# "THE WEATHER IS LIKE THE GAME WE PLAY": HMONG AND YAO FOOD SECURITY AND EMERGING LIVELIHOOD VULNERABILITIES IN THE NORTHERN UPLANDS OF VIETNAM

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*In loving memory of Carman Dale Delisle,*
*you are missed*

**ABSTRACT**

Introduced in 1986, the Socialist Republic of Vietnam's economic renovation policy, or *Đổi Mới*, has both expanded and constricted livelihood opportunities in the northern uplands, while the introduction of modern agricultural technologies, namely hybrid rice seeds, has created new challenges for the region's largely ethnic minority householders. The incidence of extreme weather events in the region further point to a multiple-stress environment. The aim of this thesis is to assess food security and livelihood vulnerability, stresses and coping strategies among ethnic minority Hmong and Yao in Sa Pa District, northern Vietnam. To answer this aim I draw on a conceptual framework that incorporates key elements from food security, sustainable livelihoods, and vulnerability literatures. Focusing on eight villages in the Mường Hoa valley in Sa Pa District, Lào Cai province, I completed ethnographic fieldwork, including informal conversational interviews, semi-structured interviews and a Photovoice project with Hmong and Yao participants. I undertook fieldwork in summer 2012 and completed follow-up research in summer 2013. I find that Hmong and Yao food systems are exposed to internal and external stresses that diminish access to needed livelihood capitals and decrease asset productivity, as well as constrict overall food output. Householders respond by blending traditional safety nets with newer market-oriented opportunities to diversify their coping strategies. Access to livelihood capitals, especially financial and social capital, determines a household's coping capacity. In sum, while most Hmong and Yao households are resilient, I argue that the psychological impact of livelihood stresses and the lack of government support for these communities decrease resiliency and must be addressed.

**RÉSUMÉ**

La politique de rénovation économique ou « *Đổi Mới* » de la République Socialiste du Vietnam, démarrée en 1986, a à la fois développé et limité les opportunités de moyens d'existence dans les hauts plateaux du nord. L'introduction de technologies agricoles modernes, telles que les semences de riz hybrides, a créé de nouveaux défis pour les habitants de la région, essentiellement des minorités ethniques. En outre, la fréquence des phénomènes climatiques extrêmes dans la région révèle un environnement soumis à de multiples tensions. L'objectif de ce mémoire est d'évaluer la sécurité alimentaire et la vulnérabilité des moyens d'existence ainsi que les contraintes et les stratégies de survie parmi les minorités ethniques Hmong et Yao du District de Sa Pa dans le nord du Vietnam. Pour répondre à cet objectif, j'utilise un cadre théorique intégrant les éléments clés des littératures sur la sécurité alimentaire, les moyens d'existence durables et la vulnérabilité, et me fonde sur un travail de terrain ethnographique dans huit villages de la vallée de Mường Hoa du District de Sa Pa dans la province de Lào Cai, notamment des entrevues non-structurées et semi-structurées, ainsi qu'un exercice de Photovoice avec les participants Hmong et Yao. J'ai effectué cette étude sur le terrain pendant l'été 2012 et une étude de suivi pendant l'été 2013. Je constate que les systèmes alimentaires Hmong et Yao sont exposés à des tensions tant internes qu'externes qui diminuent leur accès aux capitaux nécessaires à leurs moyens d'existence, réduisent la productivité de leurs actifs et freinent l'ensemble de leur production alimentaire. En réaction, les habitants associent les dispositifs traditionnels de protection sociale aux nouvelles opportunités du marché pour diversifier leurs stratégies de survie. L'accès aux capitaux nécessaires à leurs moyens d'existence, notamment financiers et sociaux, détermine leur capacité de survie. Malgré la résilience de la plupart des Hmong et des Yao, je conclus en expliquant qu'il convient de remédier à l'impact psychologique des tensions sur les moyens d'existence de ces communautés et au manque de soutien de l'Etat à leur égard.

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# CHAPTER 1 – INTRODUCTION

There are increasing reports of extreme weather events in the upland regions of Vietnam. In recent years, newspaper articles have reported dramatic cold spells, floods and intense rainfalls, with headlines such as: "Northern Lào Cai province sees longest cold spell for 40 years", "Floods, landslides pummel Lào Cai, no deaths reported," "Northern provinces clean up after heavy rainfall, whirlwind" (VietNam News, Feb 12 2008, May 14 2011, Apr 23 2012). Extreme weather poses an added risk to ethnic minority Hmong and Yao households because hybrid rice seeds – increasingly at the core of their semi-subsistence food systems – have a low environmental threshold and are sensitive to climate variability. These seeds were introduced into the region through government programs in the late 1990s. Today, they make up the majority of household rice production and food supply, replacing traditional upland seed varieties (Bonnin and Turner 2012). Thus, the potential impacts of climate variability are great.

Aiming to build on the literature focusing on ethnic minority Hmong and Yao livelihoods in the northern uplands, I began this research with a focus on the impacts of climate variability. However, during my fieldwork in the Mường Hoa valley in Sa Pa district, northern Lào Cai province (see Figure 1.1), I realized that Hmong and Yao householders grapple with a variety of internal and external stresses that impact their food security and livelihood sustainability. Climate variability is just one of many livelihood stresses. I thus refocused this thesis to examine a broader range of stresses, from extreme weather events, to livestock diseases and limited access to livelihood capitals.

The locale for my research, Lào Cai, is one of Vietnam's most northern provinces, sharing a border with China's Yunnan province. It is also bounded by the Vietnamese provinces of Hà Giang to the northeast, Yên Bái to the southeast and Lai Châu to the west. Lào Cai's northern latitude, high elevation and mountainous terrain provides a moderate subtropical climate. The two main seasons, winter and summer, occur between October and April, and May and September, respectively (Sowerwine 2004). Within the province, Sa Pa town, upland northern Vietnam's best known tourist destination, is situated at 1650 metres above sea level and has an average winter temperature of ten degrees Celsius and an average summer temperature of twenty-three degrees (Sowerwine 2004; Delang 2005). Lào Cai's provincial population is predominately rural, and ethnic minorities account for 65 percent of the population (GSO 2010a). Hmong and Yao are the first and third most populous minorities in the province respectively (GSO 2010a). According to the national government's economic profile of the area, Lào Cai's population is also very poor. The 2010 Vietnam Household Living Standards Survey notes that the province had a poverty rate of 40 percent compared to the

national average of 14 percent (GSO 2010b). However, while state statistics portray this area as underdeveloped, purely economic considerations do not adequately represent the wealth and diversity of ethnic minority livelihood activities practiced in the region.

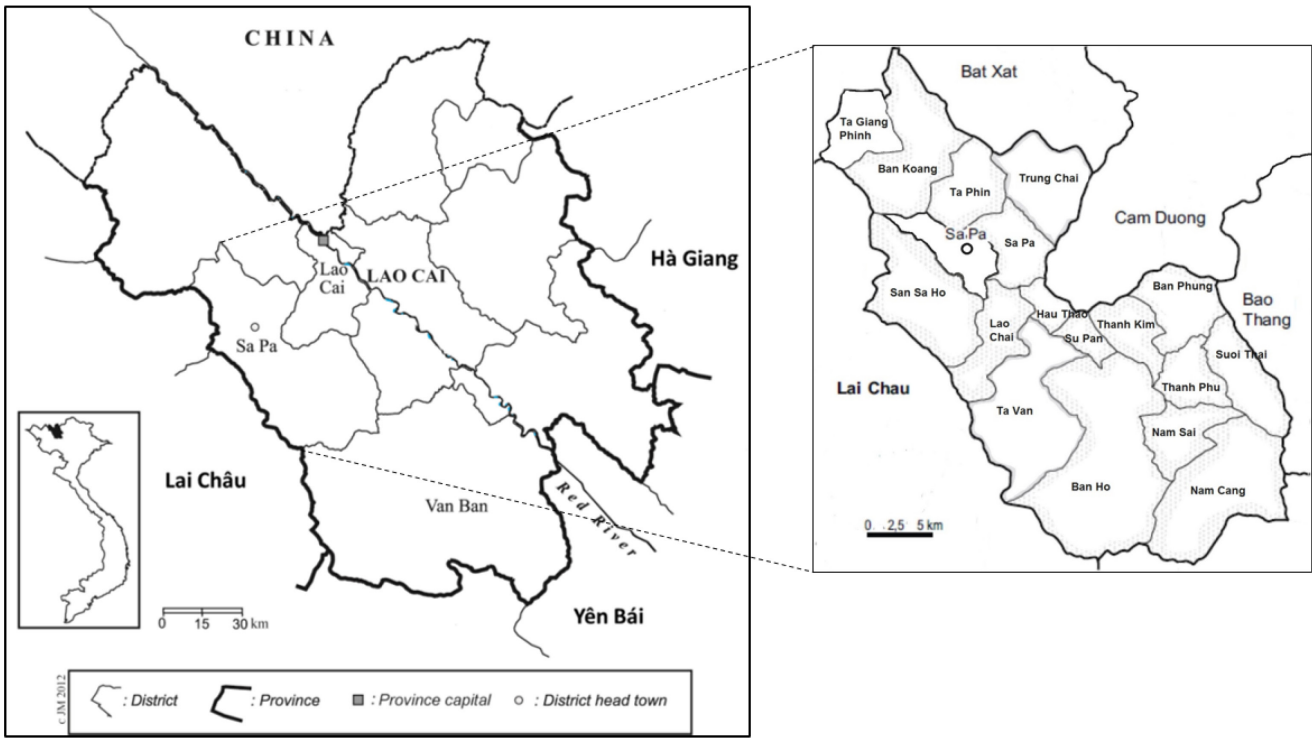


**Figure 1.1 Research Area (Source: Adapted from Roche and Michaud 2000, 107; Bonnin and Turner 2012, 97).**

As semi-subsistence farmers, Hmong and Yao in the Mường Hoa valley, in Sa Pa district, focus on rice and corn production for household consumption. In addition to rice and corn crops, householders raise livestock, tend to household gardens, weave and embroider their own clothes, collect non-timber forest products, and engage in a range of cultural and religious activities. Income-generating activities, such as cardamom cultivation and selling handicrafts to tourists, are also necessary for earning income to purchase modern agricultural inputs, such as hybrid seeds and chemical fertilizers. However, for many households these income streams are highly variable. In this research, I look at these and other characteristics that strain Hmong and Yao food security and livelihood sustainability.

### 1.1 Thesis Aim and Research Questions

The aim of this research is to assess food security and livelihood vulnerability, stresses and coping strategies among ethnic minority Hmong and Yao in the Mường Hoa valley, northern Vietnam. This aim is operationalized through three research questions:

1) To what degree are Hmong and Yao households maintaining food security through their livelihoods?

In order to have a baseline for examining the impacts of potential stresses, I analyse how Hmong and Yao household food systems operate and how these connect to broader livelihood activities.

2) How are climate variability/extreme weather events and other stresses affecting Hmong and Yao food security and livelihoods?

To identify the nature and impacts of stresses on food security and livelihoods, I divide stresses into two main categories: climatic and non-climatic. Climatic stresses include cold spells, wind gusts and variable precipitation (ranging from intense rainfall to drought). Non-climatic stresses include all other stresses, both internal and external to the household, from limited access to arable land to livestock disease.

3) How do Hmong and Yao householders respond to stresses on food security and livelihoods?

Household responses strategies can mitigate or exacerbate the short-term and long-term impacts of livelihood stresses. Therefore, it is necessary to identify how households are responding to identified stresses in order to assess their food and livelihood security. In turn, a household's vulnerability will be determined by the interplay between exposure, sensitivity and coping/adaptive capacity.

### 1.2 Thesis Outline

I begin this thesis by developing my conceptual framework which outlines the theoretical concepts that support this research. Specifically, I examine the literature around food security, livelihood sustainability and vulnerability and identify the core concepts that inform my data collection and analysis. Next, in Chapter 3, I describe my research context. In order to better understand how Hmong and Yao compose their livelihoods in Lào Cai province, I situate these livelihoods in the larger geographical context of the Southeast Asian Massif as well as the historical, political and social contexts of ethnic minority policy in Vietnam. I critique four topics: the northern uplands as a social and political entity; Hmong and Yao livelihoods and government policies affecting them; the food security agenda in Vietnam; and, climate change and extreme weather in Vietnam, with a focus on the northern uplands. In Chapter 4, I introduce my research methods, including sampling strategies, data collection methods and methods of analysis. I also discuss difficulties in the research environment, including ethical dilemmas that arose, and reflect on the socially-constructed nature of this research. In order to do this, I discuss critical reflexivity as well as exploring my own positionality and the contributions of my research participants and research assistants.

Chapter 5 begins the first of three results chapters. In this chapter, I respond to my first research question as I outline contemporary Hmong and Yao food systems and link these to broader livelihood components and activities. In Chapter 6, I move to my second research question, and examine the internal and external stresses that are affecting food systems and livelihoods. Major stresses include access to livelihood capitals, such as land and income, as well as livestock disease and extreme weather events. I also identify short-term householder responses for reducing exposure and sensitivity to these stresses. In Chapter 7, I examine strategies for maintaining food security and livelihood stability over the long-term. These include strategies for recovering from stress impacts and mitigating future risks. Furthermore, I present the results of my food security analysis, and describe my three food security categories, Fragile/Chronic, Resilient/Transitory and Enduring/Secure. I develop three case studies to illustrate this classification. In Chapter 8, I move on to my discussion and highlight three significant points that arose from my analysis and interpretation. Namely, I examine the importance of considering the psychological and emotional aspects of security. I also discuss the importance of access and stability for food security and the interconnected nature of livelihood capitals in household response systems. Finally, I illustrate some important ways that the government could contribute to Hmong and Yao livelihood security in this borderland region.

## CHAPTER 2 – CONCEPTUAL FRAMEWORK

As outlined in Chapter 1, the aim of this research is to assess food security and livelihood vulnerability, stresses and coping strategies among Hmong and Yao households in the Mường Hoa valley, northern Vietnam. As a result, my conceptual framework engages three inter-related concepts, food security, sustainable livelihoods, and vulnerability, to examine the state of Hmong and Yao food security and livelihoods, and their responses to livelihood stresses. Figure 2.1 illustrates how these concepts relate to the overall aim of this research and my research questions.

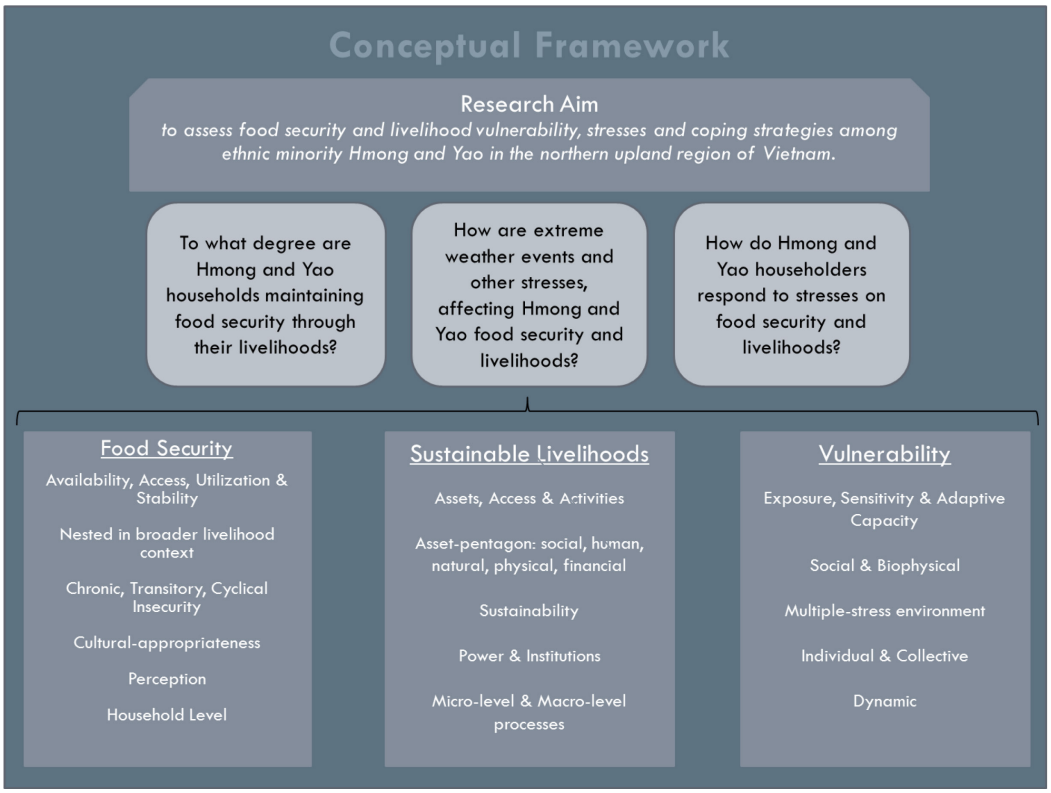


**Figure 2.1 Conceptual Framework**

First, the literature on food security (Section 2.1) provides a framework for examining Hmong and Yao household food systems in terms of availability, access, utilization and stability as well as for looking at how other internal and external factors influence food security. The second body of literature on sustainable livelihoods (Section 2.2) serves as a building block to examine how Hmong and Yao households combine available resources and opportunities to make a living, how structural factors, such as power relations and institutions, mediate livelihood opportunities and how external stresses can affect livelihood strategies and outcomes. The vulnerability literature (Section 2.3) provides the basis for examining vulnerability as a function of exposure, sensitivity and adaptive

capacity and establishes the various multi-scalar and multi-dimensional factors that contribute to vulnerability.

## 2.1 Food Security

In this section I define food security in order to establish how its components will inform this research. The core elements I then draw from this literature include: availability, access, utilization and stability; the need to examine food security within a household's broader livelihood context; the hierarchical nature of the core components; the importance of culture and perception in defining food security; and the household as a unit of analysis.

### 2.1.1 Defining Food Security

The Declaration of the World Summit on Food Security (FAO 2009, 1) affirms that:

> Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. The four pillars of food security are availability, access, utilization and stability. The nutritional dimension is integral to the concept of food security.

The conventional definition of food security has evolved through several major reorientations since the 1970s (Webb et al 2006).[1] In the 1970s, food availability, or rather adequate world food supply, was considered the primary factor limiting food security (Yaro 2004; Coates et al 2006; Webb et al 2006). As a result of this Food Availability Decline (FAD) approach, hunger was addressed through international food aid schemes, green revolution technologies and adjustments in trade, in an effort to increase the food supply in famine-struck and food insecure regions (Sen 1981; Maxwell and Smith 1992; Yaro 2002; Carr 2006). In the 1980s, new research revealed that food insecurity could exist even in regions where local food supply was adequate, provoking a shift in conventional understandings of food insecurity (Carr 2006). As Sen (1981, 154 original emphasis) states, the problem with FAD logic was that it "gives little clue to the causal mechanism of starvation, since it does not go into the *relationship* of people to food." In response to this shortcoming Sen (1981) developed the entitlements approach, theorizing that one's ability to avoid starvation is a function of ownership. People starve because they do not possess the resources with which to avoid it. In essence,

[1] While I chose the conventional definition of food security for this project due to the volume of available research using and assessing these food security components, alternative definitions and frameworks exist that highlight different components of food security. For an overview of these see Maxwell and Smith 1992, and Coates 2013.

they lack sufficient access. This new outlook resulted in a shift in the scale of analysis from the national or regional level to the household and individual (Maxwell and Smith 1992).

The entitlement approach consists of two core elements: endowments, which are the resources an individual owns, and exchange entitlement mapping, which is the range of possible commodities an individual can acquire through different uses of their endowments (Sen 1981). The possibilities for exchange are determined by one's personal endowments as well as various external elements, such as economic and political forces, that create favourable or unfavourable exchange conditions. Both personal and external factors define entitlements and how much food an individual can access. As Sen pointed out, one limitation of this approach is that the strong emphasis on access blurs other explanations for why people might starve. For instance, people may choose to undergo short-term food shortages, such as choosing to starve instead of eating seeds necessary for the next growing season, in order not to compromise their long-term livelihoods (Sen 1981, 50). Thus, concentrating on access does not adequately consider the complexities of household motivations and competing claims on resources. As a result, there has also been a move to locate food security within a livelihoods framework (Maxwell 1996; Yaro 2004; Carr 2006; Hart 2009). As Maxwell and Smith (1992, 4) state:

> it is misleading to treat food security as a fundamental need, independently of wider livelihood considerations: people may go hungry to preserve assets or meet other objectives and it is important to study food security in the context of livelihood security.

This is the approach I adopt. Within the sustainable livelihood framework which informs this study (Section 2.2.2), food security is seen as a contributor to, and an outcome of, a secure livelihood.

### 2.1.2 Food Security Components

These four main pillars of food security - availability, access, utilization and stability - can be understood as steps in a hierarchical system: food must first be available to be accessed, and utilization depends on the quality of accessed food (Webb et al 2006; Barrett 2010). The need for a stable food supply and stable access highlight the necessity of the fourth factor, stability (FAO 2006).

*Availability*

As the FAO (2006, 1) states, availability is "the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid)." As such, availability is generally reduced to a discussion of the supply of staple food stuffs, measured using caloric supply per capita (Scanlan 2003). However, as Maxwell (1996) states, the use of nutritional requirements is fraught with difficulties as large variations can occur based on age, health, activity

level, environment and behaviour. Other definitions frame availability as a combination of agro-ecological conditions and social context. For instance, Schmidhuber and Tubiello (2007, 19703) define food availability as:

> the overall ability of the agricultural system to meet food demand. Its subdimesions include the agro-climatic fundamentals of crop and pasture production and the entire range of socio-economic and cultural factors that determine where and how farmers perform in response to markets.

This definition emphasizes the process of creating a food supply, not simply the outcome, and highlights the interplay between ecosystems and social systems. This integration is important, not just for availability but for the other components as well, and for food security as a whole (Scanlan 2003). This definition is useful since it clearly ties a household's natural capital or the natural resources they have access to, discussed in Section 2.2.1, to food availability. Therefore, this research will assess availability using the integrated agro-ecological/social definition since it links this component of food security to broader livelihood components.

*Access*

Conventional definitions of access are still closely related to Sen's concept of entitlements. The FAO (2006, 1) defines access as,

> access by individuals to adequate resources (entitlement) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).

Thus, access is indicated by one's ability to get available food. One key measurement associated with access is purchasing power, or how much a household can get in exchange for their resources, which is a successor of Sen's exchange entitlement mapping (Schmidhuber and Tubiello 2007; Hart 2009). Through different combinations of resources within their livelihood portfolios, households can access food through production, purchase or transfer (Hart 2009). Thus, access is not simply about access to food but also about one's ability to access the key inputs needed to acquire food. As this definition highlights, these opportunities are influenced by broader societal structures. As Ribot and Peluso (2003, 154) state, "some people and institutions control resource access while others must maintain their access through those who have control." I explore these issues of power, institutions and access further in Section 2.2.3.

*Utilization*

Utilization refers to nutritional and physiological well-being which stems from nutritional adequacy, quality and food safety (FAO 2006). As Schmidhuber and Tubiello (2007, 19703) state "utilization encompasses all food safety and quality aspects of nutrition; its sub-dimensions are therefore related to health, including the sanitary conditions across the entire food chain." While quantitatively assessing a household's nutritional status is beyond the scope of this research, utilization remains fundamental to food security. Therefore, in keeping with the subjective-qualitative assessment approach, discussed in Section 2.1.4, I will assess food quality and nutritional adequacy according to Hmong and Yao perceptions of the adequacy of their different dietary staples and other food items.

*Stability*

In order to be food secure, a household must have stable access to nutritious food at all times. As Schmidhuber and Tubiello (2007, 19703) discuss, shocks create the "risk of temporarily or permanently losing access to the resources needed to consume adequate food." If a household can respond to these shocks without experiencing food deprivation then food access and availability is stable. So, the concern with stability is about the degree of security of the food system.

There are several measures of food insecurity that classify its temporal dimensions and which are beneficial to apply to the concept of stability. Hart (2009) discusses chronic, transitory and cyclical food insecurity situations. Chronic food insecurity results from long-term unavailability and/or inaccessibility of food and is linked to deep-rooted structural failures and chronic poverty. Transitory food insecurity is more temporary and usually results from sudden, unpredictable shocks while cyclical, or seasonal, insecurity is also temporary though it generally follows a predictable, recurring pattern. Oshaug (1985) also engages the temporal element but in terms of the time it takes a household to recover from a shock. In this classification, 'Enduring Households' are those where food security is constant, 'Resilient Households' are those that experience shocks but are able to recover quickly, and 'Fragile Households' are those that experience greater insecurity with successive shocks. For this research, I blend Hart's and Oshaug's classifications to create a classification system that describes both the temporal nature of food security stresses as well as the resiliency of household coping strategies.

### 2.1.3 Cultural-Appropriateness and Perception

The emphasis on food preference in the World Declaration on Food Security definition stems from the acknowledgement that food consumption is culturally constructed. Thus one's perception of food is important to consider when examining food security (Maxwell 1996; Coates 2013). For instance, if a rice crop fails but other nutritious foods are available and accessible to fill the gap, such as root crops and forest foods, people may still feel deprived if these other foods are viewed as culturally inferior, as simply being rice substitutes. They may not be hungry but they still experience deprivation. As Maxwell and Smith (1992, 41) state,

> the highest state of food security requires not just secure and stable access to a sufficient quantity of food, but also access to food that is nutritionally of adequate quality, culturally acceptable, procured without any loss of dignity and self-determination, and consistent with the realisation of other basic needs.

Therefore, a sound understanding of food security needs to consider the social and cultural context of the study in addition to household and community economics and other structural factors. In order to determine if there is sufficient availability, this research will identify preferred food stuffs and examine the characteristics of their production.

### 2.1.4 Assessing Food Security

Traditionally, quantitative measures have taken precedence in the measurement of food security. However, as Hart (2009) suggests, this reliance on quantifiable data effaces some of the complexity of food insecurity experiences and the strategies and responses used to address these situations. Furthermore, with the shift from objective-quantitative assessments towards subjective-qualitative assessments, methods that allow respondents to define their own measures of food security have gained more credibility (Maxwell 1996; Webb et al 2006). Since I am interested in cultural notions and perceptions of food security subjective-qualitative assessments form the basis of this study.

Central to this shift in methods, the household or individual level has become the common level of analysis, though there is some debate in the literature about the appropriateness of household level analysis. As Maxwell and Smith (1992, 20) point out, household analysis conceals intra-household access dynamics. The unitary household composition model assumes an "undifferentiated unit" with a common goal of increased welfare for all members thereby ignoring age, gender and power relations (Kerr 2005, 55; Maxwell 1996). Household level analysis also fails to acknowledge the placement of households within larger kinship and community networks. While food security and livelihoods can

be examined at multiple scales, this research focuses on the household scale since this is the basic economic unit in Hmong and Yao communities (Cooper et al. 1995; Corlin 2004; Sowerwine 2004). However, when individual differences are clearly apparent, these are examined.

### 2.1.5 Drawing from the food security literature

In summary, my research focuses on food security at the household level and examines four components: availability, access, utilization and stability. Availability is assessed in terms of food supply and as a function of agro-ecological and social systems. Access is the ability to acquire sufficient food or other necessary inputs needed to acquire food. These two components are influenced by perception and cultural norms. As a result, a subjective-qualitative approach is adopted to assess food security. Utilization concerns food quality and nutritional adequacy while stability is a measure of security in the system. Stability is measured in terms of the prevalence of food insecurity in a household using a chronic/Fragile, transitory/seasonal/Resilient, secure/Enduring classification. Food security is one element of a household's broader livelihood strategy, explored next.

## 2.2 Sustainable Livelihoods

The second body of literature which helps me construct my conceptual framework is that relating to sustainable livelihoods. In this section, I define livelihoods, discuss sustainability and examine power, institutions and access as essential elements of livelihood analysis. The core elements that I draw from this literature include: the assets, access and activities approach to livelihoods; the asset-pentagon as a way to classify assets; the relationship between vulnerability and sustainability; the components of livelihood sustainability; and the importance of power and institutions for linking micro-level experiences to macro-level processes.

### 2.2.1 Livelihood components

Stripped of its theoretical baggage a livelihood is, simply put, "a means of gaining a living" (Chambers and Conway 1992, 6). Livelihoods are dynamic and need to be understood in a framework of changing social and political contexts and emerging opportunities (de Haan and Zoomers 2005). Since gaining prominence in the late 1980s, the concept has been the centre-piece of a variety of approaches, frameworks and methodologies spanning diverse disciplines and scales (Scoones 2009). One benefit of this diversity means that it has become more difficult to reduce complex local realities to a single-sector approach (Scoones 2009).

As a concept, Ellis (2000, 10) states that a livelihood includes:

> the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household.

Thus a livelihood can be described as a household's assets, its access and activities, the risks it needs to overcome when using resources, and the institutions and policy context that influence decision-making (Chambers and Conway 1992; Scoones 1998; Ellis 2000; de Haan and Zoomers 2005; Ellis and Freeman 2005). Local context can act to facilitate or constrain access to capital resources and other opportunities. For example, since the 1990s, access to commercial livelihood opportunities for Hmong and Yao households in the northern Vietnam highlands have been increasingly influenced by government policies (Donovan et al 1997; Michaud 2000; Tugault-Lafleur and Turner 2009).

In this thesis I classify livelihood assets in terms of the asset-pentagon concept, which uses the terms asset and capital interchangeably (Carney 1998). The asset-pentagon comprises five different assets/capitals, namely: natural capital, which includes the stocks, flows and environmental services such as soil, water and air which provide the foundation for livelihoods; physical capital, which includes assets which are the result of production such as agricultural technologies like hybrid seeds and chemical fertilizers; human capital, which includes internal stores, aptitudes and abilities such as knowledge, skills, health and ability to work; financial capital, which includes monetary assets; and social capital, which includes the array of social networks, affiliations and associations which provide different forms of support for livelihood activities (Scoones 1998, Carney 1999, Bebbington 1999, Ellis 2000). Social capital is further divided into three types: bonding, bridging and linking. Bonding and bridging social capital denote horizontal relationships, with bonding involving closed and tightly connected networks between similar individuals or groups, such as between kinship group members, while bridging refers to more open networks between different groups and communities (Putnam 2000, Turner 2007). On the other hand, linking refers to vertical connections between individuals or groups of different social, political or economic status (Woolcock 2002, Turner 2007).

In some instances, cultural capital (see Bebbington 1999) or political capital (see Yaro 2004) may also be included depending on their perceived importance. However, with this emphasis on livelihood formation, it is important to recognize that just as livelihoods are not solely about income, capitals do not function solely as a means to make a living, but also as a meaning maker (Bebbington 1999). People have access to capitals but capitals also establish people in the world through social relations and through the opportunities they provide. Therefore, by creating the context within which people come to define themselves and act, capitals are also about power relations.

Activities, the final livelihood component, are the occupations people engage in with the opportunities their capabilities and assets provide: individuals combine what they can do with the options open to them in an effort to gain a living (Chambers and Conway 1992). Thus, a livelihood includes an array of material and non-material inputs as well as material and non-material outputs, from food and clothing to human security, health and the opportunity to get an education. As de Haan and Zoomers insist (2005, 32), a "livelihood should be seen as a dynamic and holistic concept."

Chambers and Conway (1992) situate livelihoods at the level of the household, which they define as a group of people that eat from the same hearth. As with the debate in the food security literature, there is some tension about the appropriateness of this analytical unit. This stems from a growing recognition that households can be marked by intra-household conflict and differentials in capitals and capabilities (Chambers and Conway 1992; Ellis 2000; de Haan and Zoomers 2005). As a result, different members will also be differently affected by changing circumstances. Furthermore, the definition of a household is up for discussion since not all members who contribute to a household's livelihood necessarily live under the same roof (Ellis 2000). For example, remittances from an individual living in another location may form an important part of a household's financial capital. For this research, the household level will be the main unit of analysis since this is the main economic unit for Hmong and Yao communities, as discussed in Section 2.1.7. However, for this research I employ an emic definition of a household, namely because Hmong and Yao define their households in terms of how many people share the rice produced in a family's fields.

### 2.2.2 Sustainability + Livelihoods

Sustainability in livelihoods research is about the resilience of a livelihood system, or the ability to recover from shocks, and the ability to meet needs in the long-term (Scoones 2009). A widely used definition of livelihood sustainability states: "A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Scoones 2009, 175).

The notion of capabilities, which has roots in Sen's entitlement approach, refers to "being able to find and make use of livelihood opportunities" as well as respond to and cope with stresses and shocks, and proactively adapt (Chambers and Conway 1992, 5; Bebbington 1999). As Bebbington (1999, 2022, original emphasis) points out, these capabilities are inherently linked to an individual's assets, which "give [the individual] the *capability* to act."

In the late 1990s, two sustainable livelihood frameworks were developed which remain influential today. The Institute of Development Studies (IDS), a an international development research unit based in the United Kingdom, developed a framework that focuses on how institutions and organizations, both formal and informal, within a particular context influence how livelihood resources are combined to create livelihood strategies that produce sustainable outcomes (Scoones 1998). This framework outlines three broad rural livelihood strategies which will inform this research: agricultural intensification or extensification, diversification or migration (Scoones 1998). This means people can use their resources to grow more, or undertake additional livelihood activities, or move elsewhere and try to compose a livelihood there. Research shows that individuals adopt these strategies in dynamic ways that are influenced by their context and other livelihood factors; for instance, Bouahom, Douansavanh and Rigg (2004) note that the motivation for diversifying is important for distinguishing between distress diversification and progressive diversification. Turner (2007) also finds that individuals may selectively diversify their livelihood activities at times when available opportunities do not interfere with other priorities.

The United Kingdom's Department for International Development (DfID) framework (Figure 2.2) emphasizes four components of livelihood sustainability: resilience to external shocks, self-sufficiency, maintenance of long-term productivity and maintenance of other livelihood options (DfID 1999). These factors will inform my assessment of livelihood sustainability since they link livelihood sustainability to livelihood vulnerability and provide a basis for examining the impact of extreme weather events and other stresses. Self-sufficiency will also be a key focus since the adoption of hybrid seeds is stimulating further market integration of Hmong and Yao livelihoods and potentially reducing household self-sufficiency (Bonnin and Turner 2012).

As illustrated in Figure 2.2 vulnerability is viewed as a function of environmental factors and is affected by policies, institutions and processes, which also affect which livelihood strategies are adopted. In turn, this vulnerability context affects access and assets, consisting of human, natural, social, financial and physical capitals. As Ellis (Introduction to Hussein 2002, 11) states, sustainable livelihoods remain "firmly anchored in the asset vulnerability framework." Positive outcomes of sustainable livelihoods include increased well-being, reduced vulnerability, and maintenance of the natural resource base. Increased food security is also clearly linked to this framework as an outcome of sustainable livelihoods.

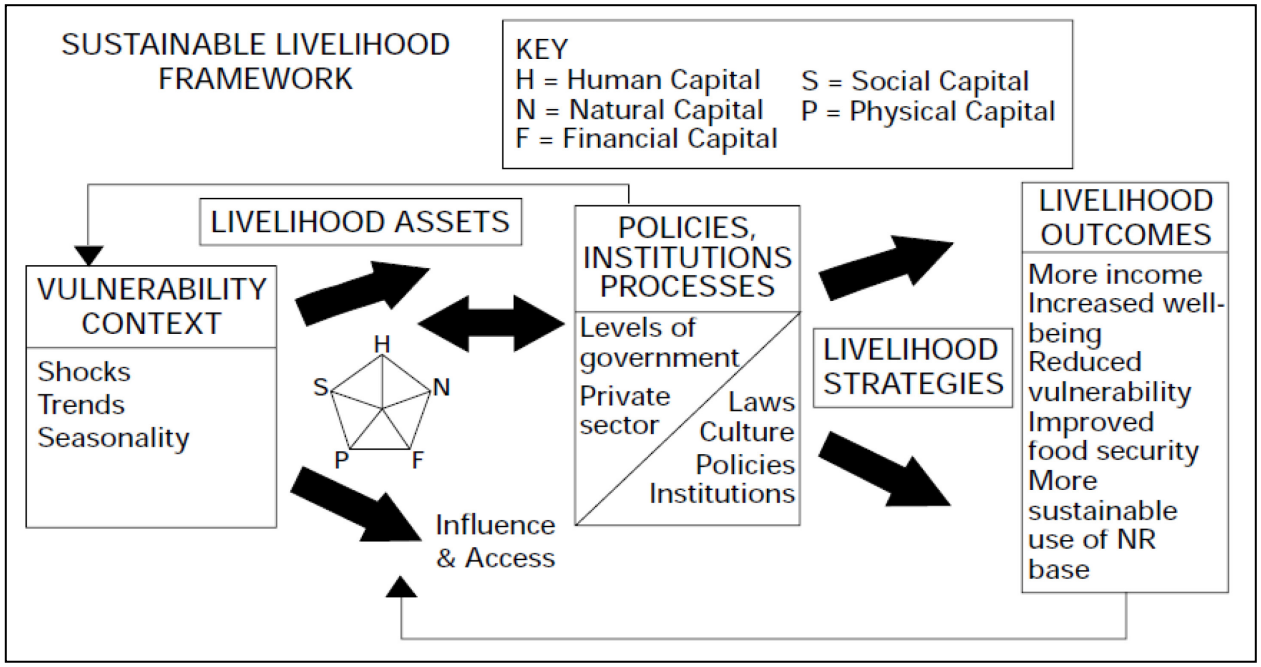


**Figure 2.2 DfID Sustainable Livelihoods Framework (Source: DfID 1999, 1)**

However, there is one significant shortcoming in DfID that need to be addressed. Scoones (2009) contends that the emphasis on the asset-pentagon and accessing these capitals has resulted in an over-emphasis on economic analysis of livelihoods. While economics are central to livelihoods, a living is much more complex and assets are more than just resources that facilitate consumption. As Bebbington (1999, 2022) suggests, capitals "are the basis of agents' power to act and to reproduce, challenge or change the rules that govern the control, use and transformation of resources." Concentrating on the economic possibilities of capitals distorts the myriad ways they create meaning and contribute to livelihoods.

### 2.2.3 Power, Institutions and Access

As Bebbington (1999, 2022) states, "a person's assets are in large part determined by the structures and logics at work in economic and political spheres." These so-called structures and logics are important because they determine the opportunities available to people for accessing assets. Assets are the building blocks of livelihoods but access to these building blocks is essential for composing a livelihood that meets current needs and can also respond to changing circumstances. The concept of access used in the livelihoods literature grew out of Sen's work on entitlements, discussed in Section 2.1.3. Access is multifaceted and is largely ruled by power relations. As de Haan and Zoomers (2005, 35) state, "access is shaped by institutions."

Institutions can be defined as "the formal rules, conventions, and informal codes of behaviour, that comprise constraints on human interaction" (Ellis 2000, 38). Examples include laws, property rights and the market. Inherent in this definition is the idea that institutions mediate social interactions and define the range of possible ways people can access resources. There are both formal and informal institutions. Formal institutions are generally codified at the macro-scale, such as laws, while informal institutions are generally based on mutual agreement between people at the micro-scale, such as codes of behaviour (Leach, Mearns and Scoones 1999; Ellis 2000; de Haan and Zoomers 2005). Through this establishment of norms and rules, institutions also entrench power relations in society (Scoones 1998). Identity, social relations and community membership are also important gatekeepers that restrict or facilitate access (Ellis 2000; Ribot and Peluso 2003). While sustainable livelihoods frameworks identify institutions as important contextual factors, sustained examinations of how gender, class, ethnicity, religion, culture and other types of identity structure livelihoods are also needed (Scoones 2009). One institution which this research will engage is ethnicity and how Hmong and Yao ethnicities mediate food security and livelihood access. Gender and culture are also examined to varying degrees.

Finally, when looking at power and politics it is important not to limit examination to local interactions. As Scoones (2009, 185) states,

> the attention to power and politics must, of course, move beyond the local level to examine wider structures of inequality. Basic questions of political economy and history matter: the nature of the state, the influence of private capital and terms of trade, alongside wider structural forces, influence livelihoods in particular places.

Therefore this research adopts a view that while micro-level experiences provide the immediate context for livelihood composition and local factors may be uppermost on research participants' minds, macro-level events, trends and histories can influence livelihoods in sometimes hidden yet meaningful ways. Therefore, wider structural characteristics are identified in this research and linked to lived experiences. The goal is to strike a balance between the local and the global, between structure and agency.

### 2.2.4 Drawing from the sustainable livelihoods literature

In summary, this research examines sustainable livelihoods in terms of three main livelihood components, namely assets, access and activities, as well as the ability to withstand and recover from shocks. The asset-pentagon is used to classify a household's assets while access to these assets is

viewed as a function of broader structural factors. Activities are the occupations people choose to engage in with their combination of assets and access. In terms of assessing sustainability, the vulnerability context is an important focus and directly relates to the four sustainability components that will be examined in this research: resilience to external shocks, self-sufficiency, maintenance of long-term productivity and maintenance of other livelihood options. Finally, sustainable livelihoods will be examined at the household level but these micro-level experiences will be linked to macro-level processes through an analysis of power relations and institutions.

## 2.3 Vulnerability

This research is concerned with the food security impacts of livelihood stresses, such as livestock disease, limited access to essential livelihood capitals, and extreme weather events resulting from climate variability. For this research, climate variability is defined as "a deviation from the overall trend or from a stationary state, and refers to variations in the mean state and other statistics (such as the occurrence of extremes and so on) of the climate on all temporal and spatial scales" (CCCSN 2010, online). In this section I establish how vulnerability is approached in this research. The core elements that I draw from this literature include: biophysical and social components of vulnerability; exposure, sensitivity and adaptive capacity; multiple-stress environments; individual and collective vulnerability; and the dynamic nature of vulnerability.

### 2.3.1 Defining Vulnerability

Definitions of vulnerability can vary based on discipline, theoretical framework, epistemology, or research focus (Cutter 1996; Luers 2005; Adger 2006; Fussel 2007). Despite the array of vulnerability definitions, the majority used in social science research address some common features; these include, the resources accessible to reduce exposure to a stress, the distribution of these resources across natural and social spheres, and the mediating institutions which influence resource access and adaptive strategies (Adger 2006). This emphasis on access highlights the prevalent understanding that vulnerability is not only a function of the physical environment it is also socially constructed (Adger 1999; Cutter 2003).

Since I am interested in extreme weather events and climate variability, a good starting point for looking at vulnerability is the definition created by the Inter-governmental Panel on Climate Change (IPCC), a key player in setting the international climate change agenda. The IPCC's definition integrates the two main vulnerability approaches. The biophysical approach, influenced by work in the natural sciences and hazards research, maintains that vulnerability is the outcome of a system's

exposure and sensitivity to a hazard (Adger et al 2004; Fussel 2007). On the other hand, the social vulnerability approach maintains that a system can be in a state of vulnerability before a hazard even occurs as a result of structural factors, such as poverty, marginalization and a lack of food entitlements (Adger et al 2004).

In the IPCC's Fourth Assessment Report, Adger and colleagues (2007, 720) offer an integrated definition of vulnerability as,

> the propensity of human and ecological systems to suffer harm and their ability to respond to stresses imposed as a result of climate change effects. The vulnerability of a society is influenced by its development path, physical exposure, the distribution of resources, prior stresses and social and government institutions.

Here the main components of vulnerability include a system's sensitivity, the stress it is exposed to and its ability to adapt, which are common components in the wider vulnerability literature (Luers 2005; Adger 2006). Ford and colleagues (2006) provide a good illustration of how the combination of biophysical and social elements defines a system's vulnerability (see Figure 2.3). Since this research is interested in food security and livelihood responses, I will adopt an integrated approach looking at both biophysical and social elements of vulnerability; however, the emphasis will be on social vulnerability since I am most interested in different features of Hmong and Yao society, namely livelihoods and food systems.

A stress can be environmental, such as a natural hazard, or socio-political, such as a conflict situation, and is generally external to the system (Luers 2005; Adger 2006). It is increasingly acknowledged that environmental change, such as climate change, creates a multiple stress environment where more than one stimuli needs to be addressed at the same time (Nelson, Adger and Brown 2007). The natural hazards literature offers a range of frameworks to further describe the characteristics of a stress or hazard including magnitude, frequency, spatial dispersion, duration, speed of onset, timing and temporal spacing (Ford, Smit and Wandel 2006; also see Burton et al 1993).

A system's sensitivity is the degree to which the system responds to a stress while exposure is the extent to which a system experiences, or is exposed to, a stress (McCarthy et al 2001; Adger 2006). Adaptive capacity is the degree to which the system can adapt and evolve in light of the changing conditions created by the stress and is influenced by a variety of economic, political and social factors (Luers 2005; Adgers 2006).

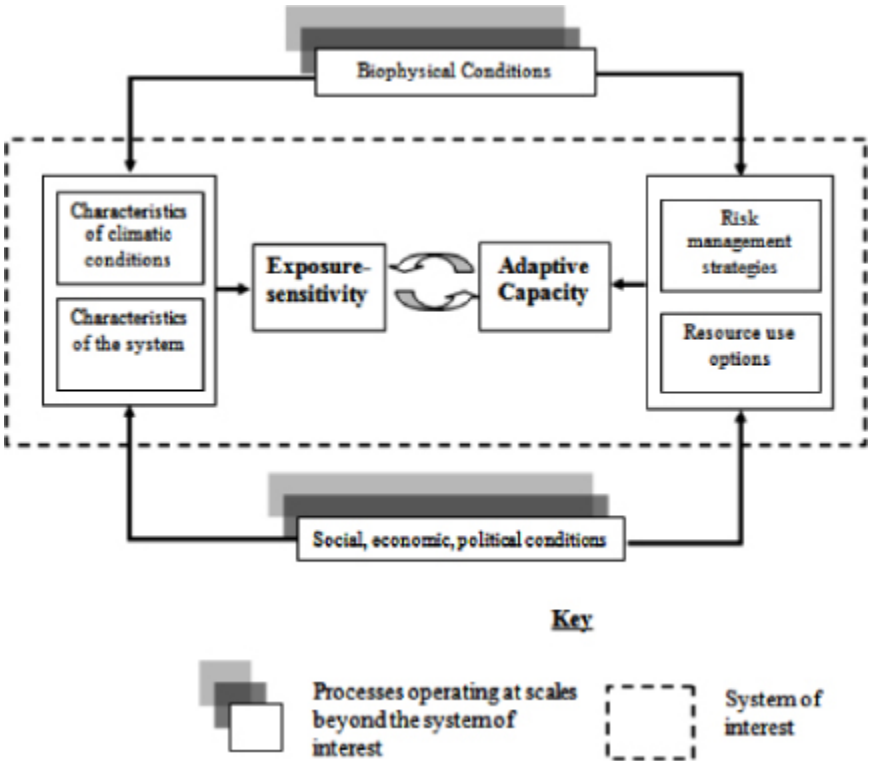


**Figure 2.3 Climate change vulnerability framework (Source: Ford, Smit and Wandel 2006, 147)**

Adaptation is a long-term process while coping is a short-term response (Yohe and Tol 2002; Brooks, Adger and Kelly 2005). Coping capacity is a function of a system's underlying resilience, or ability to undergo change without affecting the functioning of the system (Yohe and Tol 2002; Cannon and Muller-Mahn 2010). Developed in the ecological sciences, the concept of resilience has recently gained more credence in climate change literature where there has been a trend in conducting resilience studies as opposed to vulnerability studies (Cannon and Muller-Mahn 2010). Adaptive capacity has a positive correlation with resilience: as adaptive capacity increases vulnerability decreases thereby increasing the system's resilience (Nelson, Adger and Brown 2007).

### 2.3.3 The causal structure of vulnerability

While the exposure/sensitivity/adaptive triumvirate provides a sound vulnerability framework, two additional components are highlighted in this research in order to strengthen the conceptual link between food security, sustainable livelihoods, and vulnerability. Firstly, Bohle and colleagues (1994, 39) propose a causal structure analysis of vulnerability based on a view of vulnerability as "a multi-layered and multidimensional social space defined by the determinate political, economic and institutional capabilities of people in specific places at specific times." Here the authors explicitly consider the multiple interactions that influence vulnerability. This view of vulnerability as dynamic and highly contextual is echoed in more contemporary work on social vulnerability (Cutter 2003). As

with examinations of food security and sustainable livelihoods, vulnerability needs to be examined as a balance between structural factors and local agency. The notion of individual and collective vulnerability is particularly useful and will be used to address these issues since it highlights that vulnerability is multi-scalar. Individual vulnerability is the result of personal factors such as access to resources, diversity of income, and status within the community among other factors (Adger and Kelly 2001). It is at this scale that personal or household decision-making has the most influence on vulnerability. Collective vulnerability is the result of more structural factors such as institutional and market characteristics as well as the availability of social security and infrastructure (Adger 1999; Adger and Kelly 2001).

Finally, as Bohle and colleagues (1994) point out, vulnerability also has a temporal element. Vulnerability, like food security and sustainable livelihoods, is not static rather it needs to be seen as a dynamic state (Cutter 1996; Adger 2006; Fussel 2007). As Adger (2006, 274) states, "what is vulnerable in one period is not necessarily vulnerable in the next period." Thus, this research will examine how vulnerability fluctuates over time.

#### 2.3.4 Drawing from the vulnerability literature

In summary, this research views vulnerability in terms of exposure, sensitivity and adaptive capacity. Both biophysical and social conditions contribute to vulnerability by influencing the degree of exposure and sensitivity and the system's capacity to adapt. Resilience is a function of system's ability to cope with and adapt to stresses. Extreme weather/climate variability and other livelihood stresses create multiple stress environments therefore there can be several stresses operating on a system at the same time. I will employ the concept of individual and collective vulnerability to examine vulnerability, across scales and, since vulnerability is dynamic, I will also examine how it changes over time.

## 2.4 Conclusion

As illustrated in Figure 2.1, this chapter engages three main conceptual building blocks to inform this research: food security, sustainable livelihoods and vulnerability.

Drawing from the literature on food security, in this study I utilize the conceptual building blocks of **availability**, **access**, **utilization** and **stability** of food systems, which need to be examined as elements **nested in the broader livelihood context**. The core components form a **hierarchical** system with availability enabling access, and access enabling utilization. Food security is attained when sufficient

nutritious food is accessible at all times, therefore, stability is a core component. The degree of stability in a food system affects the availability and accessibility of food supplies. Food insecurity, which is **chronic, transitory or cyclical**, can indicate different degrees of instability in a system. **Cultural-appropriateness** and **perception** are also important aspects of food security since they determine what items are considered food. Finally, in this research food security is examined mainly at the **household level**, though individual level differences are addressed when differences arise.

The sustainable livelihoods literature provides the building blocks that make up my second core conceptual component. Sustainable livelihoods consist of **assets, access and activities** and are sustainable when they can cope with and recover from external shocks. Assets include the **human, natural, social, physical and financial** capitals that a household has access to. The **household level** is the main scale of analysis that will be employed. Broad rural **livelihood strategies** include agricultural intensification or extensification, diversification and migration. In terms of sustainability, the **vulnerability context** is a dynamic component that influences household assets and access and therefore affects how livelihood strategies are ultimately composed. **Power and institutions** also mediate access and affect how assets are acquired and used. Thus livelihoods need to be investigated in terms of **micro-level and macro-level processes**.

The third body of literature on vulnerability provides the final set of building blocks for my conceptual framework. I conceptualize vulnerability in terms of **exposure, sensitivity and adaptive capacity** which are influenced by the **biophysical and social** characteristics of the system. I also use the concept of **multiple-stress environments**, since I am addressing not only climate variability but other livelihood stressors as well, which need to be addressed at the same time. Short-term responses to stresses are a function of the system's **coping capacity** while **adaptive capacity** denotes long-term changes in behaviour**.** I will be using both these concepts to assess Hmong and Yao responses. The concept of **individual and collective** vulnerability provides a useful mechanism for examining vulnerability factors across multiple scales. Finally, vulnerability is **dynamic** and therefore needs to be examined as a state that changes over time.

As such, the building blocks from these three bodies of literature will inform my study to assess food security and livelihood vulnerability among Hmong and Yao households in the northern uplands. These bodies of literature also directly inform the *a priori* themes that drive the creation of my methodological approach, discussed in Chapter 4.

# CHAPTER 3 - CONTEXT

In this chapter, I illustrate how Hmong and Yao livelihoods operate in the historical, social and environmental context of Vietnam's northern uplands. I begin in Section 3.1 by situating the northern uplands region as a physical and political entity. In Section 3.2, I introduce Hmong and Yao livelihoods and begin to examine how they have been, and continue to be, challenged by state structures. Namely, I explore the pervading lowland/highland binary that places ethnic minorities in the northern uplands in an inferior position in Vietnam's historical and contemporary popular imagination. I argue that these perceptions duly inform policy decisions related to northern minority populations. Next, in Section 3.3, I discuss food security and examine the livelihood impacts of the government's food security agenda. Finally, in Section 3.4, I assess climate change vulnerabilities in the northern uplands in order to identify the possible climactic stresses Hmong and Yao livelihoods may experience.

## 3.1 The northern uplands of Vietnam

As a physical entity, the northern uplands of Vietnam are part of a larger region known as the Southeast Asian Massif which is defined by the mountain ranges and highlands connecting southwestern China, Burma, Thailand, Laos, Cambodia and Vietnam (Michaud 2006). As a social entity, the Massif is a mosaic of over 80 million ethnic minority highland-dwellers representing five language families, hundreds of languages, and a wide variety of political, economic and cultural systems (Michaud 2006). Even though the Massif is divided by international political borders, Vietnam's northern uplands share many social and cultural diversity characteristic of the Massif region. It has been argued that this diversity is the result of centuries of successive waves of peoples fleeing to the highlands to take shelter from state-making endeavours in the lowlands (Culas and Michaud 2004; Scott 2009). The social diversity of Vietnam's highlands provides an interesting contrast to the lowlands which are dominated by one ethnic group, Vietnam's *Kinh* majority.

In addition to the ethnic Vietnamese, or *Kinh* majority group, the Socialist Republic of Vietnam identifies 53 ethnic minority groups, or *các dân tộc thiểu số*, comprising over 12.2 million individuals, a large number of whom live in the northern upland region (GSO 2010a).[2] According to the 2009 Population and Housing Census, the upland population consists of just over 11 million people: the Kinh comprise a population of slightly over five million in this region while the largest minority

[2] The General Statistics Office (GSO) of Vietnam (2010a) labels the country's northern uplands as the Northern Midlands and Mountains, which include the provinces of Hà Giang, Cao Bằng, Bắc Kạn, Tuyên Quang, Lào Cai, Điện Biên, Lai Châu, Sơn La, Yên Bái, Hòa Bình, Thái Nguyên, Lạng Sơn, Bắc Giang and Phú Thọ.

ethnic groups are Tày, Hmong, Thai, Mường, Nùng and Yao. Twenty other ethnic groups with populations over one thousand individuals also reside in the area (GSO 2010a). Due to this diversity, it is common for three to four minority groups to co-habitat in the same commune, which is the lowest state administrative level; in fact, only 3 percent of upland communes are mono-ethnic (McElwee 2004; see also Michaud, Turner and Roche 2002).[3]

Economic development also defines the northern uplands in contrast to Vietnam's lowlands. With much of the region ranging between 500 and 1000 metres in elevation, the population is mainly rural with less than 16 percent living in urban areas compared with the national average of about 29 percent (Minot et al. 2006; GSO 2010a). Agriculture is the main economic activity, engaging 72 percent of the population compared with the national average of 50 percent (GSO 2009). Upland ethnic minority groups are mainly small-scale subsistence farmers growing rice and/or maize as their staple crop. Poverty is also high in the region standing at an average of 25 percent compared with 13 percent for the whole country (GSO 2009).[4] These socio-economic features have contributed to making the northern uplands and its ethnic minority residents a target for development programs (Tugault-Lafleur and Turner 2011). When considering these statistics and the state's actions regarding ethnic minorities in the uplands, there are two underlying structures that need to be discussed: the lowland/highland binary and, relatedly, the state's perception of ethnic minorities.

### 3.1.1 State Presence and the northern uplands

Current state development programs are underscored by the prevailing perception of the uplands as socially and economically backward; as Sowerwine (2004) argues, a lowland/highland binary pervades Vietnam's state apparatus and popular consciousness, wherein 'lowland' equals Kinh/modern and 'highland' equals ethnic minority/backward/Other. This is the result of a long history of the highland region being characterised in opposition to the lowlands by dominant groups. As Sowerwine (*ibid.*, 125) states, the binary was "discursively mapped onto the landscape" through a series of state making endeavours first under the French and then under the Socialist state (also see Scott 2009).

During the French Colonial period (1887-1954), ethnic minorities in northern Tonkin were largely ignored by a colonial administration more interested in economic gains in central Annam and southern

[3] 'Commune' is a state administrative category. A hamlet is a more endogenous category for many of these groups and is more likely to describe kinship based mono-ethnic settlements.

[4] The Government Statistics Office (2010b) defines the poverty rates as 400,000 Vietnamese đồng (VND), or ~ $20 USD, per capita per month for rural areas and 500,000 VND ($25USD) per capita per month for urban areas.

Cochinchina (Corlin 2004).[5] In fact, colonial intervention in the northern uplands was basically limited to the encouragement of opium production for export to China as well as the presence of military detachments and colonial agents to ensure to region was under French control. (Michaud 2009). The classification of the region's ethnic groups was also an important activity. In the 1890s and early 1900s French military personnel were the first to make detailed accounts of ethnic minorities in the northern uplands as a means to establish their rule over the region (Michaud 2000; Koh 2002). Ethnology, the study and representation of ethnic groups, became a tool of the colonial system that allowed the colonizer to define the colonized (Koh 2002). In the northern uplands, where heterogeneity was a key feature of the social and cultural landscape, the process of classification allowed the colonial administration to decipher the mosaic and thereby bring these non-state spaces under the purview of the state and establish at least nominal control (Duncan 2004; Scott 2009). However, this control was not, and still is not, absolute, as will be discussed.

Ethnology continues to play a political role for the Vietnamese state (McElwee 2004). Following reunification in 1975, national unity became a stated goal for the government and with this, ethnic minority integration into the larger Vietnamese state become a driving policy objective (McElwee 2004; Michaud 2009). While the Socialist Republic of Vietnam's 1992 Constitution grants full citizenship to all ethnic minorities as well as guarantees their right "to preserve their national identity, and to express their good customs, habits, traditions, and culture", state ethnology homogenized ethnic minority history in order to incorporate these groups into the 'national history' which emphasizes national unity and the dominance of the primarily Kinh state (McElwee 2004, 188; Koh 2002). In order to incorporate ethnic minorities and the highland regions more firmly into the unified Socialist state, the government established a series of development and settlement programs for this region.

One pre-reunification project the Viet Minh government implemented with regards to ethnic minorities was the establishment of two autonomous regions which had been promised to minority groups if they sided with the Communists against the French (McElwee 2004, Michaud 2009). Thai-Meo/Tay Bac and Viet Bac Autonomous Regions were established in 1955 and 1956 respectively, and quickly encompassed nearly one million ethnic minority inhabitants (McElwee 2004). These regions were dissolved in 1981 for supposed economic reasons, but, as McElwee (2004) convincingly argues, the underlying reason was to facilitate better integration of ethnic minorities into the socialist state.

[5] During the French colonial period the present-day area of Vietnam was divided into three administrative regions: Tonkin, which encompassed the Red River Delta and northern mountains; Annam, which covered the central coastal region; and Cochinchina, which encompassed the Mekong Delta and surrounding areas.

Other early efforts to refashion the uplands included the Viet Minh government's land reforms of the 1950s and 1960s whereby all land became a national resource managed by the state on behalf of the people. However, there is evidence that in the northern uplands ethnic minority communities soon abandoned collectivization in favour of their traditional systems, or never really took it on board to begin with (Michaud and Turner 2000; Corlin 2004). The "Fixed Cultivation, Fixed Residence" program initiated by Resolution 38 in 1968 targeted the 2.8 million shifting cultivators in the northern and central highlands and offered land allocation certificates to encourage the establishment of permanent household residences and fixed agriculture; however, it too achieved limited success (McElwee 2004). The ineffectiveness of these programs illustrates the difficulty in implementing national policies in areas where state presence is limited; in fact, there is some evidence that lowland Kinh historically avoided moving to northern provinces due to superstition and a fear of northern cultures (Turner 2010; Tugault-Lafleur and Turner 2011). This is another example of the predominance of the lowland/highland binary which characterizes the highlands as a threatening place.

Another push for upland development was spurred by the government's *Đổi Mới* policy. Introduced officially in 1986 at the Sixth Party Congress, *Đổi Mới* was an economic renovation policy aimed at promoting national socioeconomic development and market integration (Boothroyd and Pham Xuan Nam 2000). For example, in order to promote rural development, agricultural production for self-sufficiency was discouraged in favour of commodity production; moreover, the price of agricultural produce was removed from the purview of the state and was left to market forces (*ibid*.). The 1993 land reforms also brought the state presence further into the uplands. The 1993 Land Law reaffirmed that all land and water belonged to the Vietnamese state, but allowed land parcels to be leased to individuals, households and organizations for a period of twenty years for cropland and fifty years for forested land (Corlin 2004). Land use certificates, known colloquially as 'Red Books', granted the bearer the right to exchange, transfer, lease, inherit and mortgage the land. While giving the title holder more control over land, the new system also required landholders to be much more knowledgeable about management and their rights. As Corlin (2004, 301) states, "many ethnic minority people, lacking literacy or fluency in Vietnamese as well as the economic means, are bound to come out as losers in the competition for scarce resources." Furthermore, individual land tenure contradicts some minorities' land use systems, such as for Hmong, further discussed below.

Another example of the government's renewed focus on the uplands was the establishment in 1993 of the Committee for Ethnic Minorities in Mountain Areas (CEMMA) which was mandated with "identifying, coordinating, implementing and monitoring projects geared toward ethnic minority development" (Baulch et al. 2007; 1164). One of its core projects, Programme 135 *Socio-Economic Development Programme for Extremely Difficult Communes in Ethnic Minority and Mountainous Areas*, was created in 1998 to target mountainous communes with large ethnic minority populations and under-developed physical and social infrastructure (CEMMA 2005). In 1998, 1,012 communes were included, while new communes were identified and added every subsequent year. In 2005, the programme was operating in 1,938 communes (*ibid.*). Sustainable development is the stated goal of the program, including investment in transportation, irrigation, schools, clinics, clean water and sanitation systems, electricity, markets as well as agriculture and forestry extension stations.

The Ministry of Agriculture and Rural Development (MARD) also oversees programs aimed at transforming northern regions, for example Programme 143 on Hunger Eradication and Poverty Reduction. As Bonnin and Turner (2012) state, the core component of this program is the provision of modern agricultural technologies and knowledge through rural extension programs.

At one time there was as many as 21 different programs operating for socioeconomic development of ethnic minorities (Nguyen Thi Thu Phung and Baulch 2007). Though the number is smaller today, economic reorganization, resettlement, the provision of education in the Vietnamese language, and poverty reduction and agricultural extension programs are still key features of the upland policy landscape (Michaud and Turner 2000; Socialist Republic of Vietnam 2005; Tugault-Lafleur and Turner 2011; Bonnin and Turner 2012).

While these programs and policies aim to improve the living standards of upland populations, target populations are rarely involved in the formation of these programs and have little input in their implementation. Furthermore, socio-economic development programs are based on a fundamental contradiction: while ethnic minority contributions to 'national history' are celebrated and their cultures enshrined in museums, ethnic minorities are still identified as "backward" and in need of modernizing in state development policies (van de Walle and Gunewardena 2001; Michaud 2006; Tugault-Lafleur and Turner 2011). This dualism means that ethnic minorities, like the Hmong and Yao, are in a constant process of negotiating state policies and development programs while securing their livelihoods. However, they are not powerless.

When discussing the position of ethnic minorities vis-à-vis the state discourse that emphasizes the need to "improve" them, it is equally important to emphasize the agency and resistance of these groups to these pressures. As Scott (2009) argues, ethnic minorities in the Southeast Asian Massif, which he terms Zomia (following van Schendal 2002), are best understood not as groups left behind by civilization, but rather as groups who exercised their power to leave the centralized state-space and pursue livelihoods they deemed more appropriate. Even as these minority groups are currently incorporated into the Vietnamese state in the sense that they live within the country's borders, work on Hmong livelihoods by Michaud (2011) and Turner (2010a, 2012a,b) shows how these groups are not simply reactive, rather they act to subtly resist state dominance and maintain their autonomy.

### 3.1.2 Hmong and Yao populations in Vietnam's northern uplands

Hmong and Yao are Vietnam's sixth and ninth most populous ethnic groups respectively (GSO 2010a). Ethnologists classify both groups as belonging to the Miao-Yao language family. Using comparative linguistic methods, researchers estimate that they arrived in Vietnam from southern China within the last few hundred years: Yao starting in the seventeenth century and Hmong starting in the late eighteenth century (Culas and Michaud 2004; Michaud 2006). However, some Yao oral histories suggest that their arrival in Vietnam dates to the 13$^{th}$ century (Sowerwine 2004). Hmong and Yao are considered late arrivals to the northern uplands relative to other ethnic groups, which is suggested as one reason for the tendency of Hmong and Yao to favour higher elevations, where other groups had not settled (Michaud 2006).

Since Hmong tend to occupy lands above 1000 metres elevation, today they are concentrated in the mountainous areas of several provinces (see Table 3.1) (Corlin 2004; Michaud 2006; GSO 2010a). Between 1980 and 1999, the national Hmong population nearly doubled from 400,000 to 787,600 individuals; in 2009, the Hmong population in Vietnam stood at 1,068,189 people (Vuong Duy Quang 2004). According to government statistics, in 2009, the Yao population in Vietnam was 751,067 people (see Table 3.1) (GSO 2010a).[6]

[6] According to the Government Statistics Office, Yao are referred to as Dao, though conventional pronunciation of the ethnonym is with a y-sound. The confusion arises from variations in pronunciation between northern and southern Vietnamese-speakers and also reflects power relations around the production of knowledge related to ethnic minorities in Vietnam. Whereas the letter 'd' is pronounced like a y-sound in the south, it is pronounced like a z-sound in the north. Since northern scholars are more prominent authorities on Vietnam's ethnic minorities, their terminology pervades and Yao continue to be referred to as Dao and mistakenly pronounced with a z-sound (Michaud 2006).

**Table 3.1 Hmong and Yao Populations in Vietnam's northern uplands**

| *Hmong* | | *Yao* | |
|---|---|---|---|
| **Total national population** | **1,068,189** | **Total national population** | **751,067** |
| Hà Giang Province | 231,464 | Hà Giang Province | 109,708 |
| Điện Biên Province | 170,648 | Tuyên Quang Province | 90,618 |
| Sơn La Province | 157,253 | **Lào Cai Province** | **88,379** |
| **Lào Cai Province** | **146,147** | Yên Bái Province | 83,888 |
| Lai Châu Province | 83,324 | Bắc Kạn Province | 51,801 |
| Yên Bái Province | 81,921 | Cao Bằng Province | 51,124 |
| Cao Bằng Province | 51,373 | Lai Châu Province | 48,745 |

**Source: GSO 2010a, online.**

## 3.2 Hmong and Yao livelihoods in the northern uplands of Vietnam

Hmong and Yao have developed livelihoods adapted to their high elevation conditions. While Hmong and Yao are distinct ethnic groups, their livelihood patterns in the northern uplands have many similarities, which justifies an integrated analysis of their food system and livelihood characteristics. Hmong land management is based on household access rights as well as communal access rights. These are underscored by the Hmong belief that land cannot be owned, rather territory and resources belong to ancestral spirits (Corlin 2004). This is in marked contrast to the official Vietnamese land tenure system which promotes individual access rights. Hmong beliefs in nature and place are also influenced by geomancy, or "the belief that the landscape is imbued with powers affecting man's fortune" (Corlin 2004; 307). Even extreme events such as floods and droughts might elicit a geomantic explanation.

In Hmong society, kinship ties are important. The household is the central social and economic unit and a Hmong village or hamlet usually comprises members of one, two or more exogamous patrilineal clans (Cooper et al. 1995; Corlin 2004). Traditionally semi-nomadic, Hmong were shifting cultivators. While households still grow some tubers and root vegetables in this manner, swidden fields are not as central to the Hmong food system as before, in large part due to the Government's sedentarization policies (Tugault-Lafleur and Turner 2011).

Swidden agriculture focused on the production of dry rice and maize, however sedentary agriculture, especially paddy cultivation for wet rice, has also been long established; indeed knowledge of wet rice cultivation came with Hmong migrants from China over 100 years ago (Le Trong Cuc 2003; Tugault-Lafleur and Turner 2011). In northern Vietnam, due to the cool climate in the mountains, Hmong

households can grow only one crop of rice or maize per year; as a result, poorer households may experience food shortages during the winter months (Mai Thanh Son 1999; San Chang 2003).Where level land is available, households rely on terraced rice production, while in steeper areas less suitable for wet rice terracing, maize and/or dry rice are the preferred crops (Tugault-Lafleur and Turner 2011). Livestock, especially buffalo, are key assets for Hmong households. They are symbols of wealth and status, they are used to plough fields and, since they can be sold fairly readily in times of need, they are an important insurance commodity (Tugualt-Lafleur and Turner 2011).

Beginning in the mid-1800s, opium poppy cultivation was a significant livelihood activity for highland ethnic minorities and, along with the trade in coffin wood, provided an important source of cash income until, in 1992, the government passed Decree 327 which banned poppy production (Michaud 2000; Tugualt-Lafleur 2007; Turner and Michaud 2008; Turner 2012b). Contemporarily, forests still play an important role in providing resources for Hmong livelihoods; for instance, the trade in non-timber forest products, such as cardamom, orchids, honey and mushrooms, has become an important cash source (Delang 2005; Tugault-Lafleur and Turner 2011). Furthermore, forests are also an important source of fuel, construction materials and fodder for livestock (Corlin 2004).

According to research by Tugualt-Lafleur and Turner (2011) as well as my own observations while in the field, a typical Hmong livelihood labour calendar in Lào Cai province starts with preparing rice and maize fields in February, then ploughing and fertilizing these in March and April. Traditional fertilizers include a mix of manure, ash and leaves, while chemical fertilizers are increasingly used. Maize is planted at the end of March and left to grow till harvest in August. During the month of March, rice seedlings are also sown and left to grow until they are transplanted at the end of April and into May. Rice is left to grow through the rainy season and other activities such as cultivating and gathering cardamom take precedence during this time. In September, cardamom is harvested and the rice harvest also begins and continues into November. December is occupied with preparations for the New Year and January is focused on Hmong New Year celebrations (see Table 3.2).

Two important non-food crops for Hmong in Lào Cai are hemp and indigo which are central to producing traditional Hmong clothing, which is made from hemp cloth then dyed indigo and heavily embroidered (Mai Thanh Son 1999). Most households or kin groups in Sa Pa district generally grow their own hemp. Women are the principal actors in the production of hemp clothing and they spend great quantities of time cultivating, tending and harvesting the plant stalks as well as processing and weaving the fibers into functional material (Mai Thanh Son 1999). Hmong girls learn to embroider

around age eight and begin to make their own clothes in their early teen years; every year, Hmong women are responsible for making new clothes for Hmong New Year for each household member (Mai Thanh Son 1999).

**Table 3.2 Hmong labour calendar for Sa Pa District**

| | |
|---|---|
| **January** | Prepare for Hmong New Year. |
| **February** | Prepare maize and rice fields. |
| **March** | Prepare fields for maize. Plant fields end of month. Prepare rice fields; sew nurseries of rice seedlings. |
| **April** | Rice field preparation. Start transplanting rice at end of month. |
| **May** | Transplant rice. |
| **June** | Complete rice transplanting.<br>Cardamom harvesting. |
| **July** | Check cardamom fields. |
| **August** | Check cardamom fields. Harvest maize. Pick indigo. |
| **September** | Harvest and dry cardamom. Start to harvest rice. |
| **October** | Rice harvesting. |
| **November** | Complete rice harvest. Collect firewood. New Year preparations, and other tasks. |
| **December** | Collect firewood, prepare clothes for New Year, and other tasks. |
| **Source: Adapted from Tugault-Lafleur and Turner (2011, 107).** | |

The basic economic unit for Yao is also the household, which consists of the extended family of male siblings since Yao society, like Hmong, is patrilocal and exogamous; this means that individuals must marry outside their clans and a wife is expected to move in with her husband's family (Vo Mai Phuong 1999; Sowerwine 2004).

In Lào Cai province, Yao households usually maintain wet rice fields and some land for swidden agriculture. Rice and corn are the staple food crops supplemented by other cultivated foods such as squash and sweet potato (Sowerwine 2004). While men plough the fields, women are the primary agricultural workers for planting, weeding and harvesting the fields (*ibid.*). Some Yao households also cultivate cassava which is a fairly versatile crop: it can be sold to provide income, used to make alcohol or be an essential source of food when a family's rice supply runs out. Income is also earned from the sale of fruit and forest products such as cardamom, medicinal plants and timber. Livestock such as chickens and pigs are also kept though their importance is mostly related to rituals and ceremonies, not necessarily food security (*ibid.,* own field observations).

Social networks are important to both Hmong and Yao livelihoods. As Sowerwine (2004) illustrates, Yao kinship networks developed through marriage are essential conduits of ecological knowledge between villages and also serve to facilitate the transfer of rice and corn varieties between households. Women are the main actors in these networks as they store ecological knowledge but also because

they are the ones who marry and move to new villages. Maintaining social networks and connections in their home villages ensures continued access to medicinal plants from that area as well as access to new seed varieties (Sowerwine 2004). As Turner (2012a) reports, kinship networks are also important for dispersing cardamom seedlings.

### 3.2.1 Responding to *Đổi Mới*

While contemporary Hmong and Yao livelihoods retain many of their traditional characteristics, their responses to the changing political and economic context characterized by the *Đổi Mới* reforms of the 1980s have introduced several novel elements. *Đổi Mới* created new livelihood opportunities while decrees in the same decade constrained several other traditional livelihood avenues, such as the trade in opium and coffin wood.

As Tugault-Lafleur (2007) illustrates, in the period before economic renovation, upland economic activities were highly influenced by kinship structures and focused on subsistence, whereas in the post-*Đổi Mới* period local economies and minority livelihoods are more influenced by national policies and incorporated into development planning. Contemporary Hmong and Yao livelihood portfolios can include traditional elements such as rice and maize cultivation, horticultural gardens and livestock as well as newer activities such as tourism. The development of income opportunities associated with the tourism industry in Lào Cai province, and most specifically in Sa Pa and Bac Ha districts, was spurred by the government's decision in 1993 to allow foreign tourists into the region (Turner 2011). Since this time, involvement in tourism in Sa Pa district has come to consist of young Hmong and Yao women acting as trekking guides as well as Hmong and Yao women engaging in the production and sale of embroidered textiles (Michaud and Turner 2000; Turner 2007; Turner 2012a). Another livelihood activity which has arisen as a result of emerging markets is involvement in cardamom cultivation for trade, as Tugault-Lafleur and Turner (2011) illustrate. However, the changing economic and policy climate is not only providing novel opportunities, it is also affecting traditional activities such as rice cultivation.

## 3.3 The Food Security Agenda in Vietnam

In 2004, it was estimated that 6.2 million people in northern Vietnam were food insecure, and ethnic minorities were the most vulnerable; in Lào Cai province it was estimated that at least half the population was potentially food insecure (FAO 2004). In order to secure rice production, the government championed the cultivation of hybrid rice varieties through importing seeds, mostly from

China, investing in domestic research and development, and subsidizing production (Tran Duc Vien and Nguyen Duong Nga 2009). This move was part of the government's larger food security agenda.

In Vietnam, food security is synonymous with rice production: currently, domestic rice demand consumes fifty-four percent of national rice output and the grain accounts for about three-quarters of Vietnam's calorie intake (Minot and Goletti 2000; Nguyen Van Ngai 2010). However, it is only in the past two decades that the country has moved out of position of food insecurity. In the late 1970s and early 1980s, Vietnam experienced chronic food shortages due to the inability of domestic producers to meet domestic demand. As a result, the government was forced to import thousands of tonnes of rice annually (Minot and Goletti 2000; Bui Tat Thang 2000). However, owing to the economic reforms and market liberalization of Đổi Mới in the 1980s, within less than a decade, Vietnam became one of the world's leading exporters of rice (Minot and Goletti 2000; Trang Thi Huy Nhat 2008). This turnaround resulted in part from decollectivization, as well as the increased adoption of high-yield rice varieties as well as more intensive cultivation methods which increased rice production from 16 million metric tons in 1986 to 26 million metric tons in 1996 (Kerkvliet 1995, Minot and Goletti 2000; Tran Ti Uht 2002). As Đổi Mới reforms spurred economic growth, poverty rates also declined rapidly, from a national rate of 58.1 percent in the early 1990s to 24.1 percent in 2004 (Trang Thi Huy Nhat 2008). National food security increased as higher incomes led to greater food expenditures. However, while the nation's supply of its key foodstuff is no longer a prime cause for concern, food security remains one of the government's top priorities in light of persistent issues regarding access and nutrition as well as emerging challenges to national food supply (Socialist Republic of Vietnam 2009).

In terms of access to food, poverty rates may have decreased significantly since the 1990s, but the benefits of socioeconomic development have not accrued to all groups equally. For instance, ethnic minorities are commonly cited as a group vulnerable to food insecurity since poverty rates in minority communities are several times higher than amongst the Kinh majority (FAO 2004; Trang Thi Huy Nhat 2008; Hoang Xuan Thanh et al 2009). Other groups at high risk of being food insecure include the landless poor and low-income urban migrants, as well as cash crop producers whose income is subject to market volatility, and households living in high natural hazard risk areas (FAO 2004; Hoang Xuan Thanh et al 2009).

Poverty contributes to food insecurity because it diminishes access to nutritious food. For instance, Molini (2006) found that while food expenditure in Vietnam in the 1990s increased for poor and

better-off households alike, poor households merely bought greater quantities of nutrient poor foods, such as rice and cereals, while better-off households were able to access more micronutrient rich foods, such as vegetables and fish. Malnutrition is still a widespread problem due to unbalanced diets that are too dependent on nutrient-poor rice (Hoang Xuan Thanh et al 2009).

A new set of challenges to national food security are emerging due to demographic and environmental changes. For example, population growth is expected to grow from 90 million to between 120 and 130 million by the year 2030 (Hoang Xuan Thanh 2009). In addition to demographic growth, economic growth is stimulating industrialization and urbanization which are hastening the conversion of rice paddy land to other uses. In the five years between 2001 and 2006, total national paddy land decreased by almost five percent (Nguyen Van Ngai 2010). Vietnam's vulnerability to natural hazards, such as typhoons and floods, also threatens food output in the lowland Red River and Mekong Deltas on an annual basis (Hoang Xuan Thanh et al 2009). Climate change vulnerabilities are further discussed below.

In 2009, the Vietnamese state reiterated its food security concerns through the issuance of Resolution 63. This *Resolution on National Food* Security makes the availability of and access to nutritious food for all citizens a key intermediate and long-term policy issue tied to the country's socioeconomic development (Socialist Republic of Vietnam). While the resolution mentions several other food items, the focus remains on the production of the nation's predominant food staple, rice. As the Resolution states, the government is committed to the modernization and industrialization of food systems, especially the promotion of more efficient rice cultivation.

### 3.3.1 Food Security and Hybrid Rice in the northern uplands

In 1998, the government instituted price subsidies on hybrid seeds, chemical fertilizers and pesticides to encourage the cultivation of hybrid rice among ethnic minorities in the northern uplands (Bonnin and Turner 2012). Bonnin and Turner (2012) investigated Hmong and Yao experiences of hybrid rice in Lào Cai province and found that the hybrid's increased output was viewed favourably even while individuals lamented the taste. Increased output was particularly important because population pressures in the area meant that more people needed to be fed from the same amount of land. Farmers were concerned nevertheless about adopting hybrid rice because it would increase their reliance on the central government for a significant part of their livelihoods. The need for greater cash outlay to purchase seeds and fertilizer was also a concern as it required the household economy to move further towards market integration. Furthermore, experiences with delays in the distribution systems have

illustrated that the government could not necessarily guarantee access to seed and other inputs. As a result, most households were cautious in their adoption of these seeds.

While the government continues to promote these varieties, there is a lack of research on how hybrid seeds will perform under changing environmental conditions. For instance, hybrid seeds have a narrow environmental tolerance and how well they will withstand climate shocks, which are increasingly being recorded in Vietnam, is unknown (United Nations Vietnam 2009; Bonnin and Turner 2012). While Hmong and Yao livelihood portfolios are diverse, rice and maize production are still central activities; therefore the increased vulnerability of these crops may increase potential food insecurity. Since the cost of hybrid seed production for home consumption is estimated to be ten times higher than production of local or traditional varieties, the costs associated with hybrid varieties may further decrease the resources available to weather climate shocks (Tran Duc Vien 2006). Furthermore, Hmong and Yao livelihoods are still heavily dependent on the natural environment, not just in terms of food cultivation, but also for the gathering of non-timber forest products. While climate variability and change is high on the state's agenda there is little understanding of how these macro-level processes are affecting, or might affect, upland ethnic minority livelihoods and how these groups will adapt.

### 3.4 Climate Change and Extreme Weather Events in Vietnam

Vietnam is one of the most vulnerable countries in the world to climate change. This stems from the high vulnerability of the country's extensive coastal zones and heavily-populated lowland areas to sea level rise (United Nations Vietnam 2009). It is estimated that fifty-five percent of the country's population lives in low-elevation coastal areas which are the most vulnerable to sea level rise and tropical storms (Luan Thuy Duong 2010). According to a broad climate assessment completed by Vietnam's Institute of Strategy and Policy on Natural Resources and Environment (IPONRE, 2009), general climate change trends in the country over the past fifty years include: temperature increases of 0.05 to 0.2 degrees Celsius per decade, with higher increases experienced in the north, a declining trend in the frequency of cold fronts in the north, and, a rising trend in the frequency of tropical storms. In the future, current climate models predict that total annual rainfall will increase throughout the country, though there will be a greater increase in the north (Luan Thuy Duong 2010). Rainfall variability will also increase, meaning that the dry season will get drier as the wet season gets wetter (United Nations Vietnam 2009). Thus, the risk of floods and droughts is expected to increase as well.

The Government of Vietnam identifies climate change as one of the major obstacles to the country becoming "a modern industrialized country by 2020" (Socialist Republic of Vietnam 2011). This issue has been a government priority for several years as illustrated by its support for the United Nations 1992 Framework Convention on Climate Change and the 1997 Kyoto Protocol (Luan Thuy Duong 2010). In 2008, the government instituted its first domestic policy framework for climate change action and mitigation in the country with the National Target Programme to Respond to Climate Change (NTP-RCC). This legislation established the Ministry of Natural Resources and Environment (MONRE) as the government's lead agency on the response to climate change. The NTP-RCC was followed in 2012 with the National Climate Change Strategy, which reiterated that climate change is a threat to the socio-economic development and future growth of the country. While Vietnam was very successful in reducing the national poverty rate over the last 20 years, greater frequency and intensity of climate hazards such as floods and droughts put these socioeconomic advances at risk (World Bank 2010).

In addition to the biophysical vulnerabilities, poverty and reliance on agrarian livelihoods create widespread social vulnerability to climate change. Climate hazards, such as drought and flooding, will pose particular risks to subsistence farmers and small landholders and will especially impact food security in poor, developing regions (FAO 2008; Easterling 2007). For example, farmers in Vietnam's Red River and Mekong Deltas will be faced with increased rainfall intensity and potential flooding as well as increased incidence of saltwater intrusion due to sea level rise (Chinvanno et al 2006; IPRONE 2009). This can threaten yields and the country's food supply as the deltas are responsible for two-thirds of the nation's rice production (Minot and Goletti 2000).

### 3.4.1 Climate Change and Extreme Weather in the northern uplands

The World Bank (2010) identifies the northern uplands as a region of low-exposure and high-sensitivity to climate change. The region is classified as low-exposure due to a low potential for increases in short-term and long-term climate hazard events. However, I argue that this classification is not entirely valid. Indeed, while there is little evidence in the quantitative record about changing climate conditions, qualitative evidence suggests that extreme weather events are having a greater impact than in the past. Case in point, in 2012, Lesk and Champalle at McGill University analyzed 40 years of daily temperature and precipitation data from the Sa Pa and Bac Ha weather stations in Sa Pa District, Lào Cai province. Their analysis revealed that there are no perceivable variability trends in either temperature or precipitation at the monthly or yearly resolutions. However, they also note that

extreme weather events, because they are often so short-term, can easily get lost in the data, depending on the level of analysis.

On the other hand, localized qualitative research shows that extreme weather is having an impact on a number of communities in the northern uplands (see also Mai Thanh Son 2011). For example, official and unofficial evidence from the local government and ethnic minority farmers indicates that extreme cold spells are affecting Hmong and Yao livelihoods in Lào Cai province (Bonnin 2011). Furthermore, using the online article database for Viet Nam News (http://vietnamnews.vn/), I performed a simple keyword search for extreme weather phenomena (such as "cold spell," "flash flood") and "Lào Cai" or the name of other northern upland provinces. Since 2005, there have been 33 extreme weather events reported in the northern upland region (see Table 3.3), and a general trend of increasing numbers of reports. These events range from intense rainfall to cold spells and drought.

**Table 3.3 *Viet Nam News* articles about Extreme Weather Events (EWEs) in the northern provinces**

| Date | Article Headline | Location | EWE |
|---|---|---|---|
| **Jan 06 2005** | "Cold weather brings visitors to mountains, threatens crops" | Lào Cai | cold spell |
| **Aug 9 2006** | "One missing in Yên Bái floods, fields destroyed" | Yên Bái, Lào Cai | heavy rainfall, landslides/ tropical storm |
| **Aug 19 2006** | "Landslides and floods claim 16 more victims" | Cao Bằng, Lào Cai | heavy rainfall, landslides |
| **Dec 26 2006** | "Cold spell leaves many sick, damage crops in Lào Cai" | Lào Cai | cold spell |
| **Feb 05 2007** | "Lào Cai sees rare snowfall" | Lào Cai | cold spell |
| **Feb 23 2007** | ""Forest fires blamed on hot, dry weather in the northwest" | Sơn La, Lào Cai | forest fires, hot/dry weather |
| **May 19 2007** | "Flash flood kills 5-year-old-child" | Lào Cai | flash flood |
| **Jan 03 2008** | "Northern region bundles up awaiting more frosty weather" | Northern provinces | cold spell |
| **Feb 11 2008** | Northern Lào Cai province sees longest cold spell for 40 years" | Lào Cai | cold spell |
| **Apr 19 2008** | "Floods cause traffic jam in Lào Cai" | Lào Cai | floods, landslides |
| **Aug 14 2008** | "Trains evacuate hundred from flood-ravaged areas" | Lào Cai | floods, landslides |
| **Dec 03 2008** | "North to see frost, as tropical pressure forms in East Sea" | Northern province | cold spell |
| **Jan 16 2009** | "More cold, endless drizzle, flood tides forecast for Tet" | Northern province | cold spell |
| **Feb 12 2010** | "Fire destroys 1,00ha of primeval heritage forest" | Lào Cai | forest fires, hot/dry weather |
| **Dec 14 2010** | "Warning as tropical low nears" | Lào Cai | heavy rainfall |
| **Jan 06 2011** | "Cold weather wreaks havoc in northern region" | Northern provinces incl. Lào Cai | cold spell |
| **Jan 17 2011** | "Cold snap prompts fears for stock" | Northern provinces incl. Lào Cai | cold spell |
| **Mar 17 2011** | "Snow created winter wonderland in Sa Pa" | Lào Cai, Hà Giang, Cao Bằng | cold spell |
| **May 14 2011** | "Floods, landslides pummel Lào Cai, no deaths reported" | Lào Cai | flash floods, landslides |
| **Dec 24 2011** | "Tourists flock to Sa Pa for 'White Christmas'" | Sa Pa, Lào Cai | cold spell |
| **Apr 01 2012** | "Northern provinces clean up after heavy rain, whirlwind" | Lào Cai | hail, whirlwind |
| **Apr 28 2012** | "600 households relocated in Lào Cai" | Lào Cai | flash flooding, |

| | | | |
|---|---|---|---|
| | | | landslides |
| **May 03 2012** | "Forest fires wreak havoc" | Lào Cai, Hà Giang | heat wave, forest fires |
| **May 30 2012** | "Heavy rainfall, floods turn deadly" | Yên Bái, Cao Bằng, Quảng Ninh, Sơn La | intense rainfall, floods |
| **Jun 11 2012** | "Frequent landslides threaten village" | Điện Biên | Landslide |
| **Jun 25 2012** | "Flash flooding kills 1, injures 6 in Hà Giang" | Hà Giang | flash flooding |
| **Sep 27 2012** | "Households moved from path of impending flood" | Lào Cai | landslide, flood |
| **Jan 03 2013** | "Three-day cold snap expected to grip northern region today" | Sa Pa, Northern provinces | cold spell |
| **Mar 27 2013** | "Giant hailstorms pummel Lào Cai" | Lào Cai | Hailstorm |
| **Mar 29 2013** | "Drought kills 10 tonnes of fish" | Sa Pa, Lào Cai | Drought |
| **Apr 25 2013** | "Whirlwind ravages northern mountainous provinces" | Lào Cai, Tuyên Quang | whirlwind, heavy rain, hailstorms |
| **May 02 2013** | "Northern provinces braced for floods, whirlwinds and landslides" | Lào Cai, Yên Bái | flash floods, hail, landslide, whirlwinds |
| **May 07 2013** | "Hailstorms destroy rubber trees in Lai Châu" | Lai Châu | Hailstorm |
| Source: Viet Nam News (http://vietnamnews.vn/) | | | |

The World Bank (2010) classifies the northern uplands as highly-sensitive to climate change due to high rates of poverty, large ethnic minority populations, high illiteracy, high prevalence of subsistence agriculture and poor infrastructure. Ethnic minorities are further identified as one of the most vulnerable groups owing to their reliance on agrarian livelihoods, higher rates of poverty, lower agricultural productivity due to limited investment, and limited access to credit (World Bank 2010). Moreover, ethnic minorities are considered to have lower adaptive capacity due to illiteracy and lack of fluency in Vietnamese which limits access to resources and opportunities. However, this discussion of adaptive capacity does not take into account traditional ecological knowledge gained over decades and sometimes centuries, of living in the uplands, which could increase these groups' resilience.

As part of the World Bank's 2010 social vulnerability study, fieldwork was undertaken in Hà Giang province, with Hmong in highland Quản Bạ district and with Kinh and several unidentified ethnic minorities in lowland Quảng Bình district. Hà Giang was chosen due to a high proportion of ethnic minority households, which exceeds ninety percent, a high poverty rate and mountainous topography. Households in both districts identified spring and summer droughts and late-summer flash floods as climate hazards while Hmong in Quản Bạ also stated that winter cold spells were threatening livestock (World Bank 2010). Households also revealed that the rainy season was getting shorter which meant that water stress was an emerging issue for some households. Whereas irrigation is more common in Quảng Bình, the shorter rainy season means that Hmong households in Quản Bạ are at greater risk due to their reliance on rain-fed agriculture.

While the upland region is highly sensitive to climate change due an array of socioeconomic factors, the principal interest in adaptation strategies appears to be on climate-proofing infrastructure and other 'hard' adaptation measures (World Bank 2010). For instance, in Hà Giang province recent climate change adaptation ventures include a Nordic Development Fund project to climate proof roads to ensure all-weather access to rural areas and an investment by the Vietnamese state in irrigation projects as a measure to reduce the risk of drought (World Bank 2010, NDF 2011). The United Nations Development Program (2011) also links the resilience of infrastructure in the northern uplands to continued socioeconomic development in the area: resilient physical infrastructure is seen as a necessity for reducing social vulnerability and ensuring economic growth. With more research on local impacts there are increasing opportunities for community-level collaboration and knowledge sharing. For instance, in terms of coping strategies, the World Bank (2010) found that indigenous knowledge and coping strategies were important for dealing with extreme events. Though the magnitude of climate changes are rendering traditional responses less effective, some strategies are still possible such as Hmong making earthen-walled buffalo hut to protect buffalo during cold spells or feeding them a special rice/corn and herb porridge to keep them warm.

### 3.5 Conclusion

In this chapter, I outlined Hmong and Yao livelihoods and possible food security and livelihood vulnerabilities. I illustrated the importance of considering the lowland/highland binary for understanding the Vietnamese state's socioeconomic and development policies regarding the uplands and showed how state perceptions have provided constant challenges for Hmong and Yao livelihoods. However, I also made the point that Hmong and Yao should not be seen as "backward" groups in need of modernization; rather their livelihoods are culturally-rooted. Furthermore, they are valid responses to outside pressures to incorporate ethnic monitories into the state structure. As such, Hmong and Yao are not reactive groups left behind by the majority Kinh and the Vietnamese state, but need to be understood as active agents. In addition to new development programs being implemented in the uplands, including the push for the use of hybrid seeds, climate variability poses a possible threat to food and livelihood security. I argue that Hmong and Yao need to respond to the environmental reality of changing weather conditions and also negotiate state policies in an effort to maintain endogenously appropriate livelihoods.

# CHAPTER 4 - METHODOLOGY

> The qualitative researcher acknowledges that people who have direct life experience with a phenomenon know more about it than she does; that *they* rather than *she* are the experts (Auerbach and Silversten 2003, 26).

In this chapter I outline the research design which supports this thesis including my data collection and analysis methods, and a discussion of my practical fieldwork experiences in Sa Pa District, Lào Cai province in northern Vietnam in 2012 and 2013. My examination of food security and livelihood vulnerability relies on the use of qualitative research methods. As Auerbach and Silverstein (2003) state above, qualitative research requires the researcher to release control over the knowledge-production process; this approach dovetailed nicely with my goal to have research participants highlight and discuss their own concerns in addition to responding to my questions.

This research is based on data I collected during ten weeks spent in Sa Pa District between May and July 2012 and an additional field season of six weeks in June and July 2013. After a brief stop in Hanoi when I first arrived in Vietnam in mid-April 2012, I spent ten days in Sa Pa town acquainting myself with the area by trekking to surrounding villages with several Hmong guides, having informal discussions with Hmong and Yao as well as Kinh residents, and making contact with potential research assistants. This initial introduction was followed by eight weeks spent interviewing twenty-eight Hmong and Yao householders and conducting a participatory photography project with seven Hmong students from a local social enterprise. In 2013, I had the opportunity to complete follow-up interviews with ten of the Hmong and Yao householders whom I spoke with in 2012.

As England (1994, 84) states, "We do no conduct fieldwork on the unmediated world of the researched, but on the world *between* ourselves and the researched." Thus it is necessary to recognize the active nature of the researcher in the research process. Since data is generated through interactions between the researcher and the "world of the researched," the researcher needs to be placed within the research, and not simply as a passive observer (*ibid.*). By eschewing the idea of "uncontaminated data," in this chapter I consciously highlight how this research is socially constructed, namely how personal decisions and circumstances inform the design, conduct and interpretation of this study (Miller and Brewer 2003, 259). By employing critical reflexivity, or "examining the way one's own subjectivity influences one's research," I examine how unequal power relations, research settings and inter-subjectivities shape this representation of climate vulnerability in Vietnam's northern uplands (Auerbach and Silverstein 2003, 27). While fixating on self-representation is a stated danger of the

reflexive activity (Robertson 2002), it provides a continual impetus for constructing an understanding of my positionality.

I begin this chapter with a discussion of my field sites (Section 4.1) and my sampling strategies (Section 4.2). In Section 4.3, I discuss my methods: participant observation supplemented my use of informal conversational interviews with Hmong and Yao householders, and informal conversational and semi-structured interviews with a selection of key informants. Finally, though the results were not what I anticipated, my attempt to use Photovoice, also provided a third key source of data. In order to work my data into a legible form I employed thematic coding for data analysis (Section 4.4). Finally, I further elaborate on the relationships that shaped this research. In Section 4.5, I discuss negotiating with various gatekeepers and working with my five Hmong and Yao research assistants, whose assistant made this entire research possible. In Section 4.6, I discuss research ethics, politics in the field and how I am positioned within this research.

**4.1 Field Sites**

This research was conducted in mountainous northern-most Lào Cai Province in northern Vietnam (see Figure 1.1). To conduct this fieldwork, I established my home base in Sa Pa town, a major tourist town in Sa Pa District, Lào Cai. This location was chosen as a proxy for the northern uplands due to several characteristics, including favourable conditions for physical and social access to field sites.

Sa Pa town is surrounded by numerous heterogeneous ethnic minority communes inhabited by a mix of Hmong, Yao, Giay or Tày households and hamlets, which reflects the multi-ethnic nature of communes in the region (McElwee 2004; see also Michaud, Turner and Roche 2002). Located near the Mường Hoa river valley, Sa Pa is surrounded by numerous villages in mountain and valley locations. Many of these are accessible by way of a good road transportation network. Furthermore, there is documented evidence of climate variability affecting households in the area (Bonnin 2011). As such there is easy physical access to a pool of suitable individuals from which to sample (see Section 4.2). Research participants came from 8 villages located in both mountain and valley locations; these were Cát Cát, Lao Chải, Giàng Tà Chải, Tả Phìn, Bản Hồ and Sử Pán as well as Ý Linh Hồ and Trung Chải (see Research Area in Figure 4.1). I conducted research on the ground in the first six villages while participants from the latter two were involved in the photography project and I did not get the opportunity to visit their homes due to distance and time constrains. At the outset of my field season I had intended to visit several other villages including Bản Khoang; however, one gatekeeper warned me against visiting several of these locations (discussed in Section 4.5).

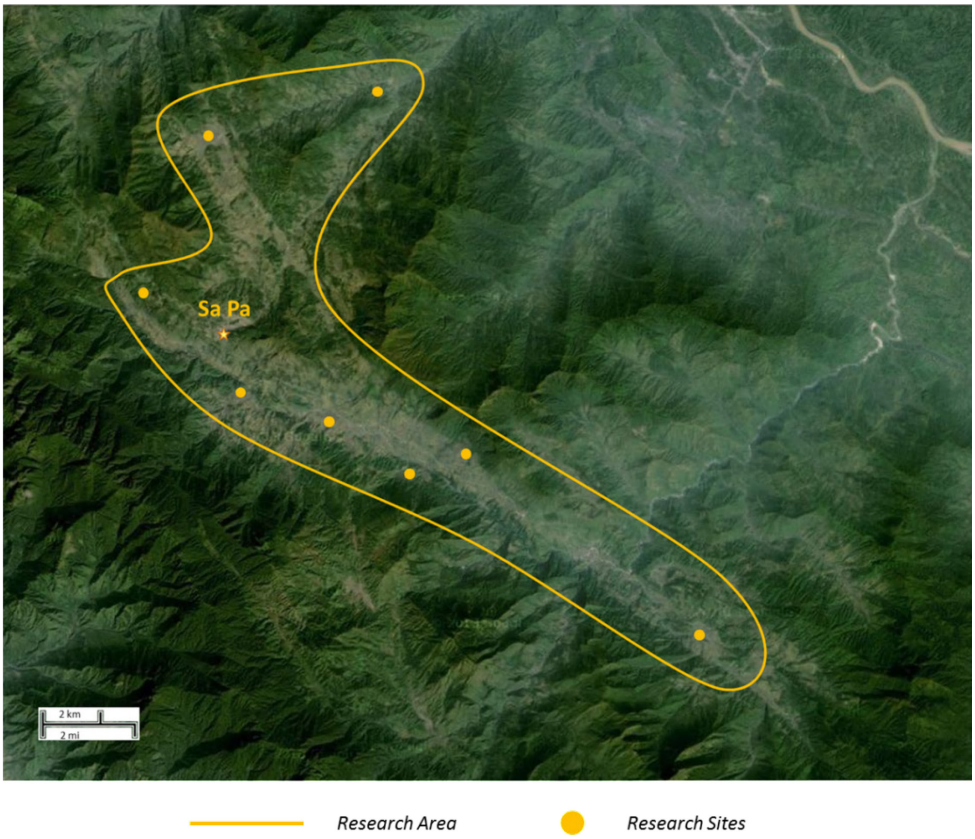


**Figure 4.1 Research Area and Research Sites in Sa Pa District**

Social access, or the ability to effectively engage with research participants, was facilitated by my supervisor's long-standing academic research connections in the area. As a result, her network of professional contacts afforded me important introductions to gatekeepers and possible research assistants, as well as aided with logistical issues. Moreover, Sa Pa's burgeoning tourism industry, which provides employment opportunities for trekking guides to conduct excursions to visit local ethnic minority villages, meant there was a group of Hmong and Yao women with ample English-language skills and, equally valuable, local knowledge that could be potential research assistants.

Most field sites could be reached within thirty to forty-five minutes on motorbike from Sa Pa town while closer sites like Cát Cát village could be reached within a 20 minute walk. At the beginning of the field season, I trekked on foot to closer villages; however as this could take up to five hours I soon switched to hiring motorbikes in order to save time and be able to arrive at the village with sufficient energy and time to conduct multiple interviews. Motorbike drivers routinely dropped my research assistant and I off in the village centre and then we would walk around the village and approach interviewees' homes on foot.

## 4.2 Sampling Strategies

Through a combination of chain referral and purposive sampling techniques a total of thirty-five Hmong and Yao individuals participated in this research. In 2012, this included twenty-two Hmong and Yao householders (Section 4.2.1), six Hmong and Yao key informants (Section 4.2.2) and seven Hmong mature students (18 years or older) from an educational cooperative in Sa Pa who participated in the photography project (Section 4.2.3). In 2013, I completed follow-up interviews with 10 of my previous participants.

### 4.2.1 Interviewees

The central focus of my research on Hmong and Yao householders' perceptions, experiences and responses to food insecurity and livelihood vulnerabilities meant this group formed the core component of my participant sample. Twenty-two individuals were recruited through chain referral sampling. Also known as snowball sampling, this technique involves identifying individuals with the required characteristics and then asking them to refer others in similar situations (Berg 2007; Bradshaw and Stratford 2010). One advantage is that this technique can facilitate contact with vulnerable groups or other hard-to-access populations (Miller and Brewer 2003). Before broadening my research focus, I was interested primarily in individuals who had experienced extreme weather impacts. Since kinship networks are a key social feature of Hmong and Yao communities and an important avenue for sharing information, chain referral was an effective way to identify potential participants. In addition to following leads suggested by interviewees and my Hmong and Yao research assistants, I used contacts already established by my supervisor and previous Master's and Doctoral students from our research lab. One drawback of this technique is that by favouring inter-relationships, individuals who are not connected with the network may be overlooked (Miller and Brewer 2003). As a result of this concern, I also tried to target research participants outside this network, sometimes simply approaching a householder as my research assistant and I walked through a village.

Convenience sampling, which "relies on available subjects or those that are close at hand" was also employed sparingly when unexpected opportunities arose in the field (Berg 2007, 43). For instance, I was able to interview one participant's neighbour because she was present for part of an interview and expressed an interest in what we were doing. Several drawbacks of this technique are that participants may not have the desired characteristics and that relying solely on this technique will generate a biased sample (Berg 2007; Rice 2010). However, I found that using convenience sampling in a limited

way allowed me to counter the potential bias of chain referral sampling and provided several data rich encounters.

I attempted to obtain equal numbers of Hmong and Yao interviewees and equal numbers of male and female as well as older and younger householders in order to counter bias and encourage diversity within the sample. Though this proved difficult I did manage to get a broad range of participants. My final interviewee sample comprised twelve Hmong and ten Yao respondents, 16 women and six men. In 2013, my follow-up sample included seven Yao and three Hmong respondents, eight women and two men, from three villages, Tả Phìn, Bản Hồ and Lao Chải (Table 4.1). One of the challenges with recruiting male participants was that they were usually not around the house when I would arrive to do an interview during the day. I was often told by their wives that they were in the fields or working elsewhere and if a man did enter the house while an interview was in progress he would say hello and then usually disappear elsewhere. Out of six male respondents five were in their 50s or older because these men are considered too old to work in the fields and so they remain at home during the day. For female interviewees, six of the sixteen were in their 20s, six were in their 30s and 40s and four were older.

In order to get a broad sample of micro-climate conditions, I focused my sampling to cover both upland and valley villages around Sa Pa town. It was also important to get a broad sample of experiences in these different areas due to differences in livelihood strategies.

### 4.2.2 Key Informants

Key informants may occupy important social positions within their communities, have access to specialized knowledge or possess the ability to bridge the spaces between the researcher and research participants (Payne and Payne 2004; Dunn 2010). As Payne and Payne (2004, 210) state: "we deliberately select key informants because they are *not* typical: they know more about the community or organization than other people." As such, for this project key informants were selected based on their ability to contribute to the research in ways other research participants might not have been able to. Indeed, one of my key informants was a Hmong shaman who was able to fill the gaps in my understanding about how local rituals are tied to food security, while the other five individuals were my research assistants/interpreters.

As Temple and Young (2004) state, including research assistants as key informants allows for a fuller discussion about how their experiences and perspectives transform the data they transmit (also

Edward 1998). I also found that through their involvement in the interviews, research assistants enhanced the robustness of the data through active involvement in the exchange. I encouraged a moderate degree of interpreter independence to ask follow-up or probing questions which at times generated data I had not anticipated (Williamson et al 2010). For instance, during interpretation

**Table 4.1 Research Participant Overview & Data Collection Methods Used**

| | | | 2012 | | | 2013 |
|---|---|---|---|---|---|---|
| **Village / Informant** | **Gender** | **Ethnicity** | **Interviewee** | **Photography** | **Key Informant** | **Follow-Up Interview** |
| **Cát Cát** | | | | | | |
| **Lee** | **M** | **H** | | x | | |
| **Kee** | **M** | **H** | | x | | |
| **Ý Linh Hồ** | | | | | | |
| **Cai** | **M** | **H** | | x | | |
| **Tee** | **M** | **H** | | x | | |
| **Tả Phìn** | | | | | | |
| **Thi** | **F** | **Y** | x | | | x |
| **Xuan** | **F** | **Y** | | | x | x |
| **Ngan** | **M** | **Y** | x | | | |
| **Ja** | **F** | **H** | x | | | |
| **San** | **M** | **Y** | x | | | x |
| **Thao** | **M** | **H** | x | | | x |
| **Tien** | **M** | **Y** | x | | | x |
| **Lien** | **F** | **Y** | x | | | x |
| **Choi** | **F** | **Y** | x | | | x |
| **Sai** | **F** | **Y** | x | | | |
| **Lao Chải** | | | | | | |
| **Bo** | **F** | **H** | | | x | |
| **Daw** | **F** | **H** | x | | | |
| **Kia** | **F** | **H** | | | x | x |
| **Mai** | **F** | **H** | x | | | |
| **Di** | **M** | **H** | x | | | |
| **Lu** | **F** | **H** | x | | | |
| **Yi** | **F** | **H** | x | | | |
| **Kaw** | **F** | **H** | | | x | |
| **Xia** | **F** | **H** | | x | | |
| **Me** | **F** | **H** | | x | | |
| **Giàng Tà Chải** | | | | | | |
| **Cua** | **F** | **H** | x | | | |
| **Mo** | **F** | **H** | x | | | |
| **Man** | **F** | **Y** | x | | | |
| **Kao** | **M** | **Y** | x | | | |
| **Lich** | **F** | **Y** | x | | | |
| **Sử Pán** | | | | | | |
| **Paa** | **F** | **H** | | | x | |
| **Sua** | **F** | **H** | | | x | |
| **Tau** | **F** | **H** | x | | | |
| **Bản Hồ** | | | | | | |
| **Na** | **F** | **H** | x | | | x |
| **See** | **F** | **H** | x | | | x |
| **Trung Chải** | | | | | | |
| **Saw** | **M** | **H** | | x | | |

most of my assistants would provide additional commentary or substantiate information by relaying stories about how their families had similar experiences. Acknowledging the presence of research assistants/interpreters and validating their role as producers of knowledge encouraged access to a fuller, more robust understanding of local experiences (Temple and Edward 2002; Larkin et al 2007).

I recruited my research assistants through referral from my supervisor and others in our research lab. The other two informants were recruited through referral from two of my assistants. Similar to the skewed nature of the core interview sample, my key informants were all women and the majority (four out of six) were in their twenties. Two were Yao from Tả Phìn village and four were Hmong, with two coming from Lao Chải and two from Sử Pán. Furthermore, three of my research assistants/key informants had spent several years living outside their home communities in Sa Pa, one living in Hanoi and two living in northern Europe. These experiences most likely informed their opinions and perspectives, but also provided them with a broader context for comparisons (as well as their families remaining in their home village with resources not available to other families).

### 4.2.3 Photovoice Participants

Photovoice is a qualitative research method which puts cameras in the hands of informants as a way to allow them to capture their perspective on an issue (see Wang and Burris 1997). It is a participatory approach wherein participant-photographers record and select which images they think are the most relevant to the research question and that they would like to discuss further with the researcher. Due to its participatory nature, recruitment through established partnerships is common and has been shown to increase community participation (Hergenrather et al 2009; Catalani and Minkler 2010). In fact, Rose (2008) recommends that the researcher should have an established relationship with the community before broaching the idea of a Photovoice project. As a result of these considerations, various purposive (see Neill et al. 2011) and chain referral (see McIntyre 2003) sampling techniques have been used to identify communities for Photovoice projects. For my research, I was fortunate enough to partner with a local social enterprise providing educational opportunities to ethnic minority youth in the Sa Pa area. This relationship provided both opportunities and constraints for my research (discussed further in Section 4.6). At the beginning of my fieldwork, I volunteered with this organization for six weeks working with a group of older Hmong students who were interested in becoming trekking guides. In early June, I invited those students over the age of 18 to participate in a photography project exploring their family's food systems. Initially six students expressed interest in participating but two needed to withdraw as they were too busy with trekking and other work

commitments. I proceeded with the group of four and then later that month approached a second group of students and recruited three more participants aged 18 and over. In all, I recruited five male Hmong participants and two female Hmong participants. Of these, four lived in villages that were relatively close to Sa Pa and went home every evening and three students boarded at the school during the week and returned home on weekends.

#### 4.2.4 Summary of sampling strategies

Adapting Miles and Huberman's work (1994), Curtis et al (2000) posit six attributes for establishing the rigour and validity of a sampling strategy for qualitative research: it should 1) be relevant to the research questions, 2) generate abundant data on the chosen phenomenon, 3) contribute to the generalizability of the research, 4) produce reliable data, 5) be ethical, and 6) be feasible (also see Baxter and Eyles 1997).

Overall my sample satisfied all these requirements to some degree. In terms of the first requirement, when I started my research, I intended to focus on the effects of climate variability on food security. After a couple of interviews I acknowledged that interviewees kept mentioning other vulnerabilities that needed to be addressed as well. As a result, I reformulated my research questions to better address participants concerns which further contributed to generating useful data on food security vulnerabilities. In terms of generalizability, this sample is not statistically representative nor was it meant to be. Rather the final sample represents a diversity of age, gender and location characteristics among Hmong and Yao participants in the Sa Pa area. While the Photovoice participants are relatively younger than the other Hmong householder interviewees, recruiting this younger group, especially the five young Hmong men, helped to fill the gap in the larger core interview sample. It would have been ideal to have a similar Yao youth group but there is no comparable Yao social enterprise that I could partner with and the logistical challenges of recruiting this group given time constraints were too great. Generally key informants were also younger than the core interviewee sample.

The reliability of the sample was reinforced by the replication of certain responses, experiences and concerns to varying degrees across the sample while the use of several sampling techniques greatly enhanced the feasibility of the process. Furthermore, follow-up data collected 2013 provided a key opportunity to gather new data, but also to validate responses from some interviewees. Finally, ethical considerations were a continual concern which affected not only who participated in the research, but also how I engaged them (discussed further in Section 4.6.2).

### 4.3 Interviews and Participant Observation Methods

This research involved numerous treks to ethnic minority villages which afforded opportunities for participant observation as well as conversational interviews with Hmong and Yao householders. During these data collection treks I also built rapport with my research assistants which allowed me to gain their perspectives on my research topics and later to invite them to participate in semi-structured interviews as key informants. As well, my time volunteering with the local social enterprise allowed me to connect with participants for the participatory photography project. In addition to these groups which make up the majority of my research participants, I also attempted to engage non-governmental organizations and local academics working on climate change issues with upland ethnic minorities. Unfortunately, this last group was more difficult to access.

Shortly after arriving in Vietnam, I started contacting international NGOs conducting projects related to climate change and ethnic minority livelihoods in the northern uplands. However, my emails and follow up phone calls went unanswered. Finally, on a brief trip to Hanoi in June I visited the head office of one organization and was able to set up a meeting; however this was subsequently cancelled by the potential interviewee because of a scheduling conflict. I never received responses to my inquiries from the other NGOs. My sense is that these professionals were both too busy with their own work and perhaps uninterested in mine. Furthermore, the language barrier may have contributed to this disinterest. Though I did offer to bring along a Vietnamese translator my inquiries were sent in English and therefore may not have received much attention to begin with. In the end I decided to abandon this research avenue and focus on Hmong and Yao experiences.

I did receive one response from a Vietnamese academic who conducted his research in a neighbouring province. He was studying abroad and therefore we settled on an interview via Skype. While this semi-structured interview was ultimately data-rich and provided some excellent comparative material, my internet connection was terrible and resulted in some frustration on my end as the connection was dropped multiple times. The interviewee took it all in stride and it did not seem to affect our rapport.

#### 4.3.1 Participant Observation

There is a wealth of experience that exists beyond the structured spaces that certain methods create in the research arena. Kearns (2010, 245) proposes participant observation as one way to "develop understanding through being part of the spontaneity of everyday interactions." As the name suggests, participant observation involves spending time within a community, and can involve talking to people, asking questions, listening and observing (Payne 2004, Laurier 2010). The extent of these interactions

can range along a continuum from solely observing, where the researcher is merely present and watching, to complete participation, where the researcher may spend substantial amounts of time becoming immersed in the phenomenon under scrutiny (Payne 2004, Kearns 2010). During my fieldwork, I spent numerous hours in Hmong and Yao villages, walking around rice paddies, observing the agricultural landscape, helping (or more precisely trying to help) prepare meals and informally talking with householders. These activities provided important visual stimuli and prompts for householder interviews or discussions with my research assistants. For instance, during my first treks around Sa Pa at the end of April and beginning of May, I observed that many of the terraces en route to Lào Chai and Tả Phìn communes were dry and filled with hard grey dirt (see Figure 4.2). My research assistant confirmed that the weather had been unseasonably sunny and dry and the planting schedule had been delayed as a result. This information prompted my initial questions regarding climate variability and its impacts on Hmong and Yao food systems.

During subsequent treks, I would make note of the activities occuring in the fields, how much water there was in rice fields, the general state of the crops and weather conditions. During interviews I would also make note of household characteristics, such as the relative size of the home as well as the presence of motorbikes and other technology as a proxy for household wealth. I also noted how many sacks of rice were stored in loft spaces, what types of food were served if we were invited to partake in a meal, and food preparation methods. Data collected during participant observation allowed me to find concrete examples and provide immediacy to abstract ideas like "food security" and "climate variability" thereby increasing the value of other research encounters. For example, if there were no rice sacks visible I could use this to broach the issue of food shortages during householder interviews.

One important critique of this method is that by merely being present researchers can affect the phenomena they wish to observe (Cook 2005; Kearns 2010). Indeed, while I was interested in observing the kinds and amounts of food consumed at meals, my presence meant that sometimes individuals would go out and buy foods, especially meat, if they knew in advance that I was coming. Also, because I would bring noodles, fruit or other food items to compensate interviewees for their time, these would regularly be served if my research assistant and I were invited to stay for a meal. However, while our presence at the dinner table might have influenced what was served, participating in meals also provided another opportunity for discussing householders' food security concerns.

**Figure 4.2 Dry rice paddies near Lào Chai, May 2012 (Source: Author)**

4.3.2 Hmong and Yao Householder Interviews

Interviews are an effective means for exploring people's opinions and experiences because they allow interviewees to describe and explain their lives (Valentine 2005; Dunn 2010). Research interviews range in terms of flexibility and the degree of interviewee-control along a continuum from structured interviews with set, standardized questions to unstructured or conversational interviews wherein questions are more interviewee-driven (Dunn 2010; Winchester and Rofe 2010). Semi-structured interviews lie in the middle with the interviewer bringing pre-determined themes or questions but letting the interview develop in a more conversational, informal manner (Longhurst 2010). The twenty-two Hmong and Yao householder interviews included in this research ranged from unstructured, conversational interviews to more slightly more structured conversational interviews. This range allowed for a more flexible interview style that could be adapted to specific contexts (Miller and Brewer 2003). The ultimate structure of these exchanges depended on the interviewee's willingness to discuss their experiences, which could be influenced by numerous factors such as the level of rapport between the interviewee, my research assistant/interpreter and myself (discussed further in Section 4.5). As Dunn (2010) states, the interviewer-interviewee relationship is critical to effective interviewing. At the outset of the interview I would state the general aim of my research; if interviewees took charge of the discussion we would explore their issues and I would interweave some of my questions. On the other hand, if I needed to draw out interviewees I would begin asking about broad themes and then allow for tangents if and when they arose. Having an established

relationship facilitated follow-up interviews. Even a year later in 2013, follow-up interviews generally flowed more easily than initial interviews.

Interviews were held in participants' homes since my research assistant and I approached potential interviewees who were in or around their houses. This decision was based on the assumption that setting interviews in a participant's home would foster a more relaxed exchange (Valentine 2005). However, three interviews were also held in the home of one of my research assistants because on several occasions friends and neighbours came to visit her and consented to be interviewed after a brief chat. As these individuals were familiar with this setting having been there multiple times, it did not appear to negatively influence data generation. However, it did mean that I did not have access to the same visual prompts and observations provided by the home setting as available in other interviews.

Informed consent was obtained orally because the majority of participants were illiterate. The informed consent process involved introducing myself as a researcher and stating my affiliations, providing an overview of the research project and its aim as well as discussing the participant's rights. I also asked if I could use a digital recorder to record the interviews. Since the interviewees were predominantly illiterate, it might have been off-putting for me to take written notes during interviews so I opted for using a digital recorder. Despite my initial concerns no one refused to be recorded. Recording interviews allowed me to conduct slightly longer interviews than if I had been relying solely on my memory.

On two occasions during my first fieldwork period, I was also able to conduct follow-up interviews with participants about one-month after our initial interview. Since the first interviews were held in mid-May when the weather was particularly dry and they were both concerned with how the weather would affect their crops, the second interviews provided a very beneficial follow-up about how they had fared. Follow-up interviews in summer 2013 provided another unique opportunity to gather follow-up data about how interviewees were faring one-year after their initial interviews.

#### 4.3.3 Hmong and Yao Key Informant Interviews

Key informant interviews involved semi-structured interviews where the discussion was focused on specific topics or themes that arose in other interviews. For instance, the importance of food in Hmong funerals was mentioned several times during interviews, so a focused interview with one of my research assistants improved my knowledge about the spiritual significance of the food items

involved as well as the social obligations for bringing food to funerals. I tried to compensate key informants for their time in a variety of ways: offering rice noodles and fruit, buying meals when we were out or buying small gifts.

#### 4.3.4 Photovoice: trying out a new method?

Wang and Burris (1997) developed Photovoice to achieve three main goals: 1) to allow individuals to record their viewpoints and concerns, 2) to promote critical reflection and dialogue about community issues, and 3) to convey the resultant knowledge to policymakers. Thus, within their method visual images act as a promoter of social change by providing an opportunity for communities to speak out. The approach has been useful for researching topics ranging from peasant perspectives on deforestation in China (Zackey 2007) to the use of community food programs in Nunavut (Lardeau, Healey and Ford 2011). While Photovoice promotes participatory research, the degree of community involvement can range from the community being included as a full research partner from the initial design phase (see Castleden, Garvin and Huu-ay-aht First Nation 2008) to community participation being limited to data collection and photo analysis, which is more frequently the case (Catalani and Minkler 2010).

My initial conceptualization of using photography in my research was to meld Photovoice with mobile interviewing techniques, something I will call "photo-trekking" (see Brown and Durrheim 2009). Representatives of the local social enterprise were enthusiastic about the proposed project and offered their support. Food security issues were recurrent themes in my householder interviews, yet as a relative newcomer to the Sa Pa area I was still unfamiliar with the day-to-day realities of Hmong and Yao livelihoods. As such, participatory photography seemed like an effective way to gather more in-depth data about food systems, since I could gain a better understanding of the visual and cultural landscape through photographs. I chose to add a mobile interviewing element since accompanying the participant on one of their photo-taking excursions would provide me with an opportunity to have a preliminary conversational interview which would allow the participants and me to better contextualize pictures and issues during later discussions. As Brown and Durrheim (2009, 915) state, mobile interviewing can create new kinds of "spatially determined knowledge" as elements of the landscape become crucial prompts in the discussion. Furthermore, mobile interviewing encourages interviewee-driven dialogue and can increase their participation in the data generation process which dovetailed with the participatory goal of Photovoice (*ibid.*).

The framing questions I used to focus participants were:

1. how does your family grow food?
2. what do you do if you do not have enough food?

Initially, I tried photo-trekking with two participants who had been my students during my volunteer period. However, moving from a "teacher" role to a "teach-me" or participatory research facilitator role proved problematic. My volunteer-teaching class had focused on how students could become more effective trekking guides. Therefore, we had discussed what a good trekking guide should do. When we started the first photo-trek one of my participants 'put on his trekking-guide cap' and forgot about taking pictures, except for a couple of scenery shots. For the most part he would point things out that related to Hmong food-systems for my picture-taking benefit. Then at his home, he continued his guide role and showed me around, explained what things were and answered questions. As such, it felt that my presence was disruptive instead of creating novel spaces for him to reflect and discuss his experiences.

Language also proved to be a barrier. Since I do not speak Hmong, informative discussions during photo-treks really depended on our ability to converse in English. While both the photo-trek participants could manage simple naming and explanations I felt they would have had more to say if they were not searching or struggling for words. Having an interpreter present may have addressed this issue but also may have compromised the aim of Photovoice further. During the photo-treks, one of my main concerns was with ensuring that photographs were truly participant-derived; that meaning participants took a photograph because they believed the image was relevant for them. Therefore, while I made several comments reminding the two photo-trekking participants to take pictures, I tried to minimize my presence in the decision-making process. After these first two treks I realized that short of not being present I could not negate my impact.

As a result of these experiences, I dropped the 'trekking' part of my approach and adopted a more traditional Photovoice approach where participants were loaned digital cameras, took photographs on their own and then returned to discuss them. I also decided to have a Hmong interpreter present during later photo discussions so participants would not be constrained by their English language abilities.

The five remaining students were loaned cameras for several days to take pictures individually while the first two students were also offered the cameras if they wanted to take pictures on their own. However, both declined saying they felt they had enough pictures. I also removed the second part from the focus statement, "what do you do if you do not have enough food," because participants

expressed difficulty in capturing this idea in a photo. As a result, I opted to ask questions about food shortages during the discussion session.

Following the photo-taking exercise, individual discussions of the participant's photos were held. Participants expressed enjoyment at viewing their photos on my laptop, since the images could be enlarged bigger than standard photo size so instead of printing out photos for the discussion session, we viewed them digitally. While Photovoice traditionally involves a focus group discussion of participants' images, coordinating seven participants and an interpreter proved difficult. Furthermore, even though participants knew each other and many were friends, they were very shy about speaking up in a group setting when we had our initial meetings to discuss the project. As such, individual discussions were favoured. Traditional Photovoice discussions are also intended to be participant directed with participants choosing which photos they wish to discuss (see Wang and Burris 1997), but logistical constraints (i.e. computer access for viewing digital photographs) meant that participants could not choose a selection of photographs before the discussion and so we ended up scrolling through and discussing the majority of each participant's portfolio.

Photo discussions were held at the social enterprise and would start with a brief discussion of whether participants liked the photo taking exercise and why, as a way to ease into the conversation as well as to learn more about their experiences of the process. With each new photo, I would ask "What is this?" which usually elicited either a one word answer or triggered a discussion. I would also pose a couple of probing questions to get at more substantive issues. For instance, if the photo was of a pig I would ask how many pigs the family had, what they were used for, whether they had pigs die before and so on. The help of a Hmong interpreter facilitated discussion; several times initial one-word answers in English were followed by longer explanations in Hmong.

Because I needed to ask a lot of questions to prompt discussion, I felt I was a little too present in the process for it to be considered true Photovoice and this method became more comparable to photo elicitation, namely "inserting a photograph into a research interview" (Harper 2002, 13). In retrospect, while the entire project from recruitment to wrap-up spanned six weeks, there should have been more focus on fostering participant buy-in for the project to be considered truly participatory. For instance, a smaller introductory one-week photo-taking and discussion exercise may have allowed participants to become familiar and more comfortable with the format and process before launching the project.

To compensate and thank participants, I asked them to choose ten of their photos which I had printed and laminated for them in Sa Pa and also gave them rice noodles and fruit to take home to their families. A selection of their images were also printed and displayed at the social enterprise.

While the use of photography was not what I anticipated for this research, nonetheless I found that it was a worthwhile activity. For starters, the use of images provided a greater depth to interviews because they provided an anchor for discussions. Instead of asking abstract questions, the images provided clear prompts. Furthermore, because this research activity allowed me to access a younger group of individuals it illustrated that the food security and vulnerability concerns discussed by older householders are paralleled by younger individuals who are not yet the head of their households. As a result, these individuals may be more open to trying innovative methods for reducing their future vulnerabilities.

Thus, the use of participant observation, conversational and semi-structured interviews, and participatory photography, allowed a range of Hmong and Yao individuals to participate in this research. Using multiple methods and multiple sources facilitates methodological and data triangulation as well as increasing the validity of the resultant data (Miller and Bewer 2003; Cope 2010). The use of these three methods provided different ways for discussing experiences of food insecurity and climate variability among Hmong and Yao communities in similar, yet distinct, social and physical spaces.

### 4.4 Data Analysis

In order to reduce my qualitative interview and participant observation data to a legible form, I employed thematic coding analysis. My analysis started with the transcription of my interview data. This began in Vietnam and was completed shortly after I returned home. As Brown notes (2009, 927), "transcribing is generative analytically, a creative and ruminative engagement, which is, in effect, interpretive and constructive." At this stage I also begin to memo my data. As Miles and Huberman (1994, 72) state, this involves tying together "different pieces of data into a recognizable cluster, often to show that those data are instances of a general concept." Memo-ing allowed me to make note of interesting connections or recurring issues as they arose. Furthermore, this was an essential step in tackling a potentially overwhelming amount of transcribed material: memo-ing allowed me to gain a first indispensable finger hold on a mountain of data. I reviewed these memos as I moved into coding.

For the next step, I employed a method similar to that described by Auerbach and Silverstein (2003): I reduced my raw data to relevant text, coded repeating ideas and themes and then abstracted these according to my theoretical structures. For coding, codes were distilled from my pre-fieldwork conceptual framework and contextual readings, as well as from my post-fieldwork memos and other topics that emerged from the data itself. These *a priori* and *a posteriori* codes allowed me to reduce my data and segregate themes (Cope 2010, Saldana 2013). I completed two rounds of coding which reduced over 500 pages of transcribed material into 71 codes and these codes into 6 main themes. These themes are: 1) Food system and livelihood components, 2) Extreme weather/Climatic stresses, 3) Non-climatic and other livelihood stresses, 4) Extreme weather/climatic stress response strategies, 5) Non-climatic and other livelihood stress response strategies, and 6) Strategies for securing food.

### 4.5 Research Environment / Accessing the field

The research environment is made up of a complex landscape of social and political relationships which can lead to fruitful experiences when it is successfully negotiated. In this section I elaborate on several of the key elements which defined my experiences and the outcomes of my research in order to further situate myself in the research and to highlight the subjective nature of this research endeavour.

#### 4.5.1 Gatekeepers

As Clark (2011, 487) states, gatekeepers facilitate access, or provide "physical and social bridges," to research communities. For instance, through my partnership with the local social enterprise, I met one of my primary research assistants as well as connecting with the individuals who participated in the participatory photography project. However, as Heller et al (2011) state, gatekeepers can act as both facilitators and barriers to research (also see Miller and Brewer 2003). For example, the trade-off of the above partnership was that I had to limit my research activities in minor ways. Since I was a volunteer, the enterprise's founder considered that I was a representative of the organization and several times warned me against interviewing in specific villages that were deemed sensitive by the local government. As Horwood and Moon (2003) state, due to the researcher's status as an outsider, their presence "constitutes a potential risk" to the gatekeeper or the community they represent. As such, when I was told that my presence in certain villages could reflect badly on the social enterprise, it was a means to mitigate the risk to the organization.

4.5.2 Working with Research Assistants/Interpreters

It is no understatement that this research could not have been possible without the help of my five research assistants, situating my work far from the myth of the 'lone ranger research' (cf. Geertz 1983; Davidson Wasser and Bresler 1996). Though rarely acknowledged, assistants and interpreters are central to the production of knowledge in qualitative research (Temple and Young 2004, Larkin et al 2007, Turner 2010). The two Yao and three Hmong female assistants involved in my research were invaluable for their ability to set the tone of the interview, their enthusiasm, their insights and their patience; not to mention their ability to dislodge our motorbike when we got stuck in the mud or to procure gasoline when we ran out and got stuck on the side of the road. Most important was their ability to translate and interpret discussions in a cross-language and cross-cultural research setting; as Larkin et al (2007, 468) state, "the translator has the potential to influence research significantly by virtue of his or her attempt to convey meaning from a language or culture that might be unknown to the researcher."

Two of my research assistants had previously held similar positions and three were new to the role. As Kapborg and Bertero (2002) state, it is crucial to prepare assistants and interpreters for their role as a misunderstanding or a misinterpretation of the research aim may distort the data collected (see also Williamson et al 2011). Therefore, before engaging my assistants, I provided a brief overview of the project, what I hoped to accomplish and how. Before we started interviewing, I also talked about informed consent and why it was important. At first, I did not give any specific instructions about how to interpret or translate. I adopted the view that as interpreters their main role was not the verbatim translation of participant responses; rather, they were "vital cultural broker[s]" and charged with the difficult task of translating meaning (Turner 2010, 213; also Edwards 1998, Murray and Wynne 2001, Kapborg and Bertero 2002, Temple and Young 2004, Williamson et al 2011). After seeing how well they handled initial interviews I did not feel the need to alter their approach.

It is important to note that the success of interviews often depended on the research assistant as they set the tone for the discussion through their initial interactions with interviewees. In one instance this became very apparent. One day, my RA needed to be back in Sa Pa by early evening and even though we were interviewing in the early afternoon her anxiety about getting back in time caused her to be distracted (i.e. constantly checking her phone for the time). As a result, the interview was stilted and at times I needed to repeat questions and ask for further clarification.

As Scott et al (2006) state, when using an interpreter there are three actors in the production of knowledge: the researcher, the researched and the interpreter (also Temple and Edwards 2002; Turner 2010). The fact that my RAs were mainly young Hmong or Yao women interviewing other Hmong or Yao women is important to note as matching socio-demographic characteristics is one way to increase participant comfort and facilitate more open exchanges (Williamson et al 2011). However, it is equally important to note that even when interpreter-interviewee culture is matched other factors such as age, gender or social status can influence the relationship (Kapborg and Bertero 2002). For instance, one of the male Hmong photography participants was noticeably shyer with my female Hmong RA present.

## 4.6 Positionality, Ethics and Politics

A researcher's positionality, or one's "social, locational, and ideological placement relative to the research project or to other participants in it," underlies his or her subjectivity, relative power in the research exchange and the formation of research relationships (Hay 2010a, 383). In addition to critically reflecting on these issues, conducting fair and respectful research also requires researchers to be "ethically reflexive" and act in ways that minimize participant harm (Hay 2010b). This section outlines how positionality, ethics and politics influenced the type and quality of data I collected in the field.

### 4.6.1 Positionality

Robertson (2002, 789) warns, that discussions of positionality can degenerate into a "form of self-stereotyping" if personal characteristics are essentialized rather than defined as fluid distinctions that "emerge and shift" throughout the research process. In terms of my fieldwork, I agree with Rose (1997, 315) who states: "Our identities do not pre-exist our performances of them." At the time of fieldwork I was 26 years old and in Asia for the first time. At different times and in different locales I performed different roles, namely: Foreigner, Tourist, Teacher, Volunteer, "Christine's and Sarah's friend" (referring to a previous PhD student and my supervisor) and so on which were quite different from the role I was actually there to play which was McGill Researcher. Indeed, as Bachmann (2011) also notes, I felt that through the course of fieldwork my perceived role as a researcher diminished as other roles and relationships developed and took precedent. This meant that at times I needed to re-assert the 'researcher' position. These experiences highlight the fact that, like the data generated by my research encounters, I, the researcher, am also situated and my position is "always contingent, contextual and constructed" (Chih Hoong Sin 2007, 477; Rose 1997).

My age, gender and status as a "foreigner" operated in multiple ways to facilitate and constrain my research. For instance, I felt that my age and gender made it easier to build rapport with most of my research assistants as we shared these characteristics. In turn, this camaraderie facilitated rapport building with participants during interviews, where the respectful, lively exchanges between my research assistant and I seemed to encourage similar exchanges with interviewees, especially if they were also women. Moreover, one of the reasons I think my participant sample is skewed more towards female voices is that my gender, and the gender of my research assistants, made female household members more accessible. Indeed, wives, mothers, sisters and grandmothers were more willing to sit and speak with us. Though men were sometimes present they would often leave us to speak with a female household member. On one occasion we had just sat down with a Yao man when his sister entered; he directed us to her saying that she could better answer our questions.

Being Caucasian, and thus a foreigner, was both an advantage and a barrier. For instance, like Tugualt-Lafleur (2007) found, being a non-Kinh outsider seemed to allow Hmong and Yao interviewees to be more openly critical of the Vietnamese state and perhaps more candid about their experiences than if I were a Vietnamese researcher. I also found that my foreignness in some ways was mitigated by my research assistants' Hmong or Yao ethnicity. Several authors have noted that research assistant/interpreter positionality can significantly affect the type and quality of data generated (Temple and Edwards 2002; Scott et al 2006; Turner 2010). While I was a foreigner, my research assistants were Hmong or Yao and generally interviewed other Hmong or Yao individuals; as such, by proxy of my research assistants I gained a certain measure of insider status. However, it was also important to note that my research assistants' positionality was fluid as well (Turner 2010). This was highlighted once when an interviewee spent several minutes asking questions and trying to figuring out who my research assistant was (i.e. where she was born, her family, her marital status, and so on) because she had never before encountered a Hmong woman working with a foreigner. Just as I was situated in relation to my research assistant, so too did I affect how she was perceived.

### 4.6.2 Politics, Power Relations and Ethics

The majority of the relationships involved in generating this data involved asymmetrical power relations, meaning that as a researcher I was in a position of greater power than the participants in terms of defining the research and its conclusions (Dowling 2010). While I tried to balance these relations through the use of more participant-driven methods, the application of ethical guidelines was also a way to further mitigate the potential harm caused by my "purposeful disruption of other

people's lives" (England 1994, 85). For instance, the act of requesting consent was an important measure for empowering research participants, thereby giving them the choice about whether or not they wanted to take part in the research (Berg 2007; Dowling 2010).

Despite these efforts to minimize the power imbalance and to be responsive to local needs, subtle manifestations of resistance highlighted that it was still present; for instance, one of my research assistants stated that sometimes participants answered "I don't know" not only to avoid questions but also as a way to cut the interview short. This may have been because the costs of participating (i.e. time commitment, boredom, and so on) outweighed the perceived benefits (i.e. rice noodles, fruit).

Compensation was another way to ensure the research relationship was not too exploitative. However, here I struggled with how many packages of rice noodles, mangoes or photographs were sufficient. Should I give enough for one meal or several? While I consulted my research assistants about the quantity of items I should give, I ended up adding a little more because I had the resources to do so.

This concern over the imbalance in research benefits was further highlighted on the follow-up visits I was able to conduct. When I was greeted warmly and called a friend by both these householders I began to wonder if asking more questions would be exploiting these feelings of friendship (see also England 1994; Bonnin 2010). While I returned because I was genuinely concerned about how these households were getting on since our previous meeting, I was also there to collect data. However, when I reminded them of my research project they were quite willing to answer some more questions.

### 4.7 Conclusion

In this chapter I introduced my field sites in the Mường Hoa valley, outlined the methods supporting this thesis, including my data collection and analysis methods, and foregrounded the socially constructed nature of this work. I also discussed my practical fieldwork experiences, including some challenges I faced. For this research, I completed conversational and semi-structured interviews as well as a photography project with participants that I recruited through a combination of chain referral and purposive sampling. My final participant sample represented a diversity of age, gender and villages among Hmong and Yao participants in the Sa Pa area. Throughout this research, I strove to establish the rigour and validity of my research process. In addition to methods and data triangulation, the replication of certain responses, experiences and concerns to varying degrees across the sample reinforced the reliability of my data. This was further strengthened by the follow-up data I collected in 2013. In the following chapters, I move into presenting my results and discussing my conclusions.

## CHAPTER 5 – CONTEMPORARY HMONG AND YAO FOOD SYSTEMS

In this chapter I map out Hmong and Yao food systems in Sa Pa district, Lào Cai province, as I begin to answer my first research question: to what degree are Hmong and Yao households maintaining food security through their livelihoods? I begin by analyzing the production processes and consumption practices of staple rice and corn crops (Section 5.1), followed by livestock (Section 5.2) and vegetables (Section 5.3). Then, I examine the inputs needed for food preparation (Section 5.4). Finally, I turn to focus on the importance of income-generating activities and analyze the necessity of cash inputs in current food systems (Section 5.5). Throughout, I draw on livelihood concepts from my conceptual framework to illuminate food systems and highlight the range of livelihood capitals that Hmong and Yao households require to produce, acquire and prepare the components that encompass their diet. In this way, I enumerate the myriad elements that Hmong and Yao householders require for food security. This chapter provides the foundation for evaluating the current state of food security and for my examination of food system stresses and vulnerabilities in Chapter 6. While Hmong and Yao are distinct ethnic groups, the similarities in their livelihood patterns in the northern uplands justify an integrated analysis of their food system characteristics. However, where cultural differences do exist they are explicitly highlighted.

### 5.1 Staple Crops: Rice and Corn

As discussed in Chapter 3, rice production is at the core of food security in Vietnam (Minot and Goletti 2000; Nguyen Van Ngai 2010). As with most *Kinh* (lowland Vietnamese), rice is a staple of Hmong and Yao food systems in Sa Pa District, Lào Cai province. As Mr. Kao, an elderly Yao widower from Giàng Tà Chải village stated: "Rice is very important to us. If we don't have it, we don't eat" (18/05/2012). While corn is a staple food crop in some parts of the northern uplands, in Sa Pa, corn is used as a primary feedstuff for livestock as well as an emergency foodstuff for families.

#### 5.1.1 Household Rice Production and Consumption

Of my 35 interviewee[7] all were members of semi-subsistence farmer households engaged primarily in paddy rice production. As the primary staple food in the district, rice is consumed multiple times daily. Mrs. Mai, a 27-year old Hmong woman with two children, explained, there is "morning time rice, afternoon rice and dinner rice" (29/05/2012). It can also be a secondary feedstuff for livestock if households run out of corn. As Table 5.1 illustrates, household rice production across my participant sample ranged from 500 to 4000 kilograms of rice per year. The household sizes ranged from a

[7] This total includes 22 Hmong and Yao householder interviewees, 7 Hmong Photovoice interviewees and 6 Hmong and Yao key informants

minimum of four individuals, usually two adults and two children, to 12 individuals, with an average of six people per household. Households were usually defined in terms of how many people shared the rice produced in a family's fields.[8] The immediate family group consists of those that work together in the same rice fields and/or are entitled to the rice from those fields. For instance, Mrs. Tau, a Hmong grandmother from Sử Pán village, stated that there were 12 people in three stand-alone houses that were part of her household as all these shared the 2500 to 4000 kilograms of rice produced in their family's paddies. These included Mrs. Tau and her husband, who were too old to work but still received rice from the fields, one son and daughter-in-law, one widowed daughter-in-law and her new husband as well as six grandchildren (10/07/2012). In terms of rice consumption, my research assistant Miss Kia estimated that about 500 kilograms per person per year were required to be food secure. However, as Table 5.1 shows, some householders produced less than 500 kilograms per household member and did not experience shortages, which suggests that other factors need to be considered as well.

**Table 5.1 Overview Rice Production by Household**

| Village / Informant | Ethnicity | # People in Household | Total Rice Production (kg) | Traditional Rice Production (kg) | Rice Production Shortage | Shortage Length |
|---|---|---|---|---|---|---|
| **Cát Cát** | | | | | | |
| **Lee** | H | **6 people** (2 adults, 4 children) | 750 | | Chronic | 6-7 months annually |
| **Kee** | H | **4 people** (2 adults, 2 children) | 1250 | 250 | | |
| **Ý Linh Hồ** | | | | | | |
| **Cai** | H | **10 people** (5 adults, 5 children) | 4000 | | | |
| **Tee** | H | **5 people** (2 adults, 3 children) | 750-1000 | | Transitory | |
| **Tả Phìn** | | | | | | |
| **Thi** | Y | **6 people** (4 adults, 2 children) | ~3000 | | | |
| **Xuan** | Y | **5 people** (2 adults, 3 children) | 1750 | | Transitory | |
| **Ngan** | Y | **6 people** (5 adults, 1 child) | 3000-3500 | 500 | | |
| **Ja** | H | **5 people** (2 adults, 3 children) | 1250-3000 | | | |
| **San** | Y | **7 people** (4 adults, 3 children) | 2000-3000 | 150-350 | | |
| **Thao** | H | **8 people** (4 adults, 4 children) | 2000 | 250 | Chronic | ~3 months annually |
| **Tien** | Y | **7 people** (5 adults, 2 children) | 2500 | 100-150 | | |
| **Lien** | Y | **7 people** (4 adults, 3 children) | 2500 | 250 | | |
| **Choi** | Y | **4 people** (2 adults, 2 children) | 1000 | | | |
| **Sai** | Y | **7 people** (5 adults, 2 children) | 1500-1750 | | Transitory | |
| **Lao Chải** | | | | | | |
| **Daw** | H | **6 people** (4 adults, 2 children) | 1000+ | 0 | | |
| **Mai** | H | **4 people** (2 adults, 2 children) | ~500 | | Transitory | |
| **Di** | H | **6 people** (4 adults, 2 children) | 2500 | | | |
| **Lu** | H | **8 people** (5 adults, 3 children) | 1400-1750 | 200 | | |
| **Yi** | H | **7 people** (3 adults, 4 children) | 1500-1750 | | | |

[8] This is an emic definition. As discussed in Section 2.2.1, a household is usually defined in the livelihoods literature as the people who eat food prepared from the same hearth (Chambers and Conway 1992). However, a household is defined differently here as this is how my research participants defined their households.

| | | | | | | |
|---|---|---|---|---|---|---|
| **Xia** | H | **7 people** (5 adults, 2 children) | 1000-1500 | 100 | | |
| **Me** | H | **5 people** (4 adults, 1 child) | 1500 | 150 | Chronic | 1-2 months annually |
| **Giàng Tà Chải** | | | | | | |
| **Cua** | H | **5 people** (2 adults, 3 children) | 1000 | | Chronic | 4-7 months annually |
| **Mo** | H | **8 people** (5 adults, 3 children) | 2500-4000 | | Transitory | |
| **Man** | Y | **6 people** (3 adults, 3 children) | 1800-2000 | 200-250 | | |
| **Kao** | Y | **6 people** (3 adults, 3 children) | 3000-3500 | | | |
| **Lich** | Y | **5 people** (2 adults, 3 children) | 2400 | 300 | | |
| **Sử Pán** | | | | | | |
| **Tau** | H | **12 people** (6 adults, 6 children) | 2500-4000 | | | |
| **Bản Hồ** | | | | | | |
| **Na** | H | **8 people** (3 adults, 5 children) | 750-1000 | | Chronic | ~6 months annually |
| **See** | H | **8 people** (2 adults, 6 children) | 1500 | 100 | Chronic | 4-5 months annually |
| **Trung Chải** | | | | | | |
| **Saw** | H | **8 people** (2 adults, 6 children) | 2750-3000 | | | |

*5.1.1.1 Livelihood Capitals and Rice Production*

In terms of rice production, households closely follow the livelihood calendar described by Tugault-Lafleur and Turner (2011) outlined in Table 3.2, preparing rice paddies after Hmong New Year, starting in February, planting rice seeds in seed nurseries in March (either traditional varieties or Chinese hybrid seeds), transplanting seedlings in April and May, and then letting the rice grow till harvesting from September to the beginning of November.

Natural, social, human, physical and, increasingly, financial capitals are important for rice production. In terms of natural capital, or the environmental services that form the foundation of a livelihood (Carney 1998), households require access to arable land with a dependable, either rain-fed or mountain-spring water supply. Informants stated that the ideal time for rice seedlings to remain in the seed nurseries is between two weeks to one month; any longer and the seedlings are too old which is thought to decrease the yield, taste and quality of the rice (4 interviewees, 04/05/2012-14/06/2012). In order to ensure this does not happen, rice paddies must be adequately flooded to allow seedlings to be transplanted in the ideal two week window. Once seedlings are transplanted, paddies must remain sufficiently flooded to ensure optimal growth and to prevent insects and other pests from attacking rice roots and stalks as they grow (2 interviewees, 18/05/2012, 30/05/2012). Furthermore, the growing season requires cool, wet weather to ensure paddies remain flooded while harvest time requires sunny, dry weather so paddies can be drained and then rice plants cut and dried.

While water stocks rely heavily on natural capital, individuals also employ a mix of human, physical and social capital to secure this resource. For instance, individuals use their learned skills (human capital) to channel water from mountain-springs to their fields by building irrigation schemes with hollow bamboo shoots, or purchased plastic pipes (5 interviewees, 30/05/2012-26/06/2012; 3 interviewees, 18/05/2012-07/06/2012; see Figure 5.1).

**Figure 5.1 "Bamboo taking water to a rice paddy" (Source: Mr. Cai, 26/06/2012)**

For terraced rice paddies, water supply is dictated by elevation but governed by social customs. For instance, after rainfall, landholders at the top of a hill are the first to receive excess water run-off from the mountain above and can more easily fill their paddies. When they have enough they break a gap in their terrace walls and allow the water to flow down to the next landholder. Therefore, landholders further down the valley need to wait (3 interviewees, 18/05/2012-30/05/2012). As Mr. Tien, a Yao grandfather from Tả Phìn stated, villagers have been sharing water in this way since his grandparent's generation, hence circa 1915 (14/06/2012). However, this type of resource partition depends on communal respect for one's water rights and conflict-free social relations. For example, several Yao households in Tả Phìn village also own rice paddies in neighbouring Ban Khoang village. However, householders reported that at times their bamboo pipes are broken and they have constant struggles to ensure their paddies receive water (2 interviewees, 30/05/2012, 27/06/2012). My research assistant Mrs. Thi explained that part of the problem is that Ban Khoang Yao are a different clan group than Tả

Phìn Yao (30/05/2012). This has resulted in Tả Phìn householders needing to spend more time tending their paddies in the neighbouring village.

In terms of community membership mediating access to productive resources, similar issues were reported with regards to land ownership in Bản Hồ village, which lies down the valley from Sa Pa town. Bản Hồ is predominantly a Tày village with a small number of Hmong households. Two Hmong householders reported that their Tày neighbours consistently encroached upon their rice paddies (03/06/2012). When asked what they could do about the loss of land, both responded that there is nothing they can do; there are not enough Hmong in the village to defend their claim and they cannot complain to the village leader because he is also Tày. Thus, without sufficient bonding social capital, such as other Hmong households, or sufficient bridging social capital, such as strong affiliations with the dominate Tày to compensate for being in the minority, these Hmong households are vulnerable. These examples highlight the importance of social capital, or the social networks and associations that provide livelihood support, for accessing and securing natural capitals needed for household production (Carney 1998).

Another important natural capital used for rice production is water buffalo. At the beginning of the growing season, farmers use water buffalo to break the soil with a metal plough, and then to further till or harrow rice paddies. As a result of this productive capacity, water buffalo are considered a household's most important asset (see Bonnin 2011). This was illustrated when, regarding the impact of buffalo deaths, Mr. Kao said: "When a buffalo dies it makes it harder to work. The buffalo is important for the local people. It's the same as your car. You need that for work. The same as your motorbike" (18/05/2012). Not only do buffalo provide the labour needed to plough fields they are also able to navigate between fields, move over uneven landscapes and climb hills by their own power which makes them ideal for working the challenging terrain in the Sa Pa valley (14/06/2012). To a lesser extent, buffalo also produce manure which is used as a natural fertilizer (2 interviewees, 14/06/2012, 05/07/2012).[9]

[9] It is debatable whether water buffalo are a physical or natural capital. According to DfID (1999), physical capitals are basic infrastructures and productive equipment that contribute to a livelihood. Water buffalo are in fact productive resources that contribute significant energy input to Hmong and Yao livelihoods. However, Ellis (2000, 32) states that natural capital consists of the "biological resources," such as water and land, that help people survive. Furthermore, natural capital "is enhanced or augmented when it is brought under human control that increases its productivity" (*ibid.*). Since water buffalo are produced by nature yet trained to work in the fields, it can be argued that they are "enhanced or augmented" natural capital.

From preparing and ploughing fields, to transplanting to harvesting, growing rice is a labour intensive activity. Hmong and Yao meet these labour requirements through immediate family and broader social capital networks. The process of labour exchange whereby neighbours, friends and extended clan members aid with rigorous activities, such as transplanting, takes place with the unspoken agreement that they in turn will receive help when they require it (2 interviewees, 04/05/2012, 18/05/2012). Labour exchange is also integral to other activities such as house-building (2 interviewees, 29/05/2012, 30/05/2012). Receiving households may also thank individuals for their time by offering them a meal, sometimes including meat or sticky rice (3 interviewees, 29/05/2012-14/06/2012).

In terms of physical capital, that is, the infrastructure and physical goods that support livelihoods, terraced paddies and water buffalo are two essential components for rice production. Households must build and maintain their rice paddies to ensure that the earth is not cracked and that the paddy fields can retain water when they are flooded in preparation for planting. Finally, as Bonnin and Turner (2012) illustrate, financial capital has been an increasing part of Hmong and Yao rice production for several years due to the introduction of hybrid, or "Chinese" rice varieties, discussed next.

*5.1.1.2 Chinese Rice: "Everyday rice"*

All 35 of my interviewees indicated that their families grow hybrid, or "Chinese" rice varieties. The prevalence of these seeds is further highlighted by several participants who stated that everyone in their villages grows Chinese rice (3 interviewees, 04/05/2012-02/07/2012). Interviewees stated that Chinese rice is favoured because the stalks do not grow as tall as local varieties and therefore plants can be placed closer together which allows more to be planted in a paddy field and results in higher-yields (2 interviewees, 18/05/2012). Favourable perceptions include that Chinese rice can double non-hybrid yields, and that these seeds could grow "anywhere" and on any land (5 interviewees, 04/05/2012-03/06/2012). As two middle-aged Hmong mothers from Giàng Tà Chải village, Mrs. Cua and Mrs. Mo articulated, Chinese rice also fosters a sense of security because there is more and therefore families worry less about whether they will be hungry (17/05/ 2012).

However, there are also several drawbacks related to Chinese hybrid rice seeds, as Bonnin and Turner (2012) affirm. These include the need for cash to purchase inputs, such as seeds but most especially fertilizer, which is discussed in Section 5.1.3 (5 interviewees, 17/05/2012-02/07/2012). Householders stated that Chinese rice seeds cost between 75,000 and 85,000VND ($3.72 to $4.25 USD) per kilogram, with one kilogram producing over 40 kilograms of rice (3 interviewees, 17/05/2012-

18/05/2012). Though most households eat Chinese rice daily and praise its high yields, it will probably never be the only rice variety that households grow because there is a perception that it does not provide enough sustenance when individuals have to work particularly hard, such as during planting and harvesting time (2 interviewees, 18/05/2012, 07/06/2012). As Mrs. Thi, a young Yao mother from Tå Phìn stated, Chinese rice is "everyday rice" (31/05/2012). Households therefore maintain certain local varieties, especially sticky rice, to meet other needs.

*5.1.1.3 Sticky Rice*

Twelve of my 35 research participants stated that they grow some sticky rice, on average 200 kilograms per year. This amounts to a small fraction of their overall rice production, which for one household listed above reaches 4000kg. Sticky rice is not only valued for its perceived energy properties, quality and taste, it also has cultural value. Participants indicated that they saved their sticky rice for periods of hard work, and for special occasions and rituals (3 interviewees, 18/05/2012-07/06/2012). Sticky rice is central to both Hmong and Yao New Year celebrations, and sticky rice cake is required on other special days throughout the year (7 interviewees, 17/05/2012-01/07/2012). As Mrs. See, a middle-aged Hmong woman with seven children, stated: "If you don't have sticky rice for Hmong New Year, you need to buy sticky rice. It is our culture that we always have to have sticky rice … Many generations have grown it. It is also important for the ancestors and it is important for us" (03/06/2012). Thus while 'Chinese rice' now dominates household production, many Hmong and Yao farmers maintain some traditional varieties for its cultural value and to preserve a link to past generations.

5.1.2 Household Corn Production and Consumption

Hmong and Yao families in Sa Pa produce corn primarily as a livestock feedstuff for their pigs, chickens and ducks, though it can also be an emergency human foodstuff. Twenty-two of my 35 research participants indicated that they grow corn and all 22 stated that they experience corn feed shortages that were either chronic or transitory. The main reason for these shortages is an inability to access sufficient corn fields and the impact of extreme weather events (discussed in Chapter 6).

*5.1.2.1 Livelihood Capitals and Corn Production*

Corn production mainly requires natural, human and social capital, as well as some financial capital as a result of the increasing need for fertilizer, discussed below. Since rice is the main foodstuff in the Sa Pa valley, all suitable household land is allocated to rice production. Corn fields still require a dependable water supply, though not as abundant as that needed for rice production. As a result, corn

is generally grown on steep hillsides that are not appropriate for rice paddies. As mentioned above, this use of marginal land means that most households cannot produce enough corn to feed their livestock. Responses to limited land availability are examined in Section 7.1.1.

In terms of human capital, corn production, like growing rice, requires significant labour input. Since most corn is grown on hillsides in the mountains, individuals must make the trek to and from their fields to tend their crop. During the summer months, householders begin their days before sunrise and work until late in the day. Mrs. Thi stated that each morning during the growing season she gets up before 5 a.m. to make breakfast for her family, then, several times a week she makes the 45 minute hike to tend her corn fields (30/05/2012). These treks also provide the opportunity for gathering firewood, discussed further in Section 5.4. Next however, I turn to discuss financial capital requirements for corn and rice production.

### 5.1.3 Fertilizer Consumption and Financial Capital

While households now need to purchase hybrid seeds on an annual basis, interviewees commented most frequently about the need for cash to buy chemical fertilizers. Access to sufficient fertilizer was identified by 17 research participants as a major input for food production. Twelve participants stated that purchased chemical fertilizers were needed to grow their rice and/or corn crops. Without this input, crops would not grow or would produce poor quality grain. This perception is best exemplified by Mrs. Sai, a 26-year old Yao mother of two from Tå Phìn village, who stated that "if we don't have fertilizer, we can't grow anything" (27/06/2012). An additional five participants specified that Chinese rice needed fertilizer otherwise it would not grow properly. Fertilizer needs to be applied to rice and corn at least twice during the growing season; for rice this needs to be once after transplanting seedlings and once again later in the summer (6 interviewees, 07/06/2012-03/07/2012). Householders specified that they needed two types of fertilizer: "blue fertilizer," which is mainly nitrogen, and "white fertilizer," which is mainly phosphate. Table 5.2 illustrates the fertilizer use and cost for nine householders that detailed their fertilizer consumption patterns.

Annual fertilizer consumption ranged from 200 kilograms for Mrs. See's eight-person household that produced 1500 kilograms of rice per year and experienced a chronic four- to five-month rice shortage, to 1200 kilograms for Mr. Tien's seven-person household that produced 2500 kilograms of rice and did not experience a shortage. Table 5.2 also highlights the differences in usage amounts for comparable rice crop output; for instance Mr. Di, Mrs. Lien and Mr. Tien all produced around 2500 kilograms of rice per year but used 1200, 600 and 800 kilograms of fertilizer respectively.

**Table 5.2 Annual Fertilizer Consumption**

| Informant | Fertilizer Usage | Rice Production (kg) | Total Fertilizer Cost (VND) | Cost Details (VND/50kg) |
|---|---|---|---|---|
| **Thi** | 700kg | ~2500 | 3.75 million | Nitrogen: 175,000 |
| | | | | Phosphate: 500,000 |
| **See** | 200kg | 1500 | 1.68 million | Nitrogen: 280,000 |
| | | | | Phosphate: N/A |
| **Xuan** | 1000kg | 3250 | 5.45 million | Nitrogen: 175,000 |
| | | | | Phosphate: 500,000 |
| **Ja** | 400kg | 1250-1500 | 2.04 million | Nitrogen: 260,000 |
| | | | | Phosphate: 500,000 |
| **Thao** | 800kg | 2000 | 3.48 million | Nitrogen: 170,000 |
| | | | | Phosphate: 530,000 |
| **Tien** | 1200kg | 2500 | 8.4 million | Nitrogen: 175,000 |
| | | | | Phosphate: 530,000 |
| **Di** | 600kg | 2500 | N/A | Nitrogen: 250,000 |
| | | | | Phosphate: 700,000 |
| **Lien** | 800kg | 2500 | ~4 million | Nitrogen: 170,000 |
| | | | | Phosphate: 500,000 |
| **Saw** | 800kg | 2750-3000 | ~2.4 million | N/A |

While these variations in fertilizer usage may be explained due to differences in land quality and other environmental conditions, it is also important to highlight the human element. As my research assistant Mrs. Xuan explained, most householders determine application amounts through trial and error (06/06/2012). Based on input from family members or neighbours, a householder will apply an amount the first year, wait to see what happens, and then adjust the following year. Unsurprisingly this can result in lower crop outputs for the first few years. Therefore, due to a lack of guidelines or the lack of proper communication regarding proper usage, individuals are unlikely to be using fertilizer as effectively and efficiently as possible.

Generally, fertilizer was described as "expensive" (5 interviewees, 07/06/2012-26/06/2012). Some participants linked their income-generating activities directly to the need to have cash to purchase fertilizer (5 interviewees, 07/06/2012- 05/07/2012). For instance, Mr. Cai, one of the Hmong Photovoice participants from Ý Linh Hồ, indicated that fertilizer was one of the most important things his family purchased with the money they obtained from the sale of cardamom. This statement points to the central importance of income-generating activities in food production, discussed further in Section 5.5.

## 5.2 Livestock Production

In addition to keeping water buffalo as work animals, Hmong and Yao households often raise a variety of other animals, mostly chickens and pigs, but also ducks and goats, for consumption purposes. While water buffalo are valued for their strength and ability to work in the fields, they are also killed and consumed by Hmong families as part of funeral rituals, especially for older family members such as grandparents (2 interviewees, 04/05/2012). This function increases the buffalo's cultural value and Hmong families without a buffalo for a funeral are expected to sacrifice other productive assets, such as land, to acquire one (Miss Kia, 06/06/2012). Buffalo do not play a role in Yao funerary practices (06/06/2012).

Meat consumption among Hmong and Yao households is highly contextual and can change quickly. Among my research participants, meat consumption varied widely from several times a week to very infrequently; the latter circumstance characterized by Mrs. Na, a middle-aged Hmong woman, who stated that meat was "just like a dream" because her family ate it so rarely (03/06/2012). For the most part, households consumed their own animals if they could spare them, or they would buy some meat from a local market if they had money to do so. However, whether or not a household felt they had sufficient animals that they could consume one could change in a matter of days if animals were killed by a livestock disease or extreme weather events (discussed further in Chapter 6). Those with fewer animals indicated they would save their chickens for if they needed a shaman, and they would save their pigs for New Year's rituals (3 interviewees, 17/05/2012-26/06/2012). The pig for New Year's is slaughtered and smoked and usually provides not only meat, but also (dried) cooking fat for a majority of the year.

### 5.2.1 Livelihood Capitals and Livestock Production

Households may acquire their animals with financial capital by purchasing them, or with social capital as they may be donated baby animals through kinship networks (5 interviewees, 04/05/2012-05/07/2012). Households with sufficient natural capital in the form of arable land will grow corn as a primary feedstuff for their animals and this is supplemented with rice skin saved during de-husking or from gathered plants. 'Buffalo grass' is also an important plant which is grown specifically for feeding buffalo when they are working in the fields or during the winter. Pig feed, usually consisting of corn, is cooked on the fire. As mentioned above, most families experience yearly shortages of corn and so alternatives are also used for animal feed. If it is available, rice is commonly given to baby

animals such as chicks and ducklings, and sometimes feedstuffs such as cassava will be purchased. Responses to feed shortages are discussed further in Chapter 7.

Generally, animals are not kept in pens or cages and are free to wander about around the family's home or through the village and then eventually meander home to be fed. As Mrs. Mai explained, there is an honour system which operates to ensure that people do not steal animals; people do not take animals that are not theirs because then someone might take their animals (29/05/2012).

A family's livestock performs two functions. First, it provides animals for household consumption or ritual purposes. Second, it serves as a household asset, or financial capital. In terms of the latter, fourteen of my respondents indicated that they sold their animals, mostly chickens and pigs, when they needed cash. Some householders raised animals with the express view of selling them to buy agricultural inputs, which highlights the potential impact on household food security if these assets die or are otherwise lost (4 interviewees, 03/06/2012-14/06/2012).

## 5.3 Vegetable Production

The majority of Hmong and Yao families have a household garden. They grow a variety of vegetables and other edible plants in the summer months, like cucumbers, beans and squashes as well as a selection of herbs and garnishes. In the winter months, vegetable production declines as temperatures decrease, however many households still grow winter cabbage and some potatoes to supplement their rice consumption. Therefore, unlike meat consumption, vegetable consumption is a more stable component of the daily diet.

### 5.3.1 Livelihood Capitals and Vegetable Production

As with rice and corn production, vegetable production requires natural capital in terms of arable land and dependable water supply. A household's gardens are usually located near their house, while beans may be grown intermixed with corn crops further away. While some plants regrow yearly, householders may otherwise access seeds through kinship networks (social capital), by saving them from one year to the next (Figure 5.2), or, more recently, by buying seeds from the market (financial capital) (3 interviewees, 03/06/2012-02/07/2012; 6 interviewees, 04/05/2012-02/07/2012; 5 interviewees, 03/06/2012-05/07/2012). One problem with saving seeds is that during years with lower-yields, there may not then be any seeds left if the family consumes everything (Mr. Tee, 02/07/2012). After these periods, seeds must be obtained through other means.

**Figure 5.2 "Beans hanging on beam, drying for growing next year" (Source: Mr. Cai, 26/06/2012)**

Wild foods, such as plants gathered in the forest, used to be an important source of vegetables and other foodstuffs. However, these foods are now accessed infrequently. In fact, the only households that reported continued consumption of wild foods were three of the households that experienced chronic rice shortages (3 interviewees, 17/05/2012-03/06/2012). Therefore, the consumption of wild foodstuffs appears to be linked to limited access to preferred alternative foods. When asked about the decline in eating wild foods, my research assistant Miss Kia also suggested it was a result of people being able to buy food when they experience shortages, now that the market is more accessible and more households have cash reserves (17/05/2012).

### 5.4 Food Preparation and Livelihood Capitals

In addition to production and consumption, food preparation is also an important part of the food system. Hmong and Yao households need natural, human, physical and financial capitals to acquire the necessities to properly prepare their food. For instance, firewood is a needed to cook rice and other dishes. Householders also cook some of their pig-feed to make it easier for animals to digest. I only saw one gas range during my interviews and this was in the home of my Yao interviewee, Mrs. Thi. She had a small propane hot plate which she used to cook meals for homestay guests who stayed with her family. When there were no guests, the family cooked their meals at the fireplace.

Every two or three days, one or more household members will spend part of a day collecting firewood in the forest, or they may simply collect it on their way home from working in the fields (5 interviewees, 03/06/2012- 06/06/2012). In certain areas, dry wood can be scarce, forcing householders to travel longer distances, sometimes on motorbike, to find a supply (2 interviewees, 02/07/2012). Two interviewees also reported that sometimes householders will buy wood from loggers, however

this can be expensive and only better-off households can afford it (21/06/2012-02/07/2012). Householders also need firewood to boil their drinking water.

Drinking water is either collected with plastic containers from mountain springs, or pipes bring it directly into homes. Through the use of physical and human capital, Yao householders plumb mountain-springs and install plastic pipes to bring the water to their houses (3 interviewees, 06/06/2012). Generally for Hmong households a family member gets water at the closest spring, sometimes on a daily basis (2 interviewees, 26/06/2012, 03/07/2012). Depending on the perceived quality of the water, it is boiled before drinking (2 interviewees, 17/05/2012, 02/07/2012).

Access to water is also needed for de-husking rice. Traditionally, Hmong and Yao households use a water-powered mill to remove the rice husk (Figure 5.3). These mills are installed at the side of rushing streams or rivers. They are considered communal assets in that the householder that owns the mill will allow others to use it at no charge (Mr. Tee, 02/07/2012). While I saw several of these at work during my interviews, I also noticed that several households had bought their own mechanical de-huskers that run on petrol. Though these require continued cash inputs to buy petrol, the benefit is that individuals no longer need to haul their rice sacks to and from the water-mill (2 interviewees, 30/05/2012, 05/07/2012).

**Figure 5.3 Water-powered rice mill (Source: Author 2012)**

Cash is also needed to buy a range of cooking seasonings such as salt and mono-sodium glutamate (6 interviewees, 17/5/2012-26/06/2012). Condiments such as soya sauce and fish sauce may also be purchased (Mr. Cai, 26/06/2012). In the case of salt, it has long tied upland households to the larger economy (see Salemink 2011). As Duong Bich Hanh (2011) states, households in the Sa Pa area have always needed to acquire salt from external sources. Oil is another cooking necessity. Most Hmong and Yao households get their yearly supply of oil from the pig they slaughter for New Year's celebrations (3 interviewees, 17/05/2012-26/06/2012). However, those without animals will purchase oil from the market or will buy pig fat to render themselves (3 interviewees, 03/06/2012007/06/2012). While food preparation requires small amounts of financial capital compared to rice production, obtaining these inputs still tie households to the market economy and increase the need for cash income.

### 5.5 Income-Generating Activities

Cash income is important for accessing contemporary agricultural inputs such as hybrid seeds and fertilizer, but Hmong and Yao householders also indicated that if money is available beyond these purchases, householders might also buy additional food items such as meat, vegetables or noodles.

Table 5.3 illustrates the range of income-generating activities and other income sources householders reported as part of their livelihood portfolios, from selling items to tourists to growing orchids to engaging in metalwork, such as making silver jewellery. These activities require a variety of livelihood capitals from human-capital intensive activities, such as basket-making and metal-working, to more physical-capital intensive activities, such as operating a homestay or tourist shop which still require human capital but also require physical infrastructure such as buildings.

**Table 5.3 Household Income-Generating Activities and Other Sources**

| Village / Informant | Ethnicity | Sell to Tourists | Cardamom | Orchids | Metal-work | Trekking Guide | Sell Animals | Rent Land | Other Activities | Other Income |
|---|---|---|---|---|---|---|---|---|---|---|
| **Cát Cát** | | | | | | | | | | |
| **Lee** | H | | **X** | | | **X** | | | own tourist stand | |
| **Kee** | H | | **X** | **X** | | | | | | |
| **Ý Linh Hồ** | | | | | | | | | | |
| **Cai** | H | | **X** | | | | | | | |
| **Tee** | H | | | | | | | | care for other's cardamom | |
| **Tả Phìn** | | | | | | | | | | |
| **Thi** | Y | **X** | **X** | **X** | | | **X** | | operate homestay | |
| **Xuan** | Y | | **X** | **X** | | **X** | **X** | | | |
| **Ngan** | Y | | | | | | | | medicine baths | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Ja** | H | | **X** | **X** | | | **X** | **X** | | |
| **San** | Y | **X** | **X** | **X** | | | **X** | | non-timber forest products | |
| **Thao** | H | | **X** | **X** | | | | **X** | basket-making | pension |
| **Tien** | Y | **X** | **X** | **X** | | | **X** | | | |
| **Lien** | Y | **X** | **X** | **X** | | | **X** | | | |
| **Choi** | Y | | | **X** | | | | **X** | government work | |
| **Sai** | Y | **X** | | | | | | | | |
| **Lao Chải** | | | | | | | | | | |
| **Bo** | H | | | | | **X** | | | | |
| **Daw** | H | | **X** | | | | **X** | | own a tourist shop | |
| **Kia** | H | | | | | **X** | | | | |
| **Mai** | H | | | | | **X** | **X** | | custodian | |
| **Di** | H | **X** | **X** | | **X** | **X** | | | basket-making | |
| **Lu** | H | | **X** | | | | **X** | | | |
| **Yi** | H | | **X** | | | | | | | |
| **Kaw** | H | | | | | | | | sell timber | remittances |
| **Xia** | H | **X** | **X** | | | | | | | |
| **Me** | H | **X** | | | | **X** | **X** | | | |
| **Giàng Tà Chải** | | | | | | | | | | |
| **Cua** | H | **X** | | | | | | | | |
| **Mo** | H | **X** | **X** | | | | | | sell timber | |
| **Man** | Y | **X** | | | | | | | | |
| **Kao** | Y | **X** | **X** | | | | **X** | | | |
| **Lich** | Y | **X** | **X** | | | | **X** | | | |
| **Sử Pán** | | | | | | | | | | |
| **Paa** | H | | | | | **X** | | | | |
| **Sua** | H | | | | | | | | shaman | |
| **Tau** | H | | **X** | | **X** | | | | | pension |
| **Bản Hồ** | | | | | | | | | | |
| **Na** | H | **X** | | | | | | | | |
| **See** | H | | | | **X** | | **X** | | | |
| **Trung Chải** | | | | | | | | | | |
| **Saw** | H | | **X** | | | | **X** | | | |

By far, the two most reported activities for gaining financial capital were selling textiles and other items to tourists (14 out of 35 households) and growing cardamom for sale (19 out of 35 households).[10] Selling to tourists is an activity engaging Hmong and Yao women of various ages. They gather a selection of items, such as bags, wallets, and bracelets, some of which they make themselves and some of which they buy from other sources, to sell to tourists in Sa Pa and surrounding villages. This activity relies heavily on human capital as sellers need embroidery and sewing skills, as well as the ability to speak a basic level of English in order to communicate with tourists. Social capital and financial capital can also facilitate access to merchandise.

Cardamom cultivation requires natural capital in the form of access to land with forest cover to keep the growing area cool and humid. Human capital, in terms of knowledge of how to care for the plants,

[10] See Sowerwine 2004; Tugault-Lafleur and Turner 2011; Turner 2011.

is also needed. Social capital can further facilitate access to cardamom seedlings (see Turner 2012). Generally, householders can sell their cardamom either fresh, for between 25,000 – 35,000 VND ($1.2-$1.75USD) per kilogram, or dry, for between 85,000 – 150,000 VND ($4.25 - $7.50USD) per kilogram (3 interviewees, 08/06/2013-10/06/2013). However, these prices are variable.

Other income activities, such as orchid growing, also depend on a mix of natural, social and human capital. Orchids are grown and sold to *Kinh* buyers who bestow them as gifts during Vietnamese New Year celebrations (see Tugault-Lafleur 2007). My research assistant Mrs. Xuan said some families had been growing orchids for five to seven years, while other interviewees stated that it was a new activity for their own households (7 interviewees, 07/06/2012-02/07/2012, 08/06/2013-10/06/2013). To grow the flowers for sale, orchid bulbs are either collected in the forest or acquired through one's kinship network. The bulbs are planted and must be cared for as they grow for four years at which time they are ready to be sold. Depending on how big they are and how many flowers bloom, a mature orchid plant can be sold for VND2 million ($100USD). As Table 5.3 illustrates, orchid-growing is currently only being undertaken in the villages closest to Sa Pa town, which could point to the importance of market access for this activity. While the final financial return for orchid-growing is large by local standards, it is not a risk free venture and, just as with cardamom, extreme heat or other weather shocks can kill the plants.

Thus Hmong and Yao householders engage in a range of activities that use different livelihood capitals to generate the income needed to support their food systems. The greatest demand for income comes from the need for hybrid seeds and chemical fertilizers, yet other requirements, such as the need for salt and MSG, also play a small yet consistent role. However, one of the common characteristics between income-generating activities is the inter- and intra-annual variability in revenue that households can derive from them (discussed further in Section 6.1.3). Fluctuations in potential income can affect a householder's ability to access needed agricultural inputs and therefore affect their rice and corn productivity.

### 5.6 Chapter Conclusion

In this chapter I have outlined Hmong and Yao food systems and the range of livelihood capitals needed to produce staple rice and corn crops, as well as to produce supplemental foods such as meat and vegetables. Rice and corn production relies heavily on natural capital in the form of arable land and dependable water supplies. In some situations, access to natural capital can be facilitated or obstructed by clan or ethnic identity. Due to the need to access hybrid rice seed and chemical

fertilizer, rice production now relies heavily on financial capital. These agricultural technologies have allowed households to increase their annual crop output; however, their productive potential is not always fully optimized, as in the case of fertilizer. If income is available beyond purchases of these inputs, householders might also buy additional items, like seasonings such as salt or MSG or foods like pork, vegetables or noodles. In order to earn income, Hmong and Yao engage in a range of activities: from natural-capital intensive activities, such as cardamom and orchid cultivation, to human-capital intensive activities, such as basket-making and metal-working, to more physical-capital intensive activities, such as operating a homestay or tourist shop which still require human capital but also require physical infrastructure such as buildings. Access to these income opportunities depends not only on access to necessary livelihood capitals but also on access to markets, as illustrated by tourism opportunities and orchid cultivation. Throughout this chapter, I have highlighted both the dietary, cultural and economic importance of different food system components and showed how income-generating activities form an integral part of these food systems. I have also hinted at possible vulnerabilities that might strain a household's productive capacity, which I address fully in the next chapter.

# CHAPTER 6 – FOOD SYSTEM VULNERABILITY

In this chapter I focus on my second research question: how are climate variability/extreme weather events and other stresses affecting Hmong and Yao food security and livelihoods? As clearly shown in Chapter 5, Hmong and Yao households in Sa Pa district require access to a range of livelihood capitals to maintain viable food systems. However, these food systems are exposed to multiple stresses. These stresses diminish access to needed livelihood capitals and decrease asset productivity, as well as constricting overall food output. In Chapter 2, I defined a system's vulnerability to stress as the interaction between three components: exposure, sensitivity and coping/adaptive capacity (also see McCarthy et al 2001; Luers 2005; Adger 2006). In this chapter, I examine vulnerability in terms of exposure and sensitivity, or how these stresses impact Hmong and Yao food system components. I focus on stresses that affect the entire food system continuum from inputs to outputs. I also examine the short-term response strategies, or coping strategies, that householders employ to reduce their exposure, minimize losses and manage impacts.

I begin this chapter by analyzing stresses related to food system inputs at the household level (Section 6.1), notably land availability, rice production input concerns and cash income fluctuations, and household strategies for responding to these stresses. Then I examine the impacts of and immediate response strategies to livestock diseases (Section 6.2). I then investigate four extreme weather events and climatic stresses – cold spells, drought, intense rainfall and landslides, and wind gusts (Section 6.3) – and examine household response strategies to each in turn. Throughout the chapter I highlight both biophysical and social characteristics to create an integrated vulnerability analysis that considers environmental, societal and institutional factors and how these affect the vulnerability of Hmong and Yao food systems (Adger 1999; Cutter 2003). This discussion provides the foundation for my assessment of household food security in Chapter 7 wherein I more closely examine food system resilience by examining long-term strategies for recovering from stress-induced losses.

## 6.1 Input-related Stresses at the Household Level

Vulnerability, like food security, is not static, rather it needs to be seen as a dynamic state (Cutter 1996; Adger 2006; Fussel 2007). With changing contexts and shifting livelihood prospects, "what is vulnerable in one period is not necessarily vulnerable in the next period" (Adger 2006, 274). For instance, prior to the 1980s, Vietnam experienced decades of chronic food insecurity due to widespread structural constraints. The adoption of hybrid rice varieties and improved cultivation techniques beginning in the late 1980s in the lowland delta regions, combined with economic growth

and subsequent poverty reduction spurred by Đổi Mới reforms, effectively ended decades of food shortages (Minot and Goletti 2000; Tran Ti Uht 2002; Trang Thi Huy Nhat 2008). However, recent studies suggest that achievements in national food security have not accrued to all groups equally. For instance, ethnic minority farmers in the upland regions are frequently cited as one of most vulnerable and food insecure groups due to chronic poverty (FAO 2004; Trang Thi Huy Nhat 2008; Hoang Xuan Thanh et al 2009). While Hmong and Yao households in Sa Pa do experience varying levels of food insecurity, my research participants made it evident that their situations have improved in recent years.

Of my 35 interviewees, 16 indicated that they had experienced food insecurity in the 1980s and 1990s. This food insecurity was characterized by the limited availability of rice and the increased consumption of substitute foodstuffs such as wild foods, cassava and corn (12 interviewees, 17/05/2012-09/07/2012). Rice shortages were associated with being poor and not having alternative avenues for accessing rice, such as being able to buy or borrow it (3 interviewees, 17/05/2012 – 18/05/2012). However, most significantly, households were unable to grow enough rice themselves, which informants directly linked to the growing of low-yield local rice varieties. Interestingly, many informants characterized this time of shortage as "B.C." or "Before Chinese-rice" varieties, which places the lower-yields of local rice seeds in opposition to the higher yields achieved with newer hybrid varieties and intensive cultivation methods (6 interviewees, 30/05/2012 – 09/07/2012). As Mrs. Ja, a 29-year old Hmong woman with three children, stated "My grandparents said that before, when they didn't have the seed from China, they didn't have enough rice to eat. After New Year's they finished the rice and so they had to go get cassava" (07/06/2012). According to Hart's (2009) classification discussed in Chapter 2, this state would have been classified as a time of chronic food insecurity since households experienced unavailability or inaccessibility of staple foods over long-periods. In 2012-13, by comparison, when asked if they felt they had enough food for their needs numerous households indicated that they experience transitory shortages as a result of various temporary or sudden stressors., Only six out of the 35 interviewees reported that they experience yearly food shortages, ranging from one to seven months without rice (see Table 6.1).

Furthermore, these contemporary shortages were not reasoned to be the result of local varieties' low-yields or household poverty, but rather due to a lack of access to sufficient arable land for growing rice. This points to an important shift in terms of household vulnerability. To understand this shift further, in this section I look at factors that affect the productivity of a household's livelihood capitals,

or that restrict access to needed capitals. These factors limit both the availability and accessibility of food stuffs. In addition to analyzing land availability and quality stresses and household strategies for reducing their impact (Section 6.1.1), I examine stresses that affect rice production inputs (Section 6.1.2) and those that constrain income-generation (Section 6.1.3).

**Table 6.1 Chronic Food Shortages Past and Present**

| | | Past | | Present | |
|---|---|---|---|---|---|
| **Village / Informant** | **Ethnicity** | **Yearly Rice Shortages** | **Main reason** | **Yearly Rice Shortages** | **Main reason** |
| **Cát Cát** | | | | | |
| **Lee** | H | | | 6-7 months | limited land |
| **Tả Phìn** | | | | | |
| **Thi** | Y | X | small local rice yields | | |
| **Ja** | H | X | small local rice yields | | |
| **San** | Y | X | small local rice yields | | |
| **Thao** | H | X | small local rice yields | ~3 months | limited land & cash for inputs |
| **Tien** | Y | X | small local rice yields | | |
| **Sai** | Y | X | not enough rice | | |
| **Lao Chải** | | | | | |
| **Di** | H | X | small local rice yields | | |
| **Lu** | H | X | small local rice yields | | |
| **Yi** | H | X | | | |
| **Me** | H | X | small local rice yields | 1-2 months | limited land |
| **Giàng Tà Chải** | | | | | |
| **Cua** | H | | | 4-7 months | limited land |
| **Mo** | H | X | small local rice yields | | |
| **Man** | Y | X | not enough rice | | |
| **Kao** | Y | X | not enough rice | | |
| **Sử Pán** | | | | | |
| **Tau** | H | X | small local rice yields | | |
| **Bản Hồ** | | | | | |
| **Na** | H | | | ~6 months | limited land |
| **See** | H | | | 4-5 months | limited land |
| **Trung Chải** | | | | | |
| **Saw** | H | X | small local rice yields | | |

### 6.1.1 Land Availability and Quality Concerns

Of my 35 respondents, 23 indicated that concerns with land availability and quality were straining the productivity of their food systems. These concerns ranged from inadequate land holdings limiting rice and corn production to soil nutrient exhaustion decreasing cultivable land. In terms of insufficient land availability, householders cited three contributing factors: population pressure, government policies and loss due to landslides. While population growth is increasing the number of people to be fed, government policies limit access to new lands that could sustain this growth, while landslides are further eroding the availability of productive fields.

When Hmong and Yao sons get married they receive a portion of their parent's land on which to grow food for their new family. Land is divided equally among all sons, while daughters who marry take up residence with their husbands' families and have no claim on their birth family's land (2 interviewees, 17/05/2012, 06/06/2012; also see Sowerwine 2004; Turner 2012). This practice has operated for generations, but population growth is one factor that is compromising the viability of continuing this custom. For instance, if one householder, with a limited parcel of land, has three sons who then each have three sons and so on, in three generations the original landholding will have to sustain 27 households, if no new land is brought into production. In the past, Hmong and Yao would cultivate new land as needed, but this option is no longer possible, as discussed below. While the adoption of hybrid seeds and chemical fertilizer can increase the land's productivity above the natural carrying capacity, households still need a minimum landholding to survive. As Mr. Tee, a Hmong Photovoice participant from Ý Linh Hồ, stated: "I have a big family with many uncles, so [my father] only has a small piece of land" (02/07/2012). As a result, it is difficult to grow enough rice for his family of five and, at times, they have to borrow rice from his uncles. Four more interviewees stated that they worry their sons will not have sufficient land to survive on when they eventually marry (17/05/2012 – 26/06/2012). In addition to these, eight householders cited population growth as a factor limiting their access to land resources (04/05/2012 – 07/06/2012). As Mr. Thao, a 91-year old Hmong grandfather from Tả Phìn stated:

> When I was younger, we had more land. There was not as many people and we had more land so it was easy to grow our crops. Now there are more people and we don't have enough fields. When we use our land every year for many years, we don't have good soils anymore. (07/06/2012)

Thus, families are less able to accommodate their growing numbers.

Population growth via in-migration is also exacerbating the problem. One afternoon, as we were sitting in Tả Phìn's village square, my research assistant Mrs. Xuan stated: "Fifteen years ago more Vietnamese families started arriving. It makes it difficult for Yao families because they [the Vietnamese] buy a lot of land. This used to all be rice paddies" (08/06/2013). She waved her hand to indicate the area that is now occupied with homes, homestays, shops and restaurants.

Land availability has been further restricted by government policies prohibiting the conversion of forests to other land uses. These restrictions resulted from the State's concern with declining forest cover in the 1990s. Officially, several communes in Sa Pa District, including Lao Chải and Bản Hồ,

lie within Hoang Lien National Park, which is a protected forest (Tugault-Lafleur 2007). There is also a wide 'buffer zone' surrounding the park which encompasses 'protection' and 'production' forests that are administered by Forestry and State officials at the district and commune level (*ibid.*). Five interviewees indicated that since they are barred from using or converting forest land they are less able to access grazing land for animals or expand their fields for crop production (18/05/2012 – 06/06/2012; 10/06/2013).

Government development projects also constrain land availability. Three Hmong householders from Lao Chải and Bản Hồ indicated that they lost land when it was reallocated by the government for road and dam construction (21/05/2012- 19/06/2012; 04/07/2013). Mr. Di further indicated - with frustration - that the road construction destabilized some of his remaining land, resulting in a small landslide that destroyed several rice paddies. In addition to Mr. Di, 10 interviewees indicated that landslides triggered by intense rainfall reduced their household productivity. This extreme weather impact is analyzed in Section 6.3.3.

Where land is available, other factors may reduce its suitability for crop production. Fourteen interviewees expressed concerns about land quality; these ranged from diminished crop productivity due to nutrient depletion (5 interviewees; 30/05/2012 – 09/07/2012), to inadequate water supply on available land (9 interviewees; 17/05/2012 – 05/07/2012). As Pandey et al (2007) state, soils in northern Vietnam's upland region are generally acidic and naturally have low fertility. As a result, they can quickly become exhausted though overuse. As Mr. Thao states in the above quote, pressures on land availability have exhausted soil nutrients in places, because households can no longer afford to let land lie fallow for a growing season. To counteract overuse, householders rely more heavily on chemical fertilizers (4 interviewees, 30/05/2012 – 09/07/2012).

Chronic water shortages also limit household productivity (9 interviewees, 17/05/2012 – 05/07/2012). As Mrs. Sai, a 26-year-old Yao mother from Tả Phìn, explained regarding her commune: "Land *is* available, but there is not enough water" (27/06/2012). Several householders linked these long-term water supply problems to other environmental changes, such as continued deforestation due to population pressure (5 interviewees, 17/05/2012 – 22/06/2012). Transitory water shortages resulting from extreme weather are analyzed in Section 6.3.2.

In response to these land availability and quality concerns, some householders borrow additional land from family and friends or gain access to more land through marriage. In some cases, households are

also mortgaging their chronically dry and unproductive lands. By trading this natural capital for financial capital to buy rice they attempt to secure a more stable food supply. I examine these mechanisms further in Section 7.2.

### 6.1.2 Costs and non-reliability of Rice Production Inputs

As discussed in Chapter 5, current rice production practices require Hmong and Yao householders to buy hybrid seeds, chemical fertilizers and, sometimes, pesticides. However, the use of these inputs increases the exposure and sensitivity of households and, indeed, community food systems. As Bonnin and Turner (2012) maintain, to date hybrid seeds have been propagated and developed in distant, lowland locations and may not be suitable to local climatic or environmental conditions in the uplands. While many upland householders praised 'Chinese' rice for its increased productivity, crop output can vary greatly depending on the quality and suitability of seeds. For example, four householders from three different villages (2 from Giàng Tà Chải, 1 from Lao Chải, 1 from Tả Phìn) reported that their 'Chinese' rice crop failed in 2010 because the rice would not grow (17/05/2012 – 06/06/2012). The seeds were described as "too old" (2 interviewees, 17/05/2012, 18/05/2012) or "not good" (06/06/2012). Mrs. Lich stated that all the households in Giàng Tà Chải experienced the same problem (18/05/2012). Given that all 35 of my research participants grew 'Chinese' rice as their main food crop, even small variations in annual output can have major impacts on food security.

Additionally, unlike the traditional custom of saving seeds from one season to the next, hybrid seeds must be purchased annually. This increases household reliance on cash income, which for many households is highly variable. The need for chemical fertilizers (discussed in Section 5.1.3) has a similar effect. This reliance on purchased inputs increases household sensitivity to stresses that impact financial capitals. In the case of fertilizers, the lack of human capital to maximize efficient usage, as noted earlier, also means that householders may waste resources which creates a drain on financial capital.

### 6.1.3 Constraints and fluctuations in Cash Income

One consistent feature of Hmong and Yao households is the variability in cash income that they derive from livelihood activities. For many, income can fluctuate on a monthly, seasonal or yearly basis. For instance, several Hmong women who itinerantly street vend in Sa Pa town recounted times when they would try to sell to tourists for an entire day only to return home having sold nothing; or, times when they would make several hundred thousand Vietnamese dong in one day and then earn nothing for the following month (3 interviewees, 17/05/2012 – 18/05/2012). The time of year can also

affect potential returns. As Mrs. Cua, a vendor from Giàng Tà Chải, stated, it is easier to sell in the winter because that is when there are more Western tourists, whereas in the summer the more numerous Vietnamese tourists are not so keen to buy from Hmong and Yao traders (17/05/2012). In June 2013 householders also reported that their tourism-related income was down from previous years.

While cardamom growers can expect one harvest per year, weather conditions, pests and the age of the plants can all influence annual yields (7 interviewees, 04/05/2012 – 10/07/2012). Cultivators can dry their cardamom pods before selling to increase its market value, but frequent, and sometimes sudden, price fluctuations can also impact expected returns (2 interviewees, 04/05/2012, 18/06/2012). As Mrs. Lich explained: "In one day [the buying price for dry cardamom] can change a few times. Sometimes in the morning it goes up to 120 or 150 [thousand VND per kilo] and then in the afternoon it drops to 100 [thousand VND per kilo]" (18/06/2012). While some households can store their dry cardamom and wait for the best selling price, others with more immediate cash needs must sometimes accept a lower price (3 interviewees, 04/05/2012 – 30/05/2012). Thus, cardamom income may be more dependable than street vending, but it is still unreliable.

While numerous households rely on their income to purchase necessary agricultural inputs or to buy food directly, there are numerous constraints on the capitals required for various activities. For instance, cardamom cultivation is under pressure from deforestation, which reduces the tree cover necessary for optimal growth (2 interviewees, 07/06/2012, 22/06/2012). As Mrs. Choi explained: "Now … there is not enough forest. If we want cardamom we cannot grow any. There is no place. Too many people have cut down a lot of trees" (22/06/2012).

In terms of vending, the lack of human capital, especially the ability to speak English, was cited as the main reason certain family members did not engage in itinerant street vending (5 interviewees, 17/05/2012 – 10/07/2012). Interestingly, gender also underscores an income generation differential. As one interviewee, Mrs. Man from Giàng Tà Chải, stated: "My husband does not know what to do to make money. But sometimes I can go to sell [to tourists] and earn money" (17/05/2012). This statement points to the important fact that Hmong and Yao street vendors, as well as trekking guides, are predominantly women. Interestingly, cardamom cultivation as well as metal-working are gendered as male-dominated activities (7 interviewees, 17/05/2012-26/06/2012). Finally, aging and infirmity also diminish human capital and were mentioned as reasons why some householders no longer engaged in some earning activities such as metal-working or basket-weaving (4 interviewees,

07/06/2012-02/07/2012). As a result, other family members need to work harder to compensate for this loss of income. This lack of access to livelihood capitals for income-generation limits the diversification options available to households seeking to secure cash inputs for modern agricultural technologies. This illustrates the need for multiple income streams to secure Hmong and Yao food systems. I examine this factor further in Chapter 7.

### 6.2 Livestock Disease

From my interviews I found that disease is one of the greatest stresses on household livestock production. Twenty-three of my 35 research participants reported that their animals, mostly chickens and pigs, succumb to sickness on a fairly consistent basis (04/05/2012 – 09/07/2012). While some interviewees stated that they did not know why their animals were getting sick, others attributed it to the presence of noxious chemicals from household soaps and detergents in the ground and water, or to the spread of chicken flu. Two respondents also stated that poor sanitation conditions and lack of proper household toilet facilities might be exposing animals to disease (22/06/2012-3/07/2012). Though explanations differ, the characteristics of the outbreaks are quite similar. Householders report that animals get sick and die very quickly, sometimes within a day, and outbreaks occur frequently. Nine interviewees stated that their livestock is affected by disease at least once, though sometimes multiple times, a year (17/05/2012 – 02/07/2012). Outbreaks can decimate a household's livestock, with losses ranging from a few piglets or chicks, to full-grown pigs or all of a household's chickens.

Most significantly, disease results in the loss of financial capital for a household. As Mrs. Na, a Hmong farmer from Bản Hồ, told me: "When we lose animals, it is the same thing as losing money or income for you" (3/06/2012). Indeed, Mrs. Xuan reported that she lost 4 million VND ($200USD) when five of her 8-kilogram pigs died in February 2013. She estimated that she could have sold them for 100,000VND ($5USD) per kilogram.

When livestock die, households also lose the resources they invested to feed and raise the animals (Lich, 18/05/2012). Furthermore, meat consumption is reduced since most households do not have the financial resources to buy meat if their animals die (2 interviewees, 07/06/2012, 06/06/2012). Households employ several strategies for reducing their exposure to disease discussed next.

#### 6.2.1 Household Responses to Livestock Disease

Householders reported two main strategies for reducing exposure to livestock disease: administering medicine and quarantining animals. As Mrs. Lu explained: "We live in the middle of the village, all

together. One family's [animals] get sick and die … and then other people's animals get sick and die" (01/07/2012). In order to reduce the risk of contracting disease, three householders reported that they purchase medicines from their local pharmacy to protect their animals (18/06/2012 – 02/07/2012). Four householders also stated that when disease breaks out they quarantine their animals in shelters in the mountains (17/05/2012 – 02/07/2012). Mrs. Lich, from Giàng Tà Chải, reported: "Before [Hmong] New Year, everyone's chickens were all dying in this village … So my uncle and I went to the forest and made a little house with plastic and brought a few of our big hens there. So now we [still] have a few." She went on to explain that she only does this if none of her animals are sick yet. If even one animal develops symptoms, then the rest will get sick as well.

If one's livestock does contract disease, natural remedies or store-bought medicines are dispensed as treatment (11 interviewees, 18/05/2012 – 09/07/2012). Natural medicines are based on local traditional knowledge, and range from using garlic or cardamom to opium or medicinal plants gathered from the forest (6 interviewees, 18/05/2012 – 03/07/2012). On the other hand, pharmaceutical medications are purchased from village pharmacies. These purchases are based on word-of-mouth recommendations from relatives, or, since veterinarians are not available, the advice of pharmacy attendants (5 interviewees, 27/06/2012 – 05/07/2012). Unfortunately, while householders expend both financial and human capital to access these interventions, both natural medicines and pharmaceuticals are rarely effective and householders still lose animals (10 interviewees; 22/06/2012 – 09/07/2012). Two interviewees did report that local government officials advised villagers to protect their animals with a certain drug, but, after spending several hundred thousand VND on these injections, their animals still died (22/06/2012). It is important to note that preventive measures usually occur only after disease has already been reported in a village. This may account for the high-incidence of livestock morbidity and subsequent mortality among my interviewee households.

When animals die, they are thrown away or buried in the forest (10 interviewees, 18/05/2012 – 9/07/2012). However, four households did indicate that they would cook and consume large pigs if the meat was good (18/05/2012 – 9/07/2012). Chickens and piglets are never eaten. Once an outbreak ends, householders replace their losses using kinship networks or village markets. These long-term recovery strategies are examined in Section 7.1.3

### 6.3 Extreme Weather Events (EWEs) and Climatic Stresses

Inter-annual weather variability is a factor that Hmong and Yao farmers deal with on an annual basis. As Mrs. Cua, a Hmong mother from Giàng Tà Chải, stated: "The weather is like the game we play"

(17/05/2012). She went on to explain that some years there is good weather and she can grow a few more sacks of rice, or some years the weather is unfavourable and she grows a little less. Thus every year there is an element of chance and uncertainty involved. Despite these anticipated variations, there is a growing sense that variability is becoming more extreme and Hmong and Yao householders no longer know quite what to expect. Thirteen of my 35 interviewees observed that they felt that seasonal weather characteristics were changing (18/05/2012 – 10/07/2012). These changes ranged from summers becoming hotter and drier (6 interviewees), to rainfall being more erratic (4 interviewees), and winters getting colder (3 interviewees).

Beyond increasing weather variability, the impact of extreme weather events is also an emerging phenomenon. Thirty-four of my 35 research participants reported that extreme weather was affecting their food production systems. In this section, I analyze these events and the short-term responses to minimize the impact of these stresses. I start with winter cold spells (Section 6.2.1.). Then I examine two aspects of variable precipitation, drought conditions (Section 6.2.2) and intense rainfall, including rainfall-triggered landslides as a secondary stressor (6.2.3). I finally evaluate the impact of wind gusts (6.2.4). An overview of extreme weather impacts by village and household is provided in Table 6.2.

**Table 6.2 Extreme Weather Impacts on Hmong and Yao Food Systems**

| | | Cold Spells | | | Drought | | | Intense Rainfall / Landslides | | | Wind Gusts |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Village / Informant** | **Ethnicity** | **Buffalo** | **Other Livestock** | **Card-amom** | **Rice** | **Corn** | **Card-amom** | **Rice** | **Rice Paddies*** | **Corn** | **Corn** |
| **Cát Cát** | | | | | | | | | | | |
| **Lee** | H | | | | X | | | | X | | |
| **Kee** | H | X | | X | | | | X | | | X |
| **Ý Linh Hồ** | | | | | | | | | | | |
| **Cai** | H | X | | | | | | | | X | |
| **Tee** | H | | X | | | | | X | | | X |
| **Tả Phìn** | | | | | | | | | | | |
| **Thi** | Y | X | | | X | | X | X | | | X |
| **Xuan** | Y | X | | | | | | | | | |
| **Ngan** | Y | X | | | X | | | | | | X |
| **Ja** | H | | X | X | | | | | | | X |
| **San** | Y | X | X | | | | X | | X | X | |
| **Thao** | H | X | | | | | X | | | | |
| **Tien** | Y | X | | | X | X | X | | | | X |
| **Lien** | Y | X | | X | | | X | | | | X |
| **Choi** | Y | X | | | | | | | | | |
| **Sai** | Y | X | | | | | | X | X | X | X |
| **Lao Chải** | | | | | | | | | | | |
| **Bo** | H | | | | | | | | | | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Daw** | H | | | | | | X | | | | |
| **Kia** | H | | X | | | | | | | X | |
| **Mai** | H | X | | | | | | X | | | |
| **Di** | H | | X | | | X | X | | X | | |
| **Lu** | H | X | X | | | | X | X | | | |
| **Yi** | H | X | | | | | | | | | X |
| **Kaw** | H | | | | X | X | | | | | X |
| **Xia** | H | X | | | X | | | | | | X |
| **Me** | H | X | | | | | | | | | X |
| **Giàng Tà Chải** | | | | | | | | | | | |
| **Cua** | H | | | | X | | | | | | X |
| **Mo** | H | X | | | X | | X | | | | |
| **Man** | Y | | X | | X | | | | | | |
| **Kao** | Y | X | | | X | | X | X | | | |
| **Lich** | Y | X | | | X | X | X | | | | |
| **Sử Pán** | | | | | | | | | | | |
| **Paa** | H | X | | | | | | | | | |
| **Sua** | H | | | | X | X | X | | | | |
| **Tau** | H | | | | X | X | | | | | X |
| **Bản Hồ** | | | | | | | | | | | |
| **Na** | H | X | | | | X | | | X | | |
| **See** | H | | X | | X | X | | X | X | | |
| **Trung Chải** | | | | | | | | | | | |
| **Saw** | H | X | | | X | | | | | | X |

**Refers to actual terraced paddy walls/structures

### 6.3.1 Cold Spells

Lào Cai Province is characterized by a moderate subtropical climate due to its northern latitude and higher elevation, mountainous terrain. Sa Pa town is situated at 1650 metres above sea level and has an average temperature of 15.6 degrees Celsius which, on average, can reach over 23 degrees in the summer and dip below ten degrees in the winter months (Sowerwine 2004; Delang 2005). In the wintertime, temperatures can also hover around freezing for short, intense, cold spells. While these cold spells may only last for several days they can have major impacts on water buffalo. As Bonnin (2011) reports, since 2008, colder-than-normal conditions have caused the deaths of thousands of water buffalo in northern upland provinces. Local news articles illustrate that cold spells have been a concern for numerous years (see Table 6.3).

**Table 6.3 Viet Nam News Articles on Cold Spells and Livestock**

| Date | Article Title | Location | Report |
|---|---|---|---|
| **December 26 2006** | "Cold spell leaves many sick, damage crops in Lào Cai" | Lào Cai | "More than 100 buffaloes and cows in the mountain communes also fell sick due to neglect of local residents." |
| **December 03 2008** | "North to see frost, as tropical pressure forms in East Sea" | Northern provinces | "People living in the northern mountainous region should be aware that cold weather could cause livestock to suffer from epidemic break-outs more easily, and called on them to keep their cattle warm." |
| **January 16 2009** | "More cold, endless drizzle, flood tides forecast for Tet" | Northern provinces | "Highland provinces, especially Lao Cai and its Sa Pa Township, should prepare to cope with the bitter cold that accompanies frost and hoarfrost.<br>The cold [is] a threat to mountain livestock, but there [is] still water for agriculture." |
| **January 06 2011** | "Cold weather wreaks havoc in northern region" | Northern provinces incl. Lào Cai | SaPa residents moved their cattle south to Lào Cai City to avoid the cold front; "Agricultural authorities from mountainous regions have required that local residents stop grazing livestock during cold days and begin storing food and covering breeding facilities to keep them warm." |
| **January 17 2011** | "Cold snap prompts fears for stock" | Northern provinces incl. Lào Cai | In Lào Cai nearly 1,200 buffalo and cows died |
| **January 21 2011** | "Cold front brings misery to north, central regions" | Lào Cai, Sơn La, Lai Châu, Cao Bằng | 17,000 cows and buffalos have died due to prolonged cold weather |
| **December 24 2011** | "Tourists flock to Sa Pa for 'White Christmas'" | Sa Pa, Lào Cai | "Snow fell in the northern mountainous province of Lào Cai for the first time last year"; "Farmers in the area, likely to be hit hard by the cold weather, have been urged to take measures in helping their cattle and poultry cope with the extreme conditions" |
| **January 03 2013** | "Three-day cold snap expected to grip northern region today" | Sa Pa, Northern provinces | "Authorised agencies were advised to take measures to prevent livestock from freezing" |

Twenty-one of my 35 interviewees reported that they had lost buffalo to extreme cold; these are shown on Table 6.4 classified by village and household. The table illustrates that over the past five years cold spells have affected buffalo on a near annual basis. While these conditions may have occurred prior to 2008, that year seems to be when cold spells started significantly affecting households. Only two of my interviewees reported a buffalo death from cold prior to 2008 (2 interviewees, 17/05/2012, 22/06/2012).

The cold affects buffalo directly - reducing an animal's physical capacity to care for itself - and via a reduction in livestock feed. Prolonged cold periods kill the grasses that buffalo graze on in winter months (3 interviewees; 17/06/2012 – 03/07/2012). When this happens buffalo either lose body fat,

which increases their sensitivity to the cold, or they spend more time grazing for food, increasing their exposure. A small or skinny buffalo is more susceptible to the cold, with baby buffalo the most vulnerable (2 interviewees, 06/07/2012, 17/05/2012).

**Table 6.4 Household Buffalo Losses due to Cold Spells (2007-2011)**

| Informant | Ethnicity | 2007 or before | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| **Cát Cát** | | | | | | |
| **Kee** | H | | | | | 1 buffalo |
| **Ý Linh Hồ** | | | | | | |
| **Cai** | H | | 4 buffalo | | | |
| **Tả Phìn** | | | | | | |
| **Thi** | Y | | 2 buffalo | | | |
| **Xuan** | Y | | | | 1 buffalo | |
| **Ngan** | Y | | 5 buffalo | | 2 baby buffalo | |
| **Ja** | H | | | | | |
| **San** | Y | | 1 buffalo | | | |
| **Thao** | H | | | | 2 baby buffalo + 1 buffalo | |
| **Tien** | Y | | | | | 1 buffalo |
| **Lien** | Y | | | | | 2 baby buffalo |
| **Choi** | Y | 1 baby buffalo | | | | |
| **Sai** | Y | | | | | 3 buffalo |
| **Lao Chải** | | | | | | |
| **Lu** | H | | | | | 1 buffalo |
| **Yi** | H | | | | 4 buffalo | 2 buffalo |
| **Xia** | H | | | | 3 baby buffalo | |
| **Me** | H | | | | 3 buffalo | |
| **Giàng Tà Chải** | | | | | | |
| **Mo** | H | 1 buffalo | | | | |
| **Kao** | Y | | | | | 1 buffalo |
| **Lich** | Y | | | | | 2 baby buffalo + 1 buffalo |
| **Sử Pán** | | | | | | |
| **Sua** | H | | | | 1 buffalo | |
| **Bản Hồ** | | | | | | |
| **Na** | H | | | | 1 buffalo | |
| **Trung Chải** | | | | | | |
| **Saw** | H | | | | | 2 baby buffalo + 3 buffalo |

Cold spells also kill other household livestock. Eight householders reported that they have lost pigs, chicken, ducks and goats (17/05/2012 – 02/07/2012). As with buffalo, younger animals appear more vulnerable and due to their smaller body weight, succumb to the cold more quickly than larger, older

animals. The loss of mature animals is a greater immediate loss to a household, because more time and feed has been expended to raise them and, when well, they can be more readily sold for greater income if necessary. As Mrs. Lich explained, a lot of time went into raising her buffalo from a calf. When it died, she lost not only its labour but also all the resources she had invested in the animal (18/05/2012). However, the loss of young animals also jeopardizes a household's future productivity because without young animals to raise they are less able to replace future losses.

When a household loses buffalo they lose an important physical capital asset for rice production (labour for ploughing) as well as the potential financial capital that can be accessed in times of crisis (selling the animal). As a result this loss may decrease a household's coping capacity and therefore increase its sensitivity to future shocks. This potential insecurity is clearly exemplified by Mrs. Thi who stated that when she lost her buffalo it felt like she had "nothing left" (31/05/2012). Moreover, decreased supply of buffalo locally has increased their market price which creates another demand on a household's financial capital if new livestock are required for farming or ritual purposes. The loss of other livestock animals affects the household food system by reducing the available supply of meat.

Finally, cold conditions are also reducing financial capital by shrinking cardamom production. Three householders reported that snowfall in the past two years killed a portion of their cardamom plants and significantly reduced their harvests (07/06/2012 – 05/07/2012). For Mrs. Ja her average annual harvest fell from 300 kilograms of fresh cardamom to only 50 kilograms in 2010 and again in 2011 as a result of snow (07/06/2012). This greatly reduced her expected income. While only three householders have reported this concern, it is possible that these impacts will increase in the future. Especially if, as some householders report, winters continue to get colder as summers get hotter and drier.

#### *6.3.1.1 Household Responses to Cold Spells*

Household responses to cold spells focus on preserving water buffalo. The two most important response activities are ensuring buffalo have a shelter from the elements and making sure they are properly feed (14 interviewees, 04/05/2012 – 02/07/2012). As Mrs. Mo explained: "In the wintertime you need to have a beautiful place for your buffalo and you have to go to the forest to get the grass for the buffalo. If you leave the buffalo alone he cannot find anything to eat so it's really cold, [and] he dies" (18/05/2012). Buffalo feed usually consists of grasses and other plants, which can be grown near the home or gathered in the forest. Due to a buffalo's size and appetite, gathering feed can be a labour-intensive activity; it must be collected every day and plants can be hard to find in the winter which

means longer treks to find the requisite amount. As Mrs. Mo went on to say, "In the winter [during cold spells]…if you are lazy in taking care of your buffalo and let them walk around then maybe after two or three days the buffalo will die" (*ibid.*).

Five householders also reported trying to keep their buffalo warm by feeding them cooked corn or hot water, or by covering them with blankets (04/05/2012 – 02/07/2012; also see World Bank 2010). However, these measures are not always successful. Sometimes, even when a household does everything they can, buffalo still succumb to the cold. When buffalo die, householders have three strategies for reducing their overall financial and food system losses: they eat, share or sell the meat. In Lao Chải, Mrs. Yi, who lost a buffalo in 2011, said: "The buffalo have a little place to stay and we carry the grass to feed it. We keep the buffalo in the room but it is still cold for them and they die. So we eat the meat and sometimes we sell the meat" (01/07/2012). Sharing meat through kinship and community networks reinforces this social capital, while eating the meat is one way to transform the loss of financial and physical capital into a gain for household food consumption. Householders will also smoke buffalo meat to preserve it which can provide a sustained protein source for several months (8 interviewees, 17/05/2012 – 01/07/2012). On the other hand, selling the meat is one way to recoup some of the financial loss. Nine householders reported selling their buffalo meat; however the returns are only a fraction of the market value of a live buffalo (17/05/2012 – 03/07/2012). Long-term coping strategies for dealing with the loss of buffalo labour are examined in Section 7.1.3.

### 6.3.2 Variable Precipitation: Drought Conditions

While six Hmong and Yao householders (18/05/2012 – 01/07/2012) reported that they thought summer conditions were becoming drier and hotter over the past several years, twenty-two of my research participants indicated that they had been affected by drought conditions. A major concern related to this extreme weather event is the combination of high temperatures and lack of rainfall which effectively withers plants and stunts crop growth. As I discussed in Chapter 5, various food crops, such as rice, and income activities, such as cardamom cultivation, require wet and/or cool conditions to maximize growth potential. As a result, they are particularly susceptible to drought conditions.[11] The three most impacted food system components, rice, corn, and cardamom, are analyzed here.

[11] In this context I use the term 'drought' simply to refer to a period of insufficient rainfall and above-average air temperatures.

Rice production in Sa Pa district begins in March and April when households start preparing their rice paddies and sowing rice seedlings in small nursery fields (see Section 5.1.1). Then, at the end of April and into May when the rainy season begins and rice terraces are properly flooded, farmers transplant the rice seedlings. There is an optimal two week to one month period in which to complete this transplanting. After this threshold, rice quality and output decreases. When I started fieldwork in mid-May 2012, interviewees kept voicing concerns about their rice because of the unseasonably dry conditions. During the last two weeks of May, six interviewees stated that they were still waiting for the rain in order to transplant rice seedlings (17/05/2012 – 31/05/2012). Three worried that if the lack of rain delayed transplanting for a few more weeks, they would not be able to produce enough rice for the next year (17/05/2012-18/05/2012). These concerns highlight the sensitivity of rice output to drought events; as Mrs. Man stated: "If it doesn't rain, then next year we won't have anything to eat" (17/05/2012).

In June, most households reported – with relief – that they had enough water to transplant seedlings in at least a portion of their rice paddies. Yet in total, 14 households reported difficulties with their rice production due to delayed rainfall (17/05/2012-03/07/2012). Of these, six householders stated they expected lower rice harvests as a result of the late growing season. Two householders estimated their expected losses at 500 and 1000 kilograms of rice, or about 17 and 30 percent of their average annual production, respectively (03/07/2012, 10/06/2012).

Householders also expected diminished corn harvests. Six interviewees reported that during the summer of 2012 their corn plants became desiccated due to water shortages and above-average temperatures (18/05/2012 – 26/06/2012). The extreme weather conditions either stunted growth or killed the plants completely. As a result, householders anticipated corn shortages for the following year. Since corn is the primary feed for household livestock, these shortages point to reduced livestock productivity, decreasing the supply available for meat consumption and labour, as well as financial capital.

Drought conditions further constrain the availability of financial capital by affecting cardamom production. As the plants began to germinate, the lack of rainfall and hot temperatures caused the flowers to dry out. Thus cardamom pods did not develop. Twelve householders reported difficulties with their cardamom plants (04/05/2012 – 10/07/2012). Of these, eight households projected drastically reduced harvests (04/05/2012 – 01/07/2012), while four interviewees expected a complete failure of their cardamom crop (06/06/2012 – 10/07/2012). As discussed in Chapter 5, cardamom is a

primary income-generating activity for 19 of my research participants, and for many provides the cash income necessary for accessing modern agricultural technologies, especially fertilizer. Without cardamom revenues, Hmong and Yao householders are less able to access essential food system inputs.

*6.3.2.1 Household Responses to Drought Conditions*

The predominant response from householders to the lack of rain in 2012 was just to wait and hope that the rains would eventually come (11 householders, 04/05/2012-02/07/2012). As Mr. Kao stated: "If it doesn't rain we don't know what to do because it's the weather. We just hope it will rain in the next month" (18/05/2012). While householders waited, they kept their rice seedlings in the smaller rice nurseries which did have sufficient water. This was a practical response given the uncertainty about whether fields would receive enough water to maintain transplanted seedlings. Four householders indicated they would try to irrigate their dry rice paddies using bamboo or plastic pipes (17/05/2012 – 27/06/2012). For householders in Tả Phìn village with dry paddies in neighbouring Ban Khoang, negotiations for water access with Ban Khoang villagers were a key way that householders tried to get more water to their rice fields (3 interviewees, 22/06/2012). These actions were moderately successful as some interviewees were able to get more water. In terms of cardamom, only one householder reported that she would purchase new cardamom seedlings to replace the ones that had died (18/06/2012). When asked, the other 11 householders that anticipated losses did not report any strategies for protecting their cardamom income. This could indicate a lack of capacity for long-term planning and impact mitigation.

While many householders did not feel that they could minimize their drought-related losses, the majority did report long-term strategies for dealing with the expected rice, corn or cardamom shortages. For instance, these included borrowing or buying rice or corn, or accessing financial capital for agricultural inputs through other avenues, such as loans. These strategies are examined further in Chapter 7. However, the fact that there are few options for reducing the impact of a drought once it is occurring points to the need for increased attention to possible mitigation measures. For instance, one Hmong interviewee, Mr. Di did suggest that more trees should be planted in order to keep areas cooler and aid with water supply. His suggestion correlates with those interviewees who identified deforestation as the cause of chronic water shortages (4 interviewees, 14/06/2012 – 22/06/2012).

6.3.3 Variable Precipitation: Intense Rainfall and Landslides

While too little rain can devastate food systems, too much rain can have a similar effect. Sixteen of the 35 interviewees described problems related to extreme or erratic rainfall patterns. While some reported that this might cause difficulties with their corn crops (4 interviewees, 18/05/2012 – 27/06/2012), the majority reported that rice production was most severely affected (12 interviewees, 18/05/2012 – 5/07/2012).

While lack of rainfall creates problems at the beginning of the rice growing season, excess rainfall is most disruptive during the growing season and at harvest time. Three householders reported that at times too much rain waterlogged their soil and killed their rice plants (18/05/2012 – 30/05/2012). Rainfall at harvest time can be equally damaging because warm, dry conditions are needed for drying harvested rice in preparation for storage. If rice is not sufficiently dry, it can rot. Five research participants reported that this problem had affected their rice supply, with four householders reporting losses in both 2010 and 2011 (30/05/2012 – 02/07/2012). The impacts ranged from a negligible loss (See, 03/06/2012) to a loss of 150 to 200 kilograms of rice, or about a two month supply for Mr. Tee and his family in 2010 (2/07/2012). Additionally, Mrs. Thi reported that in 2010, rain that caused waterlogging at harvest time reduced her harvest to 1000 kilograms, a drastic reduction from her annual average of about 2500 kilograms (30/05/2012). The following year her household had to consume old rice from the year before to cope with the resulting rice shortage. Eating food substitutes as a coping strategy is discussed further in Section 7.2.2.3.

In addition to these stresses, rainfall-triggered landslides can destroy terraced rice paddies, which are essential physical capital inputs for rice production. In most villages, landslides occur infrequently. They happen during the summer rainy season when excess rainfall destabilizes rice paddies or steep mountain slopes. Six householders reported that they were directly affected by landslides, while an additional four described how these events had affected other households in their village or in neighbouring villages (29/05/2012 – 26/06/2012). For those directly affected, impacts ranged from minimal, such as a small slump in one rice paddy (Mrs. Sai, 27/06/2012), to severe, such as the destruction of multiple terraced paddies. Three households recounted how successive landslides damaged their rice paddies and reduced their harvests. All three households experienced chronic rice shortages. For Mr. Lee, this resulted in yearly losses of 100 to 150 kilograms of rice when his household only averages 750 kilograms annually (26/06/2012). For the other two households,

landslides had significantly disrupted the water supply to their paddies thereby reducing their access to suitable land and their capacity to grow rice (03/06/2012, 03/06/2012).

*6.3.3.1 Household Responses to Intense Rainfall and Landslides*

Householders reported several practical loss-minimizing strategies, though none were widespread. For instance in terms of rainfall at harvest-time, Mrs. Xuan reported that she would wait for dry periods and then simply get friends to help her harvest as quickly as possible (06/06/2012). Mrs. Paa also stated that she would wait for dry periods, but if her harvested rice could not be sufficiently dried then she would warm the rice in a pan over her fire or spread the rice in the loft above her fire in order to dry it for storage (10/07/2012).

With regards to landslides, Mrs. See built new paddies where possible and converted her irreparable paddies to corn and cassava cultivation (03/06/2012). This action reduced the overall impact on her household's food system by transforming the loss of rice into a gain for feed crop production. Other responses ranged from reinforcing destabilized paddies with bamboo (Mrs. Sua, 10/07/2012) to making offerings to the spirits to protect the land from further slides (Mrs. Na, 03/06/2012).

6.3.4 Wind Gusts

While rainfall variability mostly impacts rice output, wind gusts affect corn production. Since corn is generally grown on steep hillsides that are not suitable for rice paddies, corn crops are exposed to strong winds. My interviewees reported that wind gusts are getting stronger; fourteen have had some or all of their corn stalks blown over in the past few years (17/05/2012 – 09/07/2012). One recurring explanation for these losses is the growing characteristics of local corn varieties; since local corn grows quite tall, it is more easily blown over (4 interviewees, 04/05/2012 – 05/07/2012). In contrast, 'Chinese' corn varieties – from hybid seeds –grows lower to the ground and are described as less vulnerable to wind gusts (2 interviewees 07/06/2012, 14/06/2012). As corn is the main feedstock used for household livestock production, corn losses impact this component of Hmong and Yao food systems. Due to wind events in the summer of 2012, two householders anticipated not having enough corn for their livestock (22/06/2012, 01/07/2012). Another six expected lower than average harvests (30/05/2012 – 26/06/2012).

6.3.4.1 Household Responses to Wind Gusts

As discussed in Chapter 5, all 22 of my research participants that reported growing corn stated that they experienced chronic or transitory corn shortages; wind gusts being one of the main contributing factors. Corn shortages result in feed shortages for a household's livestock (strategies for securing

feed are examined in Chapter 7). Interestingly, the only strategy for minimizing the impact of these losses was feeding the blown-over corn stalks to the household's buffalo (2 interviewees, 06/03/2012, 10/07/2012). Once again, while Hmong and Yao respondents were quite vocal about how they would handle food or feed shortages, their short-term responses for protecting their assets and minimizing the impacts of some weather related stressors were less developed. This could point to the need for more attention to preparedness and mitigation activities for dealing with extreme weather.

**Figure 6.1 Buffalo eating corn stalks blown over by wind gusts (Source: Author 2012)**

### 6.4 Chapter Conclusion

In this chapter, I examined stresses that affect the entire Hmong and Yao food system continuum from inputs to outputs. I examined food system vulnerability in terms of exposure and sensitivity, or how stresses impact food system components. I also examined the short-term response strategies, or coping strategies, that householders employ to reduce their exposure, minimize losses and manage impacts. I explored stresses related to food system inputs at the household level, namely land availability, rice production input concerns and cash income fluctuations. These stresses are largely created by community-level change, or institutional processes beyond the immediate control of Hmong and Yao householders. Then I analyzed how Hmong and Yao food systems are critically exposed to extreme weather stresses because they rely heavily on natural capital to compose their semi-subsistence

livelihoods. Hmong and Yao are also highly sensitive to these stresses because they rely on household production for the majority of their food supply. Extreme weather stresses impact food systems in two ways: first, by hindering plant growth and reducing household food production, and second, by diminishing the availability of other capitals needed to acquire inputs or purchase alternative food stocks. For instance, follow-up interviews in 2013 revealed that drought and extreme wind impacts in summer 2012 had decreased food and feed supply, as well as decreased financial capital through the destruction of cardamom and orchid plants. Hybrid rice losses occurring from the four- to six-week planting delay ranged from six to 25 percent of average annual harvest for some households (4 interviewees, 08/06/2013-04/07/2013). For other households, the loss of most of their cardamom harvest had an even more serious impact because it strained their ability to access cash for fertilizer for the 2013 growing season (2 interviewees, 08/06/2013, 09/06/2013). In the next chapter, I examine how householders respond to these impacts and act to secure their food systems and livelihoods over the long-term.

# CHAPTER 7 – STRATEGIES FOR MAINTAINING HOUSEHOLD FOOD SECURITY

In this chapter, I answer my third research question: how do Hmong and Yao householders respond to stresses on food security and livelihoods? I examine how households recover from stress-related losses and attempt to secure their food systems and livelihoods over the long-term. While stresses may be caused internally due to a household's lack of livelihood capitals or externally from extreme weather events, householders employ similar strategies for dealing with the outcomes, regardless of the cause. These strategies rely heavily on financial capital as well as bonding and sometimes bridging social capital for buying or borrowing needed items, be it corn land, water buffalo or sacks of rice. While some of these responses can be seen as adaptation, or "the process of deliberate change" in response to external stress, I argue that in many ways Hmong and Yao are simply coping, or managing the short-term impacts of these food security and livelihood stresses (Nelson, Adger and Brown 2007, 395).

In Section 7.1, I analyze strategies for acquiring food system inputs, namely land, fertilizer and livestock. Next I examine mechanisms for securing staple food and livestock feed in response to rice and corn shortages (Section 7.2). Finally, Section 7.3 presents three household case studies that illustrate how specific households cope with and adapt to stresses. Since response strategies are highly contextual, depending on a household's assets and the opportunities available to them, these studies work to illustrate how food systems operate and interconnect with broader livelihood activities. Case studies are presented according to the household's level of food security, which is informed by Oshaug's (1985) and Hart's (2009) classifications. This includes Fragile/Chronic, Resilient/Transitory and Enduring/Secure households, as discussed in Chapter 2.

## 7.1 Securing Assets and Inputs: Land, Fertilizer and Livestock

As discussed in Chapter 6, lack of access to key inputs can severely restrict the productivity of Hmong and Yao food systems. In this section, I examine the strategies householders use to secure essential assets and agricultural inputs. These include land (Section 7.1.1), fertilizer, (Section 7.1.2) and livestock (Section 7.1.3).

### 7.1.1. Securing Land

Arable land is the fundamental natural capital that semi-subsistence farmers rely on. Without it, current day Hmong and Yao food systems would collapse. As Table 6.1 illustrated, inadequate access to land has resulted in chronic annual rice production shortages for six interview households. The limited availability of land for corn production is also the main factor contributing to chronic corn

shortages. In some instances where water shortages are affecting productivity, householders redirect water from mountain streams to rice paddies and other fields with a combination of human capital (labour, skill and knowledge) and natural capital (bamboo shoots), or physical and financial capitals (purchased plastic pipes) (9 interviewees, 18/05/2012-26/06/2012). Where chronic water shortages cannot be resolved, some householders rent out parcels of dry land and use the income to buy rice, thereby diminishing the loss to food production. This strategy is examined further in Section 7.2.

Social capital can also increase land productivity and access to additional land. For example, kinship labour is often necessary for undertaking the arduous task of building new rice paddies (3 interviewees, 18/06/2012 – 02/07/2012, 04/07/2013). Furthermore, householders can also access additional rice paddies and corn fields through their kinship networks. For instance, Mrs. Lich and Mrs. Man, both Yao women from Giàng Tà Chải village, stated that when possible family members would lend them corn lands for the growing season (18/05/2012, 17/05/2012). Mrs. Paa and Mrs. Sua, two Hmong women and relatives from Sử Pán village, stated that they would lend their surplus land to households that could not grow enough food or did not have good quality fields (10/07/2012). They could do this because their landholdings exceed their family' needs and they are also very busy, one being a shaman and the other a trekking guide. Therefore, they lend some fields to other families they know very well and they may also help them to buy seed and fertiliser. Then, at harvest time, these families give them half the harvest from the borrowed land. In this way, both households benefit. Through the exchange of assets, in this case natural capital/land for human capital/labour, both households optimize their productivity and the borrower can also secure a more stable food supply. However, this avenue is only available to householders who are connected to someone with additional land, and who are perceived as hard-working and trustworthy. The informal rules that govern borrowing assets are further examined in Section 7.2.2.2.

Marriage is another avenue to increase social capital and access to land. For instance, large Yao households with many sons can marry a son into a household that only has daughters. This son-in-law then has a claim to inherit the land of his wife's family (2 interviewees, 27/05/2012). I did not have the opportunity to investigate if Hmong households have same custom.

Buying land is another way to secure access, but for many households this option is prohibitively expensive (Miss Me, 09/07/2012). Mr. Saw, the only interviewee who reported purchasing land, stated that his family had to borrow money from their local bank to cover the cost (03/07/2012). Chronic water shortages were the main reason for the purchase. As a result of this as yet unpaid loan,

Mr. Saw's household is unable to borrow further funds, which in turn diminishes their ability to deal with other stresses. For example, when five of their buffalo died during the 2011/2012 winter, they were unable to borrow more money to buy a new buffalo. Therefore they rely on their one remaining buffalo and may need to borrow an animal from an uncle for a couple days to prepare their fields.

### 7.1.2 Securing Fertilizer

As discussed in Section 5.1.3, fertilizer consumption and the ability to access this fundamental input is intricately tied to a household's income. Fifteen households discussed their strategies for obtaining fertilizer when they did not have readily available funds or when typical revenue sources, such as cardamom income, were compromised. These include intensifying income-generating activities, borrowing money to buy fertilizer and directly borrowing fertilizer from a shop. Selling assets, such as animals or orchids, to earn needed income is another possible strategy (3 interviewees, 31/05/2013-06/06/2012). In extreme cases, when householder strategies cannot produce the needed fertilizer, householders will also reduce the amount of fertilizer used (2 interviewees, 03/06/2012, 7/06/2012). Inevitably, this results in lower yields.

Intensifying income-generating activities is a widespread strategy since householders attempt to resolve issues using internal capitals and opportunities before getting external help (6 interviewees, 17/05/2012-22/06/2012). Intensification can involve spending more time trying to sell handicrafts to tourists, or gathering more non-timber forest products for sale. Householders without reliable revenue may also earmark income throughout the year, saving it for future fertilizer purchases (2 interviewees, 03/06/2012).

Due to cardamom losses resulting from the 2012 drought, householders relied more heavily on other income sources in 2013, reported to me during my return visit. For example, income from tourism, either trekking or selling handicrafts, became more important for securing fertilizer (3 interviewees, 08/05/2013-10/06/2013). However, in 2013, householders also reported a downturn in the number of tourists compared to previous years (5 interviewees, 08/05/2013-10/06/2013, 04/07/2013). As a result, this limited householders' abilities to intensify their tourism-related activities. When I asked why there were fewer tourists, Mrs. Xuan suggested: "Maybe it is because the government has opened more places for tourists to visit, so people go elsewhere" (08/06/2013). This statement highlights the hidden vulnerability of tourism-reliant livelihoods and underscores the fact that Hmong and Yao livelihoods are also exposed to distant political decisions and economic trends. As a trekking guide, Mrs. Xuan's income was greatly reduced in 2013: she only completed 22 treks in March and April,

whereas in 2012 she completed 22 treks in March alone. However, she declared that she was not too badly affected; after harvesting only half her average annual cardamom crop in autumn 2012, she sold four large orchids in January, taking advantage of the higher prices available before New Year. Mrs. Xuan earmarked these earnings for fertilizer.

Where internal resources are not sufficient to meet fertilizer demands, householders may borrow money either from within their social network or from a bank (7 interviewees, 07/06/2012 – 09/07/2012; 08/06/2013 – 09/06/2013). Five householders discussed borrowing funds from family and friends who had an available surplus, thus using bonding and sometimes bridging social capital to access financial capital (30/05/2012-10/07/2012). Generally, these loans are given interest-free. However, they are not available to everyone. My research assistants, Miss Kia and Mrs. Xuan, explained that in order to borrow money from family and friends, the lenders need to trust that the borrowers have the means to repay the loan (06/06/2012-18/06/2012). Thus, householders without cardamom or other reliable income are seen as greater risks. In particular, it is difficult for widows to borrow money because there is a perception that they will not be able to repay the amount (2 interviewees, 06/06/2012, 18/06/2012). In order to maintain the social capital necessary for this borrowing, borrowers need to prioritize repayment. As Mrs. Xuan stated: "If I don't have money to pay back [to my lender] then I need to borrow again from someone else to pay it back" (08/06/2013).

Borrowing money from a bank was the least frequently reported strategy, and may point to a lack of linking social capital between Hmong and Yao communities and institutionalized lenders. Difficulties navigating the lending institutions' requirements were cited as the main obstacles (4 interviewees, 17/05/2012-09/07/2012). As Miss Kia explained, accessing bank credit requires a householder to produce land certificates as well as itemize and prove ownership of animals, cardamom and other assets (06/06/2012). This complexity can dissuade potential Hmong and Yao borrowers who are largely illiterate and unfamiliar with institutional banking practices. However, householders do not need direct access to bank credit in order to benefit from this service. Mrs. Xuan and Mrs. Choi both indicated that they knew other Yao householders with access to bank credit and these individuals were willing to borrow money from their bank to lend Mrs. Xuan or Mrs. Choi, if necessary (22/06/2012). In this way, Mrs. Xuan and Mrs. Choi could use bonding social capital to circumvent the banks' restrictive regulations and access financial capital when needed.

Four households discussed borrowing directly from a shop as a method for securing fertilizer (18/05/2012-22/06/2012). This involves borrowing fertilizer as needed and then paying the commonly

*Kinh* shopkeeper a premium when money is available. This premium ranges from an extra 20,000 VND to 35,000 VND ($1 to $1.75 USD) per 50 kilogram sack (3 interviewees, 07/06/2012-22/06/2012, 08/06/2013). As with borrowing from a bank, shopkeepers vet their borrowers as well, thus the linking social capital required is only accessible to certain individuals. Three of my interviewees explicitly stated that they could not borrow on credit from shops because they were too poor and thus considered too risky to receive a loan (17/05/2012-14/06/2012). In order to repay loans, some households intensify their income generating activities and make payments as money becomes available while others wait for money from their cardamom harvest to repay the shop. However, this means that householders must scramble to gather funds when cardamom harvests are lower than expected.

As with responses to other stressors, many householders identified more than one possible strategy for securing fertilizer. Decisions about which strategies will actually be employed are highly contextual. *Are there chickens available to sell*? *Is there metal-work to be commissioned*? *Can money be borrowed from family or friends*? Individuals assess the opportunities available with their current capital portfolio and they act accordingly, using the most beneficial and least costly strategies available to them before others.

### 7.1.3 Securing Livestock

Householders employ two sets of strategies for recovering after the loss of livestock. Small animals such as chickens are replaced through kin and village donations or household purchases, while new water buffalo are either bought, borrowed or their labour is completely replaced.

Fourteen interviewees reported that donations of chicks, ducklings and, sometimes, pigs, from kin, neighbours or friends were the primary means for recovering from disease and cold-spell related losses (04/05/2012-09/07/2012). Householders offer their surplus animals because, as Mrs. Cua stated: “In the village, local people often give each other things. So when I don’t have I can ask you for something, and when you don’t have you can ask me” (17/05/2012). Thus these donations reinforce bonding and bridging social capital and ensure that householders will receive similar help if needed. When recovering from livestock disease, transfers come from neighbouring or distant villages and occur a few weeks after the outbreak has ended to reduce the risk of new animals also dying (4 interviewees, 21/06/2012-05/07/2012).

If livestock are not available through these networks then householders will buy new animals, usually from within their Hmong or Yao communities (8 interviewees, 30/05/2012-09/07/2012). Several

householders explicitly stated that they avoid buying small livestock from external markets because these livestock get sick more easily (2 interviewees, 17/05/2012, 22/06/2012). Thus they do not trust the quality of market chickens and pigs. These perceptions of market goods are further examined in Section 7.2.2.1.1.

In terms of recovering from the loss of buffalo, the predominant concern is not necessarily acquiring another animal per se but replacing the lost labour potential. To achieve this, householders will buy a new buffalo, borrow or hire one from family or friends, or replace buffalo completely by using alternate labour sources. Of the 17 householders who discussed losing water buffalo, only four indicated that they might buy a new animal, with the money coming from intensified income activities, loans or government aid (17/05/2012-10/07/2012). Householders reported that the main constraint on buying buffalo was the price. Six householders stated that buffalo were simply too expensive for them to purchase a replacement (17/05/2012-27/06/2012). As discussed in Section 6.3.1, cold spells have greatly decreased the number of buffalo available locally thereby increasing their market price. The long-term impact is that water buffalo ownership is now beyond the means of some Hmong and Yao householders. Furthermore, land pressures are reducing grazing land making it harder for some households to care for and raise buffalo (2 interviewees, 17/05/2012, 18/05/2012). These concerns factor into decision-making and are prompting householders to pursue alternatives.

Borrowing or hiring a buffalo from within one's social network is a common strategy. Since buffalo are such valuable assets, borrowing and lending tends to occur only between immediate family members or close friends (7 interviewees, 07/06/2012-03/07/2012). The borrower does not directly compensate the lender, but they must feed the buffalo for the several days it is in their care. If a householder cannot borrow an animal in this manner, they can hire one from a family with buffalo labour to spare (3 interviewees, 03/06/2012-10/07/2012). Mrs. See estimated it cost 1.5 million VND ($75 USD) to hire a buffalo for ten days (03/06/2012) from outside of one's social networks. If the householder does not have money readily available, they can work off the cost working in the lender's fields before borrowing the animal (Mrs. Cua, 17/05/2012).

Barring these possibilities, a householder will employ buffalo labour substitutes. The most accessible of these is simply ploughing and preparing the fields by hand, thus replacing buffalo labour with human labour (4 interviewees, 17/05/2012-26/06/2012). However, due to the intensive nature of the work this is considered a last resort and householders will first exhaust their other options. In recent years, there has been a proliferation of mechanical, gasoline-powered ploughs in villages in the

Mường Hoa valley: ten of my 35 interviewees used these machines (17/05/2012-27/06/2012). These householders have either purchased their own ploughs outright, pooled money with other households to share a plough, or hired a plough from another family. The initial purchase cost (9-12 million VND or $450-600 USD) is a fraction of the price of a working-age buffalo (18-20 million VND or $900-1000 USD) (3 interviewees, 17/05/2012-26/06/2012). While this equipment is undoubtedly filling a need, householders complain about the ongoing costs for gasoline and their unsuitability in the mountainous environment (3 interviewees, 17/05/2012-14/06/2012). For example, Mrs. Man explained, "We don't have a place to graze a buffalo so we bought a machine plough. But there are too many rocks and stones in my fields so this year the machine has broken every day. This makes it harder for us to work" (18/06/2012). Furthermore, since some of her fields are further up in the mountain and not accessible by roads, hauling the plough to these areas is strenuous. On the other hand, buffalo are self-propelled and can complete the trek under their own power. Thus, while some householders prefer water buffalo as they are better suited to the environment, others have adopted mechanical ploughs in order to adapt to changing circumstances.

### 7.2 Securing Food and Feed: Rice and Corn

As discussed in Section 6.1, in the past householders had few options for dealing with food shortages as there was an absolute lack of available staple grains, namely rice. Thus households relied on alternate foodstuffs such as wild foods, cassava and corn. However at present there is a wider range of possible strategies. While some householders still use substitute foods at times, they can also buy rice and corn from the market or borrow rice from their social network. In this section, I examine the long-term strategies householders employ for securing their staple food and livestock feed crops, or rice and corn respectively. Many householders discussed a portfolio of strategies, explaining how they were used in different circumstances depending on the resources and assets available to them. Householder responses also depend on the nature of the food shortage. For example, householders react differently to a shortage of sticky rice versus everyday rice. If sticky rice is limited, householders will use this rice only for special occasions or for certain working days, such as during rice transplanting, which require more energy (2 interviewees, 06/06/2012, 01/07/2012). In this section, I focus on how individuals secure corn and rice for everyday use.

#### 7.2.1 Securing Food: Everyday Rice

Many householders discussed a portfolio of long-term strategies for managing rice shortages. For example, householders will first exhaust their domestic resources before requesting aid from other

individuals. Thus, if possible, they will use rice substitutes or buy rice before borrowing rice. In this section, I examine these three strategies: buying rice, borrowing rice and eating rice alternatives, as well as several factors that constrain these options.

*7.2.1.1 Buying Rice*

With increased access food markets and cash income, Hmong and Yao households now have greater opportunities to buy food. In times of rice shortages, buying rice is now the predominant strategy. Of the 26 householders that discussed food shortages, 22 interviewees stated that purchasing rice was a part of their response portfolio. There are four primary ways that householders get money for these purchases: intensifying current income activities, selling livestock, exchanging labour for rice, and renting land.

Fourteen householders stated that they worked harder to earn income when faced with a rice shortage (17/05/2012-09/07/2012, 08/06/2013). Ten of these depended on tourism-related activities such as selling textiles and crafts to tourists or guiding treks, which are women-dominated activities (17/05/2012-09/07/2012, 08/06/2013). Interviewees stated that they would increase the number of days per week that they worked, with some saying they would go selling to tourists every day to earn money for rice. Three interviewees reported that men in the household would also work more, usually at a skilled trade like metalwork or basket-making (29/05/2012-21/06/2012).

For householders with fewer marketable skills, farm labour for other households is a vital option. Six householders indicated that they could provide field labour for richer families who would compensate them with rice (17/05/2012-02/07/2012). As Mrs. Na explained, rich households can hire workers for their fields because they have diversified away from farming but have retained their farm lands. In Bản Hồ, where Mrs. Na resides, these are usually Tày households engaged in tourism, for example as homestay operators. These householders prefer to concentrate on their businesses and so hire workers for their fields (03/06/2012). However, this option is only available at certain times during the growing season when there is work to do. Thus, even Hmong and Yao householders who are not directly engaged in the tourism industry are linked to this economic activity via the emergence of peripheral opportunities.

Selling livestock is another way to quickly access cash. Three householders reported that they sold small livestock, such as pigs and chickens as a way to buy rice (17/05/2012-06/06/2012). Three additional householders stated that they would sell their livestock, but they did not have any to sell (18/05/2012-22/06/2012). Their animals had been decimated by disease and other livestock stressors.

As Mrs. Lich explained: "A few years ago I was able to sell my chickens in the market and buy a few packages of rice. I could use my chickens to buy things. Now I don't have any. There is too much disease. They die" (18/05/2012). This illustrates how livestock losses are reducing coping capacity and having larger impacts on household food security than in the past. While chickens and pigs are expendable, water buffalo are never sold to secure rice because selling a water buffalo compromises the household's ability to grow their own food the following year; buffalo labour is too important for rice production (Mrs. Lich, 18/05/2012).

Finally, renting out land is a relatively new long-term strategy Hmong and Yao householders are using to reduce their vulnerability to rice shortages and stabilize food supply. One Hmong and two Yao householders, all villagers in Tả Phìn, currently rent out a portion of their fields (07/06/2012-22/06/2012). According to my key informant Mrs. Xuan, householders in Tả Phìn village started renting out parcels of their land around 2008 (08/06/2013). Householders choose lands that are chronically dry and therefore cannot be used for their traditional crops. Vietnamese companies, who grow artichokes or cabbages, offer up to ten year contracts for these fields (5 interviewees, 07/06/2012-10/07/2012, 08/06/2013-10/06/2013). All three interviewees reported that they used their rent money to purchase rice. In this way, these householders are able to transform unproductive natural capital into financial capital and use this to mitigate shortages. As Mrs. Choi explained, before she started renting her land, she frequently needed to borrow rice from her parents. In 2010, she started a 10-year contract and now uses the money to purchase an additional 550 kilograms of rice per year. This has increased her pervious yearly supply by one-third. While Hmong and Yao householders are capable of growing artichokes and cabbages on their own land, they do not have access to the commodity networks, or rather to sufficient linking social capital, to engage in cash cropping (Mrs. Xuan, 08/06/2013). While this type of diversification, which Wells-Dang (2012) terms distress diversification (following Bouahom, Douangsavanh and Rigg 2004), has diverted household livelihood assets away from agriculture and contributes in-migration related land pressures, this strategy has made these households more food secure.

*7.2.1.1.1 Constraints on Buying Food: Market Food Quality and Safety Concerns*

In addition to buying rice, 18 householders reported that they buy other foods, such as meat or fruits and vegetables, in the market (04/05/2012-02/07/2012). In order to be truly food secure a household must have access to "safe and nutritious food to meet their dietary needs" (FAO 2009, 1). While greater access to food markets has increased the food items available to Hmong and Yao householders, eight interviewees revealed concerns with the quality and safety of market-available

foods (18/05/2012 – 09/07/2012). Most of these concerns centred on the use of chemicals in food production, especially in relation to meat and vegetables. Householders discussed how chickens and pigs available in markets were fed "chemicals" or "medicine" to make them grow faster (4 interviewees; 29/05/2012 - 09/07/2012). As Mrs. Thi explained, market chickens take two to two-and-a-half months to grow to a weight that would take her chickens three to four months (29/05/2012). Likewise, chemicals were also present on vegetables and fruits available for purchase. These substances affected quality and taste. They could also make people sick and, in extreme cases, result in death (Kia, 06/06/2012). Generally, there was a discursive dichotomy made by my interviewees between market foods and Hmong or Yao foods. Market foods are sometimes labelled "Vietnamese" or "Chinese," indicating that they are not locally-grown items, while Hmong- and Yao-produced foods are seen as more natural and considered better quality (5 interviewees; 29/05/2012 - 09/07/2012). As discussed in Chapter 2, one's perception of food is an important component of food security (Maxwell 1996). Therefore, while markets increase the absolute availability of food, householder perceptions of these items as toxic or potentially harmful may decrease the sense of security derived from accessing these foods.

*7.2.1.2 Borrowing Rice*

Fourteen householders indicated that they had borrowed or would borrow rice in the event of a shortage (17/05/2012-09/07/2012). Immediate kin, such as parents or siblings, are the most likely lending sources though friends and neighbours are also potential lenders (10 interviewees, 17/05/2012-09/07/2012). Depending on the nature of the arrangement, borrowed rice may or may not be repaid at the next harvest. At times, householders give rice to poorer relatives who do not have the means to repay as a gift (2 interviewees, 03/06/2012, 22/06/2012). Rice borrowed from friends and neighbours however is usually treated as a loan and repaid.

*7.2.1.2.1 Constraints on Borrowing: Social Capital, Reputation & Collective Vulnerability*

For many householders, borrowing is seen as a secondary strategy because it requires asking others for help. For some householders, the embarrassment of making this request keeps them from borrowing rice (2 interviewees, 21/06/2012, 26/06/2012). There is also a limit to the amount of rice that can be borrowed since households can only lend what they do not need to eat. Therefore for many householders borrowing must still be combined with other strategies. As Mrs. Tau explained: "We can borrow rice but we can only get one [50-kilogram] sack at a time so we need to stretch it. We need to try to get more food on our own before going and asking for more; so we eat corn meal with our rice or go find work to be able buy more rice" (10/07/2012).

Since householders can only lend if they have a surplus, there is need for a certain abundance within one's social network to enable lending and borrowing. In the event of community-wide hazard, such as a drought that reduces yields, this option is constricted. When asked about coping with the 2012 drought, Mrs. Man replied: "If there is no rice because of the weather, then if I don't have rice other people won't have rice" (17/05/2012). Fortunately, the 2012 event was not severe enough to create this problem, but this highlights the fact that householder coping strategies are dependent on the scale of the stress.

Social capital for borrowing is further restricted by one's reputation, or more precisely, the reputation of the head male householder. Four interviewees discussed how having a husband with a drug addiction or a reputation for being lazy restricted the household's ability to borrow (4 interviewees, 17/05/2012-10/07/2012). This happens because addictions and laziness are perceived to affect whether these householders can repay the loan. Unfortunately, the character of the female householder does not figure into these considerations.

*7.2.1.3 Substituting Rice*

Rice is the preferred dietary staple for Hmong and Yao households in the Mường Hoa valley. Thus, if householders have the means they will buy or borrow rice. However, eight householders indicated that they substituted or supplemented rice with other foods (30/05/2012-09/07/2012, 04/07/2013). These actions were taken pre-emptively to stretch rice stores, or they were a last resort if householders had exhausted all other options. For example, Mrs. Na and Mrs. Tau explained that they would prepare cassava and corn meal, respectively, with their rice in order to make their supply last longer (03/06/2012-10/07/2012, 04/07/2013). Neither household has dependable income sources or abundant borrowing networks. Thus without robust coping mechanisms these women employ what is available to them to ensure a continuous food supply.

Corn, cassava or surplus rice from a past year are consumed during shortages (8 householders, 30/05/2012-09/07/2012, 10/06/2013-04/07/2013). Corn usually comes from a householders own fields, while cassava might be grown or purchased. As Mrs. Sai discussed, she purchased cassava instead of rice because it was cheaper: 50 kilograms of rice costs 340,000VND ($17USD) versus 150,000VND ($7.50USD) for 50 kilograms of cassava (27/06/2012). In terms of excess rice from previous harvests, it is not as satisfying as newer rice, but as with eating corn cakes and corn meal, it is the last resort for some householders. As Mrs. Thi explained: "Old rice is not so good, but we don't have any more rice and we can't afford to buy more. So we eat old rice" (30/05/2012). Thus

householders eat substitute and supplementary foods because they must. Thus, needing to consume rice substitutes on a regular basis is a characteristic of households with low food security.

Householders develop and maintain a range of strategies for managing food shortages. Depending on the resources and assets at their disposal, householders blend approaches and take advantage of available opportunities. Their strategies for securing secondary sources of feed and food are highly contextual and generally robust. While many householders reported that they experienced some degree of food insufficiency, only one householder reported that her response strategies were inadequate and, at times, her family might face an absolute food shortage (Mrs. See, 03/06/2012). Thus, most of my Hmong and Yao informants are at least minimally food secure.

### 7.2.2 Securing Livestock Feed: Corn

Householders prefer to feed their livestock corn because the dense energy content makes the animals grow faster (2 interviewees, 08/06/2012). Thus, when the household corn supply is finished householders try to access more corn or they substitute it with other high energy feedstuffs, such as cassava or rice. Unlike rice, few householders borrow corn through their social network because most households experience corn shortages and therefore do not have any to lend (4 interviewees 07/06/2012-02/07/2012). As a result, householders need to combine the resources available to them to secure a feed supply.

Of the 25 householders that discussed feed shortages, sixteen stated that they would buy corn or cassava, the latter being a less costly alternative (17/05/2012-09/07/2012, 10/06/2013). The money for corn and cassava purchases comes from regular income activities, such as selling to tourists or cardamom cultivation. Mr Tien also stated that he can earn cassava in exchange for working a few days in another family's fields (14/06/2012).

If possible, these purchases are made at local markets, otherwise householders must make the trip down to the Lào Cai city area where the climate in conducive to two yearly crops (4 interviewees, 06/06/2012-26/06/2012). However, this distance is prohibitive and the latter option is only available to households with access to means of transportation. As Mrs. Lich from Giàng Tà Chải village explained: "I want to buy cassava in Lào Cai but without a motorbike I cannot make it" (18/06/2012). As a result, in the summer of 2012 she was feeding her chickens and pigs rice, but she also worried that her rice would run out before the new corn crop was ready. Alternatively, two householders indicated that they grow small amounts of cassava to mitigate corn shortages, however, they can only do so because they have access to suitable land at lower elevations (30/05/2012-03/06/2012).

For some householders using rice as animal feed, is a temporary measure before purchasing additional feed, but for others who cannot afford corn or cassava it is the main alternative (15 interviewees, 18/05/2012-09/07/2012, 08/06/2013-10/06/2013). As illustrated by Mrs. Lich above, this can create pressure on the household food supply. As a last resort, householders rely on feedstuffs they gather in the forest or around their communities. For example, Mr. Cai stated: "If we have money, we buy corn. If we don't have money then we use rice skins and vegetables" (26/06/2012). Rice skins, which grow between the husk and the grain, are usually discarded during the rice de-husking process and pile up as a de-husking machine, either mechanical or water-powered, is used. Individuals are free to gather them (Mrs. Lu, 01/07/2012). Vegetables for feed are usually a variety of green plants gathered in the forest or around householders' fields, such as sweet potato or banana leaves (5 interviewees, 14/06/2012-03/07/2012). During the winter, these plants are more difficult to find which means householders need to spend more time searching for them.

### 7.3 Case Studies: Classifying Household Food Security

In this final section, I examine three household case studies to better illustrate how food security is shaped by the availability of and access to livelihood capitals. I examine how these households utilize short-term and long-term strategies to cope with and adapt to internal and external stresses. Households are classified into three categories: Fragile Households experience chronic food insecurity and are unable to sustain their food supply; Resilient Households experience transitory food insecurity but are able to recover quickly from stressors; and, Enduring Households are food secure and do not experience any degree of food insecurity.

In order to define these classifications, I developed indicators. First, I examined the household's livelihood as a whole to determine its sustainability. As discussed in Section 2.2.2, sustainable livelihoods are essential for food security. I considered the four components of livelihood sustainability: resilience to external shocks, self-sufficiency, maintenance of long-term productivity and maintenance of other livelihood options (DfID 1999). Second, since being food secure requires access to culturally appropriate foods, I used the absence of rice, which is the preferred staple food for Hmong and Yao individuals in the Mường Hoa valley, to indicate a time of potential food insecurity. Third, as discussed in Section 2.1.2, access is not simply about access to food but also about one's ability to access the key inputs and resources needed to acquire food. Thus, I considered whether households have reliable access to food production inputs. Households that experience frequent to yearly rice production shortages, struggle to secure access to needed inputs and cannot ensure a continued rice supply with the assets and strategies available to them are classified as Fragile

Households. Households who experience occasional rice production shortages or occasionally struggle to secure access to needed inputs but are able to utilize their assets and response strategies to ensure a continued rice supply are labelled Resilient Households. Finally, households that have a constant rice supply and do not experience shortages are Enduring Households. I begin with this final category of households because they are the exception.

### 7.3.1 Enduring Households

Only three of my interviewees can be classified as Enduring Households. As with other householders, these individuals experience stresses, however these do not affect their short-term or long-term ability to produce enough food or access needed inputs. Their livelihood portfolios are abundant enough to weather external stresses and their food security is constant. Mrs. Paa is illustrative of this group.

*Household Overview: Mrs. Paa and Mrs. Sua, Sử Pán village*

Mrs. Paa, a young Hmong mother, aged 25, lives with her husband, children and parents-in-law in Sử Pán village. Mrs. Sua is her mother-in-law. The household has more than enough land to meet their production needs so they lend some of their paddies and fields to other Hmong family and friends in Sử Pán. Thus bonding capital, which links closed and tightly connected groups, facilitates this transaction. Mrs. Paa helps these families purchase seeds and fertilizer, then, at harvest time, they repay her with half of their harvest. In this way, Mrs. Paa is able to capitalize on the productive potential of her natural capital without the usual human capital inputs. This works well because Mrs. Paa is one of the founding members of a successful Hmong-run trekking business in Sa Pa, which keeps her very busy. A large portion of her household income comes from this activity and, as a result, her family has a very stable source of income for purchasing fertilizer and other inputs.

In terms of stresses, in 2011, her hybrid rice seeds failed to germinate into seedlings. However, she was able to purchase different seeds and, though her transplanting was slightly delayed, her harvest was not affected. Livestock disease and cold spells have also killed some of her livestock, including a water buffalo. In order to replace the buffalo labour, she purchased a mechanical plough and now shares it with two other families. Her household productive capacity has not been affected. Thus, due to abundant human, natural, and financial capital Mrs. Paa's household does not struggle to acquire agricultural inputs and the family has stable access to an adequate food supply.

### 7.3.2 Resilient Households

The majority of my interviewees, 26 out of 35, are Resilient Households. These households experience transitory food insecurity and occasionally struggle to access needed inputs for food production, namely fertilizer. However, their livelihood portfolios are sufficient to overcome these shortfalls, they are able to maintain self-sufficiency and they are able to recover without long-term impacts on their food security or livelihoods. Mrs. Lien is illustrative of this group.

*Household Overview: Mrs. Lien, Tả Phìn village*

Mrs. Lien, Yao, aged 37, lives with her husband and three children in Tả Phìn village. Her parents-in-law also reside with the family and bring the household to seven members. Currently, the household produces between 2500 and 2750 kilograms of rice per year, which is sufficient for their needs. In addition to growing corn, Mrs. Lien cultivates a variety of beans and squash for her household's consumption. She has two adult water buffalo and also raises chickens and pigs. Every year the family slaughters and smokes a pig for Hmong New Year. Mrs. Lien will also buy chicken or pork during the year. The family eats meat a couple times per week. For income, Mrs. Lien and her mother-in-law sell textiles and crafts to tourists. Mrs. Lien also grows orchids and her husband cultivates cardamom. Annually, they spend at least four million VND ($200USD) on fertilizer.

*Mrs. Lien's household Food Security and Livelihood Stresses*

Except for infrequent incidents, like the failure of her Chinese rice seeds in 2007, Mrs. Lien's household has a relatively stable rice supply. However, securing a stable livestock feed supply and needed agricultural inputs is a periodic struggle. Cold spells, drought, and extreme wind are the main extreme weather stressors. Other stresses include livestock disease and income variability.

In 2011, Mrs. Lien lost two buffalo during a winter cold spell. The family sheltered their animals in a buffalo hut and fed them during the cold period. While their two adult buffalo survived, two younger animals did not. In response, the family ate and smoked the meat, as well as sharing some with their kin and neighbours in the village. Cold weather in 2010 also reduced their cardamom harvest from an average annual yield of 100 kilograms when dried, to only 30 kilograms dried. The household experienced a similar shock in 2012 when the summer drought dried out the growing cardamom plants. After drying, their harvest was only 32 kilograms.

In addition to the loss of cardamom income, the household's ability to secure agricultural inputs, namely fertilizer, is further challenged by rising costs. For example, in 2013, the cost of fertilizer rose

by about 40,000VND ($2USD) per bag. This translates to an estimated increase of 640,000VND ($32USD) in fertilizer costs for the growing season.

In 2011, Mrs. Lien lost 15 pigs to disease. To minimize the household impact, she smoked the meat and added it to the household food supply. Frequent outbreaks of bird flu also decimate her chickens. She simply buries the remains. At times, the household also struggles to secure livestock feed. For example, in 2012, extreme wind felled half the stalks in her household's corn fields resulting in a feed shortage. Luckily, the family has several potential strategies for responding to these stresses.

*Mrs. Lien's Household Strategies for Securing Food and Agricultural Inputs*

In 2007, when her Chinese/hybrid rice only produced 500 kilograms of rice, Mrs. Lien had several options for dealing with the shortage. First, her family finished the last of the rice they had from the previous harvest. She also bought rice using income from selling to tourists, or borrowed rice from her parents (living in a different household and accessing different fields). In this way she used the financial capital and social capital, in this case bonding social capital, at her disposal to minimize the impact of the shortage.

In response to the loss of cardamom income for fertilizer purchases, Mrs. Lien and her mother-in-law spend more time selling to tourists. However, this income is not reliable. In 2013, Mrs. Lien reported that due to fewer tourists visiting Tả Phìn village that spring her income was less than expected. Fortunately, her mother-in-law regularly sells in Sa Pa town so the household has access to several locations. If necessary, they can also borrow fertilizer from a shop and repay the loan with interest at a later date.

In response to feed shortages, Mrs. Lien feeds her animals rice for a short period. She also buys corn using income gained from selling to tourists or from selling some of her small livestock. In response to livestock disease, she either buys new animals or gets some from kin or friends. In these ways Mrs. Lien's household is able to ensure long-term food security and livelihood stability.

### 7.3.3 Fragile Households

Six of my 35 interviewees were Fragile Households at the time of their interviews. These households were unable to produce a yearly rice supply sufficient for their family's needs and struggled to secure sufficient access through other means. Fundamentally, their livelihood portfolios were highly vulnerable and inadequate to sustain their households. Mrs. Na's case is illustrative of this group.

*Household Overview: Mrs. Na, Bản Hồ village*

Mrs. Na lives with her husband, her five children and an unmarried sister-in-law in Bản Hồ village, forming a household of eight individuals. Currently, they produce between 750 and 1000 kilograms of rice per year, which they can make last for about six months. They need about 3000 kilograms per year to meet their needs. Due to their limited land, they only grow a small amount of corn. Without land for a household garden, their vegetable consumption consists mostly of wild plants gathered in the forest as well as cassava leaves. Meat consumption is almost non-existent. As Mrs. Na stated: "Meat is like a dream; we only eat it maybe once every three months" (03/06/2012). They have three water buffalo, two pigs and no chickens. For income, Mrs. Na sells textiles to tourists and sells small livestock. The family does not have cardamom.

*Mrs. Na's Household Food Security and Livelihood Stresses*

Landslides, drought and cold spells are the main extreme weather stresses that affect Mrs. Na's household. The lack of income for agricultural inputs is another major stress that undermines her household's ability to produce a suitable food supply.

Mrs. Na's household experiences landslides on an intermittent basis. Around 2002, a rain-triggered landslide destabilized the family's home and caused them to move. The same thing happened a few years later. These events range from small slumps that might affect one or two rice paddies, to bigger slides. These land movements not only destroy rice paddies, they also affect the water supply to fields which further decreases the household's natural capital (productive land) and physical capital (productive rice paddies). Their landholding is also eroded by government development schemes, which appropriate land for road projects, and the encroachment of Tày householders. As Mrs. Na stated, "Tày families have been building a lot of houses and they just come in here and take our land. They say that our land belongs to them. We are only two Hmong families in this village and we are not strong enough to protect our land" (03/06/2012). Mrs. Na's statement points to her household's lack of bridging social capital with Tày community members. This lack of social capital also affects their livestock as Mrs. Na reported that her chickens are sometimes stolen. Since the only other Hmong householder in the village is her sister's family, she assumes the thieves are Tày. Though she should be able to report the thefts to commune officials, she feels powerless to do so. The household does not have effective means for mitigating these risks. As a result, these stresses are eroding their livelihood capitals and rendering their livelihood unsustainable.

Limited access to land also restricts household corn production. Without sufficient corn fields, the household experiences chronic feed shortages. In 2012, drought conditions also killed most of their corn. Luckily, though the dry conditions delayed rice transplanting, it did not affect their rice harvest. In 2011, a cold spell claimed one of their buffalo. The family attempted to keep the buffalo in a cage and fed it buffalo grass and warm water, but this was not entirely successful. While purchasing another buffalo is beyond their financial means, the household still has three buffalo so their rice production capabilities are not severely compromised.

In terms of accessing agricultural inputs, Mrs. Na relies on the income she earns from selling to tourists. However, Bản Hồ village is over 20 kilometers from the tourist hub in Sa Pa town. This distance reduces her access to tourists; as a result, this income is highly variable. Mrs. Na needs to save this money in order to buy fertilizer, otherwise she cannot afford it. The household does not have an alternative for accessing additional funds.

*Mrs. Na's Household Strategies for Securing Food and Agricultural Inputs*

In terms of securing agricultural inputs, Mrs. Na does not have a robust portfolio of strategies. If she is unable to save enough money from selling to tourists, she simply uses less fertilizer than she needs. As a result, the household reaps smaller rice harvests and cannot fully capitalize on their productive potential. In terms of land, householders use their human capital to build or rebuild rice paddies as a way to mitigate losses. They do this on a yearly basis due to persistent strains on their land.

In response, to chronic food and feed shortages, Mrs. Na cultivates some cassava for livestock as well as human consumption. Livestock feed is further supplemented with plants gathered in the forest and rice skin. The family mixes cassava with their rice in order to extend their rice supply. They also rely on fresh corn as an alternative food in the summer months. Mrs. Na cannot borrow rice from friends or neighbours because they are too poor to repay the loan. Furthermore, her parents live far away which makes borrowing from them too difficult. Once again, as with accessing tourism income, long distances impede her access to certain opportunities. As a result, when possible, Mrs. Na and other capable household members provide labour to richer Tày families in exchange for rice. As a last resort, they can borrow rice from her husband's family in Lao Chải. This does not need to be paid back.

In 2011, Mrs. Na's household received some government rice aid during the summer months, however this was non-existent in the subsequent year. Since the village receives rice aid every year,

Mrs. Na felt that her family was deliberately overlooked when it was dispensed in 2012. As she said, "Every year this village gets government support and the village leader is supposed to share with everyone. But he doesn't share with us. He give to his friends and other people, but we don't get any" (03/06/2012). In 2013, the family did receive 100 kilograms of rice from the local government. However, this was a one-time payment in compensation for rice paddy land that was recently appropriated for road construction.

Overall the impacts of extreme weather and other livelihood stresses, means that Mrs. Na does not have sufficient access to the livelihood capitals necessary to ensure food security for her household. Furthermore, her coping strategies are limited by the lack of bonding and bridging social capital in Bản Hồ village, being one of only two Hmong households living within a predominantly Tày community. The relatively isolated location of Bản Hồ, compared to the other villages in this research, also limits her access to livelihood opportunities and coping strategies.

### 7.4 Conclusion

In this chapter I examined the ways in which Hmong and Yao act to ensure the long-term stability of their food systems and livelihoods. Whether it is securing essential agricultural inputs or a household's food supply, access to livelihood capitals determines a household's coping capacity for dealing with internal and external stresses. Households with stable access to sufficient capitals maintain food security, while those without experience chronic or transitory food shortages. For many households, financial capital, which facilitates buying items, and bonding and bridging social capital, which facilitates borrowing, lending and giving, are key resources which increase coping capacity, as illustrated by my three case studies. In the next chapter, I discuss one last aspect of household vulnerability before doing a final examination of Hmong and Yao coping and adaptive capacities. I then conclude by reflecting on my overarching research aim and questions.

# CHAPTER 8 – DISCUSSION AND CONCLUSION

In this final chapter, I consider three elements at the scales of the individual, household or state that have emerged as critical points from an interpretation of my results. First, in Section 8.1, I examine a specific characteristic that affects livelihood vulnerability, namely the psychological aspects of food security and individuals' emotional responses to extreme weather and other stresses. This factor is seldom discussed in the literature, but I argue that it has important ramification for coping and adaptation strategies. Then, in Section 8.2, I highlight the core factors that came to light from my household level analysis of food security and livelihoods in Sa Pa district. From an in-depth analysis of my interviews, access and stability repeatedly emerged as key concerns. Nonetheless, it also became clear that these elements are closely interconnected with other livelihood factors in complex ways that I discuss here. In Section 8.3, I assess the extremely limited current role of government interventions in Hmong and Yao livelihoods, and suggest some ways that these could be made more effective in future. Finally, in Section 8.4, I conclude this thesis by once more reflecting on my research aim and questions.

## 8.1 Individual Level: Emotional Aspects of Food and Livelihood Security

One element that is not discussed in detail in the conceptual literature on livelihoods or food security is the psychological aspect of dealing with uncertain income and food access each year. In an effort to address this lack, Weaver and Hadley (2009; 269) carried out a systematic review of studies linking food insecurity and mental health outcomes; they found that food insecurity is characterized "as a physically and emotionally distressing experience that compromises mental health and long-term quality of life in developing-country settings." My research further supports this characterization. By increasing household rice production, it could be argued that the introduction of hybrid rice has improved Hmong and Yao food security in the Mường Hoa valley. Yet, 10 interviewees indicated that they experienced emotional and psychological distress related to food production and/or the impacts of extreme weather events (17/05/2012-27/06/2012, 10/06/2013). For householders with a high degree of vulnerability, they experienced persistent distress about their productivity and their ability to secure food. This state is best exemplified by Mrs. Na, who, due to the frequency of landslides on her land, worried "all the time" about her fields and crops (03/06/2012; also see Section 7.3.3). However, this anxiety is not limited to Fragile Households; five Resilient Householders indicated that they also worry about securing inputs for their food production (30/05/2012-22/06/2012, 10/06/2013). For some householders this was a worry every growing season. These concerns centered on their ability to

secure fertilizer, which was, ultimately a worry about their food supply. As Mrs. Lien stated: "Without fertilizer we cannot grow anything" (22/06/2012). While these householders have the livelihood capitals and skills to maintain a reasonably stable level of food security, there are uncertain variables which they cannot control that cause distress. The tourist economy is one such variable. As many households in the valley rely on tourism-related income, seasonal and annual changes in the number of tourists that visit Sa Pa town and the surrounding villages greatly affect the potential income householders can earn. This is evidenced by the effects of the tourist lull in the spring/summer of 2013 (5 interviewees, 08/06/2012-04/07/2013; see Section 7.1.2).

The weather is another uncertain variable. As Mrs. Mo highlighted when she compared the weather to a game: every year there is an element of chance and uncertainty about how weather conditions will affect crop production (17/05/2012). This is particularly heightened with the incidence of extreme weather events. For example, the drought at the beginning of summer 2012 caused a great deal of anxiety for householders (5 interviewees, 17/05/2012-30/05/2012). Mrs. Thi summed up this key concern when she stated: "If the rains are too late, we will not grow enough rice for next year" (31/05/2012). Even households with the means to buy rice are still reliant on their household harvest for the majority of their rice supply. Since households can only grow one annual crop, any threat to this output has important ramifications for short-term food security. Additionally, since borrowing/social networks are an integral part of response strategies to food shortages, the possibility of everyone's crops failing raises the concern that individual coping strategies will be compromised (Mrs. Man, 17/05/2012).

The main concern with extreme weather is that householders feel powerless to respond to these conditions. As Mr. Kao stated while discussing the 2012 drought: "I don't know what to do because it is the weather. I just hope it will rain" (18/05/2012). For most householders, waiting and hoping is their only recourse (10 interviewees, 04/05/2012-06/06/2012). This is one of the problems with extreme weather: householders do not have the tools to successfully mitigate their risks. For instance, as several householders noted, drought and chronic water shortages are not simply a result of variable precipitation patterns, they are linked to larger environmental issues like deforestation and population growth (5 interviewees, 17/05/2012 – 22/06/2012). Even when householders do have strategies for protecting their assets, these are not always effective. The impact of cold spells is a good example. Householders shelter and feed their buffalo in an effort to protect them, but some buffalo still die. When their strategies fail, the loss is even more pronounced because householders tried as hard as they could to save their animals. As Mrs. Lich explained: "I worked very hard to take care of my two

baby buffalo but after Hmong New Year, they died. I just cried and cried" (18/05/2012). Even though she still had other buffalo, the death of these two calves represented a loss of financial capital and physical capital potential. Mrs. Lich was not the only householder who reported the emotional toll of a cold spell-related loss of buffalo. Three additional householders described their emotional reactions, with one reporting that she experienced a loss of appetite and became despondent for two months afterwards (31/05/2012-07/06/2012).

In sum, this highlights that it is not only the physical impact of stresses, but also the awareness and perception of these that affect well-being and security. This reinforces the stance that one's perceptions are important in assessing food security. Additionally, none of these householders reported strategies for coping with these emotional impacts. These experiences highlight that there is a need to further examine emotional and psychological aspects to better understand the immaterial effects of food security and livelihood stressors in these communities. Given the importance of human capital for Hmong and Yao livelihoods, the potentially debilitating impact of these stressors, hinted at here, could have lasting effects on coping capacity for dealing with future events. Thus, approaches for assessing food security and livelihood vulnerability must be comprehensive and include not only tangible household production indicators but also intangible psychological markers.

### 8.2 Household Livelihoods and Food Security: access and stability

With the introduction of higher-yielding hybrid agricultural technologies and the expansion of items available in upland markets, food availability is not the problem it was for Hmong and Yao householders before the 2000s. Now, however, issues of access and stability are the main concern for many households. As discussed in Section 7.2.2, food quality issues are also an emerging concern for some householders. During my follow-ups interviews a year after my main fieldwork period, interviewees identified two main reasons why some households experience food insecurity. These factors were first, having too many children and too little land, and second, not having enough money for inputs such as fertilizer (7 interviewees, 08/06/2013 – 10/06/2013). These reasons highlight the central roles of natural and financial capital in modern-day Hmong and Yao food systems. However, I find that for food secure households these two capitals are indelibly linked to the rest of the capital-pentagon.

In order to grow food, Hmong and Yao farmers need natural capital in the form of productive land with fertile soils and a reliable water supply. As discussed in Section 6.1, limited productive land is the leading cause of chronic rice production shortages. Land availability is constricted by population

pressure, government policies, and environmental change. The increasing impact of extreme weather events, such as landslides and drought, is also eroding natural capital. These issues are causing some concern about how future generations will produce enough food, which raises questions about the long-term sustainability of these food systems. This also underscores the importance of nesting analyses of food security within broader assessments of livelihood vulnerability as a whole. However, at present the majority of households have access to enough land to meet their basic food needs.

While it is true that limited land decreases household productivity, rice production shortfalls are not necessarily an indicator of food insecurity as this only considers one element of the food production equation. Householders now have alternate means for obtaining rice, which means that if they do not grow enough food, they can buy it. The "land equals food security" equation is further complicated by the need for modern agricultural technologies, or physical capital. While land, water supply, and favourable climatic conditions provide the basic building blocks for crop production, many householders attribute their current state of heightened food security to the introduction of hybrid seeds and chemical fertilizers. When optimized, these physical capitals provide greater crop output versus traditional seed varieties and farming techniques. However, this has also resulted in a new reliance on financial capital for accessing these technologies.

Like never before, Hmong and Yao householders need constant revenue streams to support their semi-subsistence livelihoods. In order to do this, householders rely on human capital to undertake income-generating activities. On an annual basis householders must earn several million VND to purchase seeds and, especially, fertilizer. However, typical income streams are highly variable and vulnerable to a variety of stresses: tourism income is highly variable, extreme weather can destroy cardamom or orchids, and disease can decimate livestock. It is households that have multiple income streams that are the most resilient. For example, Mr. Di, a Resilient Householder, engages in metal work and tends his cardamom, while two of his daughters are tour guides and his wife sells to tourists (21/06/2012). This diversity allows the household to maintain a relatively stable income. On the other hand, Mrs. Cua, a Fragile Householder, relies solely on the money she earns selling handicrafts to tourists (17/05/2013). Furthermore, having more household members at working/earning age compared to dependants also creates more robust livelihoods. For example, Mr. Thao's household consists of eight people but only his son and daughter-in-law are able to work to support the family. Mr. Thao and his wife are too old, while the couple's four children are too young.

Being able to diversify and capitalize on new opportunities is another marker of resilience. This is best exemplified by the three Tå Phìn villagers who started renting out their unproductive land (07/06/2012-22/06/2012). This example also highlights the paradox that while population pressure creates strains on natural capital, it also presents opportunities. In this instance, the influx of Vietnamese entrepreneurs has allowed householders to transform unproductive assets into financial capital. With this increased buying power, these households have become more food secure. However, whether these short-term opportunities will provide long-term security remains to be seen.

In terms of social capital, Resilient Households have strong lending and borrowing networks, which are the mark of robust coping mechanisms. The most secure householders have reputations for being hardworking and reliable; this allows them to borrow rice, money and other goods. As a result they are better able to weather stresses. On the other hand, being lazy was cited as one reason why some households are poor and food insecure (3 interviewees, 17/05/2012 – 01/07/2012).

Overall, Resilient Households are those with the livelihood capitals to produce a robust portfolio of short-term and long-term strategies that can be tailored to the needs of a situation. In terms of being able to respond to and recover from internal and external stresses, financial capital and social capital are the most important. While householders prefer to maintain their self-sufficiency and use their own resources, social capital provides an important social safety net of last resort for many householders.

In sum, it becomes clear that the asset pentagons of these households are complex combinations of factors that are intertwined in a number of very specific ways. Only through in-depth, qualitative research are we able to unravel these combinations and connections, and begin to gain a more nuanced grasp on coping strategies and longer term adaptations. It is important that we recognise this complexity and the specific types of elements that can be involved in spatially and culturally-rooted ways, for future food security and livelihood analyses.

### 8.3 Government responses to food security concerns in the uplands

While this thesis focused on household-level impacts and householder responses, I want to briefly turn to external, government-level responses. I have reserved this examination of state interventions for my discussion section for a telling reason: namely, that this support plays a *small role* in Hmong and Yao food systems and livelihoods. However, I perceive there are numerous *opportunities* for cooperation and coordination between government offices and these communities. For instance, not one of my interviewees reported that they had access to information about proper application of pesticides, optimal chemical fertilizer usage, or other agricultural assistance. Therefore, here is an opportunity to

support Hmong and Yao livelihoods with knowledge-sharing through government agricultural extension programs and services that reduce waste and optimize productivity. However, these programs need to be offered in an appropriate manner. Many Hmong and Yao householders are illiterate and are not fully fluent in Vietnamese. Thus, information needs to be disseminated orally and ideally through an interpreter.

In terms of direct food aid, the government gives rice to a few households in the valley. One householder from Giàng Tà Chải village reported that she receives 10 kilograms of rice per person in January for Hmong New Year/Tet (Mrs. Cua, 17/05/2012). This amount lasts between 15 to 20 days. Mr. Kao, also from Giàng Tà Chải, stated that some years he receives 20 to 30 kilograms of rice which needs to be requested from the local government (18/05/2012). Unfortunately, this assistance only provides short-term relief. While householders felt that they should receive aid, seven interviewees reported that received none even if they experienced shortages (29/05/2012-26/06/2012). Four interviewees reasoned that this was because they were not considered poor or needy enough by their local government (29/05/2012 – 01/07/2012). This indicates a division between Hmong and Yao householders' needs and the institutional definition of "need" employed by government institutions. Some householders suspected that corruption was to blame as well (3 interviewees, 03/06/2012 – 26/06/2012). As Mr. Di stated:

> The government gives aid to the village but sometimes corruption in the [local] government means we don't get much help. […] When officials come to ask if we need help, I say 'Of course we need help,' but when the government sends money for the house or sends food or rice we don't get it (21/06/2012).

Not only does this reveal that government mechanisms for distributing aid are ineffective, it also reveals a degree of distrust among Hmong and Yao for government institutions.

The perceptions of aid ineffectiveness are not limited to rice support. In response to the 2008 cold spells, government officials advised householders to dig a hole in the ground as a shelter from the cold for their buffalo Even after doing so, buffalo died anyway (2 interviewees, 31/05/2012). For some, livestock vaccination programs are similarly ineffective. Follow-up interviews in 2013 revealed that local officials in Tả Phìn village started community-wide vaccinations for pigs at the beginning of 2013 (5 interviewees, 08/06/2013 – 10/06/2013). Householders were charged between 5,000 and 15,000 VND ($0.25 - $0.75 USD) per injection. Nevertheless, three of these five interviewees had

several of their vaccinated pigs die in the spring. For Mrs. Thi, she never received the injections; officials told her they would come, but never arrived on the appointed day (08/06/2013).

While this specific program was hit-and-miss in terms of protecting livestock, it is significant for another reason. Namely, Mrs. Xuan reasoned that the vaccination program was a government response to persistent community complaints about livestock deaths voiced to local officials (08/06/2013). If this is the case, then it illustrates that Hmong and Yao householders may be able to demand better services through increased and coordinated communication with government officials. This strategy could be very useful for getting support to respond to extreme weather events. As Adger and colleagues (2004) state, adaptive capacity at the individual level is determined by access to the resources needed to adapt, but at the community level it depends on the capacity for collective action. Unfortunately, while environmental conditions are changing in the Mường Hoa valley, at the individual level the majority of householders are not adapting to these changes, rather they are simply coping with them. For instance, cold spells have been killing buffalo nearly every year since 2008, yet householders still rely on buffalo shelters, which are not entirely effective. I would argue that the only householders that are truly adapting and making long-term changes are those who are renting out their dry land and those who have replaced their buffalo with mechanical ploughs (see Nelson, Adger and Brown 2007). However, it is important to note that mechanical ploughs do not embody the same cultural value as water buffalo, which means that as an adaptation strategy this is option only addresses the loss of buffalo labour not the concomitant symbolic and spiritual loss.

However, there are many ways that collective action could foster effective adaptation in Hmong and Yao communities in Sa Pa. Currently, there is research being done in other parts of the northern uplands on similar issues as those facing communities in Sa Pa (also see Section 3.5). For instance, Ngoc Son Ho completed his doctoral research on climate adaptation among Hmong, Yao and Tày communities experiencing flooding, drought and cold spells in Bắc Kạn province (25/06/2012). As with communities in Sa Pa he found that livelihood diversification and social networks were important coping mechanisms, but he also found that the use of local crop and animal breeds, as well as proper forest management could mitigate the impact of these stresses. Information like this could prove useful to the Hmong and Yao communities that participated in my research. In terms of potential challenges to collective action, Hmong and Yao suspicions of government institutions, as well as the state's enduring perceptions of ethnic populations as inferior and in need of development, could hinder collaboration.

### 8.4 Thesis Conclusion

The aim of this research was to assess food security and livelihood vulnerability, stresses and coping strategies among ethnic minority Hmong and Yao in the northern uplands of Vietnam. To meet this aim I designed a conceptual framework based on the literature around food security, sustainable livelihoods, and vulnerability. I put this research framework to work in a case study located in the Mường Hoa valley, Sa Pa District. To examine my research aim, I employed a mixed-methods approach which included participant observation, conversational and informal semi-structured interviews, and Photovoice. Specifically, I examined this aim through three research questions. In Chapter 5, I answered my first research question, to what degree are Hmong and Yao households maintaining food security through their livelihoods? I identified the range of livelihood capitals needed to produce staple rice and corn crops, as well as to produce supplemental foods such as meat and vegetables. I also analysed and highlighted the dietary, cultural and economic importance of different food system components. My main findings were that natural capital, such as arable land and reliable water supply, and financial capital are fundamental inputs in crop, vegetable and livestock production. Financial capital, namely cash for purchasing agricultural inputs, is particularly important now due to the need for hybrid seeds and chemical fertilizers for rice production. The types of income-generating activities that householders engage in depend to varying degrees on access to markets as well as the opportunities available with their livelihood capitals portfolio. As such, social, physical and human capitals are also important for securing natural and financial capitals and for supporting and optimizing household productivity.

In Chapter 6, I answered my second research question, how are climate variability/extreme weather events and other stresses affecting Hmong and Yao food security and livelihoods? I analysed the exposure and sensitivity of food system components to internal household-level stresses as well as external and climatic stresses. Land availability, the cost and non-reliability of rice production inputs, and cash income fluctuations were the main internal stresses, while livestock disease was a significant external stress which affected a household's financial capital stores as well as meat supply. In terms of extreme weather, cold spells, drought, intense rainfall and landslides, and wind gusts, were the most significant stresses. I also examined the short-term response strategies that householders employ to reduce their exposure, minimize losses and manage impacts. My main findings were that together these stresses affect the entire food system continuum from inputs to outputs. In terms of extreme weather, Hmong and Yao are also highly sensitive to these stresses because they rely on household production for the majority of their food supply. Extreme weather stresses impact food systems in two

ways: first, by hindering plant growth and reducing household food production, and second, by diminishing the availability of other capitals needed to acquire inputs or purchase alternative food stocks. Furthermore, social dynamics, such as conflict between clans or different ethnic groups, and institutional factors, such as government policies and regulations, all affect household vulnerability to varying degrees by facilitating as well as restricting response strategies and coping mechanisms.

In Chapter 7, I answered my third research question through an analysis of how my research participants recover from stress-related losses and attempt to secure their food systems and livelihoods over the long-term. My main finding was that social and financial capital for borrowing and buying needed items are central to response strategies, whether it is for replacing buffalo labour or accessing rice during a food shortage. Social capital relies on one's reputation and reciprocal giving, whereas financial capital is most commonly gained through intensifying income-generating activities but may also be borrowed with the use of social capital. Bonding and bridging social capital are the most important for household coping strategies, while access to linking social capital is limited. A second key finding was that despite of the range of food security and livelihood stresses, many Hmong and Yao livelihoods are resilient; while they experience transitory food insecurity they are able to recover quickly from stressors. It is access to livelihood capitals which determines a household's coping capacity for dealing with internal and external stresses. Households with stable access to sufficient capitals maintain food security, while those without experience chronic or transitory food shortages.

However, while many households have resilient food systems, several issues stand out from this research as requiring additional consideration. First is the degree of emotional distress that a number of my research participants experienced as a result of food insecurity or livelihood vulnerability. These psychological aspects of stress impacts need to be more fully incorporated into analyses of extreme weather impacts and vulnerability. Second, this research clearly outlines the extent to which livelihood capitals are intertwined and thus illustrates that coping strategies are seldom straight-forward. Householder responses are highly contextual and depend on a range of tangible and intangible assets and factors. This point leads directly into the third issue, which is the lack of government support in Hmong and Yao communities. While there has been little government aid so far, I argue that there are opportunities for better collaboration between communities and officials, however these will only be truly beneficial if outside actors recognize the complexity of Hmong and Yao food systems and livelihoods and seek to move forward in a culturally-appropriate and respectful manner.

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