average of 4.1 activities, a significant difference ($p < .01$).

Social Capital

Finally, social capital consists of the social networks and relationships that people draw upon to meet their needs. Data collected during this project indicate that the dissolution of this type of capital during displacement and resettlement may have been one of the CWPDP's greatest failings. It is also likely that this loss of social capital during relocation has had a strong effect on the community's food security and vulnerability to economic shocks. Whether as regular occurrences over the course of a year or as a particular strategy for coping with economic stress, many people procure food for their households from other people, friends or relatives. My data, both qualitative and quantitative, indicates that displaced participants in Phước Thiện lost much of their social capital, used for subsisting during hard times, when they were resettled.

While the Resettlement Action Plan report (World Bank 1999a:5) claims that “strategies” for resettlement would include relocating people close to home and a consideration of “existing social structures” by resettling as a group “pre-existing communities, neighborhoods, or kinship

groups,” an October 1999 CWPDP report (World Bank 1999b) indicates that there may have been some difficulty integrating the displaced households into their new communities. The report includes a transcription of an interview with a Đông Hải village leader in July 1999. The interviewer asked, “What do you think the positive effects of having the new settlers in your hamlet will be?” The village leader replied:

All these interviewee think that they will get negative effect having new settlers in their hamlet because FPZ people including two group: one do fishing mainly, the other is out of work and work as employee [hired laborer] or do stealing. These stealer will attack anyone who prevent them (stealers can organize a group with hundreds of member for attack). This is the most problem for strategy of settlement. (World Bank 1999b:80)

Thus, a couple years before the resettlement in 2001, it seems that the receiving community in the Phước Thiện Buffer Zone was already anticipating the arrival of their new neighbors with suspicion, a situation that could seriously affect the incoming households’ abilities to utilize social networks to procure food when needed.

Additionally, perhaps due to living in close quarters and perceived competition over a scarce resource (land), I noticed a lot of tension within the group settlement in Phước Thiện that I did not notice outside of the group settlement or in the group settlement in Hồ Tàu. In the process of conducting the Food Frequency Survey in Phước Thiện, I discovered that some families were not speaking to others and many whispered about suspecting others of stealing shrimp. Additionally, after the week-long Tết holiday, I found one research participant, who lived in the Phước Thiện group settlement, in bed with an ugly, stitched-up wound on his head. He told me that a neighbor, with whom he “did not have a good relationship,” snuck into his house in the middle of the night and cut him with a knife. This type of interpersonal violence was very rare in Vietnam’s rural areas. Tensions like this did not seem to plague the group settlement in Hồ Tàu. In fact, several people there boasted of the good relationships among neighbors in

rural areas. I propose that this comparative lack of tension was due to the fact that displaced households in Hồ Tàu were allowed to continue fishing in a relatively open-access environment, while those in Phước Thiện experienced the stress of relocation and a dramatic change in livelihood strategies. Aquaculture required “private property” and was failing to provide sufficient income for almost all families. Within and without the Phước Thiện group settlement, displaced households experienced strain on their social networks.

Livelihood Portfolios

Returning again to the clusters of both income-generating strategies and subsistence activities discussed in Chapter Four, I performed likelihood-ratio chi-square tests to determine if the three groups of both types of activities differed in their composition by displacement status and engagement in aquaculture. For income-generating strategies, the three groups differed ($X^2 = 80.8482, p < .001$). The first group (fishers, clam cultivators, and plastic collectors) was composed of 28.9% non-displaced non-aquaculturalists, 22.2% non-displaced aquaculturalists, 6.7% displaced aquaculturalists, and 42.2% displaced non-aquaculturalists. The second group (aquaculturalists, those involved in the CWPDP, and remittance receivers) was composed of 0% non-displaced non-aquaculturalists, 46.4% non-displaced aquaculturalists, 50.0% displaced aquaculturalists, and 3.6% displaced non-aquaculturalists. Finally, the third group (*cây thuốc cá* and vegetable cultivators and livestock raisers) was composed of 27.3% non-displaced aquaculturalists, 70.5% non-displaced aquaculturalists, 2.3% displaced aquaculturalists, and 0% displaced non-aquaculturalists.

For subsistence activities, the three groups also differed in their composition ($X^2 = 24.3370, p < .001$). The first group (those who fished in the ocean/river for food) was composed

of 17.9% non-displaced non-aquaculturalists, 23.1% non-displaced aquaculturalists, 33.3% displaced aquaculturalists, and 25.6% displaced non-aquaculturalists. The second group (those who received food from others and raised poultry for home consumption) was composed of 22.5% non-displaced non-aquaculturalists, 52.5% non-displaced aquaculturalists, 5.0% displaced aquaculturalists, and 20.0% displaced non-aquaculturalists. The third group (those who consumed seafood from their own ponds, tended a homegarden, and collected edible and medicinal wild plants) was composed of 13.3% non-displaced non-aquaculturalists, 70.0% non-displaced aquaculturalists, 10.0% displaced aquaculturalists, and 6.7% displaced non-aquaculturalists.

Because I conducted the Food Frequency Survey only in Phước Thiện Hamlet, some of the above household categories become too small to be of much use analytically. Therefore, I performed a likelihood-ratio chi-square test to determine if the three food procurement behavior categories, created by cluster analysis in Chapter Four, differ by household displacement status alone. This analysis, then, refers to differences in food procurement behavior between participants in households displaced by the CWPDP and resettled in Phước Thiện and everyone else in the hamlet. There is a significant difference in the composition of these groups by displacement status ($X^2 = 17.1385, p < .001$). The first group (visits in which participants reported purchasing most of their food and consuming few luxury foods) was composed of 42.3% visits with displaced participants and 57.7% visits with non-displaced participants. The second group (visits in which participants reported purchasing most of their food and consuming many luxury foods) was composed of 29.2% visits with displaced participants and 70.8% visits with non-displaced participants. Finally, the third group (visits in which participants reported

using the most alternative methods to procure food) was composed of 32.1% visits with displaced participants and 67.9% visits with non-displaced participants.

Focusing on the impact of the CWDP on livelihood portfolios, the striking result of these three cluster analyses is the limitations that resettlement placed on those moved to Phước Thiện and given aquaculture ponds. The majority of these displaced aquaculturalists fell into the second income-generating strategies group, the aquaculturalists, while non-displaced aquaculturalists were spread among the three groups. Additionally, the majority of displaced aquaculturalists fell into the first subsistence activities cluster, those who fished in the ocean or river for food and reported few other subsistence activities. Finally, the majority of visits with displaced participants fell into the first food procurement behavior category, visits in which participants reported purchasing most of their food and few luxury foods. This indicates a lack of access to other means of procuring food, whereas the second group indicates a preference for purchasing food, especially luxury foods. My qualitative data supports this finding that displaced families felt that resettlement narrowed their livelihood choices considerably.

When I pressed relocated research participants past what might be considered the “party line” regarding resettlement, I received much more varied answers about the costs incurred during resettlement. These responses could be divided into two main categories – difficulties associated with the livelihood reorientation toward aquaculture and the separation of relocated households from resources that were important for coping. First, while the CWDP reports cited here and various government officials in the district and provincial capitals explicitly claimed that aquaculture was encouraged in Đông Hải as livelihood diversification (i.e., to provide local people with an alternative to fishing and other economic activities that result in mangrove degradation), relocated people in Phước Thiện generally felt that their livelihood options were

severely limited by the move, both income-generating and subsistence activities. One woman, who relocated with her husband and aged mother, said, “It was easy for anyone, even poor people, to make money in Hồ Tàu. In Phước Thiện, it is difficult to make money because we can only rely on aquaculture.” Many people talked about the difficulty of moving away from a livelihood based on the harvest of wild plants and animals, usually a very low-input and, therefore, low-risk way of life.

Not only was aquaculture more risky because it required more inputs, but relocated people had the same problems making a profit from their shrimp ponds as the other aquaculturalists in Đông Hải. Water pollution, diseased stock, and lack of technical knowledge similarly caused low productivity or all-out failure of the government-issued ponds. Whereas some people, who had voluntarily moved to the region to farm shrimp, had since sold their ponds or at least diversified the use of their land when possible (e.g., planted *cây thuốc cá* or sweet potatoes, planted a homegarden, etc.), displaced people had fewer choices. Living in the rows of houses in the group settlements, relocated families had very little extra land to work. People living in the group settlement in Hồ Tàu, mainly offshore fishers, who were given no land during resettlement with the understanding that they would continue fishing, complained that, with restricted access to coastal forests and no land around their houses, it was difficult to make a living. I also observed a great deal of social pressure within the group settlements to persevere and continue to use the gift of land as the government intended it to be used. A 54-year-old displaced man tried to explain why he could not sell his land and/or do something different to make a living. He said that his neighbors would laugh at him. “Everyone has land of the same quality and everyone does aquaculture. I would not be a hero if I stopped and everyone else continued.” With a hapless shrug, he added, “We cannot just stay at home and do nothing. And

the land here in Phước Thiện offers no choices.” The “shared poverty” of Communism, referred to in Chapter One, reappeared as the shared poverty of economic development and integration into markets.

All relocated research participants in Phước Thiện worried about the debt they had incurred, and continued to incur, because of shrimp aquaculture. All families took out low-interest government loans to start their ponds – to dredge them out, build the weirs, buy the appropriate nets, condition the water, and purchase the fry. Many have since continued to take out loans in order to afford new fry, artificial feed, water conditioners, and sometimes antibiotics. Most people told me that their shrimp ponds produced just enough to provide money to “live every day” but not enough to keep up with their interest payments and certainly not enough to pay down the principal on those loans. One man said, “In Hồ Tàu, I had money in my pocket, but now everything extra goes to interest payments.” In many cases, families sent their unmarried adult children to Ho Chi Minh City or other provinces to work in factories, in restaurants, as housecleaners, etc. in order to help make interest payments. Even the wives of two of my male research participants had moved to the city to work hired labor. A woman, who was visibly distressed by the loss of two of her daughters to the city, lamented, “Our family stayed together in Hồ Tàu.”

Livelihood Outcomes

Described in Chapter Two, households with a vulnerable livelihood portfolio, when faced with economic strain, will enact coping strategies in order to continue to meet the goals of the household. Some coping strategies are unsustainable and increase the household’s vulnerability to the next stress or shock. Over time, these most vulnerable households begin to have

undesirable livelihood outcomes. This was evident with households displaced by the CWPDP.

Table 6.2 shows the comparison of the different displacement groups on the outcome variables I tested. For data collected during the Livelihoods Survey, I compared all four groups, and for data collected during the Food Frequency Survey, I only compared displaced and non-displaced households.

Table 6.2 Comparison of livelihood outcomes by displacement status

	Comparison	Not displaced/ No aquaculture (n = 25)	Not displaced/ Aquaculture (n = 54)	Displaced/ No aquaculture (n = 20)	Displaced/ Aquaculture (n = 18)
Coping Strategies					
<i>meals1</i>	NS				
<i>credrice</i>	NS				
<i>childawayhl</i>	$X^2 = 10.1275$ $p < .05$	48.0%	30.0%	25.0%	68.8%
Continuous Outcome Variables					
<i>copingfreq</i>	NS				
<i>inc2007</i>	$X^2 = 10.0000$ $p < .05$	8 million VND	16 million VND	20 million VND	13.5 million VND
<i>dds</i>	$X^2 = 16.990$ $p < .001$	median = 5 mean = 5.10		median = 5 mean = 4.65	
Dichotomous Outcome Variables					
<i>nomeat</i>	$X^2 = 4.1497$ $p < .05$	0.0%		1.3%	
<i>noveg</i>	$X^2 = 4.9937$ $p < .05$	9.2%		13.6%	

I compared the enactment of three different coping strategies. Two of these strategies – eating only one meal in a day (*meals1*) and purchasing rice on credit (*credrice*) – showed no differences in frequency of resort between displaced and non-displaced participants. There was, however, a significant difference among all four groups on the number of households with adult children away working hired labor (*childawayhl*). The largest percentage of displaced aquaculturalists (68.8%) had enacted this fairly severe coping strategy, which was significantly

higher than the percentages of non-displaced aquaculturalists (30.0%) and displaced non-aquaculturalists (25.0%) who had. With particularly vulnerable livelihood portfolios after the transition to shrimp aquaculture and a reduction of available coping strategies, families displaced from the FPZ to the resettlement community in Phước Thiện had few choices but to attempt to meet household needs by sending adult children outside of the village to work. This finding is further strengthened by the results of running the same likelihood-ratio chi-square test with only multigenerational and elderly-only households in the four categories. The percentage of displaced aquaculturalists who resorted to the coping strategy (76.9%) was still significantly higher than the percentages of non-displaced aquaculturalists (36.0%) and displaced non-aquaculturalists (33.3%).

Displaced aquaculturalists did not show comparatively undesirable livelihood outcomes when I compared coping frequency (*copingfreq*) and 2007 household income (*inc2007*). Only non-displaced non-aquaculturalists had a significantly lower median income than the other three groups. However, displaced participants did demonstrate significantly lower food security during the weekly Food Frequency Survey. Displaced participants had lower dietary diversity scores than non-displaced participants. Additionally, while there were only five occurrences of a participant reporting consuming no animal products in the previous seven days over the 8.5 months of the survey, all five were displaced participants. A significantly higher percentage of visits with displaced participants (13.6%) than non-displaced participants (9.2%) recorded the respondent had consumed no vegetables in the previous seven days. By all of these measures, displaced participants were more food insecure, an undesirable livelihood outcome, than non-displaced participants.

Conclusion

Displacement and resettlement by the CWPDP, a conservation intervention meant to rehabilitate the coastal mangrove ecosystems after a decade or so of unrestrained development in Vietnam, affected all aspects of the lives and livelihoods of the re-settlers. As a project intended “to find a balance between social and environmental development,” some of these project impacts were positive, or beneficial (World Bank 1999a:xii). All displaced households were moved away from exposed, and sometimes dangerous, positions on the beach. Many of these families’ houses were damaged or destroyed by Typhoon Linda in 1997. The project provided most displaced families with sturdily-constructed houses in the more climatically-stable Buffer Zone. The project also provided some re-settlers with land for shrimp aquaculture and other infrastructure – new roads, schools, electricity, and a medical clinic. Furthermore, the rehabilitated forests along the coast offered some environmental benefits to the inhabitants of the Buffer Zone, including coastal stabilization and storm protection. Theoretically, the restored mangroves will support higher-yielding shrimp ponds by recycling waste products and acting as nursery grounds for wild populations of shrimp and fish larvae, but these benefits have yet to be realized in southern Vietnam.

Despite these provisions of the CWPDP, data collected during this research project, qualitative and quantitative, indicate that the livelihood portfolios of displaced households were more vulnerable to economic stress than they once were before displacement and more vulnerable than their non-displaced neighbors. For the families living in the group settlement in Phước Thiện Hamlet, this enhanced vulnerability was, in part, the product of a dramatic livelihood reorientation from fishers to shrimp farmers and from market opportunists to market dependents, and the limitation of resource availability during this “double displacement.” Having

few other income-generation options, displaced families set to farming shrimp in a damaged environment with fairly ineffective extension services. Many research participants spoke of the anxiety caused by mounting debt and dissolving families. Additionally, these data show that households' access to important natural and social capital assets was disrupted during displacement and resettlement. The displaced community in Phước Thiện experienced restricted access to land for growing vegetables and to preferred wild vegetables. Finally, the severance of social ties during relocation and tensions within the group settlement and between the settlement and its neighbors limited displaced individuals' ability to obtain food from others. This is a crucial coping strategy during times of economic stress and its limited availability very likely contributed to the undesirable livelihood outcome, greater food insecurity, demonstrated by displaced participants throughout this year of research. Lacking many of the resources that elderly people elsewhere in the hamlet rely upon, these re-settlers, who have coped with mounting debt and dying shrimp by sending their children away, may find themselves the most vulnerable of all as they continue to age.

CHAPTER 7

CONCLUSION

“You can’t understand me without understanding my debt. And if you want to help someone in my village, you have to consider his debt.” – 55-year-old shrimp farmer

“Debt is the thickest and longest wrinkle on their forehead” (Choi 2000:18, writing about South Korean farmers)

Introduction

“It is a miserable life, being in debt,” My Lỳ lamented as we drank green tea in his two-room thatch house, surrounded by aquaculture ponds and replanted mangrove trees. His son sat beside him, weaving mats of *dừa nước* (water coconut) fronds with which to patch the roof in preparation for the rainy season. “I would like to build a solid house, but I don’t dare. I have to worry about how to pay the bank. Someday, I hope I will be successful with aquaculture and get enough money to pay. There are no other choices.”

Mr. Lỳ was 60 years old, “too old to catch fish or work hired labor,” at the time of this interview in February 2008. He lived with two of his sons, aged 26 and 24, and missed the rest of his family terribly. He moved to Phước Thiện Hamlet in 1992 from a rice-producing district further inland. He said he was searching for a better life for his wife and eight children. Mr. Lỳ was “encouraged” to move to Phước Thiện by local government officials, who promised large tracts of available land, lucrative shrimp aquaculture ponds, and all the fish he could catch in the sea. He bought 50,000 m² of land, dug a 30,000 m² pond out of the mud, was then required to

replant mangrove trees on a third of his land, and was now 140 million VND (~\$8,750) in debt to the Vietnam Bank for Agriculture and Rural Development (VBARD). Sixteen years after his hopeful migration to the coast, his wife and six children continued to live in Trà Cú with his mother, and two of his sons ended their formal education at the seventh and eighth grades in order to help their father make money to pay off his debts.

Moving from household to household, asking about making a living and the events and conditions that put stress on a family, I heard stories similar to that of Mr. Lý -- stories about the role that debt played in the lives of people struggling to make ends meet in a landscape full of unproductive aquaculture ponds. As they were to many of the results of the rapid economic development of the coastal region in the 1990s and 2000s, people's attitudes toward credit extension were ambivalent. Described in Chapter Five, when I asked household heads how they coped with food insecurity, over half of the responses involved credit and borrowing. Additionally, most of those who were not eligible to borrow money for one reason or another fervently wished that they could and blamed their households' economic stagnation on their lack of access to financial capital. However, I also heard stories of mounting debt and the stress it causes. One woman told me that she could not sleep at night because of her worries, and many expressed anxiety about losing their land. As I pursued this ambivalence, I came to understand that households in Đông Hải Commune were, in essence, coping with a coping strategy for dealing with periodic food shortages and overall livelihood insecurity. While cash loans were proffered by the Vietnamese government to help poor households help themselves out of poverty, a popular economic development strategy around the world, this attempt at poverty alleviation seemed to be hurting rather than helping the development and maintenance of sustainable livelihoods.

Based on ten months of ethnographic research, conducted from December 2007 to October 2008, in three coastal hamlets in Trà Vinh Province, southern Vietnam, this dissertation has detailed the creation of differential vulnerability, from national and international policymaking through the range of livelihood choices available to households to the consequences of vulnerability for individuals. I will conclude by using my results to offer a critique of microcredit, currently one of the most popular “solutions” for global poverty. Additionally, I will discuss projections for the impact of global climate change on Vietnam’s coastal communities and the importance of effectively identifying the country’s vulnerable populations in addition to celebrating its recent economic achievements.

Livelihoods and Microcredit

Called “the newest darling of the aid community” (Navajas et al. 2000), microcredit was pioneered by the Grameen Bank in Bangladesh in the 1970s. This “panacea for poverty reduction” (Weber 2002) involves the extension of small subsidized or collateral-free loans to poor people in an attempt to jumpstart self-employment, agricultural intensification, etc. and to promote further and sustainable income generation. Relating this process to the Sustainable Livelihoods Framework, pictured in Figure 1.2, microcredit programs aim to expand poor households’ portfolios of livelihood activities and/or improve the income-generating capacity of activities the household already pursues through infrastructural and technological development. This is achieved by the enhancement of different kinds of assets available to households, particularly financial and physical capital. Referring to microcredit lending projects, many people tend to think of development organizations lending small sums of money to small groups of underrepresented segments of the population, but McCarty (2001) defines microfinance as “all

small-scale formal and quasi-formal financial lending to, and savings from, rural households, directly or through groups” (2). Thus, VBARD’s and VBP’s household loans in Đông Hải fall squarely within this definition of microfinance.

Microcredit has proved extremely popular in the international development sector. The Grameen Bank and its founder, Muhammad Yunus, were awarded a Nobel Peace Prize in 2006. Putzeys (2002) writes, “Micro finance programmes, which are specifically targeted on the poor, constitute a major tool for improving the standard of living without creating dependency and encourage them to take part in the economic process” (6). Anderson et al. (2002) argue that microcredit might have a positive effect on the sustainable use of common pool resources by encouraging agricultural intensification, promoting resource stewardship and a greater demand for environmental quality, and providing access to better technology. These authors also argue that participation in microcredit programs might increase social capital by strengthening existing social ties within a community and creating new ones. The majority of the literature addressing the efficacy of microcredit lending in Vietnam is uncritical of this type of development scheme. Just like many of the studies that demonstrate the country’s plunging poverty rate and soaring GDP since the beginning of *Đổi Mới*, most studies of microfinance in Vietnam use data from the Vietnam Living Standards Survey or other survey data. Pham and Izumida (2002) contend that agricultural credit extension has had very positive results among the recipients of those loans. The only problem, they write, is that Vietnamese banks ration credit and thus cannot meet the demand for loans. They suggest that banks develop better screening and monitoring systems in order to lend to more people.

Some scholars also criticize microcredit lending in Vietnam from the standpoint of institutional sustainability. McCarty (2001) writes, “Many people argue that microfinance should

... be available at less-than-market interest rates. This is a mistake. Mixing access to finance with charity leads to problems of credit rationing, corruption, and unsustainability. Better to keep them apart. Give charity, conduct business” (3). This is a fairly common critique of microfinance schemes around the world – again, not necessarily a critique of the effect this type of development project has on the people it purports to serve, but a critique of its long-term ability to provide these services. According to Putzeys (2002), the State Bank of Vietnam has set interest rates too low in an effort to provide inexpensive credit to the poor. This does not allow VBARD and VBP to set rates that cover their costs and is, thus, not a sustainable way to help the poor.

It is really the few ethnographic studies of microcredit programs that provide a critique of this type of project from the perspective of the borrowers. For example, Rahman (1999) presents ethnographic data from one of the oldest Grameen Bank program areas in Bangladesh that juxtaposes the “public and hidden transcripts” of the Bank’s microcredit lending program. The Bank’s public goals for the project are poverty alleviation and the empowerment of women. Rahman found, however, that bank workers and male household members exploited women’s traditional roles in Bangladeshi society in order to meet the Bank’s hidden goals of financial sustainability and profit generation. Even though most loans granted to women were used by men, peer pressure from other members of loan groups and Bangladeshi women’s strong sense of honor ensured the loan center was always repaid. Rahman also found that increased pressure within households to make weekly loan payments and spiraling debt (using new loans to repay old loans) was related to increased domestic violence in 70% of borrowing households.

Another ethnographic study of Bolivian women involved in microfinance projects comes to conclusions very relevant to my own research. Due to constraints on assets (time, skill sets,

etc.) and fierce business competition because of the number of women reached by these projects and the limited number of viable businesses, Brett (2006) finds that Bolivian women usually did not make enough money to make their loan payments, let alone compensate them for their labor or cover the cost of materials. Furthermore, because of pressure from the microfinance organizations directly and social pressure from the “solidarity groups” into which the organizations placed them, women considered loan payments sacred and would borrow money from family members, reduce food quantity or quality, and take other jobs to make the payments. Brett writes that funding institutions often measure success by the sustainability of the institution or gross household income increases, but in this case, net household income usually decreased when women became involved in these projects.

Thus, Brett (2006) observed that, in order to make their loan payments, the women in his study had to enact coping strategies, some probably non-erosive and some erosive. This is problematic from the standpoint that engaging in some coping strategies depletes an individual’s or household’s resources necessary for coping with the next stress or shock, thereby increasing vulnerability to future pressures and the likelihood of undesirable livelihood outcomes (see Chambers 1989). This is precisely the process, beginning with the policy changes of economic reform and continuing through the use of unsustainable strategies to cope with debt, that I argue was creating differential vulnerability in Đông Hải.

As described in this dissertation, shrimp aquaculture became a high development priority in the mid-1990s as the Vietnamese government worked to transition the country from a centrally-planned economy to a market economy. Heavy emphasis was placed on lucrative industries that would earn foreign currency for the country. At this time, local governments lured citizens away from inland, rice-growing regions of the country to the sparsely-populated,

mangrove-covered coastline with promises of available land, lucrative shrimp ponds, and low-interest loans to get them started. Since that time, the Vietnamese government has also jumped on the microcredit bandwagon, offering low-interest loans to people possessing poverty certificates (through the VBP) and as part of other development programs, such as the Coastal Wetlands Protection and Development Program (CWDP). Thus, out of 117 research participants in Đông Hải, 72% had outstanding loans, formal and/or informal. Thi and Lensink (2007) confirm that Vietnam has a much higher number of people borrowing money within the formal sector than other developing countries because of government policies enacted in the 1990s, aimed at promoting private enterprise, particularly in rural areas. Accordingly, at the time of my research project in this coastal village, the majority of the community was coping not just with increasingly erratic seasonal changes, market price spikes, and household emergencies, but also with making their loan payments.

Described in Chapter Four, the context of this substantial amount of debt was a local economy dominated by largely unproductive, semi-intensive shrimp aquaculture. Transformed by government money, this marginalized region was neglected by extension services, populated by people with little or no education, suffering from the environmental degradation caused by the rush to the coast, and manipulated by top-down attempts to restore that natural environment. However, many households pieced together livelihood portfolios that usually succeeded in meeting the members' needs. These portfolios were composed not only of income-generating activities. People also engaged in subsistence activities to provide food for themselves and their families and to smooth consumption during hard times. They had homegardens and raised ducks and chickens for home consumption. They fished from their aquaculture ponds and from the ocean and river to put food on their tables. Many people collected wild plants to eat. To conserve

rice, they made *cháo* (rice porridge) or skipped a meal or ate less-preferred foods, such as cassava or sweet potato.

As in any economy that is not entirely self-sufficient, these non-cash-generating behaviors were not enough to get by. People needed money to pay their children's school fees, to buy medicine for sick family members, to attend important social functions such as weddings and death anniversaries, or to buy the gasoline needed to pump water into agricultural fields. However, as de Waal (1989) and Devereux (1993), among others, argue, people often choose to modify their consumption or engage in other non-cash-generating activities before disposing of assets or enacting other erosive strategies to generate cash during times of food insecurity or other crises. Devereux (1993) writes of his research participants in Ghana during a serious grain production deficit that there was “an awareness of a future beyond the current crisis, when assets would be needed for more important purposes than to bridge a transitory food gap” (54). I argue that the pressure to make loan payments, both legal and social, constrains this type of decision making, which has particularly undesirable consequences for households whose assets have been limited already by events/processes in the history of a place. Households must continue to generate cash, even during the inevitable hard times – a normally-productive family member falls ill, the shrimp in the aquaculture pond die, storms make fishing too dangerous, the 2008 Global Food Crisis causes the price of rice to spike.

The consequences of this were evident in Đông Hải. Some households sent adult children to Ho Chi Minh City and other regions of the Mekong Delta to find work and send remittances back to the village, specifically to help the households make loan payments. As described in Chapter Five, this coping strategy not only broke families apart, but also reduced the household labor pool and increased the dependency ratio of the household when labor migrants left their

young children with grandparents in the village. Additionally, although public education is technically free in Vietnam, sending one's children to school costs money – for books, uniforms, and transportation. Moreover, Đông Hải did not have a high school. Thus, parents, who wanted their children to receive higher than an eighth-grade education, had to find a way to get them to the district center (about an hour and a half round trip). When I asked household heads about the education levels of their children, the vast majority had stopped attending school after the fifth or eighth grade. “She knows her family is poor and in debt, so she wanted to stop studying to help the family.” While, in general, this generation of children managed to obtain a higher level of education than past generations, it seemed as though the immediate payment of debt had priority over investment in human capital, the advanced education of the current generation of children.

Figure 7.1 presents a summary of the effects of coping with debt in Đông Hải. As a consequence of both shrimp aquaculture and subsequent mangrove restoration and coastal stabilization projects, a majority of village households had assumed formal debt before 2008 in order to finance the transition to shrimp farming and then to cope with the increasingly insecure livelihood strategies available in the village. Much like the Bolivian women, who regarded their loan payments as sacred (Brett 2006), most Đông Hải villagers took their loan payments very seriously and had made changes within their livelihood portfolios to keep up with those payments. Namely, in addition to coping with the “normal” elements of the vulnerability context, people enacted a whole range of coping strategies, often unsustainable, to manage their debt. Unless they were able to repay their loans entirely, households found themselves caught in this cycle of coping with debt indefinitely, creating greater vulnerability to other economic stressors.

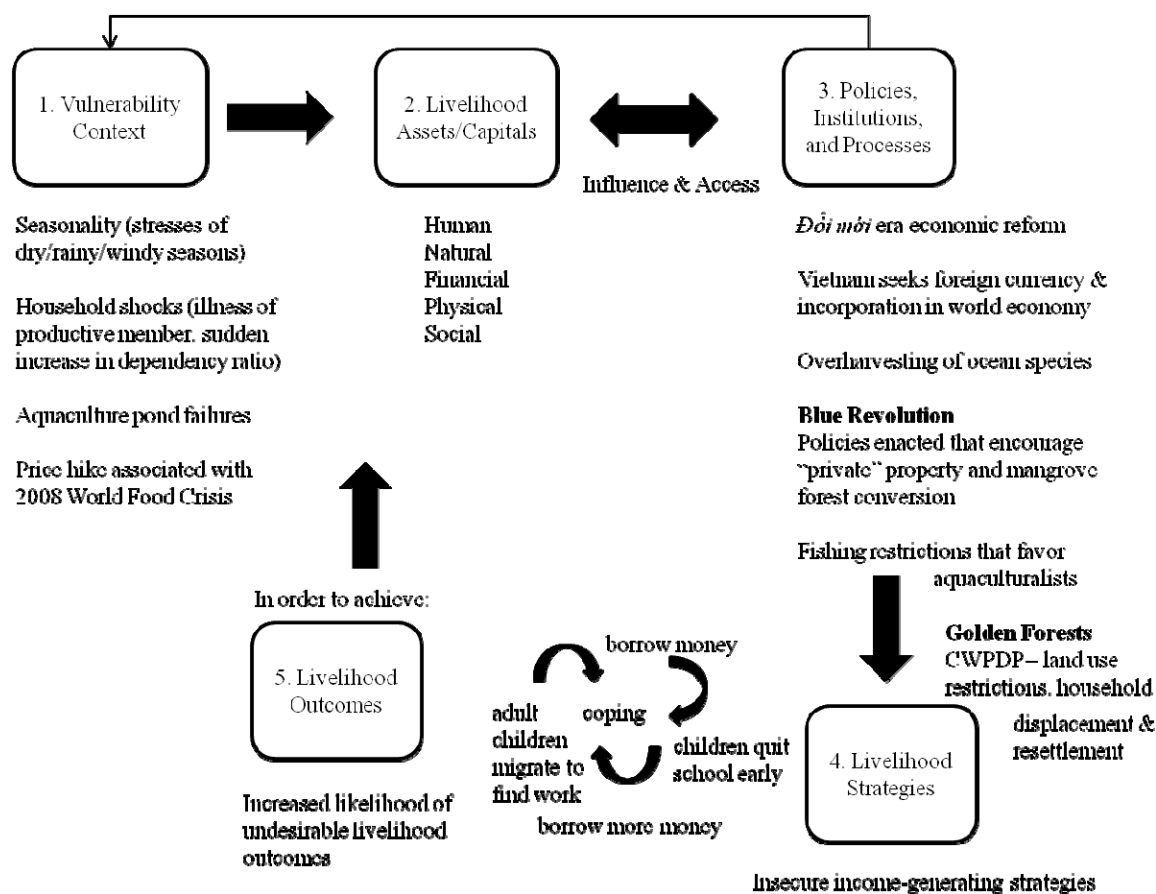


Figure 7.1 Livelihoods vulnerability in Đông Hải, Vietnam (Sustainable Livelihoods Framework adapted from Allison & Horemans 2006:759)

Navajas et al. (2000) write, “The question ... is not whether microfinance is better than nothing for its users. The question is whether microfinance is better than some other development project for the poor as a whole” (334). Lack of financial capital is certainly an impediment for the poor. However, people living on the margins – with poor access to markets and extension services and with main sources of cash income failing despite the input of financial capital from bank loans – cannot take full advantage of microcredit services and may, in fact, be hindered in the process of developing and maintaining sustainable livelihoods, ones in which people may choose among a range of income-generating and subsistence activities

depending on the household's circumstances. By being forced to focus on cash generation, families have fewer options for engaging in activities that allow them to save up and protect themselves against an uncertain future. Instead of low-interest loans provided by government banks, I argue that the people of Đông Hải would be better served by capacity building within the country's mass organizations, such as the Vietnam Women's Union, the Vietnam Farmers' Association, and the Vietnam Association of the Elderly, all of which had local rotating savings and credit associations (ROSCAs) but were not very active in that capacity. Participation in these types of organizations places control over savings and credit within the local community and has the potential to transform the loan system into a tool for household and community resilience rather than a stressor with which to cope (see, for instance, Stoffle et al. 2009 and Eroglu 2010). Regarding economic development schemes on the southern coast of Vietnam, I also suggest adult literacy programs, more frequent and more applicable aquaculture workshops that are better tailored to the education levels of the participants, subsidized school supplies for children, and perhaps the development of a more viable production activity in the region, such as agroforestry.

Long-Term Research and Livelihood Sustainability

In drawing conclusions about livelihoods sustainability, I argue that households with particularly vulnerable livelihood portfolios, such as the households displaced and resettled by the CWPDP, disproportionately employed one of the most erosive coping strategies, sending adult children away as labor migrants. With the limitation of various resources by the displacement event, such as social support and access to preferred wild food sources, more

displaced households had to resort to extreme coping strategies than non-displaced households. I also argue that contemporary elderly-only households, containing only elderly people or elderly people and their young grandchildren, displaced or non-displaced, were the result of that coping strategy and suffered more undesirable livelihood outcomes than nuclear or multigenerational households. Using a logical time-for-space substitution¹², I could argue that the elderly-only households were representative of the future for other households that had recently sent their children away to work hired labor.

However, many questions remain that would be better answered by longitudinal research in Đông Hải. Before the children moved away from the village, did current elderly-only households have lower incomes than those households that retained their adult children? Were the members of elderly-only households more food insecure before their children left than others? In other words, is it the out-migration of this generation of young adults that is contributing to more undesirable individual and household livelihood outcomes or is it those increasingly undesirable livelihood outcomes that trigger the extreme coping strategies? What is the difference in the pre-migration household circumstances of the elderly people who currently have favorable and unfavorable attitudes toward their children's out-migration? What will be the trajectories of the displaced households in terms of income, food security, and other measures of well-being?

By visiting selected households in the village over the course of a year, I was able to observe some of these relationships unfold over time. There was the story of Ms. Liên, which I recounted at the beginning of Chapter Five. Living with only her young grandson, all of her adult

¹² Space-for-time substitutions are most often used to study ecosystem succession. The approach assumes, in part, that undisturbed sample sites are representative of ecologically comparable but disturbed sample sites before the disturbance in question (Foster & Tilman 2000, Le Duc et al. 2000, Sparling et al. 2003).

children away, she was in a constant state of coping with food insecurity and suffered ill health from undernourishment. When one of her daughters moved back into Ms. Liên's home with her family, the elderly woman's health and dietary diversity improved almost immediately. Unfortunately, after only a few months of living in Phước Thiện, her daughter and son-in-law assumed too much debt and had to move away again. There was the young family – mother, father, and three children – who struggled to make a living with a small patch of *cây thuốc cá* and some fishing nets. One week, I talked with the woman about the medicinal plants she collected by the beach and with the man about how life in the country was good for his children. The next week, I found their small house vacant and boarded up. Neighbors told me they had moved the family to Ho Chi Minh City to work in the factories. There was also the middle-aged widow, who lived on the beach and suffered from a heart condition. During the period of time that I visited Ms. Nhung, both of her adult children moved away from the village to work hired labor, sent money home but were disappointed when their mother used the remittances to make loan payments rather than for healthcare, and both returned to the village when they could not make enough money to support themselves and their mother. The daughter, 19 years old, was then betrothed to a 39-year-old Australian man. She had never met him, but he sent money for her to attend manicurist school in the district capital and to care for her mother before moving to Australia to marry. When I asked how she felt about the arrangement, she said that she felt sad but thought it was a good opportunity for her family.

This anecdotal evidence of the complex relationships among the local economy, debt, out-migration, and household composition would benefit from a long-term, systematic study of household trajectories. I would monitor a wider range of coping strategies over time, look at fluctuations in household income, and administer a standardized food insecurity scale to collect

data on household food insecurity that is directly comparable to other studies around the world (e.g., Hadley et al. 2007, Swindale & Bilinsky 2006). It would also benefit the study of these relationships to work with the young adults in Ho Chi Minh City and the other areas to which they migrated. I was only able to hear the perspective of the migrants on rare occasions, such as the Tết holiday or when a migrant returned home after failing to “make it” elsewhere. The voices of the rural migrants (called “*hai lúa*” or “two rice” by the city dwellers after the name of a Vietnamese fertilizer company) are important ones to contribute to the discussion.

Differential Vulnerability and Climate Change

During just one year of fieldwork in Vietnam, “natural” disasters plagued the country. Extensive flooding around Hue trapped several colleagues from the Institute for Tropical Biology (ITB), conducting research in the central part of the country, as the transportation system shut down. Landslides in the mountainous northern region killed hundreds of people. Recounted at the beginning of Chapter Two, I encountered dangerously flooded streets in Ho Chi Minh City as I made my way from the city to the Mekong Delta for the first time. Much less dramatic, but an unfortunate harbinger of a climatologically-erratic future, unusually heavy rains characterized the 2008 wet season in Đông Hải, breaching carefully-woven roofs and walls and flooding houses and shrimp ponds.

Geographically, Vietnam has three strikes against it in relationship to the projected outcomes of global warming and climate change. The country (*đất nước*, or *water-land*) has 3,444 kilometers of coastline. It contains two major watersheds, those of the Red and Mekong Rivers, that are already prone to flooding and is located in the path of the most active zone of

tropical cyclone formation in the world (Fortier 2010, Kelly et al. 2001). Ho et al. (2011) analyzed climate data collected from 1961 to 2007 in seven different regions of Vietnam and noted a dramatic increase in heavy rainfall events during the rainy season in southern Vietnam. Furthermore, these authors project an increase in the number of hot days and a decrease in the number of cold nights before 2050 for the southern region. Birkmann (2011) anticipates increasingly unpredictable weather, increased flooding, and an increase in typhoons striking Vietnam, all as a consequence of global climate change. Finally, Dasgupta et al. (2009) modeled the effects of the one-meter sea level rise that is predicted for this century. They ranked Vietnam at the top of the ten countries most affected by sea level rise in terms of population, GDP, urban areas, and wetlands. They ranked Vietnam second only to the Bahamas in terms of land area affected and second to Egypt in terms of agricultural land affected. Much evidence points to the inevitability of global climate change and the severity of the consequences for Vietnam.

In providing these ethnographic accounts of vulnerability in coastal Vietnam and proposing models for the development of desirable and undesirable livelihood outcomes (Figures 1.3, 1.4, 7.1), this dissertation contributes to the scholarship on both the creation of differential vulnerability and the alleviation of that vulnerability. In other words, the results of this research seek to answer two important questions: Why do some people suffer more severe consequences of economic stresses and shocks than others, even within the same community? And, what can be done to build or bolster community and household resilience? As introduced in Chapter One, the answers are related to Watts and Bohle's (1993) model of vulnerability, that it involves the risk of exposure to stress, the risk of inadequate coping mechanisms, and the risk of limited capacity for recovery.

With regard to the negative consequences of global climate change and the risk of exposure to a changing vulnerability context (e.g., increase in number and intensity of storms, flooding, drought, sea level rise), we are dealing with the anthropogenic creation of differential vulnerability on three scales. From the broadest perspective, there is now little doubt that human activity is responsible for these significant changes in global climate, such as an overall increase in the Earth's surface temperature. In 1994, the United Nations Framework Convention on Climate Change (UNFCCC) defined climate change as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.” Human activities of most concern are those that contribute to increased concentrations of carbon dioxide in the atmosphere, such as fossil fuel consumption and deforestation (see, for instance, Solomon et al. 2009). These degradative activities have certainly been disproportionately perpetrated by the “Global North,” but countries with transitioning, “modernizing” economies, such as Vietnam, have contributed significantly to greenhouse gas emission in recent decades. Thus, human activities on a global scale contribute to the increased exposure of households in Đông Hải to hazards.

Particularly when discussing the “policies, institutions, and processes” component of the Sustainable Livelihoods Framework, this dissertation has addressed the creation of differential vulnerability on a national scale. The Government of Vietnam's policymaking in the era of *Đổi Mới* has both contributed to the problem of global climate change and hindered the ability of communities to adapt to the physical realities of climate change. Not surprisingly for a country that has transitioned from one of the five poorest countries to one of the fastest growing economies in the world, Vietnam's energy consumption and, therefore, carbon emissions have

increased. Timilsina and Shrestha (2009) calculate a 746,000 tCO₂ average annual carbon emission change from 1980 to 2005 and attribute this change primarily to a marked increase in energy consumption for transportation, following population and per capita GDP increases. On the other hand, while severely deforested before *Đổi Mới*, Vietnam has actually experienced a net increase in forest cover and the country's 2005 forest cover exceeded its 1980 forest cover (Meyfroidt & Lambin 2008). This reforestation is due to the rapid increase of plantation forests and the regrowth of natural forests. However, regarding the implications of this forest transition for global climate change, Meyfroidt and Lambin (2008) concede that the growth rate of carbon stock in Vietnam was much lower than its change in forest area because of the quality and age of most of the forest cover. The country has experienced an overall decline in forest density and young forests have low carbon stock.

In a series of papers, Neil Adger (1997, 1999, 2000, Adger & Brooks 2003), a leading scholar on social vulnerability and resilience, presents the case of coastal populations in northern Vietnam. A number of factors have led to increasing vulnerability in an area already subject to typhoons and floods and projected to be increasingly so. The history of Vietnam's political institutions is one such factor. Prior to French colonization, a centralized government acted to protect village communes from climatic extremes. French colonial institutions, composed of wealthy landlords and landless peasants, proved to be non-resilient during the agricultural depression of the 1920s. Communist collectivization again enhanced resilience to external shocks but caused a sharp decline in agricultural output. Finally, while decollectivization has created many positive changes in Vietnamese society, due to the undermining of collectives, individual resource users are vulnerable to climatic and market fluctuations. Further, due to the transition from a centrally-planned to a market-based economy in the last 20 years, individual

and collective vulnerability have increased. Adger argues that this is the result of decreased collective efforts towards coastal protection in the form of sea dike maintenance and mangrove privatization and conversion to aquaculture. Traditional resource use systems have been undermined, resulting in conflict over remaining resources, non-cooperative use of fisheries, and income inequality. The case of northern Vietnam illustrates the interaction of factors at the national scale creating both increased risk of exposure to stress on the coast and the risk of inadequate collective mechanisms for coping with that stress.

My own research, then, was set in this milieu, with global and national forces both creating the conditions for global climate change and undermining some of the collective institutions and degrading the environmental services that would provide a buffer and help communities adapt to the changing climatic circumstances. At the household level, the results of my research indicate that household decision making about coping with stress influences the household's ability to recover from periods of economic stress. If households choose to use, or feel that they have no other choice but to use, erosive coping strategies to continue to meet household needs during times of stress, such as the sale of livestock or sending adult children to the city to work hired labor, the household depletes the assets it has at its disposal to deal with the next stress or shock. My research indicates that households displaced by the CWPDP and thus distanced from important natural and social resources and, concurrently, coping with debt and also elderly-only households, most of whom sent adult family members away in order to cope with debt, will be the most vulnerable to global climate change and the most likely to suffer negative livelihood outcomes as a result. All sorts of ameliorative solutions have been proposed at global and national levels in order to decrease carbon emissions and increase reforestation rates around the world. However, the consequences of global warming for Vietnam's coastal

communities have already materialized and are almost certain to intensify. In these circumstances, it is of the utmost importance to understand the distribution of vulnerability in these communities and the mechanisms that create it.

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APPENDICES

Appendix A Wild plants collected in Đông Hải

Local Name	Latin Name	Family	Food	Medicine	Firewood	Animal Feed	Medicinal Uses
<i>bạc đầu</i>	<i>Kyllinga nemoralis</i> L.	Cyperaceae		X			treats throat tumors, stomach aches, boils, cough, sore throat, “cools the body”
<i>bạch đằng, bạch đàn</i>	<i>Eucalyptus</i> sp. L’Her	Myrtaceae			X		
<i>bập bè</i>					X		
<i>bìm bìm</i>		Convolvulaceae		X			treats malaria
<i>bình bát</i>	<i>Annona reticulata</i> L.	Annonaceae	X				
<i>bồ đề, cây tra</i>	<i>Ficus religiosa</i> L.	Moraceae		X	X	X	treats diarrhea in pigs
<i>bồ ngót</i>	<i>Sauropus androgynus</i> (L.) Merr.	Euphorbiaceae	X	X			“cools the body”
<i>cải trời</i>	<i>Blumea lacera</i> (Burm.f.) DC.	Compositae	X				
<i>càng cua</i>	<i>Pepperomia pellucid</i> (L.) HBK	Piperaceae					
<i>cát lồi</i>	<i>Costus speciosus</i> (Koen.) Sm.	Costaceae		X			
<i>cây bần</i>	<i>Phellodendron</i> sp.	Rutaceae			X		
<i>cây dương, cây lao</i>	<i>Casuarina equisetifolia</i> L.	Casuarinaceae			X		
<i>cây đước</i>	<i>Rhizophora conjugate</i> L.	Rhizophoraceae			X	X	
<i>cây giá</i>					X	X	
<i>cây lức</i>	<i>Pluchea indica</i> (L.) Less.	Asteraceae		X	X	X	treats arthritis, cough, fever, heart disease, headache, numbness, “cools the body”

<i>cây mắt</i>	<i>Avicennia officinalis</i> L.	Avicenniaceae			X	X	
<i>cây nhào</i>	<i>Morinda citrifolia</i> L.	Rubiaceae		X			treats headache, arthritis
<i>cây ô rô</i>		Acanthaceae		X			treats headache, nerve problems, anti-inflammatory
<i>cây thuốc cá</i>	<i>Derris elliptica</i> (Wall.) Benth.	Fabaceae			X		
<i>cây vòng nem</i>	<i>Erythrina variegata</i> L.	Fabaceae		X			
<i>châu châu</i>				X		X	treats fever, arthritis, heart disease, "cools the liver," "cools the body"
<i>chó đê</i>	<i>Phyllanthus urinaria</i> L.	Phyllanthaceae	X	X			
<i>chuối cây</i>	<i>Musa sp.</i>	Musaceae				X	
<i>chùm gọng, gọng gọng</i>	<i>Clerodendrum inerme</i> (L.) Gaertn.	Verbenaceae		X	X	X	treats arthritis, heart disease, headache
<i>cỏ</i>		Poaceae			X	X	
<i>cóc kèn</i>	<i>Derris trifoliata</i> Lour.	Fabaceae				X	
<i>cỏ cú</i>	<i>Cyperus rotundus</i> L.	Cyperaceae		X		X	treats headache, arthritis
<i>cỏ hôi</i>	<i>Ageratum conyzoides</i> L.	Asteraceae		X			treats nerves, headache, liver disease, gynecological problems, "cools the liver," "cools the body"
<i>cỏ mực</i>	<i>Eclipta alba</i> (L.) Hassk.	Asteraceae		X			"cools the body," treats arthritis, gynecological problems
<i>cỏ xước</i>	<i>Achyranthes aspera</i> L.	Amaranthaceae	X	X			treats heart disease, arthritis
<i>củ cắt</i>				X			
<i>củ quanh</i>				X			treats malaria
<i>dâu tằm</i>	<i>Morus alba</i> L.	Moraceae		X			treats fever in

ăn/cây dâu							children
dây bầu	<i>Lagenaria vulgaris</i> Ser.	Cucurbitaceae		X			treats vaginal discharge
dây dác/dây quai bị	<i>Tetrastigma strumarium</i> (Planch.) Gagnep.	Vitaceae	X	X			treats arthritis
dây tơ hồng	<i>Cucusta sinensis</i> Lamk.	Convolvulaceae	X				
dền dền	<i>Amaranthus</i> sp.	Amaranthaceae	X	X			treats high blood pressure
dền dền đỏ	<i>Amaranthus tricolor</i> L.	Amaranthaceae	X				
dông			X	X			
đu đủ	<i>Carica papaya</i> L.	Caricaceae	X	X			treats liver disease
dứa gai	<i>Bromelia</i> sp.	Bromeliaceae		X			
lá dâm, giấm	<i>Hibiscus sabdariffa</i> L.	Malvaceae	X				
lê bạ	<i>Tradescantia discolor</i> L'Her.	Commelinaceae		X			treats aches, arthritis, heart disease, lung disease, spine problems
lôi				X			
lười ươi	<i>Sterculia lychnophora</i> Hance	Sterculiaceae		X			treats gallstones
mắc cỡ	<i>Mimosa pudica</i> L.	Fabaceae		X			treats throat tumors, arthritis, rash, "cools the body"
mật ong	honey			X			treats lung disease
mặt trắng			X				
mồng toi	<i>Basella alba</i> L.	Basellaceae	X				
mướp rai		Cucurbitaceae		X			treats kidney problems, aches
ngà voi				X			treats spine problems, arthritis, aches, heart disease, lung disease
nha đam/lô hội	<i>Aloe vera</i> (L.) Burm.f.	Asphodelaceae		X			
nhãn lồng			X	X			"cools the liver," treats headache, insomnia,

							heart disease
<i>nữ hoàng cung</i>	<i>Crinum latifolium</i> L.	Amaryllidaceae		X			treats high blood pressure, diabetes, liver disease, gynecological problems
<i>ô môi</i>	<i>Cassia grandis</i> L.f.	Fabaceae		X			
<i>ranh giới</i>				X			
<i>rau đắng giông</i>	<i>Bacopa monnieri</i> (L.) Penn.	Scrophulariaceae					
<i>rau kiềm</i>	<i>Elsholtzia ciliate</i> (Thunb.) Hyl.	Lamiaceae	X				
<i>rau má</i>	<i>Centella asiatica</i> L.	Mackinlayaceae	X	X			“cools the body”
<i>rau mùi</i>	<i>Coriandrum sativum</i> L.	Apiaceae		X			treats throat tumors, diarrhea
<i>rau muống/mắt trời</i>	<i>Ipomoea aquatica</i> Forsk.	Convolvulaceae	X			X	
<i>rau muống biển</i>	<i>Ipomoea pes-caprae</i> (L.) R. Br.	Convolvulaceae		X		X	treats arthritis, kidney problems, backache, numbness, nerve problems
<i>rau sam</i>	<i>Portulaca oleracea</i> L.	Portulacaceae				X	
<i>rau sâm, rau sâm biển</i>			X				
<i>rễ chanh</i>	<i>Citrus limon</i> (L.) Burm.f.	Rutaceae		X			
<i>rễ chùm lé</i>	<i>Azima sarmentosa</i> (Blume) Benth. & Hook.f.	Salvadoraceae		X			treats arthritis
<i>rễ tranh sâm đỏ</i>	<i>Saccharum</i> sp.	Poaceae		X			“cools body”
<i>so đũa</i>	<i>Sesbania grandiflora</i> (L.) Pers.	Fabaceae	X		X	X	
<i>sóng lá (top half of tree), dừa nước (bottom</i>	<i>Nypa fruticans</i> Wurm	Arecaceae		X	X	X	treats diarrhea in goats

half of tree)							
sục sọc	<i>Crotalaria retusa</i> L.	Fabaceae		X			treats throat tumors
thòm bóp				X			treats arthritis
tóc tiên			X				
thù lù	<i>Physalis peruviana</i> L.	Solanaceae		X			treats malaria, liver disease
thù lù bọc				X			
trai giác			X				
vàng xây				X			
vú sữa đất	<i>Euphorbia hirta</i> L.	Euphorbiaceae		X			treats fever

Appendix B Seafood consumed from aquaculture ponds and from ocean/river

Common name	Aquaculture ponds	Ocean/river	Scientific Name
ba khía	X	X	<i>Uca sp.</i> (fiddler crab)
cá bóng	X	X	Non-specific goby
cá bóng cát	X	X	<i>Glossogobius sparsipapillus</i> Akihito & Meguro, 1976 (linecheek tank goby)
cá bóng lao		X	
cá bóng mú	X		
cá bóng sao	X	X	
cá bóng sậy	X	X	
cá bóng trôn	X		
cá bóng trứng	X		
cá bóng tượng		X	
cá cén	X		
cá chạch lấu		X	
cá chêm	X	X	<i>Lates calcarifer</i> Bloch (barramundi)
cá chét	X	X	<i>Eleuthronema tetradactylum</i> Shaw (four thread tassel fish)
cá chét chèo	X		
cá chim		X	<i>Colossoma brachypomum</i> Cuvier
cá dứa		X	
cá dổi	X	X	Family Mugilidae (mullet)
cá đồng tiền	X		
cá đu		X	Family Sciaenidae
cá đuối		X	Superorder Batoidea (rays & skates)
cá hanh	X		<i>Tinca tinca</i> L. (tench)
cá hó		X	<i>Trichiurus lepturus</i> L. (largehead hairtail)
cá hường	X		<i>Helostoma temminckii</i> Cuvier (kissing)

			gourami)
<i>cá kèo</i>	X	X	<i>Pseudapocryptes elongates</i> Cuvier (goby)
<i>cá kết</i>		X	<i>Kryptopterus bleekeri</i> Gunther
<i>cá khoai</i>		X	
<i>cá leo</i>		X	<i>Wallago attu</i> Bl. & Schn. (catfish)
<i>cá linh óng</i>		X	<i>Cirrhinus jullieni</i> Sauvage
<i>cá linh rìa</i>		X	<i>Labiobarbus spilopleura</i> Smith (long fin carp)
<i>cá lóc</i>	X	X	<i>Channa sp.</i> (snakehead fish)
<i>cá lù đù</i>		X	<i>Argyrosomus argentatus</i> Houttuyn
<i>cá lưỡì/ cá lưỡì trâu</i>		X	<i>Cynoglossus robustus</i> Gunther
<i>cá măng/cá kiền</i>	X		<i>Chanos chanos</i> Forsskal (milkfish)
<i>cá mè</i>	X		Family Cyprinidae (carp)
<i>cá mè danh</i>		X	
<i>cá mè gà</i>		X	
<i>cá mì gà</i>		X	
<i>cá mú</i>		X	Family Serranidae
<i>cá nâu</i>	X	X	<i>Scatophagus argus</i> L.
<i>cá nâu sắ</i>	X		
<i>cá ngát</i>	X	X	Family Plotosidae (eeltail catfish)
<i>cá ngựa</i>		X	<i>Hippocampus sp.</i> (seahorse)
<i>cá nục</i>	X	X	<i>Coryphaena sp.</i> (dolphinfish)
<i>cá ột ết</i>	X		
<i>cá phen</i>		X	Family Mullidae
<i>cá phi</i>	X	X	<i>Oreochromis niloticus</i> L. (Nile tilapia)
<i>cá song</i>	X		<i>Epinephelus bleekeri</i> Vaillant (duskytail grouper)
<i>cá thòi lòi</i>	X	X	<i>Periophthalmodon schlosseri</i> Pallas (giant mudskipper)
<i>cá tra</i>		X	Family Pangasiidae (shark catfish)
<i>cá úc</i>		X	Family Ariidae (ariid catfish)
<i>cua</i>	X	X	crab
<i>ghẹ</i>	X	X	<i>Portunus trituberculatus</i> Miers
<i>mực</i>		X	squid

<i>ram</i>	X		crab
<i>ruốc</i>		X	
<i>tép</i>	X	X	shrimp
<i>tôm bạc</i>	X	X	
<i>tôm bạc bông</i>		X	
<i>tôm bạc nghệ</i>		X	
<i>tôm bầu</i>	X	X	
<i>tôm bò</i>		X	
<i>tôm choáng</i>		X	
<i>tôm chông</i>	X		
<i>tôm dạn</i>		X	
<i>tôm dáo</i>		X	
<i>tôm đất</i>	X	X	<i>Metapenaeus ensis</i> de Haan (greasyback shrimp)
<i>tôm gạo gân</i>		X	
<i>tôm hùm/sú</i>	X	X	<i>Penaeus monodon</i> Fabricius (giant tiger prawn)
<i>tôm sắt</i>		X	tiger shrimp
<i>tôm sắt bò</i>		X	
<i>tôm thẻ</i>	X	X	<i>Litopenaeus vannamei</i> Boone (whiteleg shrimp)

Appendix C Plants cultivated in Đông Hải

Vietnamese	English
bạc hà	mint
bắp	corn
bầu	bottleneck gourd
bí	squash
bí đỏ	pumpkin
bồ ngót	sweet leaf bush
bưởi	pomelo
cà chua	tomatoes
càng cua	crab claw herb
cây bằg	
cây dương	Australian pine
cây đước	mangrove
cây mắm	white mangrove
cây ngọt nghêu	flame lily
cây nhào	noni
cây táo	apple tree
cây thuốc cá	derris
cây tra	
chanh	lemons
chùm ruột	gooseberry
chuối	bananas
cỏ mực	false daisy
cóc	
đắp cá	fish mint

dền dền	amaranth
dừa	coconut
đào tiên	peaches
đậu	beans
đậu bắp	okra
đậu đũa	cow peas
đậu rồng	winged bean
đu đủ	papaya
hành	onions
khoai lang	sweet potatoes
khoai mì	cassava
khoai mỡ	yams
khoai môn	taro
lô hội	aloe
lức dây	frogfruit
lựu	pomegranate
mãn cầu rừng (bình bát)	custard apple
mãng cầu	soursop
mãng cụt	mangosteen
me	tamarind
mía	sugarcane
mít	jackfruit
mồng tơi	spinach
mướp	squash
ngà voi	
nhãn	longan
nhãn lồng	
nữ hoàng cung	trumpet lily
ổi	guava
ớt	chiles
quế	basil
rau cần	celery
rau muống	water spinach
sương rồng	cactus
thanh long	dragonfruit
tiểu đường/rau bóp	
trái na	custard apple
vàng xây	
vú sữa	star apple
xả	lemongrass
xoài	mangoes

Appendix D Answers to the question: “What do you do when you don’t have enough money to buy rice?” (*n* = 110)

Buy rice on credit (42)
Work hired labor (31)
Borrow money from neighbors (18)
Borrow money from neighbors with interest (12)
Borrow rice from neighbors (9)
Eat porridge (7)
Borrow money from relatives (6)

Borrow money from the bank (4)
Collect crabs from aquaculture ponds to sell (4)
Catch fish from aquaculture pond to sell (4)
Ask adult children to send remittances (4)
Work more hired labor (3)
Collect and sell <i>ba khia</i> (3)
Try to catch more fish (3)
Borrow money from parents (2)
Collect more plastic (2)
Send young children to collect crabs (2)
Maternal buffering (2)
Borrow money from neighbors without interest (2)
Eat sweet potatoes and cassava (2)
Eat wild plants (2)
Borrow rice from relatives (2)
Catch fish from river to sell (2)
Neighbors donate rice (2)
Borrow money from in-laws (1)
Send young children to collect plastic (1)
Collect and sell <i>lạc</i> (1)
Work hired labor for food (1)
Receive rice from adult children (1)
Make cakes to sell (1)
Stop paying bills (electricity) (1)
Borrow money for rice (1)
Ask neighbors for rice (1)
Collect <i>cỏ cú</i> (1)
Borrow money from Farmers' Association at low interest rate (1)
Sell <i>ruốc</i> (1)
Eat sweet potato leaves (1)
Collect plastic (1)
Husband works hired labor (1)
Have neighbors buy rice on credit for me (1)
Wife must work instead of homemaking (1)
Sell <i>cây thuốc cá</i> when price is not good (1)
Collect more wild plants (1)
Neighbors donate vegetables (1)
Shopkeeper gives us a small amount of rice for free (1)
Make or repair fishing nets for money (1)
Sell possessions (1)
Borrow money from relatives with interest (1)
Collect and sell firewood (1)
Try to catch more shrimp and fish from aquaculture pond (1)
Harvest shrimp early (1)
Eat less (1)
Receive support from church (1)
Receive support from foreign aid projects (1)